SYBASE®

Reference Manual

Sybase® IQ

12.6

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Contents

About This Book

Sybase® IQ is a high-performance decision support server designed specifically for data warehouses and data marts. This book, *Sybase IQ Reference Manual*, provides reference material for many aspects of Sybase IQ, including SQL statements, language elements, data types, functions, system procedures, and system tables. Other manuals provide more context on how to carry out particular tasks. This reference manual is the place to look for information such as available SQL syntax, parameters, and options. (For command-line utility startup parameters, see *Sybase IQ Utility Guide*.)

Audience

This manual is a reference for all users of Sybase IQ.

How to use this book

This book provides comprehensive descriptions of the IQ features. However, it does not describe why you may want to use each feature. This manual is designed to be used as a reference together with the other books in the Sybase IQ documentation set.

Note The Windows information in this book applies to all supported Windows platforms, unless noted otherwise. For supported Windows platforms, see the *Release Bulletin* Sybase IQ *for Windows*.

Related documents

Documentation for Sybase IQ:

- *Introduction to Sybase IQ*

  Read and try the hands-on exercises if you are unfamiliar with Sybase IQ, with the Sybase Central™ database management tool.

- *New Features in Sybase IQ 12.6*

  Read just before or after purchasing Sybase IQ for a list of new features.

- *Sybase IQ Performance and Tuning Guide*

  Read to understand query optimization, design, and tuning issues for very large databases.

- *Sybase IQ System Administration Guide*

Read to manage the IQ Store.

- *Sybase IQ Troubleshooting and Error Messages Guide*

  Read to solve problems, perform system recovery and database repair, and understand both IQ error messages which are referenced by SQLCode, SQLState and message text, and SQL preprocessor errors and warnings.

- *Sybase IQ Utility Guide*

  Read for Sybase IQ utility program reference material, such as available syntax, parameters, and options.

- *Large Objects Management in Sybase IQ*

  Read to understand storage and retrieval of Binary Large Objects (BLOBs) and Character Large Objects (CLOBs) within the Sybase IQ data repository. You need a separate license to install this product option.

- *Sybase IQ Installation and Configuration Guide*

  Read the edition for your platform before and while installing Sybase IQ, when migrating to a new version of Sybase IQ, or when configuring Sybase IQ for a particular platform.

- *Sybase IQ Release Bulletin*

  Read just before or after purchasing Sybase IQ for last minute changes to the product and documentation. Read for help if you encounter a problem.

Note Because Sybase IQ is an extension of Adaptive Server® Anywhere, a component of SQL Anywhere® Studio, IQ supports many of the same features as Adaptive Server Anywhere. The IQ documentation set refers you to SQL Anywhere Studio documentation where appropriate.

Documentation for Adaptive Server Anywhere:

- *Adaptive Server Anywhere Programming Guide*

  Intended for application developers writing programs that directly access the ODBC, Embedded SQL™, or Open Client™ interfaces, this book describes how to develop applications for Adaptive Server Anywhere.

- *Adaptive Server Anywhere Database Administration Guide*

  Intended for all users, this book covers material related to running, managing, and configuring databases and database servers.

- *Adaptive Server Anywhere Error Messages*

This book lists all Adaptive Server Anywhere error messages with diagnostic information.

- *Adaptive Server Anywhere SQL Reference Manual*

  Intended for all users, this book provides a complete reference for the SQL language used by Adaptive Server Anywhere. It also describes the Adaptive Server Anywhere system tables and procedures.

You can also refer to the Adaptive Server Anywhere documentation in the SQL Anywhere Studio 9.0.1 collection on the Sybase Product Manuals Web site. To access this site, go to Product Manuals at http://www.sybase.com/support/manuals/.

Other sources of information

Use the Sybase Getting Started CD, the SyBooks CD, and the Sybase Product Manuals Web site to learn more about your product:

- The Getting Started CD contains release bulletins and installation guides in PDF format, and may also contain other documents or updated information not included on the SyBooks CD. It is included with your software. To read or print documents on the Getting Started CD, you need Adobe Acrobat Reader, which you can download at no charge from the Adobe Web site using a link provided on the CD.
- The SyBooks CD contains product manuals and is included with your software. The Eclipse-based SyBooks browser allows you to access the manuals in an easy-to-use, HTML-based format.

  Some documentation may be provided in PDF format, which you can access through the PDF directory on the SyBooks CD. To read or print the PDF files, you need Adobe Acrobat Reader.

  Refer to the *SyBooks Installation Guide* on the Getting Started CD, or the *README.txt* file on the SyBooks CD for instructions on installing and starting SyBooks.
- The Sybase Product Manuals Web site is an online version of the SyBooks CD that you can access using a standard Web browser. In addition to product manuals, you will find links to EBFs/Maintenance, Technical Documents, Case Management, Solved Cases, newsgroups, and the Sybase Developer Network.

  To access the Sybase Product Manuals Web site, go to Product Manuals at http://www.sybase.com/support/manuals/.

Sybase certifications on the Web

Technical documentation at the Sybase Web site is updated frequently.

❖ **Finding the latest information on product certifications**

1. Point your Web browser to Technical Documents at http://www.sybase.com/support/techdocs/.
2. Select Products from the navigation bar on the left.
3. Select a product name from the product list and click Go.
4. Select the Certification Report filter, specify a time frame, and click Go.
5. Click a Certification Report title to display the report.

❖ **Creating a personalized view of the Sybase Web site (including support pages)**

Set up a MySybase profile. MySybase is a free service that allows you to create a personalized view of Sybase Web pages.

1. Point your Web browser to Technical Documents at http://www.sybase.com/support/techdocs/.
2. Click MySybase and create a MySybase profile.

Sybase EBFs and software maintenance

❖ **Finding the latest information on EBFs and software maintenance**

1. Point your Web browser to the Sybase Support Page at http://www.sybase.com/support.
2. Select EBFs/Maintenance. If prompted, enter your MySybase user name and password.
3. Select a product.
4. Specify a time frame and click Go. A list of EBF/Maintenance releases is displayed.

   Padlock icons indicate that you do not have download authorization for certain EBF/Maintenance releases because you are not registered as a Technical Support Contact. If you have not registered, but have valid information provided by your Sybase representative or through your support contract, click Edit Roles to add the "Technical Support Contact" role to your MySybase profile.
5. Click the Info icon to display the EBF/Maintenance report, or click the product description to download the software.

Syntax conventions

This documentation uses the following syntax conventions in syntax descriptions:

- **Keywords** SQL keywords are shown in UPPER CASE. However, SQL keywords are case insensitive, so you can enter keywords in any case you wish; SELECT is the same as Select which is the same as select.
- **Placeholders** Items that must be replaced with appropriate identifiers or expressions are shown in *italics*.
- **Continuation** Lines beginning with ... are a continuation of the statements from the previous line.
- **Repeating items** Lists of repeating items are shown with an element of the list followed by an ellipsis (three dots). One or more list elements are allowed. If more than one is specified, they must be separated by commas.
- **Optional portions** Optional portions of a statement are enclosed by square brackets. For example:

  ```
  RELEASE SAVEPOINT [ savepoint-name ]
  ```

  It indicates that the *savepoint-name* is optional. The square brackets should not be typed.
- **Options** When none or only one of a list of items must be chosen, the items are separated by vertical bars and the list enclosed in square brackets. For example:

  ```
  [ ASC | DESC ]
  ```

  It indicates that you can choose one of ASC, DESC, or neither. The square brackets should not be typed.
- **Alternatives** When precisely one of the options must be chosen, the alternatives are enclosed in curly braces. For example:

  ```
  QUOTES { ON | OFF }
  ```

  It indicates that exactly one of ON or OFF must be provided. The braces should not be typed.

Typographic conventions

Table 1 lists the typographic conventions used in this documentation.

Table 1: Typographic conventions

Item	Description
`Code`	SQL and program code is displayed in a mono-spaced (fixed-width) font.
`User entry`	Text entered by the user is shown in bold serif type.
emphasis	Emphasized words are shown in italic.
file names	File names are shown in italic.
database objects	Names of database objects, such as tables and procedures, are shown in bold, san-serif type in print, and in italic online.

The sample database

Sybase IQ includes a sample database, which many of the examples in the IQ documentation use.

The sample database represents a small company. It contains internal information about the company (employees, departments, and financial data), as well as product information (products), sales information (sales orders, customers, and contacts), and financial information (fin_code, fin_data).

The sample database is held in a file named *asiqdemo.db*, located in the directory *$ASDIR/demo* on UNIX systems and *%ASDIR%\demo* on Windows systems.

Accessibility features

This document is available in an HTML version that is specialized for accessibility. You can navigate the HTML with an adaptive technology such as a screen reader, or view it with a screen enlarger.

Sybase IQ 12.6 and the HTML documentation have been tested for compliance with U.S. government Section 508 Accessibility requirements. Documents that comply with Section 508 generally also meet non-U.S. accessibility guidelines, such as the World Wide Web Consortium (W3C) guidelines for Web sites.

For information about accessibility support in the Sybase IQ plug-in for Sybase Central, see “Using accessibility features” in *Introduction to Sybase IQ*. The online help for this product, which you can navigate using a screen reader, also describes accessibility features, including Sybase Central keyboard shortcuts.

Note You might need to configure your accessibility tool for optimal use. Some screen readers pronounce text based on its case; for example, they pronounce ALL UPPERCASE TEXT as initials, and MixedCase Text as words. You might find it helpful to configure your tool to announce syntax conventions. Consult the documentation for your tool and see “Using screen readers” in *Introduction to Sybase IQ*.

For information about how Sybase supports accessibility, see Sybase Accessibility at http://www.sybase.com/accessibility. The Sybase Accessibility site includes links to information on Section 508 and W3C standards.

For a Section 508 compliance statement for Sybase IQ, go to Sybase Accessibility at http://www.sybase.com/products/accessibility.

If you need help

Each Sybase installation that has purchased a support contract has one or more designated people who are authorized to contact Sybase Technical Support. If you cannot resolve a problem using the manuals or online help, please have the designated person contact Sybase Technical Support or the Sybase subsidiary in your area.

CHAPTER 1

File Locations and Installation Settings

About this chapter

This chapter describes the installation and operating system settings used by Sybase IQ. Depending on the operating system, these settings may be stored as environment variables, initialization file entries, or registry entries.

Installation directory structure

When you install Sybase IQ, several directories may be created. The directories created depend on which options are chosen during installation and which directories already exist in your Sybase directory (the directory defined by *$SYBASE* on UNIX or *%SYBASE%* on Windows). This section describes the directory structure.

By default, Sybase IQ software is installed in a unique subdirectory under the Sybase directory. This subdirectory is call the **installation directory**. Other tools provided with Sybase IQ have unique sub-directories under the Sybase directory. This section describes only the subdirectory structure for Sybase IQ.

The Sybase IQ directory

By default, the Sybase IQ directory is *ASIQ-12_6*. The location of *ASIQ-12_6* varies, depending on where you install IQ. The *ASIQ-12_6* directory is also referred to by the environment variable *$ASDIR* on UNIX or *%ASDIR%* on Windows.

The Sybase IQ directory holds a number of directories and files:

- *Demo directory* (*ASIQ-12_6/demo*)

  This directory holds the sample database used in documentation examples. The database is held in the files *asiqdemo.db*, *asiqdemo.iq*, *asiqdemo.iqmsg* and *asiqdemo.iqtmp*. When you start the database, an *asiqdemo.log* file is also created. This directory is not essential, but Sybase recommends that you keep it.

The subdirectory */demo/demodata* holds the data to create the demo database, *asiqdemo*. You can use the file *demo/mkasiqdemo.sql* to recreate the demo database. The sample database can be used to demonstrate problems to Technical Support.

- *Scripts directory* (*ASIQ-12_6/scripts*)

  This directory holds some scripts used in examples and when creating catalog objects like stored procedures. *You should not edit these scripts*. If you edit, delete, or move these scripts, the server will not operate properly.

- *Samples directories* (*/asa/c* and */asa/javaSQL*)

  The */c* directory holds C++ examples that illustrate using ESQL and C with Adaptive Server Anywhere. Because Adaptive Server Anywhere and Sybase IQ share common code, you can modify these examples for use with Sybase IQ. The */javaSQL* directory holds Java examples.

- *Executable directories* (On UNIX, these include ASIQ-12_6 subdirectories */bin*, */lib*, */logfiles*, */res*, */tix*, and */usrlib*. On Windows, these include ASIQ-12_6 subdirectories *\h*, *\install*, *\java*, and *\win32*.)

  These directories hold executables, libraries, help files, etc.

- *Readme file* (*ASIQ-12_6/readme.txt* on UNIX or *ASIQ-12_6\readme.txt* on Windows)

  There is a *readme.txt* file containing the latest information about installing and running Sybase IQ. Sybase strongly suggests that you print this file and read it.

How Sybase IQ locates files

When starting and running, Sybase IQ needs to find and access several types of files. Understanding how Sybase IQ finds these files is important, to ensure that the correct files are used. Several directories or files with identical names may reside on a system. Sybase IQ uses both Adaptive Server Enterprise and Adaptive Server Anywhere libraries. (If either of these products have already been installed on your system, you should know the directory where they are installed, to avoid confusion.)

The types of files include but are not limited to:

- *Libraries*, which may include product libraries, system libraries, or Adaptive Server Enterprise libraries. Filename extensions include *.so.nnn* or *.so* on UNIX (*.sl.nnn* or *.sl* on HP), or *.dll* or *.lib* on Windows. These files are required to run Sybase IQ. If an incorrect DLL is located, for example, there is the possibility of version mismatch errors. For example, library files may be found in *$ASDIR/lib* or *$SYBASE/$SYBASE_OCS/lib* on UNIX, or *%ASDIR%\win32* or *%SYBASE\%SYBASE_OCS\dll* on Windows. An empty directory, *$ASDIR/usrlib*, allows you to supersede default libraries with custom libraries and patches, because start_asiq includes *usrlib* before regular library directories.
- *Interface files* are required to run Sybase IQ. For example, *.odbc.ini* and *utility_db.ini* on UNIX, and *util_db.ini* on Windows. For more information about these files, see Chapter 3, "Configuring Sybase IQ," in the *Sybase IQ Installation and Configuration Guide*.
- *Configuration files* are used to specify connection parameters. Examples include *default.cfg* on Windows or *asiqdemo.cfg*.
- *Database files* store the data and metadata. For example: *asiqdemo.db, asiqdemo.iq, asiqdemo.iqmsg, asiqdemo.iqtmp.*
- *Log files* store information about the current session on the server and connected database. For example, a server log might be named *ASIQ-12_6/logfiles/janed_asiqdemo.006.srvlog*. The database log (for example, *ASIQ-12_6/demo/asiqdemo.log*) is created when you connect to the database and stored in the directory where the server is started. For more information about these files, see the *Sybase IQ Installation and Configuration Guide*
- *Product scripts* are sample files that show how to create, populate, and upgrade databases.
- *User files* include flat files used with the LOAD command and SQL scripts used with tools such as Interactive SQL.
- *Temporary files* are created by Sybase IQ to store temporary information for operations like performing sorts for queries.

Some file names are specified in SQL statements and need to be located at run time. Examples of SQL statements that use file names include the following:

- **INSTALL statement** The name of the file that holds Java classes
- **LOAD TABLE statement** The name of the file from which data should be loaded.

- **CREATE DATABASE statement** A file name is needed for this statement and similar statements that can create files.

In some cases, Sybase IQ uses a simple algorithm to locate files. In other cases, a more extensive search is carried out.

Simple file searching

In many SQL statements such as LOAD TABLE or CREATE DATABASE, the file name is interpreted as relative to the current working directory of the database server (i.e., where the server was started).

Also, when a database server is started and a database file name (DBF parameter) is supplied, the path is interpreted as relative to the directory in which the server was started.

Extensive file searching

Sybase IQ programs, including the database server and administration utilities, carry out a more extensive search for required files, such as DLLs or shared libraries. In these cases, Sybase IQ programs look for files in the following order:

1. **The executable directory** The directory in which the program executable is held. Also, directories with the following paths relative to the program executable directory:
   - Parent of the executable directory.
   - A child of the parent directory named *scripts*. The UNIX server does not search in this location.
2. **Current working directory** When a program is started, it has a current working directory (the directory from which it is started). This directory is searched for required files.
3. **Location registry entry** On a Windows installation, Sybase IQ adds a LOCATION registry entry. The indicated directory is searched, followed by the following:
   - A child named *scripts*
   - A child with the operating system name (*win32*, *win*, and so on).
4. **System specific directories** This includes directories where common operating system files are held, such as the *Windows* directory and the *Windows\system* directory on Windows.
5. **CLASSPATH directories** For Java files, directories listed in the CLASSPATH environment variable are searched to locate files.
6. **PATH directories** Directories in the system path and the user's path are searched to locate files.

7 **LIBRARY PATH directories** Directories listed in the LD_LIBRARY_PATH_64, LIBPATH, or SHLIB_PATH (depending on platform) environment variable are searched for shared libraries.

Environment variables

Sybase IQ uses a set of environment variables to store various types of information. Not all variables need to be set in all circumstances. These environment variables are listed in this section.

Setting environment variables

Required environment variables are set by environment source files on UNIX and by the Sybase IQ installation on Windows.

❖ **Running UNIX environment source files**

Issue the following command to set all required environment variables.

1 For the Bourne/Korn shell:

```
. $SYBASE/ASIQ-12_6/ASIQ-12_6.sh
```

2 For the C shell:

```
source $SYBASE/ASIQ-12_6/ASIQ-12_6.csh;
rehash
```

On Windows platforms, all environmental variables are set by the install, so no changes should be necessary. However, if you do need to set optional variables or change defaults, use one of the following procedures, as appropriate for your operating system.

❖ **Setting an environment variable on Windows**

1 Right-click on the My Computer icon and select Properties from the popup menu.

2 Click the Advanced tab.

3 Click the Environment Variables button. The Environment Variables dialog opens. If the environment variable does not already exist, click New and type the variable name and its value in the spaces provided, then click OK.

If the variable does exist, select it from the list of System Variables or User Variables, click Edit, and make any modifications in the Variable Value field. (See the Microsoft Windows documentation for an explanation of user variables and system variables.) Click OK to make the setting.

❖ **Setting an environment variable on UNIX**

1. To check the setting for an environment variable, use the following command:

   echo $*variable-name*

   For example, to see the setting for the $SYBASE variable:

   ```
   % echo $SYBASE
   /server1/users/janed/sybase
   ```

2. In one of your startup files (*.cshrc*, *.shrc*, *.login*), add a line that sets the variable.

   In some shells (such as sh, bash, ksh) the line is as follows:

   ```
   VARIABLE=value;export VARIABLE
   ```

   In other shells (such as csh, tsch) the line is as follows:

   ```
   setenv VARIABLE value
   ```

The following environment variables used by Sybase IQ are described in this section:

- ASCHARSET
- ASDIR
- ASIQPORT
- ASJRE
- ASLANG
- ASLOGDIR
- ASTMP
- LIBRARY PATH
- PATH
- SQLCONNECT
- SYBASE
- SYBASE_JRE

- SYBASE_OCS

ASCHARSET environment variable

Setting **ASCHARSET**=*charset*

Description *Charset* is a character set name. For example, setting ASCHARSET=cp1252 sets the default character set to cp1252.

The first of the following values set determines the default character set.

- ASCHARSET environment variable
- Query the operating system

If no character set information is specified, use iso_1 for UNIX, or cp850 otherwise.

ASDIR environment variable

Setting `ASDIR = ${SYBASE}/ASIQ-12_6`

Operating System Required. Set by the environment source file or the install. This default setting can be changed on Windows.

Description ASDIR identifies the location of the Sybase IQ directory and is the location for other directories and files under that directory:

- *$ASDIR/bin/util_db.ini* holds the login ID and password for the utility database, utility_db. The installation program lets you change these from their default values, login ID dba and password sql.
- *$ASDIR/logfiles* is the default location for the server log and backup/restore log (the backup history file). You can override this default by setting the ASLOGDIR environment variable.
- *$ASDIR/demo* is the location for the asiqdemo database files.

ASIQPORT environment variable

Setting `ASIQPORT = 5556`

Operating System

Optional. If the user did not specify ASIQPORT in the environment source file, the port number defaults to 1099. This default value can be changed, provided you do so before the plug-in starts. You can set this variable as described in "Setting environment variables" on page 5 or by supplying the -DASIQPORT argument to the scjview command when starting Sybase Central. For example:

```
scjview -DASIQPORT=3345
```

Description

Overrides the default value for the IQ Agent port number, which is used for communications between the IQ plug-in and Agent. (Once the plug-in starts, you cannot change the port value.) This is a default value that the plug-in uses when searching for an agent process on any given port. If no agent is found on this port, the plug-in displays a prompt so that the user can specify the correct port value.

This functionality lets you run IQ Agents for Sybase IQ 12.5 and 12.6 on the same system. It also lets you run any number of 12.6 IQ Agents on a given host. Only 12.6 agents acknowledge this setting.

ASLANG environment variable

Setting

ASLANG=*language_code*

Operating System

Optional but recommended in non-English environments.

Description

Language_code is the two-letter combination representing a language. For example, setting ASLANG=DE sets the default language to German.

The first of the following values set determines the default language.

- ASLANG environment variable
- Registry (Windows only) as set by the installer or *dblang.exe*
- Query the operating system

If no language information is set, English is the default.

ASLOGDIR environment variable

Setting

ASLOGDIR = *path*

Operating System

Optional.

Description

The ASLOGDIR environment variable is optional and is not set by the installation program. It defines the location of various log files:

- The backup log is *.backup.syb*, in the directory specified by $ASLOGDIR.
- The server log is in the file *servername.nnn.srvlog* (where nnn is the number of times the server has been started) in the directory specified by $ASLOGDIR.

If ASLOGDIR is not set to a valid, write enabled directory, then most utilities, including start_asiq, use the default location *$ASDIR/logfiles* for all server logs.

ASTMP environment variable

Setting

```
ASTMP = temp_directory
```

Operating System

Optional on UNIX. Not used on Windows platforms.

Description

The ASTMP environment variable is optional, and is not set by the installation program. ASTMP is used by Sybase IQ to indicate a directory where temporary files are kept.

The ASTMP environment variable should point to a local directory for those using NFS (network file system). This will permit the ASTMP directory to purge directories and files that are no longer needed as client connections are closed. Remember that each client connection creates several directories and files in a temporary directory. These are only needed for the duration of the connection.*The directory must have write permissions for all users who will be connecting to the server.*

Note The temporary files whose location is defined by ASTMP are files used by the client and server. This variable does *not* control the default location of your IQ Temporary Store. For information on how Sybase IQ determines the location of your temporary store, see the CREATE DATABASE statement on page 380.

If you do not set ASTMP explicitly, or if it is set to $SYBASE or $ASDIR, then the ASIQ Agent sets ASTMP to a subdirectory in the UNIX directory */tmp*.

If more than one database server is running on a machine, each server and associated local client needs a separate temporary directory to avoid conflicts. (Sybase IQ uses shared memory connectivity instead of network connectivity when you do not specify the port or engine number for connection.)

To avoid conflicts when using shared memory:

- Create a temporary directory dedicated to each server. Make sure that each local client uses the same temporary directory as its server by setting the ASTMP environment variable explicitly in both environments.
- Create a data source name in the *.odbc.ini* file (on UNIX) for each server and provide detailed connection information. For details, see the *Sybase IQ Installation and Configuration Guide*.
- Use connection strings that specify explicit parameters instead of relying on defaults.
- Confirm connections by issuing the following command:

```
SELECT "database name is" = db_name(),
"servername_is" = @@servername
```

LIBRARY PATH environment variable

Settings

```
For AIX:
LIBPATH = installation_path/lib

For HP UNIX:
SHLIB_PATH = installation_path/lib

For Solaris:
LD_LIBRARY_PATH_64 = installation_path/lib
```

Operating System: Required. Variable name is platform dependent. UNIX only.

Description: This variable is set to include the directories where Sybase IQ shared libraries are located. On UNIX, the library path variable is set by running the environment source file.

PATH environment variable

Setting

```
PATH = installation_path
```

Operating System: Required.

Description: The *PATH* environment variable is an operating system required variable that includes the directories where Sybase IQ executables are located. On Windows, the installation program modifies *PATH*. On UNIX, you need to run the environment source file to include the necessary directories. The environment source file adds the *$SYBASE/$SYBASE_OCS/bin* directory to your UNIX path.

On Windows, PATH takes the place of the LIBRARY_PATH variable, so executables and dll are located using the PATH variable. Installing IQ on Windows adds *%SYBASE%\%SYBASE_OCS%\bin* and *%SYBASE%\%SYBASE_OCS%\dll* to your Windows path.

SQLCONNECT environment variable

Settings

```
SQLCONNECT = parameter#value ; ...
```

Operating System

Optional.

Description

The SQLCONNECT environment variable is optional, and is not set by the installation program.

SQLCONNECT specifies connection parameters that are used by several of the database administration utilities, such as DBISQL, DBINFO, DBCOLLAT, and DBSTOP, when connecting to a database server. This string is a list of parameter settings, of the form parameter=*value*, delimited by semicolons.

The number sign "#" is an alternative to the equals sign, and should be used if you are setting the connection parameters string in the SQLCONNECT environment variable. Using "=" inside an environment variable setting is a syntax error. The = sign is allowed only in Windows.

Note Specifying connection parameters in SQLCONNECT rather than on the command line offers greater security on UNIX systems. It prevents users from being able to display your password with the ps -ef command. This is especially useful if you run DBISQL or other utilities in quiet mode.

See also

For a description of the connection parameters, see the section "Connection parameters" in Chapter 4, "Connection and Communication Parameters" in the *Sybase IQ System Administration Guide*.

SYBASE environment variable

Setting

```
SYBASE = path
```

Operating System

Required.

Description — The SYBASE variable identifies the location of Sybase applications, such as Open Client and Open Server. You must set the SYBASE variable before you can install Sybase IQ on UNIX systems. This variable is required for using Sybase Central on UNIX systems.

SYBASE_JRE environment variable

Setting — `SYBASE_JRE= "${SYBASE}/shared/jre-1_43"`

Operating System — Required.

Description — On UNIX, run the environment source file to set SYBASE_JRE. On Windows, the installation program sets SYBASE_JRE when it installs Open Client Library version 12.5.

SYBASE_OCS environment variable

Setting — `SYBASE_OCS = "OCS-12_5"`

Operating System — Required.

Description — On UNIX, run the environment source file to set SYBASE_OCS. On Windows, the installation program sets SYBASE_OCS when it installs Open Client Library version 12.5.

Registry entries

On Windows operating systems, Sybase IQ uses several registry settings. These settings are made for you by the software, and in general operation you should not need to access the registry. The settings are provided here for those people who make modifications to their operating environment.

Warning! Sybase recommends *not* modifying the registry. If you make incorrect changes, you may damage your system.

Current user and local machine settings

Some operating systems, such as Windows, hold two levels of system settings. Some settings are specific to an individual user, and are used only when that user is logged on; these settings are called **current user** settings. Some settings are global to the machine, and are available no matter which user is logged on; these are called **local machine** settings. You must have administrator permissions on your machine to make local machine settings.

Sybase IQ permits the use of both current user and local machine settings. For Windows, these are held in the HKEY_CURRENT_USER registry and HKEY_LOCAL_MACHINE registry, respectively.

The Sybase IQ installation allows you to choose whether the settings it makes will be made to the current user only, or at the local machine level.

Current user takes precedence

If a setting is made in both current user and local machine registries, the current user setting takes precedence over the local machine setting.

When local machine settings are needed

If you are running an IQ program as a **service** on Windows, you should ensure that the settings are made at the *local machine* level.

Services can continue to run under a special account when you log off a machine, as long as you do not shut the machine down entirely. Services can be made independent of individual accounts, and therefore need access to local machine settings.

In general, Sybase recommends using local machine settings.

Registry structure

On Windows, you can access the registry directly using the registry editor. To start the editor, select Start → Run and type

```
regedt32
```

in the Open box.

Note Read Only Mode protects your registry data from accidental changes. To use it, click Read Only Mode on the Options menu in the registry editor.

The Sybase IQ registry entry is held in the HKEY_LOCAL_MACHINE key, in the following location:

```
SOFTWARE
    Sybase
```

```
Adaptive Server IQ
```

Registry settings on installation

The installation program makes the following registry settings in the Sybase registry:

- **Current Version** In the Adaptive Server IQ registry, this entry holds the version number. For example:

  ```
  CurrentVersion:REG_SZ:12.6.0
  ```

- **Description** In the Adaptive Server IQ registry, this entry holds the product name. For example:

  ```
  Description:REG_SZ:Adaptive Server IQ
  ```

- **Location** In the Adaptive Server IQ registry, this entry holds the installation directory location. For example:

  ```
  Location:REG_SZ:C:\Program Files\Sybase
  \ASIQ-12_6
  ```

- **Install Date** In the Adaptive Server IQ\12.6 registry, this entry holds the date the software was installed. For example:

  ```
  InstallDate:REG_SZ:10-20-2004
  ```

- **Install Type** In the Adaptive Server IQ\12.6 registry, this entry holds the type of installation. For example:

  ```
  InstallType:REG_SZ:Server
  ```

The Adaptive Server IQ registry includes other entries for the programs installed. The Sybase Central registry holds information about the Sybase Central version and installed plug-ins.

CHAPTER 2

Database Options

About this chapter

This chapter describes the database and DBISQL options that can be set to customize and modify database behavior.

Introduction to database options

Database options control many aspects of database behavior. For example, you can use database options for the purposes such as the following:

- **Compatibility** You can control how much like Adaptive Server Enterprise your IQ database operates, and whether SQL that does not conform to SQL/92 generates errors.
- **Error handling** You can control what happens when errors such as dividing by zero, or overflow errors, occur.
- **Concurrency and transactions** You can control the degree of concurrency, and details of COMMIT behavior, using options.

Setting options

You set options with the SET OPTION statement. It has the following general syntax:

SET [**EXISTING**] [**TEMPORARY**] **OPTION**
... [*userid*. | **PUBLIC**.]*option-name* = [*option-value*]

Specify a user ID or group name to set the option for that user or group only. Every user belongs to the PUBLIC group. If no user ID or group is specified, the option change is applied to the currently logged on user ID that issued the SET OPTION statement.

For example, the following statement applies an option change to the user DBA, if DBA is the user that issues it:

```
SET OPTION login_mode = mixed
```

The following statement applies a change to the PUBLIC user ID, a user group to which all users belong.

```
SET OPTION Public.login_mode = standard
```

Note For all database options that accept integer values, Sybase IQ truncates any decimal *option-value* setting to an integer value. For example, the value 3.8 is truncated to 3.

The maximum length of *option-value* when set to a string is 127 bytes.

Warning!
Changing option settings while fetching rows from a cursor is not supported, because it can lead to ill-defined behavior. For example, changing the DATE_FORMAT setting while fetching from a cursor returns different date formats among the rows in the result set. Do not change option settings while fetching rows.

For more information see the SET OPTION statement.

Finding option settings

You can obtain a list of option settings, or the values of individual options, in a variety of ways.

Getting a list of option values

- For the connected user, the sp_iqcheckoptions stored procedure displays a list of the current value and the default value of database options that have been changed from the default. sp_iqcheckoptions considers all IQ and ASA database options. IQ modifies some ASA option defaults, and these modified values become the new default values. Unless the new IQ default value is changed again, sp_iqcheckoptions does not list the option.

  sp_iqcheckoptions also lists server startup options that have been changed from the default values.

  When sp_iqcheckoptions is run, the DBA sees all options set on a permanent basis for all groups and users and sees temporary options set for DBA. Non-DBA users see their own temporary options. All users see non-default server startup options.

  The sp_iqcheckoptions stored procedure requires no parameters. In Interactive SQL, run the following command:

```
sp_iqcheckoptions
```

For more information, see “sp_iqcheckoptions procedure” on page 616.

The system table DBA.SYSOPTIONDEFAULTS contains all of the names and default values of the IQ and ASA options. You can query this table, if you need to see all option default values.

- Current option settings for your connection are available as a subset of **connection properties**. You can list all connection properties using the sa_conn_properties system procedure.

  ```
  call sa_conn_properties
  ```

  To order this list, you can call sa_conn_properties_by_name.

  For more information, see the section “sa_conn_properties_by_name system procedure” on page 679.

- In Interactive SQL, the SET statement with no arguments lists the current setting of options.

  ```
  SET
  ```

- In Sybase Central, right-click on a database, and select Options from the pop-up menu.

- Use the following query on the SYSOPTIONS system view:

  ```
  SELECT *
  FROM SYSOPTIONS
  ```

  This shows all PUBLIC values, and those USER values that have been explicitly set.

Getting individual option values

You can obtain a single setting using the connection_property system function. For example, the following statement reports the value of the Ansinull option:

```
SELECT connection_property ('Ansinull')
```

Scope and duration of database options

You can set options at 3 levels of scope: public, user, and temporary.

Temporary options take precedence over user and public settings. User level options take precedence over public settings. If you set a user level option for the current user, the corresponding temporary option is set as well.

Some options, such as COMMIT behavior, are database-wide in scope. Setting these options requires DBA permissions. Other options, such as ISOLATION_LEVEL, can also be applied to just the current connection, and need no special permissions.

Changes to option settings take place at different times, depending on the option. Changing a global option such as RECOVERY_TIME takes place the next time the server is started. The following list contains some of the options that take effect after the server is restarted.

Database options that require restarting the server:

CACHE_PARTITIONS
CHECKPOINT_TIME
DISK_STRIPING
MAIN_CACHE_MEMORY_MB
MAIN_RESERVED_DBSPACE_MB
OS_FILE_CACHE_BUFFERING
OUT_OF_DISK_MESSAGE_REPEAT
OUT_OF_DISK_WAIT_TIME
PREFETCH_BUFFER_LIMIT
PREFETCH_BUFFER_PERCENT
RECOVERY_TIME
TEMP_CACHE_MEMORY_MB
TEMP_RESERVED_DBSPACE_MB

Options that affect only the current connection generally take place immediately. You can change option settings in the middle of a transaction, for example. One exception to this is that *changing options when a cursor is open can lead to unreliable results*. For example, changing DATE_FORMAT may not change the format for the next row when a cursor is opened. Depending on the way the cursor is being retrieved, it may take several rows before the change works its way to the user.

Setting temporary options

Adding the TEMPORARY keyword to the SET OPTION statement changes the duration of the change. Ordinarily an option change is permanent: it will not change until it is explicitly changed using the Set Option statement.

When the SET TEMPORARY OPTION statement is executed, the new option value takes effect only for the current connection, and for the duration of the connection.

When the SET TEMPORARY OPTION is used to set a PUBLIC option, the change is in place for as long as the database is running. When the database is shut down, Temporary options for the PUBLIC user ID revert back to their permanent value.

Setting an option for the PUBLIC user ID temporarily offers a security advantage. For example, when the LOGIN_MODE option is enabled the database relies on the login security of the system on which it is running. Enabling it temporarily means that a database relying on the security of a Windows domain will not be compromised if the database is shut down and copied to a local machine. In this case, the LOGIN_MODE option will revert to its permanent value, which could be Standard, a mode where integrated logins are not permitted.

Setting public options

Only users with DBA privileges have the authority to set an option for the PUBLIC user ID.

Changing the value of an option for the PUBLIC user ID sets the value of the option for all users who have not SET their own value. An option value cannot be set for an individual user ID unless there is already a PUBLIC user ID setting for that option.

Deleting option settings

If *option-value* is omitted, the specified option setting will be deleted from the database. If it was a personal option setting, the value reverts back to the PUBLIC setting. If a TEMPORARY option is deleted, the option setting reverts back to the permanent setting.

For example, the following statement resets the ANSINULL option to its default value:

```
SET OPTION ANSINULL =
```

If you incorrectly type the name of an option when you are setting the option, the incorrect name is saved in the SYSOPTION table. You can remove the incorrectly typed name from the SYSOPTION table by setting the option PUBLIC with an equality after the option name and no value:

```
SET OPTION PUBLIC.a_mistyped_name=;
```

For example, if you set an option and incorrectly type the name, you can verify that the option was saved by selecting from the SYSOPTIONS view:

```
SET OPTION PUBLIC.a_mistyped_name='ON';
SELECT * FROM SYSOPTIONS ORDER BY 2;
```

user_name	option	setting
PUBLIC	a_mistyped_name	ON
PUBLIC	Abort_On_Error_File	
PUBLIC	Abort_On_Error_Line	0
PUBLIC	Abort_On_Error_Number	0
...		

You can remove the incorrectly typed option by setting it to no value, then verify that the option is removed:

```
SET OPTION PUBLIC.a_mistyped_name=;
SELECT * FROM SYSOPTIONS ORDER BY 2;
```

user_name	option	setting
PUBLIC	Abort_On_Error_File	
PUBLIC	Abort_On_Error_Line	0
PUBLIC	Abort_On_Error_Number	0
...		

Option classification

Sybase IQ provides many options. It is convenient to divide them into a few general classes. The classes of options are:

- General database options
- Transact-SQL compatibility database options
- Interactive SQL (DBISQL) options

Note that each class of options is listed in a separate table in the following sections.

Initial option settings

Connections to Sybase IQ can be made through the TDS protocol (Open Client and jConnect JDBC connections) or through the IQ protocol (ODBC, Embedded SQL).

If you have users who use both TDS and the Sybase IQ-specific protocol, you can configure their initial settings using stored procedures. As it is shipped, Sybase IQ uses this method to set Open Client connections and jConnect connections to reflect default Adaptive Server Enterprise behavior.

The initial settings are controlled using the LOGIN_PROCEDURE option. This option names a stored procedure to run when users connect. The default setting is to use the sp_iq_process_login system stored procedure, which checks whether the user is permitted to log in, and then calls the sp_login_environment system procedure. If you wish to change this behavior you can do so.

In its turn, sp_login_environment checks to see if the connection is being made over TDS. If it is, it calls the sp_tsql_environment procedure, which sets several options to new "default" values for the current connection.

For more information, see "LOGIN_PROCEDURE option" on page 85, or the sp_iq_process_login, sp_login_environment, and sp_tsql_environment system procedures in Chapter 9, "System Procedures".

General database options

The following table lists database-specific options, their allowed values, and their default settings.

See the sections "Transact-SQL compatibility options" on page 26 and "DBISQL options" on page 29 for lists of the other classes of options.

Note There are additional internal options (not listed in this table) that Sybase Technical Support may ask you to use.

Table 2-1: General database options

OPTION	VALUES	DEFAULT
AGGREGATION_PREFERENCE	-3 to 3	0
APPEND_LOAD	ON, OFF	OFF
AUDITING	ON, OFF	OFF

OPTION	VALUES	DEFAULT
BIT_VECTOR_PINNABLE_CACHE_PERCENT*	0-100	40
BLOCKING	OFF	OFF
BT_PREFETCH_MAX_MISS	0 - 1000	2
BT_PREFETCH_SIZE	0 to 100	10
CACHE_PARTITIONS	power of 2, 0 to 64	0
CHECKPOINT_TIME	number of minutes	60
CIS_ROWSET_SIZE	integer	50
CONVERT_HG_TO_1242	ON, OFF	OFF
CONVERT_VARCHAR_TO_1242	ON, OFF	OFF
COOPERATIVE_COMMIT_TIMEOUT	integer	250
COOPERATIVE_COMMITS	ON, OFF	ON
CURSOR_WINDOW_ROWS	20 to 100000	200
DATE_FIRST_DAY_OF_WEEK	0 to 6	0
DATE_FORMAT	string	'YYYY-MM-DD'
DATE_ORDER	'YMD', 'DMY', 'MDY'	'YMD'
DBCC_LOG_PROGRESS	ON, OFF	OFF
DBCC_PINNABLE_CACHE_PERCENT	0 to 100	50
DDL_OPTIONS2	0 to 3	0
DEBUG_MESSAGES	ON, OFF	OFF
DEDICATED_TASK	ON, OFF	OFF
DEFAULT_LIKE_MATCH_SELECTIVITY	0 to 100	15
DEFAULT_LIKE_RANGE_SELECTIVITY	0 to 100	15
DELAYED_COMMIT_TIMEOUT	integer	500
DELAYED_COMMITS	OFF	OFF
DISABLE_RI_CHECK	ON, OFF	OFF
DISK_STRIPING	ON, OFF	ON
EARLY_PREDICATE_EXECUTION	ON, OFF	ON
EXTENDED_JOIN_SYNTAX	ON, OFF	ON
FLATTEN_SUBQUERIES	ON, OFF	OFF
FORCE_DROP	ON, OFF	OFF
FORCE_NO_SCROLL_CURSORS	ON, OFF	OFF
FORCE_UPDATABLE_CURSORS	ON, OFF	OFF
FPL_EXPRESSION_MEMORY_KB	0 to 20000	1024
FP_PREDICATE_WORKUNIT_PAGES	integer	400
FP_PREFETCH_SIZE	0 to 100	10
GARRAY_FILL_FACTOR_PERCENT	0 to 1000	25
GARRAY_INSERT_PREFETCH_SIZE	0 to 100	3

OPTION	VALUES	DEFAULT
GARRAY_RO_PREFETCH_SIZE	0 to 100	10
HASH_PINNABLE_CACHE_PERCENT*	0 to 100	20
HASH_THRASHING_PERCENT	0 to 100	10
HG_DELETE_METHOD	0 to 3	0
HG_SEARCH_RANGE	integer	10
IDENTITY_ENFORCE_UNIQUENESS	ON, OFF	OFF
IDENTITY_INSERT	= '*tablename*'	= ' '
INDEX_ADVISOR	ON, OFF	OFF
INDEX_PREFERENCE	-10 to 10	0
INFER_SUBQUERY_PREDICATES	ON, OFF	OFF
IN_SUBQUERY_PREFERENCE	-3 to 3	0
IQGOVERN_MAX_PRIORITY	1 to 3	2
IQGOVERN_PRIORITY	1 to 3	2
IQGOVERN_PRIORITY_TIME	1 to 1,000,000 seconds	0 (disabled)
IQMSG_LENGTH_MB	0 to 2047	0
ISOLATION_LEVEL	0, 1, 2, 3	0
JAVA_HEAP_SIZE	integer	1000000
JAVA_NAMESPACE_SIZE	integer	4000000
JOIN_EXPANSION_FACTOR	0 to 100	30
JOIN_OPTIMIZATION	ON, OFF	ON
JOIN_PREFERENCE	-7 to 7	0
JOIN_SIMPLIFICATION_THRESHOLD	1 to 64	15
LARGE_DOUBLES_ACCUMULATOR	ON, OFF	OFF
LF_BITMAP_CACHE_KB	1 to 8	4
LOAD_MEMORY_MB	0 to 2000	0
LOCAL_RESERVED_DBSPACE_MB	integer > 0 in MB	200
LOG_CONNECT	ON, OFF	ON
LOG_CURSOR_OPERATIONS	ON, OFF	OFF
LOGIN_MODE	STANDARD, MIXED, INTEGRATED	STANDARD
LOGIN_PROCEDURE	string	sp_iq_process_login
MAIN_CACHE_MEMORY_MB	1 to 4194303	16
MAIN_KB_PER_STRIPE	integer > 0 in KB	1
MAIN_RESERVED_DBSPACE_MB	integer > 0 in MB	200
MAX_CARTESIAN_RESULT	integer	10000000
MAX_CLIENT_NUMERIC_PRECISION	0 to 126	0
MAX_CLIENT_NUMERIC_SCALE	0 to 126	0

OPTION	VALUES	DEFAULT
MAX_CUBE_RESULT	0 to 250000000	10000000
MAX_CURSOR_COUNT	integer	50
MAX_HASH_ROWS	integer to 250000000	2500000
MAX_IQ_THREADS_PER_CONNECTION	2 to 1000	72
MAX_IQ_THREADS_PER_TEAM	1 to 1000	48
MAX_JOIN_ENUMERATION	1 to 64	15
MAX_QUERY_PARALLELISM	integer <= # CPUs	24
MAX_QUERY_TIME	0 to 2^{32} - 1	0 (disabled)
MAX_STATEMENT_COUNT	integer	100
MAX_WARNINGS	integer	2^{64} - 1
MINIMIZE_STORAGE	ON, OFF	OFF
MIN_NLPDJ_TABLE_SIZE	1 to 4294967295	10000
MIN_PASSWORD_LENGTH	integer >= 0	0 characters
MIN_SMPDJ_OR_HPDJ_FILTERED_SIZE	1 to 4294967295	25000
MIN_SMPDJ_OR_HPDJ_INDIRECT_SIZE	1 to 4294967295	500000
MIN_SMPDJ_OR_HPDJ_TABLE_SIZE	1 to 4294967295	100000
MONITOR_OUTPUT_DIRECTORY	string	*database directory*
NOEXEC	ON, OFF	OFF
NON_ANSI_NULL_VARCHAR	ON, OFF	OFF
NOTIFY_MODULUS	integer	100000
ODBC_DISTINGUISH_CHAR_AND_VARCHAR	ON, OFF	OFF
ON_CHARSET_CONVERSION_FAILURE	string	IGNORE
OS_FILE_CACHE_BUFFERING	ON, OFF	OFF
OUT_OF_DISK_MESSAGE_REPEAT	integer	120
OUT_OF_DISK_WAIT_TIME	integer	30
PARALLEL_GBH_ENABLED	ON, OFF	ON
PARALLEL_GBH_MIN_ROWS_PER_UNIT	0 to 4294967295	3000000
PARALLEL_GBH_UNITS	0 to 100	0
PRECISION	126	126
PREFETCH	ON, OFF	ON
PREFETCH_BUFFER_LIMIT	integer	0
PREFETCH_BUFFER_PERCENT	0 to 100	40
PREFETCH_GARRAY_PERCENT	0 to 100	60
PREFETCH_SORT_PERCENT	0 to 100	50
PRESERVE_SOURCE_FORMAT	ON, OFF	ON
QUERY_DETAIL	ON, OFF	OFF
QUERY_NAME	string	empty string

OPTION	VALUES	DEFAULT
QUERY_PLAN	ON, OFF	ON
QUERY_PLAN_AFTER_RUN	ON, OFF	OFF
QUERY_PLAN_AS_HTML	ON, OFF	OFF
QUERY_PLAN_AS_HTML_DIRECTORY	string	" (empty string)
QUERY_ROWS_RETURNED_LIMIT	integer	0
QUERY_TEMP_SPACE_LIMIT	integer	2000
QUERY_TIMING	ON, OFF	OFF
RECOVERY_TIME	number of minutes	2
RETURN_DATE_TIME_AS_STRING	ON, OFF	OFF
ROW_COUNT	integer	0
SCALE	0 to 126	38
SIGNIFICANTDIGITSFORDOUBLEEQUALITY	0 to 15	0
SORT_PHASE1_HELPERS	integer	3
SORT_PINNABLE_CACHE_PERCENT*	0 to 100	20
SUBQUERY_PLACEMENT_PREFERENCE option	-1 to 1	0
SUPPRESS_TDS_DEBUGGING	ON, OFF	OFF
SWEEPER_THREADS_PERCENT	1 to 40	10
TDS_EMPTY_STRING_IS_NULL	ON, OFF	OFF
TEMP_CACHE_MEMORY_MB	1 to 4194303	12
TEMP_DISK_PER_STRIPE	integer > 0 in KB	1
TEMP_EXTRACT_APPEND	ON, OFF	OFF
TEMP_EXTRACT_BINARY	ON, OFF	OFF
TEMP_EXTRACT_COLUMN_DELIMITER	string	','
TEMP_EXTRACT_DIRECTORY	string	" (empty string)
TEMP_EXTRACT_NAME1 - TEMP_EXTRACT_NAME8	string	" (empty string)
TEMP_EXTRACT_NULL_AS_EMPTY	ON, OFF	OFF
TEMP_EXTRACT_NULL_AS_ZERO	ON, OFF	OFF
TEMP_EXTRACT_QUOTE	string	" (empty string)
TEMP_EXTRACT_QUOTES	ON, OFF	OFF
TEMP_EXTRACT_QUOTES_ALL	ON, OFF	OFF
TEMP_EXTRACT_ROW_DELIMITER	string	" (empty string)

OPTION	VALUES	DEFAULT
TEMP_EXTRACT_SIZE1 - TEMP_EXTRACT_SIZE8	AIX & HP-UX: 0 - 64GB Sun Solaris: 0 - 512GB Windows: 0 - 128GB	0
TEMP_EXTRACT_SWAP	ON, OFF	OFF
TEMP_KB_PER_STRIPE	integer > 0 in KB	1
TEMP_RESERVED_DBSPACE_MB	integer > 0 in MB	200
TEMP_SPACE_LIMIT_CHECK	ON, OFF	OFF
TIME_FORMAT	string	'HH:NN:ss.SSS'
TIMESTAMP_FORMAT	string	'YYYY-MM-DD HH:NN:ss.SSS'
TRIM_PARTIAL_MBC	ON, OFF	OFF
TRUNCATE_WITH_AUTO_COMMIT	ON, OFF	ON
USER_RESOURCE_RESERVATION	integer	1
WASH_AREA_BUFFERS_PERCENT	1 to 100	20
WAIT_FOR_COMMIT	ON, OFF	OFF

Data extraction options

The data extraction facility allows you to extract data from a database by redirecting the output of a SELECT statement from the standard interface to one or more disk files or named pipes. Several database options listed in the table above (TEMP_EXTRACT_...) are used to control this feature. For details on the use of these options, see the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” in the *Sybase IQ System Administration Guide*.

Transact-SQL compatibility options

The following options allow Sybase IQ behavior to be made compatible with Adaptive Server Enterprise, or to both support old behavior and allow ISO SQL/92 behavior.

For further compatibility with Adaptive Server Enterprise, some of these options can be set for the duration of the current connection using the Transact-SQL SET statement instead of the Sybase IQ SET OPTION statement. For a listing, see the SET statement on page 573.

Default settings

The default setting for some of these options differs from the Adaptive Server Enterprise default setting. To ensure compatible behavior, you should explicitly set the options.

When a connection is made using the Open Client or JDBC interfaces, some option settings are explicitly set for the current connection to be compatible with Adaptive Server Enterprise. These options are listed in Table 2-2.

For information on how the settings are made, see Chapter 9, "System Procedures".

Table 2-2: Transact-SQL options set explicitly for ASE compatibility

Option	ASE-compatible setting
ALLOW_NULLS_BY_DEFAULT	OFF
ANSINULL	OFF
CHAINED	OFF
CONTINUE_AFTER_RAISERROR	ON
DATE_FORMAT	YYYY-MM-DD
DATE_ORDER	MDY
ESCAPE_CHARACTER	OFF
FLOAT_AS_DOUBLE	ON
ISOLATION_LEVEL	1
ON_TSQL_ERROR	CONDITIONAL
QUOTED_IDENTIFIER	OFF
TIME_FORMAT	HH:NN:SS.SSS
TIMESTAMP_FORMAT	YYYY-MM-DD HH:NN:SS.SSS
TSQL_HEX_CONSTANT	ON
TSQL_VARIABLES	OFF

List of options

The following table lists the compatibility options, their allowed values, and their default settings.

See the sections "General database options" on page 21 and "DBISQL options" on page 29 for lists of the other classes of options.

Table 2-3: Transact-SQL compatibility options

OPTION	VALUES	DEFAULT
ALLOW_NULLS_BY_DEFAULT	ON, OFF	ON
ANSI_BLANKS*		
ANSI_CLOSE_CURSORS_ON_ ROLLBACK	ON	ON

OPTION	VALUES	DEFAULT
ANSI_INTEGER_OVERFLOW*		
ANSI_PERMISSIONS	ON, OFF	ON
ANSINULL	ON, OFF	ON
ANSI_UPDATE_CONSTRAINTS	OFF, CURSORS, STRICT	CURSORS
ASE_BINARY_DISPLAY	ON, OFF	ON
AUTOMATIC_TIMESTAMP	OFF	OFF
CHAINED	ON, OFF	ON
CLOSE_ON_ENDTRANS	ON	ON
CONTINUE_AFTER_RAISEERROR	ON, OFF	ON
CONVERSION_ERROR	ON, OFF	ON
DIVIDE_BY_ZERO_ERROR	ON, OFF	ON
ESCAPE_CHARACTER*	ON	ON
FIRE_TRIGGERS*		
FLOAT_AS_DOUBLE	ON, OFF	OFF
NEAREST_CENTURY	0 to 100	50
NON_KEYWORDS	Comma separated keywords list	No keywords turned off
ON_TSQL_ERROR	STOP, CONTINUE, CONDITIONAL	CONDITIONAL
PERCENT_AS_COMMENT	ON, OFF	ON
QUERY_PLAN_ON_OPEN*		
QUOTED_IDENTIFIER	ON, OFF	ON
RI_TRIGGER_TIME*		
SQL_FLAGGER_ERROR_LEVEL	E, I, F, W	W
SQL_FLAGGER_WARNING_ LEVEL	E, I, F, W	W
STRING_RTRUNCATION	ON, OFF	OFF
TEXTSIZE*		
TSQL_HEX_CONSTANT	ON, OFF	OFF
TSQL_VARIABLES	ON, OFF	OFF

Note An asterisk (*) next to the option name in the above table indicates an option that is currently not supported by Sybase IQ.

DBISQL options

These options change how DBISQL interacts with the database.

Syntax 1

SET [**TEMPORARY**] **OPTION**
... [*userid*. | **PUBLIC**.]*option-name* = [*option-value*]

Syntax 2

SET PERMANENT

Syntax 3

SET

Parameters

userid:
identifier, *string* or *host-variable*

option-name:
identifier, *string* or *host-variable*

option-value:
host-variable (indicator allowed), *string*, *identifier*, or *number*

Description

SET PERMANENT (Syntax 2) stores all current DBISQL options in the SYSOPTIONS system table. These settings are automatically established every time DBISQL is started for the current user ID.

Syntax 3 is used to display all of the current option settings. If there are temporary options set for DBISQL or the database server, these will be displayed; otherwise, the permanent option settings are displayed.

The following table lists the DBISQL options, their allowed values, and their default settings.

See the sections “General database options” on page 21 and “Transact-SQL compatibility options” on page 26 for lists of the other classes of options.

Table 2-4: DBISQL options

OPTION	VALUES	DEFAULT
AUTO_COMMIT	ON, OFF	OFF
AUTO_REFETCH	ON, OFF	ON
BELL	ON, OFF	ON
COMMAND_DELIMITER	string	';'
COMMIT_ON_EXIT	ON, OFF	ON
DEFAULT_ISQL_ENCODING	identifier or string	empty string (use system code page)
ECHO	ON, OFF	ON
HEADINGS	ON, OFF	ON
INPUT_FORMAT*		
ISQL_COMMAND_TIMING	ON, OFF	ON
ISQL_ESCAPE_CHARACTER	single character	\ (backslash)

OPTION	VALUES	DEFAULT
ISQL_FIELD_SEPARATOR	string	, (comma)
ISQL_LOG	file name	"
ISQL_QUOTE	string	' (single apostrophe)
NULLS	ON, OFF	NULL
ON_ERROR	STOP, CONTINUE, PROMPT, EXIT, NOTIFY_CONTINUE, NOTIFY_STOP, NOTIFY_EXIT	PROMPT
OUTPUT_FORMAT	ASCII, DBASEII, DBASEIII, EXCEL, FIXED, FOXPRO, HTML, LOTUS, SQL, XML,	ASCII
OUTPUT_LENGTH	Integer	0
OUTPUT_NULLS	String	'NULL'
STATISTICS	0, 3, 4, 5, 6	3
TRUNCATION_LENGTH	integer	256

Note An asterisk (*) next to the option name in the above table indicates an option that is currently not supported by Sybase IQ.

Alphabetical list of options

This section lists options alphabetically.

Some option names are followed by an indicator in square brackets that indicates the class of the option. These indicators are as follows:

- **[DBISQL]** The option changes how DBISQL interacts with the database.
- **[TSQL]** The option allows Sybase IQ behavior to be made compatible with Adaptive Server Enterprise, or to both support old behavior and allow ISO SQL/92 behavior.

AGGREGATION_PREFERENCE option

Function — Controls the choice of algorithms for processing an aggregate.

Allowed values — -3 to 3

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 0

Description — For aggregation (GROUP BY, DISTINCT, SET functions) within a query, the IQ optimizer has a choice of several algorithms for processing the aggregate. This option allows you to override the optimizer's costing decision when choosing the algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine.

This option is normally used for internal testing and for manually tuning queries that the optimizer does not handle well. Only experienced DBAs should use it. Inform Sybase Technical Support if you need to set AGGREGATION_PREFERENCE, as setting this option may mean that a change to the optimizer is appropriate.

The following table describes the valid values for this option and their action.

Table 2-5: AGGREGATION_PREFERENCE values

Value	Action
0	Let the optimizer choose
1	Prefer aggregation with a sort
2	Prefer aggregation using IQ's indexes
3	Prefer aggregation with a hash
-1	Avoid aggregation with a sort
-2	Avoid aggregation using IQ's indexes
-3	Avoid aggregation with a hash

ALLOW_NULLS_BY_DEFAULT option [TSQL]

Function — Controls whether new columns created without specifying either NULL or NOT NULL are allowed to contain NULL values.

Allowed values — ON, OFF

Default — ON

OFF for Open Client and JDBC connections

Description — The ALLOW_NULLS_BY_DEFAULT option is included for Transact-SQL compatibility.

For more information, see Appendix A, “Compatibility with Other Sybase Databases”.

ANSI_CLOSE_CURSORS_ON_ROLLBACK option [TSQL]

Function	Controls whether cursors that were opened WITH HOLD are closed when a ROLLBACK is performed.
Allowed values	ON
Default	ON
Description	The ANSI SQL/3 standard requires all cursors be closed when a transaction is rolled back. This option forces that behavior and cannot be changed. The CLOSE_ON_ENDTRANS option overrides this option.

ANSI_PERMISSIONS option [TSQL]

Function	Controls permissions checking for DELETE and UPDATE statements.
Allowed values	ON, OFF
Default	ON
Description	With ANSI_PERMISSIONS ON, SQL/92 permissions requirements for DELETE and UPDATE statements are checked. The default value is OFF in Adaptive Server Enterprise. The following table outlines the differences.

Table 2-6: Effect of ANSI_PERMISSIONS option

SQL Statement	Permissions required with ansi_permissions off	Permissions required with ansi_permissions on
UPDATE	UPDATE permission on the columns where values are being set	UPDATE permission on the columns where values are being set SELECT permission on all columns appearing in the WHERE clause. SELECT permission on all columns on the right side of the set clause.
DELETE	DELETE permission on table	DELETE permission on table. SELECT permission on all columns appearing in the WHERE clause.

The ANSI_PERMISSIONS option can be set only for the PUBLIC group. No private settings are allowed.

ANSINULL option [TSQL]

Function — Controls the interpretation of using = and != with NULL.

Allowed values — ON, OFF

Default — ON

Description — With ANSINULL ON, results of comparisons with NULL using '=' or '!=' are unknown. This includes results of comparisons implied by other operations such as CASE.

Setting ANSINULL to OFF allows comparisons with NULL to yield results that are not unknown, for compatibility with Adaptive Server Enterprise.

Note Unlike Adaptive Server Anywhere, Sybase IQ does *not* generate the warning 'null value eliminated in aggregate function' (SQLSTATE=01003) for aggregate functions on columns containing NULL values.

ANSI_UPDATE_CONSTRAINTS option

Function

Controls the range of updates that are permitted.

Allowed values

OFF, CURSORS, STRICT

Default

CURSORS in new databases.

OFF in databases created before version 12.4.3.

Description

Sybase IQ provides several extensions that allow updates which are not permitted by the ANSI SQL standard. These extensions provide powerful, efficient mechanisms for performing updates. However, in some cases, they cause behavior that is not intuitive. This behavior can produce anomalies such as lost updates if the user application is not designed to expect the behavior of these extensions.

The ANSI_UPDATE_CONSTRAINTS option controls whether updates are restricted to those permitted by the SQL/92 standard.

If the option is set to STRICT, the following updates are prevented:

- Updates of cursors containing JOINS
- Updates of columns that appear in an ORDER BY clause
- The FROM clause is not allowed in UPDATE statements.

If the option is set to CURSORS, these same restrictions are in place, but only for cursors. If a cursor is not opened with FOR UPDATE or FOR READ ONLY, the database server determines whether updates are permitted based on the SQL/92 standard. If the ANSI_UPDATE_CONSTRAINTS option is CURSORS or STRICT, cursors containing an ORDER BY clause default to FOR READ ONLY; otherwise, they continue to default to FOR UPDATE.

Example

The following code has a different effect, depending on the setting of ANSI_UPDATE_CONSTRAINTS.

```
create table mmg (a char(3));
create table mmg1 (b char(3));

insert into mmg values ('001');
insert into mmg values ('002');
insert into mmg values ('003')
insert into mmg1 values ('003');
select * from mmg;
select * from mmg1;
```

Option 1: Set ANSI_UPDATE_CONSTRAINTS to 'STRICT':

```
set option public.Ansi_update_constraints = 'strict';
```

```
DELETE MMG FROM MMG1 WHERE A=B;
```

This results in an error indicating that the attempted update operation is not allowed.

Option 2: Set ANSI_UPDATE_CONSTRAINTS to 'CURSORS' or 'OFF'

```
set option public.Ansi_update_constraints = 'CURSORS';
// or 'OFF'
DELETE MMG FROM MMG1 WHERE A=B;
```

In this case, the deletion should complete without the error.

See also

UPDATE statement on page 593

APPEND_LOAD option

Function

Helps reduce space usage from versioned pages.

Allowed values

ON, OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

OFF

Description

The APPEND_LOAD option applies to LOAD, INSERT...SELECT, and INSERT...VALUES statements. It takes effect on the next LOAD, INSERT...SELECT, or INSERT...VALUES statement.

When this option is OFF, Sybase IQ reuses row IDs from deleted rows. Setting this option ON appends new data to the end of the table.

ASE_BINARY_DISPLAY option

Function

Displays binary columns the same way Adaptive Server Enterprise does.

Allowed values

ON, OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

ON

Description

The ASE_BINARY_DISPLAY option affects the output of the SELECT statement.

When this option is on, Sybase IQ displays the column in readable ASCII format. (For example, 0x1234567890abcdef). When this option is OFF, Sybase IQ displays the column as binary output (not ASCII).

AUDITING option [database]

Function — Enables and disables auditing in the database.

Allowed values — ON, OFF

Default — OFF

Description — This option turns auditing on and off.

Auditing is the recording of detailed information about many events in the database in the transaction log. Auditing provides some security features, at the cost of some performance.

For the AUDITING option to work, you must set the AUDITING option to ON, and also specify which types of information you want to audit using the sa_enable_auditing_type system procedure. Auditing will not take place if either of the following are true:

- AUDITING is set to OFF
- Auditing options have been disabled

If you set AUDITING ON, and do not specify auditing options, all types of auditing information are recorded. Alternatively, you can choose to record any combination of the following: audit permission checks, connection attempts, DDL statements, public options, and triggers.

Can be set for the PUBLIC group only. Takes effect immediately. DBA permissions are required to set this option.

See also — “sa_enable_auditing_type system procedure” on page 681

AUTO_COMMIT option [DBISQL]

Function — Controls whether a COMMIT is performed after each statement.

Allowed values — ON, OFF

Default — OFF

Description

If AUTO_COMMIT is ON, a database COMMIT is performed after each successful statement. If the COMMIT fails, you have the option to execute additional SQL statements and perform the COMMIT again, or execute a ROLLBACK statement.

By default, a COMMIT or ROLLBACK is performed only when the user issues a COMMIT or ROLLBACK statement or a SQL statement that causes an automatic commit (such as the CREATE TABLE statement).

AUTO_COMMIT basically performs the same function as CHAINED, except that AUTO_COMMIT only takes effect if you are running DBISQL.

AUTO_REFETCH option [DBISQL]

Function

Controls whether query results are fetched again after deletes, updates and inserts.

Allowed values

ON, OFF

Default

ON

Description

If AUTO_REFETCH is ON, then the current query results will be refetched from the database after *any* INSERT, UPDATE or DELETE statement. Depending on how complicated the query is, this may take some time. For this reason, it can be turned OFF.

AUTOMATIC_TIMESTAMP option [TSQL]

Function

Controls interpretation of new columns with TIMESTAMP data type.

Allowed values

OFF

Default

OFF

Description

Controls whether any new columns with the TIMESTAMP data type that do not have an explicit default value defined are given a default value of the Transact-SQL timestamp value. Currently, Sybase IQ does not support this feature, so the default and only value allowed is OFF.

BELL option [DBISQL]

Function

Controls whether the bell will sound when an error occurs.

Allowed values	ON, OFF
Default	ON
Description	Set this option according to your preference.

BIT_VECTOR_PINNABLE_CACHE_PERCENT option

Function	Maximum percentage of a user's temp memory that a persistent bit-vector object can pin.
Allowed values	0-100
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	40
Description	BIT_VECTOR_PINNABLE_CACHE_PERCENT controls the percentage of a user's temp memory allocation that any one persistent bit-vector object can pin in memory. It defaults to 40%, and should not generally be changed by users. This option is primarily for use by Sybase Technical Support. If you change the value of BIT_VECTOR_PINNABLE_CACHE_PERCENT, do so with extreme caution; first analyze the effect on a wide variety of queries.
See also	“HASH_PINNABLE_CACHE_PERCENT option” on page 63 “SORT_PINNABLE_CACHE_PERCENT option” on page 122

BLOCKING option

Function	Controls the behavior in response to locking conflicts.
Allowed values	OFF
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	OFF
Description	When BLOCKING is OFF, a transaction receives an error when it attempts a write operation and it is blocked by another transaction's read lock.

BT_PREFETCH_MAX_MISS option

Function	Controls the way IQ determines whether to continue prefetching B-Tree pages for a given query.
Allowed values	0 to 1000
Scope	Can be set for an individual connection or for the PUBLIC group. Takes effect immediately.
Default	2
Description	For queries that use HG indexes, IQ prefetches B-Tree pages sequentially until it determines that prefetching is no longer useful. For some queries, it may turn off prefetching prematurely. Increasing the value of BT_PREFETCH_MAX_MISS makes it more likely that IQ will continue prefetching, but also may increase I/O unnecessarily. If queries using HG indexes run more slowly than expected, try gradually increasing the value of this option. You may need to experiment with different settings to find the one that gives the best performance. For most queries, useful settings are in the range of 1 to 10.
See also	"BT_PREFETCH_SIZE option" on page 39 "PREFETCH_BUFFER_LIMIT option" on page 111

BT_PREFETCH_SIZE option

Function	Restricts the size of the read-ahead buffer for the High Group B-Tree.
Allowed values	0 - 100. Setting to 0 disables B-Tree prefetch.
Scope	Can only be set for an individual user. Takes effect immediately.
Default	10
Description	B-Tree prefetch is activated by default for any sequential access to the High Group index such as INSERT, large DELETE, range predicates, and DBCC. This option limits the size of the read-ahead buffer for B-Tree pages. Reducing prefetch size frees up buffers, but also degrades performance at some point. Increasing prefetch size may have marginal returns. This option should be used in conjunction with the options PREFETCH_GARRAY_PERCENT, GARRAY_INSERT_PREFETCH_SIZE, and GARRAY_RO_PREFETCH_SIZE for non-unique High Group indexes.

CACHE_PARTITIONS option

Function

Sets the number of partitions to be used for the main and temporary buffer caches.

Allowed values

0, 1, 2, 4, 8, 16, 32, 64:

Table 2-7: CACHE_PARTITIONS values

Value	Description
0	IQ computes the number of partitions automatically as *number_of_cpus/8*, rounded to the nearest power of 2, up to a maximum of 64
1	1 partition only; this value disables partitioning
2-64	Number of partitions; must be a power of 2

Scope

Can be set for the PUBLIC group only. Takes effect for the current database the next time you start the database server.

Default

0 (IQ computes the number of partitions automatically).

Description

Partitioning the buffer cache can sometimes improve performance on systems with multiple CPUs by reducing lock contention. Normally you should rely on the value that Sybase IQ calculates automatically, which is based on the number of CPUs on your system. However, if you find that load or query performance in a multi-CPU configuration is slower than expected, you may be able to improve it by setting a different value for CACHE_PARTITIONS.

Both the number of CPUs and the platform can influence the ideal number of partitions. You may need to experiment with different values to determine the best setting for your configuration.

The value you set for CACHE_PARTITIONS applies to both the main and temp buffer caches. The absolute maximum number of partitions is 64, for each buffer cache.

The -iqpartition server option sets the partition limit at the server level. If -iqpartition is specified at server startup, it always overrides the CACHE_PARTITIONS setting.

The number of partitions does not affect other buffer cache settings. It also does not affect statistics collected by the IQ monitor; statistics for all partitions are rolled up and reported as a single value.

Example

In a system with 100 CPUs, if you do not set CACHE_PARTITIONS, IQ automatically sets the number of partitions to 16 as follows:

100 cpus/8 = 12, rounded to 16.

With this setting, there are 16 partitions for the main cache and 16 partitions for the temp cache.

In the same system with 100 CPUs, to explicitly set the number of partitions to 8, specify:

```
SET OPTION "PUBLIC".CACHE_PARTITIONS=8
```

See also

-iqpartition in the section "Server command-line options" on page 7 in Chapter 1, "Running the Database Server" of the *Sybase IQ Utility Guide*.

"Managing lock contention" in Chapter 10, "Transactions and Versioning" of the *Sybase IQ System Administration Guide*

CHAINED option [TSQL]

Function

Controls transaction mode in the absence of a BEGIN TRANSACTION statement.

Allowed values

ON, OFF

OFF for Open Client and JDBC connections

Default

ON

Description

Controls the Transact-SQL transaction mode. In unchained mode (CHAINED = OFF) each statement is committed individually unless an explicit BEGIN TRANSACTION statement is executed to start a transaction. In chained mode (CHAINED = ON) a transaction is implicitly started before any data retrieval or modification statement. For Adaptive Server Enterprise the default setting is OFF.

CHECKPOINT_TIME option

Function

Set the maximum length of time, in minutes, that the database server will run without doing a checkpoint.

Allowed values

Integer

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.

Default

60

Description — This option is used with the “RECOVERY_TIME option” to decide when checkpoints should be done.

CIS_ROWSET_SIZE option

Function — Set the number of rows that are returned from remote servers for each fetch.

Allowed values — Integer

Scope — Can be set for an individual connection or the PUBLIC group. Takes effect when a new connection is made to a remote server.

Default — 50

Description — This option sets the ODBC FetchArraySize value when using ODBC to connect to a remote database server.

For information on remote data access, see Chapter 16, “Accessing Remote Data” in the *Sybase IQ System Administration Guide*.

CLOSE_ON_ENDTRANS option [TSQL]

Function — Controls closing of cursors at the end of a transaction.

Allowed values — ON

Default — ON

Description — When CLOSE_ON_ENDTRANS is set to ON (the default and only value allowed), cursors are closed at the end of a transaction. With this option set ON, it provides Transact-SQL compatible behavior.

COMMAND_DELIMITER option [DBISQL]

Function — Sets the string indicating the termination of a statement in DBISQL.

Allowed values — String

Default — Semi-colon (;)

Description — If the command delimiter is set to a string beginning with a character that is valid in identifiers, the command delimiter must be preceded by a space.

COMMIT_ON_EXIT option [DBISQL]

Function	Controls behavior when DBISQL disconnects or terminates.
Allowed values	ON, OFF
Default	ON
Description	Controls whether a COMMIT or ROLLBACK is done when you leave DBISQL. When COMMIT_ON_EXIT is set to ON, a COMMIT is done; otherwise a ROLLBACK is done.

CONTINUE_AFTER_RAISERROR option [TSQL]

Function	Controls behavior following a RAISERROR statement.
Allowed values	ON, OFF
Default	ON
Description	The RAISERROR statement is used within procedures to generate an error. When the option is set to OFF, the execution of the procedure is stopped when the RAISERROR statement is encountered. When the CONTINUE_AFTER_RAISERROR switch is ON, the RAISERROR statement no longer signals an execution-ending error. Instead, the RAISERROR status code and message are stored and the most recent RAISERROR is returned when the procedure completes. If the procedure which caused the RAISERROR was called from another procedure, then the RAISERROR is not returned until the outermost calling procedure terminates. Intermediate RAISERROR statuses and codes are lost after the procedure terminates. If, at return time, an error occurs along with the RAISERROR, then the error information is returned and the RAISERROR information is lost. The application can query intermediate RAISERROR statuses by examining @@error global variable at different execution points. The setting of the CONTINUE_AFTER_RAISERROR option is used to control behavior following a RAISERROR statement *only* if the ON_TSQL_ERROR option is set to CONDITIONAL (the default). If you set the ON_TSQL_ERROR option to STOP or CONTINUE, the ON_TSQL_ERROR setting takes precedence over the CONTINUE_AFTER_RAISERROR setting.
See also	“ON_TSQL_ERROR option [TSQL]” on page 103

CONVERSION_ERROR option [TSQL]

Function	Controls reporting of data type conversion failures on fetching information from the database.
Allowed values	ON, OFF
Default	ON
Description	This option controls whether data type conversion failures, when data is fetched from the database or inserted into the database, are reported by the database as errors (CONVERSION_ERROR set to ON), or as a warning (CONVERSION_ERROR set to OFF). When CONVERSION_ERROR is set to ON, the SQLE_CONVERSION_ERROR error is generated. If the option is set to OFF, the warning SQLE_CANNOT_CONVERT is produced. If conversion errors are reported as warnings only, the NULL value is used in place of the value that could not be converted. In Embedded SQL, an indicator variable is set to -2 for the column or columns that cause the error.

CONVERT_HG_TO_1242 option

Function	Converts pre-version 12.4.2 HG indexes to an improved format.
Allowed values	ON, OFF
Scope	Can only be set for the PUBLIC group. Takes effect when you run sp_iqcheckdb in any mode.
Default	OFF
Description	Improves read performance of queries against HG indexes. You set this option and then run sp_iqcheckdb only once, and only for columns with HG indexes that were created before Version 12.4.2.

CONVERT_VARCHAR_TO_1242 option

Function	Converts pre-version 12.4.2 VARCHAR data to compressed format.
Allowed values	ON, OFF
Scope	Can only be set for the PUBLIC group. Takes effect when you run sp_iqcheckdb in any mode.

Default	OFF
Description	Helps further compress data and improve performance, especially for databases with many variable character strings. You set this option and then run sp_iqcheckdb only once, and only for VARCHAR columns that were created before Version 12.4.2.

COOPERATIVE_COMMIT_TIMEOUT option

Function	Governs when a COMMIT entry in the transaction log is written to disk.
Allowed values	Integer, in milliseconds
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	250
Description	This option only has meaning when COOPERATIVE_COMMITS is set to ON. The database server waits for the specified number of milliseconds for other connections to fill a page of the log before writing to disk. The default setting is 250 milliseconds.

COOPERATIVE_COMMITS option

Function	Controls when commits are written to disk.
Allowed values	ON or OFF
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	ON
Description	If COOPERATIVE_COMMITS is set to OFF, a COMMIT is written to disk as soon as the database server receives it, and the application is then allowed to continue. If COOPERATIVE_COMMITS is set to ON (the default), the database server does not immediately write the COMMIT to the disk. Instead, it requires the application to wait for a maximum length set by the COOPERATIVE_COMMIT_TIMEOUT option for something else to put on the pages before they are written to disk.

Setting COOPERATIVE_COMMITS to ON, and increasing the COOPERATIVE_COMMIT_TIMEOUT setting, increases overall database server throughput by cutting down the number of disk I/Os, but at the expense of a longer turnaround time for each individual connection.

CURSOR_WINDOW_ROWS option

Function	Defines the number of cursor rows to buffer.
Allowed values	20 to 100000
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	200
Description	When an application opens a cursor, Sybase IQ creates a FIFO (first in, first out) buffer to hold the data rows generated by the query. This option defines how many rows can be put in the buffer. If the cursor is opened in any mode other than NO SCROLL, Sybase IQ allows for backward scrolling for up to the total number of rows allowed in the buffer before it must restart the query. This is not true for NO SCROLL cursors as they do not allow backward scrolling. For example, with the default value for this option the buffer will initially hold rows 1 through 200 of the query result set. If you fetch the first 300 rows, the buffer will hold rows 101 through 300. You can scroll backward or forward within that buffer with very little overhead cost. If you scroll before row 101, Sybase IQ restarts that query until the desired row is back in the buffer. This can be an expensive operation to perform, so your application should avoid it where possible. An option is to increase the value for CURSOR_WINDOW_ROWS to accommodate a larger possible scrolling area, but the default setting of 200 is sufficient for most applications.

DATE_FIRST_DAY_OF_WEEK option

Function	Determines the first day of the week.
Allowed values	0 to 6
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	0 (Sunday)

Description

This option can specify which day is the first day of the week. By default (option value 0), Sunday is day 1, Monday is day 2, Tuesday is day 3, and so on. The following table defines the valid values for this option.

Table 2-8: DATE_FIRST_DAY_OF_WEEK values

Value	First Day
0	Sunday
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday

For example, if you change the value for this option to 3, Wednesday becomes day 1, Thursday becomes day 2, and so on. This option only affects the DOW and DATEPART functions, so its effect is quite narrow.

Note The Adaptive Server Anywhere option FIRST_DAY_OF_WEEK performs the same function but assigns the values 1 through 7 instead of 0 through 6. 1 stands for Monday and 7 for Sunday (the default). If you receive unexpected results, see “Ordering query results” in *Sybase IQ Performance and Tuning Guide*.

DATE_FORMAT option

Function — Sets the format used for dates retrieved from the database.

Allowed values — String

Scope — Can be set for an individual connection or the PUBLIC group. Takes effect immediately.

Default — 'YYYY-MM-DD'. This corresponds to ISO date format specifications.

Description — The format is a string using the following symbols:

Table 2-9: Symbols used in DATE_FORMAT string

Symbol	Description
yy	Two-digit year
yyyy	Four-digit year
mm	Two-digit month, or two-digit minutes if following a colon (as in 'hh:mm')
mmm	Three-character name of month
mmmm[m...]	Character long form for months—as many characters as there are m's, until the number of m's specified exceeds the number of characters in the month's name.
d	Single-digit day of week, (0 = Sunday, 6 = Saturday)
dd	Two-digit day of month
ddd	Three-character name of the day of week.
dddd[d...]	Character long form for day of the week—as many characters as there are d's, until the number of d's specified exceeds the number of characters in the day's name.
hh	Two-digit hours
nn	Two-digit minutes
ss[.s...s]	Seconds and parts of a second; up to six digits can follow the decimal point
aa	AM or PM (12 hour clock)
pp	PM if needed (12 hour clock)
jjj	Day of the year, from 1 to 366

Note Multibyte characters are not supported in date format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN. Use the concatenation operator to include multi-bye characters in date format strings. For example, if '?' represents a multibyte character, use the concatenation operator to move the multibyte character outside of the date format string:

```
SELECT DATEFORMAT (start_date, 'yy') + '?'
FROM employee;
```

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be put in upper case which will cause the substituted characters to also be in upper case. For numbers, using mixed case in the format string suppresses leading zeros.

You can control the padding of numbers by changing the case of the symbols. Same-case symbols (MM, mm, DD, dd) all pad number with zeroes. Mixed case (Mm, mM, Dd, or dD) cause the number to not be zero padded: the value takes as much room as required. For example

```
SELECT dateformat ( cast ('1998/01/01' as date ),
'yyyy/Mm/Dd' )
```

returns the following value:

```
1998/1/1
```

Examples

The following table illustrates DATE_FORMAT settings, together with the output from the following statement, executed on Thursday May 21, 1998:

```
SELECT CURRENT DATE
```

DATE_FORMAT	SELECT CURRENT DATE
yyyy/mm/dd/ddd	1998/05/21/thu
jjj	141
mmm yyyy	may 1998
mm-yyyy	05-1998

DATE_ORDER option

Function

Controls the interpretation of date formats.

Allowed values

'MDY', 'YMD', or 'DMY'

Default

'YMD'. This corresponds to ISO date format specifications.

Description

The database option DATE_ORDER is used to determine whether 10/11/12 is Oct 11 1912, Nov 12 1910, or Nov 10 1912. The option can have the value 'MDY', 'YMD', or 'DMY'.

DBCC_LOG_PROGRESS option

Function

Reports the progress of the sp_iqcheckdb system stored procedure.

Allowed values

ON, OFF

Scope

Can be set for an individual connection or the PUBLIC group. Takes effect at the next execution of sp_iqcheckdb.

Default

OFF

Description

When the DBCC_LOG_PROGRESS option is ON, the sp_iqcheckdb system stored procedure sends progress messages to the IQ message file. These messages allow the user to follow the progress of the sp_iqcheckdb operation.

Examples

The following is sample progress log output of the command `sp_iqcheckdb 'check database'`

```
IQ Utility Check Database
Start CHECK STATISTICS table: tloansf
Start CHECK STATISTICS for field: aqsn_dt
Start CHECK STATISTICS processing index:
ASIQ_IDX_T444_C1_FP
Start CHECK STATISTICS processing index:
tloansf_aqsn_dt_HNG
Done CHECK STATISTICS field: aqsn_dt
```

The following is sample progress log output of the command `sp_iqcheckdb 'allocation table nation'`

```
Start ALLOCATION table: nation
Start ALLOCATION processing index: nationhg1
Done ALLOCATION table: nation
Done ALLCOATION processing index: nationhg1
```

See also

"sp_iqcheckdb procedure" on page 611

Chapter 2, "System Recovery and Database Repair" in the *Sybase IQ Troubleshooting and Error Messages Guide*

DBCC_PINNABLE_CACHE_PERCENT option

Function

Controls the percent of the cache used by the sp_iqcheckdb system stored procedure.

Allowed values

0 to 100

Scope

Can be set for an individual connection or the PUBLIC group. Takes effect at the next execution of sp_iqcheckdb.

Default

50

Description

The sp_iqcheckdb system stored procedure works with a fixed number of buffers, as determined by this option. A large percentage of the cache is reserved by default, to maximize sp_iqcheckdb performance.

See also

"Resource issues running sp_iqcheckdb" in Chapter 2, "System Recovery and Database Repair" of the *Sybase IQ Troubleshooting and Error Messages Guide*

Chapter 2, "System Recovery and Database Repair" in the *Sybase IQ Troubleshooting and Error Messages Guide*

"sp_iqcheckdb procedure" on page 611 in the *Sybase IQ Reference Manual*

DDL_OPTIONS2 option

Function

Displays information about how long it took to insert or delete rows from an index.

Allowed values

0 to 3

Scope

Can be set for an individual connection or the PUBLIC group. Takes effect immediately

Default

0

Description

DDL_OPTIONS2 displays messages telling how long it took to insert or delete rows in each index. The following settings are allowed:

- 0 — Suppress messages
- 1 — Show messages on insert operations, such as LOAD TABLE
- 2 — Show messages on delete operations
- 3 — Show messages on insert and delete operations

For example, the following command displays messages that show how long it took to insert rows in each index:

```
SET TEMPORARY OPTION DDL_OPTIONS2 = 1
2004-04-06 09:24:10 0000000002 [20902]: Insert
completed. Index 'yahoo.DBA.ASIQ_IDX_T200_C10_FP', in 0
seconds.
```

See also

"Interpreting notification messages" in Chapter 7, "Moving Data In and Out of Databases"of the *Sybase IQ System Administration Guide*

DEBUG_MESSAGES option

Function

Controls whether or not MESSAGE statements that include a DEBUG ONLY clause are executed.

Allowed values: ON, OFF

Default: OFF

Description: This option allows you to control the behavior of debugging messages in stored procedures that contain a MESSAGE statement with the DEBUG ONLY clause specified. By default, this option is set to OFF and debugging messages do not appear when the MESSAGE statement is executed. By setting DEBUG_MESSAGES to ON, you can enable the debugging messages in all stored procedures.

Note
DEBUG ONLY messages are inexpensive when the DEBUG_MESSAGES option is set to OFF, so these statements can usually be left in stored procedures on a production system. However, they should be used sparingly in locations where they would be executed frequently; otherwise, they may result in a small performance penalty.

See also: MESSAGE statement on page 527

DEDICATED_TASK option

Function: Dedicates a request handling task to handling requests from a single connection.

Allowed values: ON, OFF

Scope: Can be set as a temporary option only, for the duration of the current connection. DBA permissions are required to set this option.

Default: OFF

Description: When the DEDICATED_TASK connection option is set to ON, a request handling task is dedicated exclusively to handling requests for the connection. By pre-establishing a connection with this option enabled, you will be able to gather information about the state of the database server if it becomes otherwise unresponsive.

DEFAULT_ISQL_ENCODING option [DBISQL]

Function: Specifies the code page that should be used by READ and OUTPUT statements.

Allowed values: *identifier* or *string*

Scope: Can be set as a temporary option only, for the duration of the current connection.

Default: Use system code page (empty string)

Description: This option is used to specify the code page to use when reading or writing files. It cannot be set permanently. The default code page is the default code page for the platform you are running on. On English Windows machines, the default code page is 1252.

Interactive SQL determines the code page that is used for a particular OUTPUT or READ statement as follows, where code page values occurring earlier in the list take precedence over those occurring later in the list:

- the code page specified in the ENCODING clause of the OUTPUT or READ statement
- the code page specified with the DEFAULT_ISQL_ENCODING option (if this option is set)
- the code page specified with the -codepage command-line option when Interactive SQL was started
- the default code page for the computer Interactive SQL is running on

For a complete list of supported code pages, see the *Adaptive Server Anywhere Database Administration Guide*.

See also: READ statement [DBISQL] in Chapter 6, "SQL Statements" of the *Sybase IQ Reference Manual*

OUTPUT statement [DBISQL] in Chapter 6, "SQL Statements" of the *Sybase IQ Reference Manual*

"Pieces in the character set puzzle" in Chapter 11, "International Languages and Character Sets" of the *Sybase IQ System Administration Guide*

Example:

- Set the encoding to UTF-16 (for reading Unicode files):

```
SET TEMPORARY OPTION DEFAULT_ISQL_ENCODING = 'UTF-
16'
```

DEFAULT_LIKE_MATCH_SELECTIVITY option

Function: Provides default selectivity estimates to the optimizer for most LIKE predicates.

Allowed values	0 to 100
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	15
Description	DEFAULT_LIKE_MATCH_SELECTIVITY sets the default selectivity for generic LIKE predicates, for example, `LIKE 'string%string'` where % is a wildcard character. The optimizer relies on this option when other selectivity information is not available and the match string does not start with a set of constant characters followed by a single wildcard. Note that if the column has either a LF index or a 1 or 2 byte FP index, the optimizer can get exact information and does not need to use this value. Users can also specify selectivity in the query, as described in the section "User-supplied estimates" on page 172 of the "Search conditions" section in Chapter 3, "SQL Language Elements."
See also	"DEFAULT_LIKE_RANGE_SELECTIVITY option" "LIKE conditions" on page 166 of the "Search conditions" section in Chapter 3, "SQL Language Elements" Chapter 3, "Improving Query Performance" in the *Sybase IQ Performance and Tuning Guide*

DEFAULT_LIKE_RANGE_SELECTIVITY option

Function	Provides default selectivity estimates to the optimizer for leading constant LIKE predicates.
Allowed values	0 to 100
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	15
Description	DEFAULT_LIKE_RANGE_SELECTIVITY sets the default selectivity for LIKE predicates, of the form `LIKE 'string%'` where the match string is a set of constant characters followed by a single wildcard character (%). The optimizer relies on this option when other selectivity information is not available. Note that if the column has either a LF index or a 1 or 2 byte FP index, the optimizer can get exact information and does not need to use this value.

Users can also specify selectivity in the query, as described in the section "User-supplied estimates" on page 172 of the "Search conditions" section in Chapter 3, "SQL Language Elements."

See also

"DEFAULT_LIKE_MATCH_SELECTIVITY option"

"LIKE conditions" on page 166 of the "Search conditions" section in Chapter 3, "SQL Language Elements"

Chapter 3, "Improving Query Performance" in the *Sybase IQ Performance and Tuning Guide*

DELAYED_COMMIT_TIMEOUT option

Function

Determines when the server returns control to an application following a COMMIT.

Allowed values

Integer, in milliseconds.

Default

500

Description

This option is ignored by Sybase IQ since DELAYED_COMMIT can only be set OFF.

DELAYED_COMMITS option

Function

Determines when the server returns control to an application following a COMMIT.

Allowed values

OFF

Default

OFF. This corresponds to ISO COMMIT behavior.

Description

When set to OFF (the only value allowed by Sybase IQ), the application must wait until the COMMIT is written to disk. This option must be set to OFF for ANSI/ISO COMMIT behavior.

DISABLE_RI_CHECK option

Function

Allows load, insert, update, or delete operations to bypass the referential integrity check, improving performance.

Allowed values

ON, OFF

Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	Users are responsible for ensuring that no referential integrity violation occurs during requests while DISABLE_RI_CHECK is set to ON.

DISK_STRIPING option

Function	Turns internal disk striping on or off.
Allowed values	ON, OFF
Scope	Can be set for the PUBLIC group only. Requires DBA permissions. You must shut down and restart the database server for the change to take effect.
Default	ON
Description	This option can force disk striping to be set or unset for performance reasons. In Sybase IQ, disk striping places data in each dbspace file segment in a round-robin fashion (e.g. the first database page written goes to the first dbspace, the second page written goes to the next dbspace, and so on). When this option is ON, the data ends up in all dbspace segments, and you will not be able to delete a dbspace with the DROP command. If you expect to drop dbspaces, you should set this option to OFF before loading any data into your database. For more information about disk striping and performance, see "Balancing I/O" in Chapter 4, "Managing System Resources" of the *Sybase IQ Performance and Tuning Guide*.

DIVIDE_BY_ZERO_ERROR option [TSQL]

Function	Controls the reporting of division by zero.
Allowed values	ON, OFF
Default	ON
Description	This option indicates whether division by zero is reported as an error. If the option is set ON, then division by zero results in an error with SQLSTATE 22012. If the option is set OFF, division by zero is not an error. Instead, a NULL is returned.

EARLY_PREDICATE_EXECUTION option

Function

This option controls whether simple local predicates are executed before query optimization.

Allowed values

ON or OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

ON

Description

If this option is ON (the default), the optimizer finds, prepares, and executes predicates containing only local columns and constraints before query optimization, including join ordering, join algorithm selection, and grouping algorithm selection, so that the values of "Estimated Result Rows" in the query plan are more precise. If this option is OFF, the optimizer finds and prepares the simple predicates, but does not execute them before query optimization. The resulting values of "Estimated Result Rows" are less precise, if the predicates are not executed.

In general, the EARLY_PREDICATE_EXECUTION option should always be left ON, as this results in improved query plans for many queries.

Note that when the EARLY_PREDICATE_EXECUTION option is ON, IQ executes the local predicates for all queries before generating a query plan, even when the NOEXEC option is ON. The generated query plan is the same as the runtime plan.

Query plan root node information The following information is included in the query plan for the root node:

- Threads used for executing local invariant predicates: if greater than 1, indicates parallel execution of local invariant predicates
- Early_Predicate_Execution: indicates if the option is OFF
- Time of Cursor Creation: the time of cursor creation

Query plan leaf node information The simple predicates whose execution is controlled by this option are referred to as invariant predicates in the query plan.The following information is included in the query plan for a leaf node, if there are any local invariant predicates on the node:

- Generated Post Invariant Predicate Rows: actual result after executing local invariant predicate
- Estimated Post Invariant Predicate Rows: calculated by using estimated local invariant predicates selectivity

- Time of Condition Start: starting time of the execution of local invariant predicates
- Time of Condition Done: ending time of the execution of local invariant predicates
- Elapsed Condition Time: elapsed time for executing local invariant predicates

ECHO option [DBISQL]

Function	Controls whether statements are echoed before they are executed.
Allowed values	ON, OFF
Default	ON
Description	This option is most useful when using the Windows READ statement to execute an DBISQL command file.

EXTENDED_JOIN_SYNTAX option

Function	Controls whether queries with an ambiguous syntax for multi-table joins are allowed, or reported as an error.
Allowed values	ON, OFF
Default	ON

Description	This option reports a syntax error for those queries containing outer joins that have ambiguous syntax due to the presence of duplicate correlation names on a null-supplying table.
	The following join clause illustrates the kind of query that is reported.
	`( R left outer join T , T  join S on ( C1 ) )`
	where C1 is a condition. If the option is set to ON, this query is interpreted as follows.
	`( R left outer join T on ( C1 ) ) join S on ( C2 )`
	where C1 and C2 are conditions.

FLATTEN_SUBQUERIES option

Function	Enables the transformation of some simple correlated EXISTS and NOT EXISTS subqueries into equivalent join-based queries.
Allowed values	ON, OFF
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	The option FLATTEN_SUBQUERIES enables the transformation of some simple correlated EXISTS and NOT EXISTS subqueries into equivalent join-based queries. In most cases in which the optimizer can apply this transformation, the query runs faster with the transformation than without the transformation applied. There are some exceptions to this performance improvement and some queries may run more slowly, so be sure that use of this option is appropriate for your environment.

FLOAT_AS_DOUBLE option [TSQL]

Function	Controls the interpretation of the FLOAT keyword.
Allowed values	ON, OFF
Default	OFF
Description	Turning on the FLOAT_AS_DOUBLE option makes the IQ FLOAT keyword behave like Adaptive Server Enterprise's FLOAT keyword when a precision is not specified. When enabled (set to ON) Sybase IQ interprets all occurrences of the keyword FLOAT as equivalent to the keyword DOUBLE within SQL statements.

Note When using JDBC and Client Library connections, for example, running Sybase Central, you must set the FLOAT_AS_DOUBLE option to ON. If you do not do this, CREATE JOIN INDEX operations will fail.

By default, IQ FLOAT values are interpreted by Sybase IQ as REAL values. Since Adaptive Server Enterprise treats its own FLOAT values as DOUBLE, enabling this option makes Sybase IQ to treat FLOAT values in the same way Enterprise treats FLOAT values.

REAL values are four bytes, DOUBLE values are eight bytes. According to the ANSI SQL/92 specification, FLOAT can be interpreted based on the platform. It is up to the database to decide what size it is, so long as it can handle the necessary precision. Adaptive Server Enterprise and Sybase IQ exhibit different default behavior.

The FLOAT_AS_DOUBLE option only takes effect when no precision is specified. For example the following statement is not affected by the option setting:

```
create table t1(
   c1 float(5)
)
```

The following statement is affected by the option setting:

```
create table t2(
   c1 float)
// affected by option setting
```

FORCE_DROP option

Function	Causes IQ to leak database disk space during a DROP command rather than reclaim it.
Allowed values	ON, OFF
Scope	DBA permissions are required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	If it is necessary to drop a corrupt index, join index, column or table, the FORCE_DROP option should be set to 'ON'. This will prevent the free list from being incorrectly updated from incorrect or suspect file space allocation information in the object being dropped. After dropping corrupt objects the file space may be reclaimed using the -iqfrec and -iqdroplks server switches. When force dropping objects, you must ensure that only the DBA is connected to the database. The server must be restarted immediately after a force drop. You should not attempt to force drop objects, unless Sybase Technical Support has instructed you to do so. For important information on using this option, refer to Chapter 2, “System Recovery and Database Repair” in the *Sybase IQ Troubleshooting and Error Messages Guide*.

FORCE_NO_SCROLL_CURSORS option

Function	Forces all cursors to be non-scrolling.
Allowed values	ON, OFF.
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	By default, all cursors are scrolling. Scrolling cursors with no host variable declared cause Sybase IQ to create a buffer for temporary storage of results. Each row in the result set is stored to allow for backward scrolling. Setting FORCE_NO_SCROLL_CURSORS = "ON" forces all cursors to be non-scrolling, thereby saving on temporary storage requirements. This option can be useful if you are retrieving very large numbers (millions) of rows, however some front-end applications make use of scrolling cursor operations and require this option to be set "OFF". If scrolling cursors are never used in your application, you should make this a permanent public option. It will use less memory and make a modest improvement in query performance.

FORCE_UPDATABLE_CURSORS option

Function	Controls whether cursors that have not been declared as updatable can be updated.
Allowed values	ON, OFF
Scope	Can be set temporary, for an individual connection, for a group, or PUBLIC. Does not require DBA permissions. Takes effect immediately.
Default	OFF
Description	When the FORCE_UPDATABLE_CURSORS option is ON, cursors which have not been declared as updatable can be updated. This option allows updatable cursors to be used in front-end applications without specifying the FOR UPDATE clause of the DECLARE CURSOR statement. Sybase does not recommend the use of the FORCE_UPDATABLE_CURSORS option unless absolutely necessary.

FPL_EXPRESSION_MEMORY_KB option

Function	Controls the use of memory for the optimization of queries involving functional expressions against columns having enumerated storage.
Allowed values	0 to 20000
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	1024 kilobytes
Description	The FPL_EXPRESSION_MEMORY_KB option controls the use of memory for the optimization of queries involving functional expressions against columns having enumerated storage. The option enables the DBA to constrain the memory used by this optimization and balance it with other IQ memory requirements (such as caches and LOAD_MEMORY_MB). Setting this option to 0 switches off the optimization.

FP_PREDICATE_WORKUNIT_PAGES option

Function	Specifies degree of parallelism used in the default index.
Allowed values	Integer
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	400
Description	The default index calculates some predicates such as SUM, RANGE, MIN, MAX and COUNT DISTINCT in parallel. This option affects the degree of parallelism used by specifying the number of pages worked on by each thread. To increase the degree of parallelism, decrease the value of this option.

GARRAY_FILL_FACTOR_PERCENT option

Function	Specifies the amount of space to reserve for an HG index.
Allowed values	0 to 1000
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	25

Description — An HG index can reserve some storage on a per-group basis (where group is defined as a group of rows with identical values). Reserving space consumes some disk space, but it can help the performance of incremental inserts into the HG index and reduce fragmentation. If you plan to do future incremental inserts into an HG index, and those new rows will have values that are already present in the index, a non-zero value for this option will help.

GARRAY_INSERT_PREFETCH_SIZE option

Function — Specifies number of pages used for prefetch.

Allowed values — 0 to 100

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 3

Description — This option defines the number of database pages read ahead during an insert to a column that has an HG index.

Do not set this option unless advised to do so by Sybase Technical Support.

GARRAY_RO_PREFETCH_SIZE option

Function — Specifies number of pages used for prefetch.

Allowed values — 0 to 100

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 10

Description — This option defines the number of database pages read ahead during a query to a column that has an HG index.

Do not set this option unless advised to do so by Sybase Technical Support.

HASH_PINNABLE_CACHE_PERCENT option

Function — Maximum percentage of a user's temp memory that a hash object can pin.

Allowed values — 0-100

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 20

Description — HASH_PINNABLE_CACHE_PERCENT controls the percentage of a user's temp memory allocation that any one hash object can pin in memory. It defaults to 20%, but this number should be reduced to 10% for sites that run a lot of very complex queries or increased to 50% in sites with simple queries that need a single large hash object to run, such as a large IN subquery.

This option is primarily for use by Sybase Technical Support. If you change the value of HASH_PINNABLE_CACHE_PERCENT, do so with extreme caution; first analyze the effect on a wide variety of queries.

See also — "BIT_VECTOR_PINNABLE_CACHE_PERCENT option" on page 38

"SORT_PINNABLE_CACHE_PERCENT option" on page 122

HASH_THRASHING_PERCENT option

Function — Specifies the percent of hard disk I/Os allowed during the execution of a statement which includes a query that involves hash algorithms, before the statement is rolled back and an error message is reported.

Allowed values — 0 - 100

Scope — Can be set for an individual connection or the PUBLIC group. Takes effect immediately.

Default — 10

Description — If a query that uses hash algorithms causes an excessive number of hard disk I/Os (paging buffers from memory to disk), query performance is negatively affected and server performance may also be affected. The HASH_THRASHING_PERCENT option controls the percentage of hard disk I/Os allowed before the statement is rolled back and an error message is returned. The text of the error message is either "Hash insert thrashing detected." or "Hash find thrashing detected."

The default value of HASH_THRASHING_PERCENT is 10%. Increasing HASH_THRASHING_PERCENT permits more paging to disk before a rollback and decreasing HASH_THRASHING_PERCENT permits less paging before a rollback.

See also

For more information on controlling excessive paging and using the HASH_THRASHING_PERCENT option, see the section "Unexpectedly long loads or queries" in Chapter 1, "Troubleshooting Hints" of the *Sybase IQ Troubleshooting and Error Messages Guide*.

Also refer to the section "HASH_PINNABLE_CACHE_PERCENT option" on page 63.

HEADINGS option [DBISQL]

Function

Controls whether headings will be displayed for the results of a SELECT statement.

Allowed values

ON, OFF

Default

ON

Description

Set this option according to your preference.

HG_DELETE_METHOD option

Function

Specifies the algorithm used during a delete in a HG index.

Allowed values

0 to 3

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

0

Description

This option chooses the algorithm used by the HG index during a delete operation. The cost model considers the CPU related costs as well as I/O related costs in selecting the appropriate delete algorithm. The cost model takes into account:

- Rows deleted
- Index size
- Width of index data type
- Cardinality of index data
- Available temporary cache
- Machine related I/O and CPU characteristics

- Available CPUs and threads
- Referential integrity costs

To force a “small” method, set this option to 1. To force the “large” method, set the option to 2. To force a “midsize” method, set the option to 3.

HG_SEARCH_RANGE option

Function	Specifies the maximum number of Btree pages used in evaluating a range predicate in the HG index.
Allowed values	Integer
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	10
Description	The default setting of this option is appropriate for most queries.

IDENTITY_ENFORCE_UNIQUENESS option

Function	Creates a unique HG index on each Identity/Autoincrement column if the column is not already a primary key.
Allowed values	ON, OFF
Scope	Can only be set temporary (for a connection), for a user, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	When option is set ON, HG indexes are created on future identity columns. The index can only be deleted if the deleting user is the only one using the table and the table is not a local temporary table.
See also	“QUERY_PLAN option” on page 114

IDENTITY_INSERT option

Function	Enables users to insert values into or to update an IDENTITY or AUTOINCREMENT column.

Allowed values	= '*tablename*'
Scope	Can only be set temporary (for a connection), for a user, or for the PUBLIC group. Takes effect immediately.
Default	Option not set.
Description	When option is set, insert/update is enabled. A table name must be specified to identify the column to insert or update. If you are not the table owner, qualify the table name with the owner name.

Example	For example, if you use the table employees to run explicit inserts:
	`SET TEMPORARY OPTION IDENTITY_INSERT = 'employees'`
	To turn the option off, specify the equals sign and a set of single quotation marks that enclose a blank space:
	`SET TEMPORARY OPTION IDENTITY_INSERT = ' '`

See also	"QUERY_PLAN option" on page 114

INDEX_ADVISOR option

Function	Generates messages suggesting additional column indexes that may improve performance of one or more queries.
Allowed values	ON, OFF
Scope	Can be set temporary (for a connection), for a user, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	When set ON, the index advisor prints index recommendations as part of the IQ query plan or as a separate message in the IQ message log file if query plans are not enabled. These messages begin with the string "Index Advisor:" and you can use that string to search and filter them from a Sybase IQ message file.

Table 2-10: Index Advisor

Situation	Recommendation
Local predicates on a single column where an HG, LF, HNG, DATE, TIME or DATETIME index would be desirable, as appropriate.	Recommends adding an <index-type> index to column <col>
Single column join keys where a LF or HG index would be useful.	Add an LF or HG index to join key <col>
Single column candidate key indexes where a HG exists, but could be changed to a unique HG or LF	Change join key <col> to a unique LF or HG index

Situation	Recommendation
Join keys have mismatched data types, and regenerating one column with a matched data type would be beneficial.	Make join keys <col1> and <col2> identical data types
Subquery predicate columns where a LF or HG index would be useful.	Add an LF or HG index to subquery column <col>
Grouping columns where a LF or HG index would be useful.	Create an LF or HG index on grouping column <col>
Single-table intercolumn comparisons where the two columns are identical data types, a CMP index will be recommended.	Create a CMP index on <col1>, <col2>
Columns where a LF or HG index exist, and the number of distinct values will allow, suggest converting the FP to a 1 or 2-byte FP index.	Rebuild <col> with 'optimize storage=on'

It is up to you to decide how many queries benefit from the additional index and whether it is worth the expense to create and maintain the indexes. In some cases, you cannot determine how much, if any, performance improvement results from adding the recommended index.

For example, consider columns used as a join key. Sybase IQ uses metadata provided by HG or LF indexes extensively to generate better/faster query plans to execute the query. Putting an HG or LF index on a join column without one makes the IQ optimizer far more likely to choose a faster join plan, but without adding the index and running the query again, it is very hard to determine whether query performance stays the same or improves with the new index.

See also

"QUERY_PLAN option" on page 114

"Message logging" on page 24 in Chapter 1, "Overview of Sybase IQ System Administration,"of the *Sybase IQ System Administration Guide*

INDEX_PREFERENCE option

Function

Controls the choice of indexes to use for queries.

Allowed values

Integer -10 to 10

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

0

Description

The Sybase IQ optimizer normally chooses the best index available to process local WHERE clause predicates and other operations which can be done within an IQ index. This option is used to override the optimizer choice for testing purposes; under most circumstances it should not be changed. The following table describes the valid values for this option and their action.

Table 2-11: INDEX_PREFERENCE values

Value	Action
0	Let the optimizer choose
1	Prefer LF indexes
2	Prefer HG indexes
3	Prefer HNG indexes
4	Prefer CMP indexes
5	Prefer the default index
6	Prefer WD indexes
8	Prefer DATE indexes
9	Prefer TIME indexes
10	Prefer DTTM indexes
-1	Avoid LF indexes
-2	Avoid HG indexes
-3	Avoid HNG indexes
-4	Avoid CMP indexes
-5	Avoid the default index
-6	Avoid WD indexes
-8	Avoid DATE indexes
-9	Avoid TIME indexes
-10	Avoid DTTM indexes

INFER_SUBQUERY_PREDICATES option

Function

Controls the optimizer's inference of additional subquery predicates.

Allowed values

ON, OFF

Scope

Can be set temporary for an individual connection or the PUBLIC group. Takes effect immediately. DBA permissions are not required to set this option.

Default

OFF

Description

The INFER_SUBQUERY_PREDICATES option controls whether the optimizer is allowed to infer additional subquery predicates from an existing subquery predicate via transitive closure across a simple equality join predicate. In most cases in which the optimizer chooses to make this inference, the query runs faster. There are some exceptions to this performance improvement, so you may need to experiment to be sure that this option is appropriate for your environment.

IN_SUBQUERY_PREFERENCE option

Function

Controls the choice of algorithms for processing an IN subquery.

Allowed values

-3 to 3

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

0

Description

The IQ optimizer has a choice of several algorithms for processing IN subqueries. This option allows you to override the optimizer's costing decision when choosing the algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine.

This option is normally used for internal testing and for manually tuning queries that the optimizer does not handle well. Only experienced DBAs should use it. The only reason to use this option is if the optimizer seriously underestimates the number of rows produced by a subquery, and the hash object is thrashing. Before setting this option, first try to improve the mistaken estimate by looking for missing indexes and dependent predicates.

Inform Sybase Technical Support if you need to set IN_SUBQUERY_PREFERENCE, as setting this option may mean that a change to the optimizer is appropriate.

The following table describes the valid values for this option and their action.

Table 2-12: IN_SUBQUERY_PREFERENCE values

Value	Action
0	Let the optimizer choose
1	Prefer sort-based IN subquery
2	Prefer vertical IN subquery (where a subquery is a child of a leaf node in the query plan)
3	Prefer hash-based IN subquery
-1	Avoid sort-based IN subquery
-2	Avoid vertical IN subquery
-3	Avoid hash-based IN subquery

IQGOVERN_MAX_PRIORITY option

Function — Limits the allowed IQGOVERN_PRIORITY setting.

Allowed values — 1 to 3

Scope — Can be set temporary, per user, or PUBLIC. Requires DBA permissions to set. Takes effect immediately.

Default — 2

Description — Limits the allowed IQGOVERN_PRIORITY setting, which affects the order in which a user's queries are queued for execution. In the range of allowed values, 1 indicates high priority, 2 (the default) medium priority, and 3 low priority.IQ returns an error if a user sets IQGOVERN_PRIORITY higher than IQGOVERN_MAX_PRIORITY.

IQGOVERN_PRIORITY option

Function — Assigns a priority to each query waiting in the -iqgovern queue.

Allowed values — 1 to 3

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 2

Description

Assigns a value that determines the order in which a user's queries are queued for execution. In the range of allowed values, 1 indicates high priority, 2 (the default) medium priority, and 3 low priority. This switch can be set temporary, per user, or public by any user. Queries with a lower priority will not run until all higher priority queries have executed.

This option is limited by the per user or per group value of the DBA settable option IQGOVERN_MAX_PRIORITY.

IQGOVERN_PRIORITY_TIME option

Function

Limits the time a high priority query waits in the queue before starting.

Allowed values

1 to 1,000,000 seconds. Must be lower than IQGOVERN_MAX_PRIORITY.

Scope

Can be set for the PUBLIC group only. Requires DBA permissions. Takes effect immediately.

Default

0 (disabled)

Description

Limits the time a high priority (priority 1) query will wait in the queue before starting. When the limit is reached, the query is started even if it exceeds the number of queries allowed by the -iqgovern setting. You must belong to group DBA in order to change this switch. The range is from 1 to 1,000,000 seconds. The default (0) disables this feature.

IQMSG_LENGTH_MB option

Function

Enables IQ message log file wrapping, and sets maximum size of this file.

Allowed values

Integer between 0 and 2047, in MB

Scope

Can only be set for the PUBLIC group. Requires DBA privileges to set. Takes effect immediately.

Default

0 (message log wrapping disabled)

Description

When you start a database, messages are recorded in the IQMSG log file, and each new line is appended to the end of the file.

Initially, message log wrapping is disabled (IQMSG_LENGTH_MB is 0), messages are always appended to the end of the file, and the file continues to grow.

When message log wrapping is enabled (IQMSG_LENGTH_MB is greater than 0), the IQMSG log file can only grow to the specified size. The maximum size you can specify is 2047 (2GB). When it reaches that size, new messages are written to the beginning of the file, overwriting existing messages on a line-by-line basis.

If wrapping is enabled when the database is shut down, it is still enabled the next time the database is started. If you then disable wrapping, by setting IQMSG_LENGTH_MB = 0, Sybase IQ writes new messages continuously to the ending position of the most recent message, overwriting any existing messages, until it reaches the end of the file. From then on, it appends new messages to the end of the file.

When wrapping is enabled, three tags remind you that the last message in the file may not be the most recent message, and help you identify where new messages are being placed.

- This tag indicates the ending position of the most recent message:

```
<next msg insertion place>
```

- This tag occurs at the start of the file:

```
!!!!!! log wrapped back here from the end of the file !!!!!!
```

- This tag occurs at the end of the file:

```
!!!!!! log wrapped back to the beginning of the file !!!!!!
```

If a database file already exists and its IQMSG file is larger than IQMSG_LENGTH_MB, the maximum file size is the actual file size. Setting this option does not truncate the file.

ISOLATION_LEVEL option

Function	Controls the locking isolation level for Catalog Store tables.
Allowed values	0, 1, 2, or 3
Default	0
Description	Each locking isolation level is defined as follows:

- **0** Allow dirty reads, nonrepeatable reads, and phantom rows.
- **1** Prevent dirty reads. Allow nonrepeatable reads and phantom rows.
- **2** Prevent dirty reads and guarantee repeatable reads. Allow phantom rows.

- **3** Serializable. Do not allow dirty reads, guarantee repeatable reads, and do not allow phantom rows.

This option determines the isolation level for tables in the Catalog Store. Sybase IQ always enforces level 3 for tables in the IQ Store. Level 3 is equivalent to ANSI level 4.

ISQL_COMMAND_TIMING option [DBISQL]

Function: Controls whether SQL statements are timed or not.

Allowed values: ON, OFF

Default: ON

Description: This boolean option controls whether SQL statements are timed or not. If you set the option to ON, the time of execution appears in the Messages pane after you execute a statement. If you set the option to OFF, the time does not appear.

You can also set this option on the Messages tab of the Options dialog.

ISQL_ESCAPE_CHARACTER option [DBISQL]

Function: Controls the escape character used in place of unprintable characters in data exported to ASCII files.

Allowed values: Any single character

Default: A backslash (\ )

Description: When Interactive SQL exports strings that contain unprintable characters (such as a carriage return), it converts each unprintable character into a hexadecimal format and precedes it with an escape character. The character you specify for this setting is used in the output if your OUTPUT statement does not contain an ESCAPE CHARACTER clause. This setting is used only if you are exporting to an ASCII file.

Example:

- Create a table that contains one string value with an embedded carriage return (denoted by the "\n" in the INSERT statement). Then export the data to *c:\escape.txt* with a # sign as the escape character.

```
CREATE TABLE escape_test( TEXT varchar(10 ) );
INSERT INTO escape_test VALUES( 'one\ntwo' );
SET TEMPORARY OPTION ISQL_ESCAPE_CHARACTER='#';
SELECT * FROM escape_test;
```

```
OUTPUT TO c:\escape.txt FORMAT ASCII
```

This code places the following data in *escape.txt*:

'one#x0Atwo'

where # is the escape character and *x0A* is the hexadecimal equivalent of the "\n" character.

The start and end characters (in this case, single quotation marks) depend on the ISQL_QUOTE setting.

ISQL_FIELD_SEPARATOR option [DBISQL]

Function — Controls the default string used for separating values in data exported to ASCII files.

Allowed values — *String*

Default — A comma (,)

Description — Controls the default string used for separating (or delimiting) values in data exported to ASCII files. If an OUTPUT statement does not contain a DELIMITED BY clause, the value of this setting is used.

Example

- Set the field separator to a colon in the data exported to *c:\employee.txt*.

```
SET TEMPORARY OPTION ISQL_FIELD_SEPARATOR=':';
SELECT emp_lname, emp_fname FROM employee
WHERE emp_id < 150;
OUTPUT TO c:\employee.txt FORMAT ASCII
```

This code places the following data in *employee.txt*:

'Whitney':'Fran'

'Cobb':'Matthew'

'Chin':'Philip'

'Jordan':'Julie'

The start and end characters (in this case, single quotation marks) depend on the ISQL_QUOTE setting.

ISQL_LOG option [DBISQL]

Function — Controls logging behavior.

Allowed values: String containing a file name.

Default: Empty string.

Description: If ISQL_LOG is set to a non-empty string, all Interactive SQL statements are added to the end of the named file. Otherwise, if ISQL_LOG is set to the empty string Interactive SQL statements are not logged.

This option logs an individual Interactive SQL session only.

ISQL_QUOTE option [Interactive SQL]

Function: Controls the default string that begins and ends all strings in data exported to ASCII files.

Allowed values: *String*

Default: A single apostrophe (')

Description: Controls the default string that begins and ends all strings in data exported to ASCII files. If an OUTPUT statement does not contain a QUOTE clause, this value is used by default.

Example:

- To change the default string that begins and ends all strings to a double quote character.

```
SET TEMPORARY OPTION ISQL_QUOTE='"'; SELECT
emp_lname, emp_fname FROM employee WHERE emp_id <
150; OUTPUT TO c:\employee.txt FORMAT ASCII
```

This code places the following data in *employee.txt*:

“Whitney”, “Fran”

“Cobb”,”Matthew”

“Chin”,”Philip”

“Jordan”,”Julie”

The separator characters (in this case, commas) depend on the ISQL_FIELD_SEPARATOR setting.

JAVA_HEAP_SIZE option

Function: To limit the memory used by Java applications for a connection.

Allowed values: Integer

Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately. DBA permissions are required to set this option for *any* connection.
Default	1000000
Description	This option sets the maximum size (in bytes) of that part of the memory that is allocated to Java applications on a per connection basis. Per connection memory allocations typically consist of the user's working set of allocated Java variables and Java application stack space. While a Java application is executing on a connection, the per connection allocations come out of the fixed cache of the database server, so it is important that a run-away Java application is disallowed from using up too much memory.

JAVA_NAMESPACE_SIZE option

Function	To limit the memory used by Java applications for a database.
Allowed values	Integer
Default	4000000
Description	This option sets the maximum size (in bytes) of that part of the memory that is allocated to Java applications on a per-database basis. Per database memory allocations include Java class definitions. As class definitions are effectively read-only, they are shared between connections. Consequently, their allocations come right out of the fixed cache, and this option sets a limit on the size of these allocations.

JOIN_EXPANSION_FACTOR option

Function	Controls how conservative the optimizer’s join result estimates are in unusually complex situations.
Allowed values	1 to 100
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	30

Description

This option controls how conservative the join optimizer's result size estimates will be in situations where an input to a specific join has already passed through at least one intermediate join that can result in multiple copies of rows projected from the table being joined.

A level of zero indicates that the optimizer should use the same estimation method above intermediate expanding joins as it would if there were no intermediate expanding joins.

This will result in the most aggressive (small) join result size estimates.

A level of 100 indicates that the optimizer should be much more conservative in its estimates whenever there are intermediate expanding joins, and this will result in the most conservative (large) join result size estimates.

Normally you should not need to change this value. If you do, Sybase recommends setting JOIN_EXPANSION_FACTOR as a temporary or user option.

JOIN_OPTIMIZATION option

Function

Enables or disables the optimization of the join order.

Allowed values

ON or OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

ON

Description

When the JOIN_OPTIMIZATION option is ON, Sybase IQ optimizes the join order to reduce the size of intermediate results and sorts and to balance the system load. When the option is OFF, the join order is determined by the order of the tables in the FROM clause of the SELECT statement.

JOIN_OPTIMIZATION should always be set ON.

The JOIN_OPTIMIZATION option controls the order of the joins, but not the order of the tables. To show the distinction, consider this example FROM clause with four tables:

```
FROM  A, B, C, D
```

By default, this FROM clause creates a left deep plan of joins that could also be explicitly represented as:

```
FROM  (((A, B), C), D)
```

If JOIN_OPTIMIZATION is turned OFF, then the order of these joins on the sets of tables is kept precisely as specified in the FROM clause. Thus A and B must be joined first, then that result must be joined to table C, and then finally joined to table D. This option does not control the left/right orientation at each join. Even with JOIN_OPTIMIZATION turned OFF, the optimizer, when given the above FROM clause, can produce a join plan that looks like:

```
FROM  ((C, (A, B)), D)
```

or

```
FROM  (((B, A), C), D)
```

or

```
FROM  (D, ((A, B), C))
```

In all of these cases, A and B are joined first, then that result is joined to C, and finally that result is joined to table D. The order of the joins remains the same, but the order of the tables appears different.

In general, if JOIN_OPTIMIZATION is turned OFF, you probably want to use parentheses in the FROM clause, as in the above examples, to make sure that you get the join order you want. If you want to join A and B to the join of C and D, you can specify this join by using parentheses:

```
FROM ((A, B), (C, D))
```

Note that the above FROM clause is a different join order than the original example FROM clause, even though all the tables appear in the same order.

This option should be set to OFF only to diagnose obscure join performance issues or to manually optimize a small number of predefined queries. With JOIN_OPTIMIZATION turned OFF, queries can join up to 128 tables, but may also suffer serious performance degradation.

Warning! If you turn off JOIN_OPTIMIZATION, Sybase IQ has no way to ensure optimal performance for queries containing joins. By disabling this key feature, you assume full responsibility for performance aspects of your queries.

JOIN_PREFERENCE option

Function	Controls the choice of algorithms when processing joins.
Allowed values	-7 to 7

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

0

Description

For joins within a query, the IQ optimizer has a choice of several algorithms for processing the join. This option allows you to override the optimizer's cost-based decision when choosing the algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine. If you set it to any non-zero value, it affects every join in a query; it cannot be used to selectively modify one join out of several in a query.

This option is normally used for internal testing, and only experienced DBAs should use it. The following table describes the valid values for this option and their action.

Table 2-13: JOIN_PREFERENCE values

Value	Action
0	Let the optimizer choose
1	Prefer sort/merge
2	Prefer nested loop
3	Prefer nested loop push-down
4	Prefer hash
5	Prefer hash push-down
6	Prefer prejoin
7	Prefer sort/merge push-down
-1	Avoid sort/merge
-2	Avoid nested loop
-3	Avoid nested loop push-down
-4	Avoid hash
-5	Avoid hash push-down
-6	Avoid prejoin
-7	Avoid sort/merge push-down

JOIN_SIMPLIFICATION_THRESHOLD option

Function

Controls the minimum number of tables being joined together before any join optimizer simplifications are applied.

Allowed values

Integer from 1 to 64

Scope — Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 15

Description — The query optimizer simplifies its optimization of join order by separate handling of both lookup tables (that is, non-selective dimension tables) and tables that are effective cartesian products. After simplification, it optimizes the remaining tables for join order, up to the limit set by MAX_JOIN_ENUMERATION.

Setting this option to a value greater than the current value for MAX_JOIN_ENUMERATION has no effect.

Setting this value below the value for MAX_JOIN_ENUMERATION may improve the time required to optimize queries containing many joins, but it also may prevent the optimizer from finding the best possible join plan.

Normally you should not need to change this value. If you do, Sybase recommends setting JOIN_SIMPLIFICATION_THRESHOLD as a temporary or user option, and to a value of at least 9.

LARGE_DOUBLES_ACCUMULATOR option

Function — Controls which accumulator to use for SUM or AVG of floating-point numbers.

Allowed values — ON, OFF

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — OFF

Description — The small accumulator for floats and doubles is highly accurate for addends in the range of magnitudes 1e-20 to 1e20. It loses a little accuracy outside of this range (but is still good enough for many applications). The small accumulator allows the optimizer to choose hash for faster performance more easily than when the large accumulator is used. The large accumulator is highly accurate for all floats and doubles, but its size often precludes the use of the hash optimization. The default is the small accumulator.

LF_BITMAP_CACHE_KB option

Function
Specifies the amount of memory to use for a load into a LF index.

Allowed values
1 to 8

Scope
DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default
4

Description
This option defines the amount of heap memory (in KB) per distinct value used during a load into a LF index. The default allots 4 KB. If the sum of the distinct counts for all LF indexes on a particular table is relatively high (greater than 10,000), then heap memory use may increase to the point of impacting load performance due to system page faulting. If this is the case, you should reduce this option value.

The following formula shows how to calculate the heap memory used (in bytes) by a particular LF index during a load:

```
Heap-memory-used = (lf_bitmap_cache_kb * 1024)
* lf-distinct-count-for-column
```

Using the default of 4 KB, a LF index with 1000 distinct values can use up to 4 MB of heap memory during a load.

LOAD_MEMORY_MB option

Function
Specifies an upper bound (in MB) on the amount of heap memory subsequent loads can use.

Allowed values
0 to 2000

Scope
DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default
0 (zero)

Description
This option specifies an upper bound (in MB) on the amount of heap memory subsequent loads can use. The default setting, 0, means that there is no upper bound, and Sybase IQ can use as much heap memory as necessary to perform the load. A non-zero value means that the user has set an upper bound. The maximum upper bound is 2000MB (2GB). This option is typically used for LOAD statements, but affects all operations where loads, inserts, or updates occur, including SYNCHRONIZE, DELETE, INSERT and UPDATE operations.

LOCAL_RESERVED_DBSPACE_MB option

Function	Controls the amount of space Sybase IQ reserves in the IQ Local Store on a multiplex query server.
Allowed values	Integer greater than zero, in megabytes
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	200; IQ actually reserves the minimum of 200MB and 50% of the size of the last dbspace
Description	This option lets you control the amount of space Sybase IQ sets aside in your IQ Local Store on a particular query server for certain small but critical data structures used during release savepoint, commit, and checkpoint operations. For a production database, set this value to between 200MB and 1GB. The larger your IQ page size and number of concurrent connections, the more reserved space you need. IQ reserves the minimum of 200MB and 50% of the size of the last dbspace, which helps DBAs avoid out-of-space conditions by reserving more space automatically.
See also	"Reserving space to handle out-of-space conditions" in Chapter 5, "Working with Database Objects," *Sybase IQ System Administration Guide*.

LOG_CONNECT option

Function	Controls logging of user connections.
Allowed values	ON, OFF
Scope	Can be set only for the PUBLIC group. Takes effect immediately.
Default	ON
Description	When this option is ON, a message appears in the IQ message log (*.iqmsg* file) every time a user connects to or disconnects from the IQ database.

Note If this option is set OFF (connection logging disabled) when a user connects, and then turned on before the user disconnects, the message log shows that user disconnecting but not connecting.

LOG_CURSOR_OPERATIONS option

Function	Controls logging of cursor operations.
Allowed values	ON, OFF
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	When this option is ON, a message appears in the IQ message log every time you open or close a cursor. Normally this option should be off, which is the default. You should only turn it ON if you are having a problem and need to provide debugging data to Sybase Technical Support.

LOGIN_MODE option

Function	Controls the use of integrated logins for the database.
Allowed values	Standard, Mixed, or Integrated
Scope	Can be set only for the PUBLIC group. Takes effect immediately.
Default	Standard
Description	This option specifies whether integrated logins are permitted. One of following three values are accepted (the values are case insensitive):

- **Standard** This is the default setting, which does not permit integrated logins. An error occurs if an integrated login connection is attempted.
- **Mixed** With this setting, both integrated logins and standard logins are allowed.
- **Integrated** With this setting, all logins to the database must be made using integrated logins.

Warning! Setting the LOGIN_MODE database option to Integrated restricts connections to only those users who have been granted an integrated login mapping. Attempting to connect using a user ID and password generates an error. The only exceptions to this are users with DBA authority (full administrative rights).

For more information on integrated logins see Chapter 3, “Sybase IQ Connections” in the *Sybase IQ System Administration Guide*.

LOGIN_PROCEDURE option

Function	Specifies a login procedure that sets connection compatibility options at startup.
Allowed values	String
Scope	Can be set for an individual connection or the PUBLIC group. DBA authority is required to set the option. Takes effect immediately.
Default	DBA.sp_iq_process_login
See also	"Initial option settings" on page 21 "sp_iq_process_login procedure" on page 657 "Managing IQ user accounts and connections" in Chapter 12, "Managing User IDs and Permissions" of the *Sybase IQ System Administration Guide*
Description	The default login procedure, sp_iq_process_login, executes when a user attempts to connect. • When Sybase IQ User Administration is enabled, this procedure checks that the user is not locked out, that the maximum number of connections for the user and database is not exceeded, and that the user's password has not expired, and then either allows login to proceed or sends an error message. • When Sybase IQ User Administration is disabled, this procedure allows login to proceed. • If sp_iq_process_login allows login to proceed, it calls the sp_login_environment procedure, which calls to determine the database connection settings. • In its turn, sp_login_environment checks to see if the connection is being made over TDS. If it is, it calls the sp_tsql_environment procedure, which sets several options to new "default" values for the current connection To use the Sybase IQ User Administration facility, LOGIN_PROCEDURE must be set to DBA.sp_iq_process_login. You can also customize the default database option settings by creating a new procedure and setting LOGIN_PROCEDURE to call that new procedure. *Do not* edit sp_iq_process_login, sp_login_environment or sp_tsql_environment. The customized login procedure needs to be created in every database you might use.
Example	The following example shows an alternative to sp_iq_process_login. This example disallows a connection by signaling the INVALID_LOGON error.

```
create procedure DBA.login_check()
begin
  declare INVALID_LOGON exception for sqlstate '28000';
  // Allow a maximum of 3 concurrent connections
  if( db_property('ConnCount') > 3 ) then
  signal INVALID_LOGON;
  else
  call sp_login_environment;
  end if;
end
go
grant execute on DBA.login_check to PUBLIC
go
set option PUBLIC.Login_procedure='DBA.login_check'
go
```

An alternative means to disallow a connection is by using the RAISERROR statement:

```
CREATE MESSAGE 28000 AS 'User %1! is not allowed to
connect there are already %2! users logged on';
ALTER procedure DBA.login_check()
begin
  declare INVALID_LOGON exception for sqlstate '28000';
  // Allow a maximum of 3 concurrent connections
  if( db_property('ConnCount') > 2 ) then
    RAISERROR 28000, connection_property('Userid'),
      db_property('ConnCount')
  else
    call sp_login_environment;
  end if;
end
```

MAIN_CACHE_MEMORY_MB option

Function	Specifies the size of the main shared buffer cache.
Allowed values	1 to 4294967295 (2^{32} -1)
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	16

Description

This option sets the size of the main shared memory buffer cache for the database. Sybase recommends that you do not use this option; instead, set the main buffer cache size with the -iqmc server option.

On 64-bit systems you can allocate as much physical memory as you have to IQ buffer caches; however, for values greater than 4GB, you must use the server options -iqmc and -iqtc to set main and temporary buffer cache sizes. On 32-bit systems, the operating system limits the amount of memory you can allocate. See the *Sybase IQ Installation and Configuration Guide* for your platform for details.

For any active database, the default main buffer cache size of 16MB is too low. For optimal performance, allocate as much memory as possible to the IQ main and temporary buffer caches. For example, if you have 4GB of shared memory on your machine available to Sybase IQ, you can split that amount between the main and temporary shared buffer caches.

When setting the main cache size you must consider many factors, including total physical memory, swap space, memory for the temporary buffer cache, your mix of query and load processing, as well as memory requirements of the operating system and other applications on the machine. See Chapter 4, "Managing System Resources" in the *Sybase IQ Performance and Tuning Guide* for important information about setting buffer cache sizes.

MAIN_KB_PER_STRIPE option

Function

Defines the number of kilobytes (KB) to write to each dbspace before the disk striping algorithm moves to the next stripe for the IQ Main Store.

Allowed values

Integer greater than zero, in kilobytes

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. Takes effect at the next checkpoint.

Default

1 (which rounds up to one page)

Description

This option lets you control the number of kilobytes written to each dbspace before the IQ disk striping algorithm moves to the next stripe for the IQ Main Store. The corresponding number of blocks is rounded up to a page boundary, so the actual amount written to each stripe may be slightly larger than requested. You can tune this option by measuring the time required to complete I/O intensive updates and adjusting the option value accordingly.

See also

Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*

"Balancing I/O" in Chapter 4, "Managing System Resources" of the *Sybase IQ Performance and Tuning Guide*.

MAIN_RESERVED_DBSPACE_MB option

Function	Controls the amount of space Sybase IQ reserves in the Main IQ Store.
Allowed values	Integer greater than zero, in megabytes
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	200; IQ actually reserves the minimum of 200MB and 50% of the size of the last dbspace
Description	This option lets you control the amount of space Sybase IQ sets aside in your Main IQ Store for certain small but critical data structures used during release savepoint, commit, and checkpoint operations. For a production database, set this value to between 200MB and 1GB. The larger your IQ page size and number of concurrent connections, the more reserved space you need. IQ reserves the minimum of 200MB and 50% of the size of the last dbspace, which helps DBAs avoid out-of-space conditions by reserving more space automatically.
See also	"Reserving space to handle out-of-space conditions" in Chapter 5, "Working with Database Objects," *Sybase IQ System Administration Guide*.

MAX_CARTESIAN_RESULT option

Function	Limits the number of rows resulting from a cartesian join.
Allowed values	Any integer Can be set temporary (for a connection), for a user, or for the PUBLIC group. Takes effect immediately.
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	10000000

Description

This option limits the number of result rows from a query containing a cartesian join (usually the result of missing one or more join conditions when creating the query). If Sybase IQ cannot find a query plan for the cartesian join with an estimated result under this limit, it rejects the query and returns an error. Setting MAX_CARTESIAN_RESULT to 0 disables the check for the number of result rows of a cartesian join.

MAX_CLIENT_NUMERIC_PRECISION option

Function

Controls the maximum precision for numeric data sent to the client.

Allowed values

0 to 126

Scope

Can be set by any user, at any level. This option takes effect immediately.

Default

0

Description

When Sybase IQ performs it calculation, it promotes data types to an appropriate size that ensures accuracy. The promoted data type may be larger than Open Client and some ODBC applications can handle correctly.

When MAX_CLIENT_NUMERIC_PRECISION is a non-zero value, IQ checks that numeric result columns do not exceed this value. If the result column is bigger than MAX_CLIENT_NUMERIC_PRECISION allows, and IQ is unable to cast it to the specified precision, the query returns the error:

```
Data Exception - data type conversion is not possible %1
SQLCODE = -1001006
```

See also

“MAX_CLIENT_NUMERIC_SCALE option”

To control precision for queries on the Catalog Store, see “PRECISION option” on page 110

MAX_CLIENT_NUMERIC_SCALE option

Function

Controls the maximum scale for numeric data sent to the client.

Allowed values

0 to 126

Scope

Can be set by any user, at any level. This option takes effect immediately.

Default

0

Description

When Sybase IQ performs it calculation, it promotes data types to an appropriate scale and size that ensure accuracy. The promoted data type may be larger than the original defined data size. You can set this option to the scale you want for numeric results.

Multiplication, division, addition, subtraction, and aggregate functions can all have results that exceed the maximum precision and scale.

For example, when a DECIMAL(88,2) is multiplied with a DECIMAL(59,2), the result could require a DECIMAL(147,4). With MAX_CLIENT_NUMERIC_PRECISION of 126, only 126 digits will be kept in the result. If MAX_CLIENT_NUMERIC_SCALE is 4, the result will be returned as a DECIMAL(126,4). If MAX_CLIENT_NUMERIC_SCALE is 2, the result will be returned as a DECIMAL(126,2). In both cases, there is a possibility for overflow.

See also

"MAX_CLIENT_NUMERIC_PRECISION option"

To control scale for queries on the Catalog Store, see "SCALE option" on page 120

MAX_CUBE_RESULT option

Function

Sets the maximum number of rows that the IQ optimizer will consider for a GROUP BY CUBE operation.

Allowed values

0 to 250000000

Scope

Can be set by any user, at any level. This option takes effect immediately.

Default

10000000

Description

When generating a query plan, the IQ optimizer estimates the total number of groups generated by the GROUP BY CUBE hash operation. The IQ optimizer uses a hash algorithm for the GROUP BY CUBE operation. This option sets an upper boundary for the number of estimated rows the optimizer will consider for a hash algorithm that can be run. If the actual number of rows exceeds the MAX_CUBE_RESULT option value, the optimizer stops processing the query and returns the error message "Estimate number: *nnn* exceed the DEFAULT_MAX_CUBE_RESULT of GROUP BY CUBE or ROLLUP", where *nnn* is the number estimated by the IQ optimizer.

Set MAX_CUBE_RESULT to zero to override the default value. When this option is set to zero, the IQ optimizer does not check the row limit and lets the query run. Setting MAX_CUBE_RESULT to zero is not recommended, as the query may not succeed.

MAX_CURSOR_COUNT option

Function	Specifies a resource governor to limit the maximum number of cursors that a connection can use at once.
Allowed values	Integer
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately. DBA permissions are required to set this option for *any* connection.
Default	50
Description	This resource governor allows a DBA to limit the number of cursors per connection that a user can have. If an operation would exceed the limit for a connection, an error is generated indicating that the limit has been exceeded. If a connection executes a stored procedure, that procedure is executed under the permissions of the procedure owner. However, the resources used by the procedure are assigned to the current connection. You can remove resource limits by setting the option to 0 (zero).

MAX_HASH_ROWS option

Function	Sets the maximum number of rows that the IQ optimizer will consider for a hash algorithm.
Allowed values	Integer up to 250000000
Scope	Can be set temporary, per user, or for the PUBLIC group. DBA authority is not required to set the option. This option takes effect immediately.
Default	2500000
Description	When generating a query plan, the IQ optimizer may have several algorithms (hash, sort, indexed) to choose from when processing a particular part of a query. These choices often depend on estimates of the number of rows to process or generate from that part of the query. This option sets an upper boundary for how many estimated rows it will consider for a hash algorithm. For example, if there is a join between two tables, and the estimated number of rows entering the join from both tables exceeds this option value, the optimizer will not consider a hash join. On systems with more than 50 MB per user of temporary buffer cache space, you may want to consider a higher value for this option.

MAX_IQ_THREADS_PER_CONNECTION option

Function	Controls the number of threads for each connection.
Allowed values	2 to 1000
Scope	Can be temporary or permanent. Requires DBA permissions to set. Can be set for the PUBLIC group only. Takes effect immediately.
Default	72
Description	Allows you to constrain the number of threads (and thereby the amount of system resources) the commands executed on a connection will use. For most applications, use the default.

MAX_IQ_THREADS_PER_TEAM option

Function	Controls the number of threads allocated to perform a single operation (such as a LIKE predicate on a column) executing within a connection.
Allowed values	1 to 1000
Scope	Can be temporary or permanent. Requires DBA permissions to set. Can be set for the PUBLIC group only. Takes effect immediately.
Default	48
Description	Allows you to constrain the number of threads (and thereby the amount of system resources) that a single operation will be allocated. The total for all simultaneously executing teams for this connection will be limited by the related option, MAX_IQ_THREADS_PER_CONNECTION. For most applications, use the default.

MAX_JOIN_ENUMERATION option

Function	Controls the maximum number of tables to be optimized for join order after optimizer simplifications have been applied.
Allowed values	Integer from 1 to 64
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	15

Description

The query optimizer simplifies its optimization of join order by separate handling of both lookup tables (that is, non-selective dimension tables) and tables that are effective cartesian products. After simplification, it proceeds with optimizing the remaining tables for join order, up to the limit set by MAX_JOIN_ENUMERATION. If this limit is exceeded, the query is rejected with an error. The user can then either simplify the query or try increasing the limit.

Normally you should not need to change this value. If you do, Sybase recommends setting MAX_JOIN_ENUMERATION as a temporary or user option.

MAX_QUERY_PARALLELISM option

Function

Sets upper bound for parallel execution of GROUP BY operations and for arms of a UNION.

Allowed values

Integer less than or equal to number of CPUs.

Scope

Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

24

Description

Sets an upper bound for parallelism the query optimizer can choose for GROUP BY operations or arms of a UNION, regardless of how many CPUs are available. This option is only effective on GROUP BY operations when the PARALLEL_GBH_UNITS option is *not* set. The PARALLEL_GBH_UNITS option sets a specific number for the degree of parallelism, whereas the MAX_QUERY_PARALLELISM option value is an upper limit and allows the optimizer more flexibility.

Normally you should not set this option. However, if you have more than 16 CPUs and you see excessive CPU time spent on system usage, try setting MAX_QUERY_PARALLELISM to a value less than 16. You will need to experiment with this value to determine the right setting for your platform, number of CPUs, and queries. Remember that there is some overhead involved when you distribute execution across multiple CPUs. In some configurations this overhead could actually decrease performance if parallelism is allowed across all available CPUs, while in others using all available CPUs could be beneficial.

See also

“PARALLEL_GBH_UNITS option”

MAX_QUERY_TIME option

Function	Sets a time limit so that the optimizer can disallow very long queries.
Allowed values	0 to 2^{32} - 1 minutes
Scope	Can be set at the session (temporary), user, or PUBLIC level.
Default	0 (disabled)
Description	If the query runs longer than the MAX_QUERY_TIME setting, IQ stops the query and sends a message to the user and the IQ message file. For example: `The operation has been cancelled -- Max_Query_Time exceeded.` This option applies only to queries and does not apply to any SQL statement which is modifying the contents of the database.

MAX_STATEMENT_COUNT option

Function	Specifies a resource governor to limit the maximum number of prepared statements that a connection can use at once.
Allowed values	Integer
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately. DBA permissions are required to set this option for *any* connection.
Default	100
Description	This resource governor allows a DBA to limit the number of prepared statements per connection that a user can have. If an operation would exceed the limit for a connection, an error is generated indicating that the limit has been exceeded. If a connection executes a stored procedure, that procedure is executed under the permissions of the procedure owner. However, the resources used by the procedure are assigned to the current connection. You can remove resource limits by setting the option to 0 (zero).

MAX_WARNINGS option

Function	Controls the maximum number of warnings allowed.

Allowed values	Any integer
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	$2^{64} - 1$
Description	This option can limit the number of warnings about rejected values, row mismatches, and so on during DDL commands. Its default virtually does not restrict the number you can receive.

MINIMIZE_STORAGE option

Function	Minimize use of disk space for newly created columns.
Allowed Values	ON, OFF
Scope	Can be set for the PUBLIC group or for temporary use. DBA authority is required to set the option. This option takes effect immediately.
Default	OFF
Description	When MINIMIZE_STORAGE is ON, IQ optimizes storage for new columns by using as little as one byte of disk space per row wherever appropriate. By default this option is OFF for the PUBLIC group, and one-byte storage is used for all newly created columns; when it is OFF for the PUBLIC group but ON as a temporary user option, one-byte storage is used for new columns created by that user ID. MINIMIZE_STORAGE=ON is equivalent to placing an IQ UNIQUE 255 clause on every new column, with the exception of certain data types that are by nature too wide for one-byte storage. Tables with few columns benefit when MINIMIZE_STORAGE is ON. Tables with many columns generally benefit from turning this option OFF. The definition of “few” depends on the processor; for larger processors, the number can be greater than for smaller ones. Specifying IQ UNIQUE explicitly in CREATE TABLE or ALTER TABLE ADD COLUMN overrides the MINIMIZE_STORAGE option for that column.
See also	Chapter 5, “Working with Database Objects” in *Sybase IQ System Administration Guide*.

MIN_NLPDJ_TABLE_SIZE option

Function	Specifies the minimum number of rows which must be present in a table before the join optimizer considers using the nested loop push-down join (NLPD) algorithm.
Allowed values	1 to 4294967295
Scope	Can be set temporary, for a user or for the PUBLIC group. Takes effect immediately.
Default	10000
Description	This option allows you to control the minimum number of rows in a table before the join optimizer considers using the nested loop push-down join algorithm. Under most circumstances you do not need to change the value of this option.

MIN_PASSWORD_LENGTH option

Function	Sets the minimum length for new passwords in the database.
Allowed values	Integer, greater than or equal to zero. The value is in bytes. For single-byte character sets, this is the same as the number of characters.
Scope	Can be set for the PUBLIC group. Takes effect immediately. DBA permissions are required to set this option.
Default	0 characters
Description	This option allows the database administrator to impose a minimum length on all new passwords for greater security. Existing passwords are not affected.
Example	• Set the minimum length for new passwords to 6 bytes. `SET OPTION PUBLIC.MIN_PASSWORD_LENGTH = 6`

MIN_SMPDJ_OR_HPDJ_FILTERED_SIZE option

Function	Constrains the join algorithm choices available to the optimizer under certain circumstances.
Allowed values	1 to 4294967295

Scope	Can be set temporary, for a user or for the PUBLIC group. Takes effect immediately.
Default	25000
Description	This option allows you to control the minimum number of rows a table (or a UNION ALL view of tables) must have left after the filtering effects of all local predicates have been considered before the join optimizer considers using either the hash push-down join (HPDJ) or the sort/merge push-down join (SMPDJ) algorithms for situations where there are no joins or only lookup joins between this join and the table (or the UNION ALL view). Under most circumstances you do not need to change the value of this option.

MIN_SMPDJ_OR_HPDJ_INDIRECT_SIZE option

Function	Constrains the join algorithm choices available to the optimizer under certain circumstances.
Allowed values	1 to 4294967295
Scope	Can be set temporary, for a user or for the PUBLIC group. Takes effect immediately.
Default	500000
Description	This option allows you to control the minimum number of rows a table (or a UNION ALL view of tables) must have left after the filtering effects of all local predicates have been considered before the join optimizer considers using either the hash push-down join (HPDJ) or the sort/merge push-down join (SMPDJ) algorithms for situations where there are non-lookup (many-to-many or many-to-1) joins between this join and the table (or the UNION ALL view). Under most circumstances you do not need to change the value of this option.

MIN_SMPDJ_OR_HPDJ_TABLE_SIZE option

Function	Constrains the join algorithm choices available to the optimizer under certain circumstances.
Allowed values	1 to 4294967295
Scope	Can be set temporary, for a user or for the PUBLIC group. Takes effect immediately.
Default	100000

Description — This option allows you to control the minimum number of rows which must be present in a table (or a UNION ALL view of tables) before the join optimizer considers using either the hash push-down join (HPDJ) or the sort/merge push-down join (SMPDJ) algorithms. Under most circumstances you do not need to change the value of this option.

MONITOR_OUTPUT_DIRECTORY option

Function — Controls placement of output files for the IQ buffer cache monitor.

Allowed values — String.

Scope — Can be set for the PUBLIC group. Takes effect immediately. DBA permissions are required to set this option.

Default — Same directory as the database.

Description — The IQ monitor sends output to the directory specified by this option. The dummy table used to start the monitor can be either a temporary or permanent table. The directory can be on any physical machine.

The DBA can use the PUBLIC setting to place all monitor output in the same directory, or set different directories for individual users.

Example — This example shows how you could declare a temporary table for monitor output, set its location, and then start the monitor sending files to that location for the main and temp buffer caches.

```
declare local temporary table dummy_monitor
(dummy_column integer)

set option Monitor_Output_Directory = "/tmp"
iq utilities main into dummy_monitor start monitor '-
debug -interval 2'

set option Monitor_Output_Directory = "tmp/"
iq utilities private into dummy_monitor start monitor
'-debug -interval 2'
```

NEAREST_CENTURY option [TSQL]

Function — Controls the interpretation of two-digit years, in string to date conversions.

Allowed values — Integer between 0 and 100

Default — 50

Description

This option controls the handling of two-digit years, when converting from strings to dates or timestamps.

The NEAREST_CENTURY setting is a numeric value that acts as a rollover point. Two digit years less than the value are converted to 20yy, while years greater than or equal to the value are converted to 19yy.

Adaptive Server Enterprise and Sybase IQ behavior is to use the nearest century, so that if the year value *yy* is less than 50, then the year is set to 20yy.

NOEXEC option

Function

Generates the optimizer query plans instead of executing the plan.

Allowed values

ON or OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

OFF

Description

When determining how to process a query, the IQ optimizer generates a query plan as a map of how it plans to have the query engine process the query. If this option is set ON, the optimizer sends the plan for the query to the IQ message file rather than submitting it to the query engine. This option only affects queries or commands that include a query.

Note that when the EARLY_PREDICATE_EXECUTION option is ON, IQ executes the local predicates for all queries before generating a query plan, even when the NOEXEC option is ON. The generated query plan is the same as the runtime plan.

See also

“EARLY_PREDICATE_EXECUTION option”

NON_ANSI_NULL_VARCHAR option

Function

Controls whether zero-length varchars are treated as NULLs for insert/load/update purposes.

Allowed values

ON, OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

OFF

Description

Description: This option lets you revert to non-ANSI (Version 12.03.1) behavior for treating zero-length VARCHAR data during load or update operations. When this option is set to OFF, zero-length varchars are stored as zero-length during load, insert, or update. When this option is set to ON, zero-length VARCHAR data is stored as NULLs on load, insert, or update.

NON_KEYWORDS option [TSQL]

Function

Turns off individual keywords, allowing their use as identifiers.

Allowed values

String

Default

Empty string.

Description

This option turns off individual keywords. If you have an identifier in your database that is now a keyword, you can either add double quotes around the identifier in all applications or scripts, or you can turn off the keyword using the NON_KEYWORDS option.

The following statement prevents TRUNCATE and SYNCHRONIZE from being recognized as keywords:

```
SET OPTION NON_KEYWORDS = 'TRUNCATE, SYNCHRONIZE'
```

Each new setting of this option replaces the previous setting. The following statement clears all previous settings.

```
SET OPTION NON_KEYWORDS =
```

A side effect of the options is that SQL statements using a turned off keyword cannot be used: they produce a syntax error.

NOTIFY_MODULUS option

Function

Controls the default frequency of notify messages issued by certain commands.

Allowed values

Any integer

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

100000

Description — This option sets the default number of notify messages Sybase IQ issues for certain commands that produce them. The NOTIFY clause for some of the commands (such as CREATE INDEX, LOAD TABLE, and DELETE) will override this value. Other commands that do not support the NOTIFY clause (such as SYNCHRONIZE JOIN INDEX) will always use this value. Its default virtually does not restrict the number you can receive.

NULLS option [DBISQL]

Function — Specifies how NULL values in the database are displayed.

Allowed values — ON, OFF

Default — ON (NULL)

Description — Set this according to your preference.

ODBC_DISTINGUISH_CHAR_AND_VARCHAR option

Function — Controls how the Sybase IQ and Adaptive Server Anywhere ODBC driver describes CHAR columns.

Allowed values — ON, OFF

Default — OFF

Description — When a connection is opened, the Sybase IQ and Adaptive Server Anywhere ODBC driver uses the setting of this option to determine how CHAR columns are described. If this option is set to OFF (the default), then CHAR columns are described as SQL_VARCHAR. If this option is set to ON, then CHAR columns are described as SQL_CHAR. VARCHAR columns are always described as SQL_VARCHAR.

See also — Chapter 4, “SQL Data Types” in *Sybase IQ Reference Manual*

ON_CHARSET_CONVERSION_FAILURE option

Function — Controls what happens if an error is encountered during character conversion.

Allowed values — String. See below for allowed values.

Default — IGNORE

Description

Controls what happens if an error is encountered during character conversion, as follows:

- **IGNORE** Errors and warnings do not appear.
- **WARNING** Reports substitutions and illegal characters as warnings. Illegal characters are not translated.
- **ERROR** Reports substitutions and illegal characters as errors.

Single-byte to single-byte converters are not able to report substitutions and illegal characters, and must be set to IGNORE.

ON_ERROR option [DBISQL]

Function

Controls what happens if an error is encountered while executing statements in Interactive SQL.

Allowed values

String (see below for allowed values)

Default

PROMPT

Description

Controls what happens if an error is encountered while executing statements as follows:

- **STOP** DBISQL stops executing statements from the file and returns to the statement window for input.
- **PROMPT** DBISQL prompts the user to see if the user wishes to continue.
- **CONTINUE** The error is displayed and DBISQL continues executing statements.
- **EXIT** DBISQL terminates.
- **NOTIFY_CONTINUE** The error is reported, and the user is prompted to press ENTER or click OK to continue.
- **NOTIFY_STOP** The error is reported, and the user is prompted to press ENTER or click OK to stop executing statements.
- **NOTIFY_EXIT** The error is reported and the user is prompted to press ENTER or click OK to terminate Interactive SQL.

When you are executing a *.SQL* file, the values STOP and EXIT are equivalent.

ON_TSQL_ERROR option [TSQL]

Function: Controls error-handling in stored procedures.

Allowed values: *String*. See below for allowed values.

Default: CONDITIONAL

See also: CREATE PROCEDURE statement [T-SQL]

CREATE PROCEDURE statement

Appendix A, "Compatibility with Other Sybase Databases"

Description: This option controls error handling in stored procedures.

- **STOP** Stop execution immediately upon finding an error.
- **CONDITIONAL** If the procedure uses ON EXCEPTION RESUME, and the statement following the error handles the error, continue, otherwise exit.
- **CONTINUE** Continue execution, regardless of the following statement. If there are multiple errors, the first error encountered in the stored procedure is returned. This option most closely mirrors Adaptive Server Enterprise behavior.

Both CONDITIONAL and CONTINUE settings for ON_TSQL_ERROR are used for Adaptive Server Enterprise compatibility, with CONTINUE most closely simulating Adaptive Server Enterprise behavior. The CONDITIONAL setting is recommended, particularly when developing new Transact-SQL stored procedures, as it allows errors to be reported earlier.

When this option is set to STOP or CONTINUE, it supersedes the setting of the CONTINUE_AFTER_RAISERROR option. However, when this option is set to CONDITIONAL (the default), behavior following a RAISERROR statement is determined by the setting of the CONTINUE_AFTER_RAISERROR option.

See also: CREATE PROCEDURE statement on page 420

CREATE PROCEDURE statement [T-SQL] on page 427

"CONTINUE_AFTER_RAISERROR option [TSQL]" on page 43

"Transact-SQL procedure language overview" on page 815

OS_FILE_CACHE_BUFFERING option

Function	Controls use of file system buffering.
Allowed values	ON, OFF
Scope	Can be set for the PUBLIC group only. You must shut down the database and restart it for the change to take effect. DBA permissions are required to set this option.
Default	OFF; default affects newly created databases only.
Description	This performance option is available on Solaris UFS file systems and Windows file systems only. It does not affect databases on raw disk. Setting OS_FILE_CACHE_BUFFERING = OFF prevents file system buffering for IQ Store files. Turning off file system buffering saves a data copy from the file system buffer cache to the main IQ buffer cache. Usually this reduces paging caused by competition for memory between the IQ buffer manager and the operating system's file system buffer. When it reduces paging, this option improves performance. However, you need to be aware of one exception. If the IQ page size for the database is less than the file system's block size (typically only in the case in testing situations) performance *decreases*, especially during multiuser operation. You may need to experiment with this option to determine the best setting for different conditions. You can change the option setting freely, but you must restart the database for the new setting to take effect.
See also	Chapter 4, "Managing System Resources" in the *Sybase IQ Performance and Tuning Guide*

OUT_OF_DISK_MESSAGE_REPEAT option

Function	Controls the interval time between out of disk space messages.
Allowed values	Any integer
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	120

Description — This option resets the default amount of time Sybase IQ should repeat the cycle of checking and then issuing an out of space message. To determine the length of this time, multiply this option value with the value for OUT_OF_DISK_WAIT_TIME. For example, using the defaults of 120 for OUT_OF_DISK_MESSAGE_REPEAT and 30 seconds for OUT_OF_DISK_WAIT_TIME, Sybase IQ would issue an out of space message every hour.

OUT_OF_DISK_WAIT_TIME option

Function — Controls the default interval time to wait before checking again when out of disk space.

Allowed values — Any integer

Scope — Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.

Default — 30 seconds

Description — This option resets the default number of seconds for Sybase IQ to wait in a hung state when it is out of disk space. At the end of this time, it checks to see if any space has been added. If none has been added, it returns to a sleep state and waits before checking again. It repeats this process until some disk space is added.

OUTPUT_FORMAT option [ISQL]

Function — Sets the output format for the data retrieved by the SELECT statement and redirected into a file, or output using the OUTPUT statement.

Allowed values — *String*. See below for allowed values.

Default — ASCII

Description — The valid output formats are:

- **ASCII** The output is an ASCII format file with one row per line in the file. All values are separated by commas, and strings are enclosed in apostrophes (single quotes). The delimiter and quote strings can be changed using the DELIMITED BY and QUOTE clauses. If ALL is specified in the QUOTE clause, then all values (not just strings) will be quoted.

Three other special sequences are also used. The two characters \n represent a newline character; \\ represents a single backslash character, and the sequence \xDD represents the character with hexadecimal code DD.

- **DBASEII** The output is a dBASE II format file with the column definitions at the top of the file. Note that a maximum of 32 columns can be output. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **DBASEIII** The output is a dBASE III format file with the column definitions at the top of the file. Note that a maximum of 128 columns can be output. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **EXCEL** The output is an Excel 2.1 worksheet. The first row of the worksheet contains column labels (or names if there are no labels defined). Subsequent worksheet rows contain the actual table data.
- **FIXED** The output is fixed format, with each column having a fixed width. The width for each column can be specified using the COLUMN WIDTH clause. If this clause is omitted, the width for each column is computed from the data type for the column, and is large enough to hold any value of that data type. No column headings are output in this format.
- **FOXPRO** The output is a FoxPro format file (the FoxPro memo field is different than the dBASE memo field) with the column definitions at the top of the file. Note that a maximum of 128 columns can be output. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **HTML** The output is in the Hyper Text Markup Language format.
- **LOTUS** The output is a Lotus WKS format worksheet. Column names will be put as the first row in the worksheet. Note that there are certain restrictions on the maximum size of Lotus WKS format worksheets that other software (such as Lotus 1-2-3) can load. There is no limit to the size of file Interactive SQL can produce.
- **SQL** The output is an Interactive SQL INPUT statement required to recreate the information in the table.
- **XML** The output is an XML file encoded in UTF-8 and containing an embedded DTD. Binary values are encoded in CDATA blocks with the binary data rendered as 2-hex-digit strings.

See also

OUTPUT statement [DBISQL] on page 533

OUTPUT_LENGTH option [ISQL]

Function	Controls the length used when Interactive SQL exports information to an external file.
Allowed values	*Integer*
Default	*0* (no truncation)
Description	This option controls the length used when Interactive SQL exports information to an external file (using output redirection with the OUTPUT statement). This option affects only ASCII, HTML, and SQL output formats.
See also	OUTPUT statement [DBISQL] on page 533

OUTPUT_NULLS option [ISQL]

Function	Controls the way NULL values appear in result sets.
Allowed values	*String*
Default	'NULL'
Description	This option controls the way NULL values appear in result sets. Every time a NULL value is found in the result set, the string from this option is returned instead. This setting applies to data displayed in Interactive SQL on the Results tab in the Results pane as well as to data in output files generated by the OUTPUT statement. This option affects only ASCII, HTML, and SQL output formats.
See also	OUTPUT statement [DBISQL] on page 533

PARALLEL_GBH_ENABLED option

Function	Allows GROUP BY operations on a single table to be executed in parallel using all available CPUs, if determined appropriate by the optimizer.
Allowed values	ON, OFF
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	ON

Description — The PARALLEL_GBH_ENABLED option causes GROUP BY operations on a single table to be done in parallel using all available CPUs. This option provides significant performance gains for some queries in certain situations.

PARALLEL_GBH_ENABLED is ON by default. You can disable this feature by setting PARALLEL_GBH_ENABLED to OFF or constrain the effect by changing the value of the PARALLEL_GBH_UNITS option.

See also — "PARALLEL_GBH_UNITS option"

PARALLEL_GBH_MIN_ROWS_PER_UNIT option

Function — Can limit the degree of parallelism chosen by the optimizer for GROUP BY operations.

Allowed values — 0 to 4294967295

Scope — Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 3000000

Description — When the PARALLEL_GBH_ENABLED option is ON, the value of PARALLEL_GBH_MIN_ROWS_PER_UNIT can indirectly limit the degree of parallelism chosen within the optimizer for GROUP BY operations by requiring that each unit of work to be done in parallel must have at least this many rows. The default of 3 million rows means that a table must have at least 6 million rows before the optimizer chooses to execute GROUP BY in parallel over that table.

The default of 3 million is appropriate for large databases on systems with numerous CPUs. For smaller systems or for servers where GROUP BY operations frequently involve more complex aggregates and grouping expressions, performance of some queries can be improved by setting this option to a lower value, such as 500,000.

See also — "PARALLEL_GBH_ENABLED option"

"PARALLEL_GBH_UNITS option"

PARALLEL_GBH_UNITS option

Function — Overrules the choice of the optimizer on the degree of parallelism of GROUP BY operations.

Allowed values: 0 to 100

Scope: Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default: 0

Description: When the PARALLEL_GBH_ENABLED option is ON, you can constrain the effect of this feature by changing the value of the PARALLEL_GBH_UNITS option. The PARALLEL_GBH_UNITS option overrules the optimizer's choice on the degree of parallelism. Normally, you should not set this option.

The argument to PARALLEL_GBH_UNITS is a value that represents a specific number of parts to break the GROUP BY into in order to execute in parallel. For example, to run in eight parts, use

```
SET TEMPORARY OPTION PARALLEL_GBH_UNITS = 8
```

If PARALLEL_GBH_UNITS is 0, the optimizer chooses the degree of parallelism based on the number of CPUs, the number of users on the server, and the amount of data to be grouped.

See also: "PARALLEL_GBH_ENABLED option"

"MAX_QUERY_PARALLELISM option"

PERCENT_AS_COMMENT option [TSQL]

Function: Controls the interpretation of the percent (%) character.

Allowed values: ON, OFF

Default: ON

Description: By default, Sybase IQ treats the percent character as a comment marker. However, it is recommended that you do not use it as such; use one of the alternative comment markers such as //, /* */, and -- (double dash) instead. The double-dash style is the SQL/92 comment delimiter.

Adaptive Server Enterprise treats the % as a modulo operator, and it does not support the Sybase IQ mod function. You can set this option to OFF for compatibility with both environments.

Adaptive Server Anywhere treats the percent character exactly as Sybase IQ, that is, as comment by default, but as a modulo operator if you turn off the PERCENT_AS_COMMENT option.

Procedures and views created with % style comments are converted to double-dash comments when they are stored in the catalog. The Sybase Central code editor does not highlight % style comments. If you wish to have your comments highlighted, you should use one of the other comment delimiters.

Note Any existing procedures that contain %-style comments must be recreated before you change the option setting; otherwise, the procedures will fail to load.

PRECISION option

Function	Specifies the maximum number of digits in the result of any decimal arithmetic, for queries on the Catalog Store only.
Allowed values	Integer value of 126
Default	126
Description	Precision is the total number of digits to the left and right of the decimal point. The default precision value is fixed at 126. The SCALE option specifies the minimum number of digits after the decimal point when an arithmetic result is truncated to the maximum specified by PRECISION, for queries on the Catalog Store.
See also	"SCALE option" on page 120 For queries on the IQ Store, see "MAX_CLIENT_NUMERIC_PRECISION option" on page 89

PREFETCH option

Function	Sets a toggle allowing you to turn fetching on or off.
Allowed values	ON, OFF
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	ON

Description

For the Catalog Store only, this option controls whether rows are fetched to the client side in advance of being made available to the client application. Fetching a number of rows at a time, even when the client application requests rows one at a time (for example, when looping over the rows of a cursor) both cuts down on response time and improves overall throughput by cutting down the number of requests to the database.

The setting of PREFETCH is ignored by Open Client and JDBC connections, and for the IQ Store.

PREFETCH_BUFFER_LIMIT option

Function

Specifies the amount of memory used for prefetching.

Allowed values

Integer

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.

Default

0

Description

This option defines the number of cache pages available to Sybase IQ for use in prefetching (the read ahead of database pages).

Do not set this option unless advised to do so by Sybase Technical Support.

PREFETCH_BUFFER_PERCENT option

Function

Specifies the percent of memory used for prefetching.

Allowed values

0 to 100

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.

Default

40

Description

This option is an alternative to the PREFETCH_BUFFER_LIMIT option, as it specifies the percentage of cache available for use in prefetching.

Do not set this option unless advised to do so by Sybase Technical Support.

PREFETCH_GARRAY_PERCENT option

Function	Specifies the percent of prefetch resources designated for inserts to HG indexes.
Allowed values	0 to 100
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	60
Description	As with PREFETCH_SORT_PERCENT, this option designates a percentage of prefetch resources for use when inserting into an HG index. Do not set this option unless advised to do so by Sybase Technical Support.

PREFETCH_SORT_PERCENT option

Function	Specifies the percent of prefetch resources designated for sorting objects.
Allowed values	0 to 100
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	50
Description	This option designates a percentage of prefetch resources for use by a single sort object. Turning this value up can improve the single user performance of inserts and deletes, but it may have detrimental effects on multi-user operations. Do not set this option unless advised to do so by Sybase Technical Support.

PRESERVE_SOURCE_FORMAT option [database]

Function	Controls whether the original source definition of procedures, views, and event handlers is saved in system files. If saved, it is saved in the column source in SYSTABLE, SYSPROCEDURE, and SYSEVENT.
Allowed values	ON, OFF
Default	ON

Description

When PRESERVE_SOURCE_FORMAT is ON, the server saves the formatted source from CREATE and ALTER statements on procedures, views, and events, and puts it in the appropriate system table's source column.

Unformatted source text is stored in the same system tables, in the columns proc_defn, and view_defn. However, these definitions are not easy to read in Sybase Central. The formatted source column allows you to view the definitions with the spacing, comments, and case that you want.

This option can be turned off to reduce space used to save object definitions in the database. The option can be set only for the user PUBLIC.

QUERY_DETAIL option

Function

Specifies whether or not to include additional query information.

Allowed values

ON or OFF

Scope

DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default

OFF

Description

When QUERY_DETAIL and QUERY_PLAN (or QUERY_PLAN_AS_HTML) are both turned on, Sybase IQ displays additional information about the query when producing its query plan. When QUERY_PLAN and QUERY_PLAN_AS_HTML are OFF, this option is ignored.

When QUERY_PLAN is ON (the default), especially if QUERY_DETAIL is also ON, you may want to enable message log wrapping to avoid filling up your message log file. See “IQMSG_LENGTH_MB option” on page 72 for details.

See also

“QUERY_PLAN option”

“QUERY_PLAN_AS_HTML option”

QUERY_NAME option

Function

Gives a name to an executed query.

Allowed values

Quote-delimited string of up to 80 characters.

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — Empty string.

Description — The QUERY_NAME option can be assigned any quote-delimited string value, up to 80 characters, for example:

```
set temporary option Query_Name = 'my third query'
```

When this option is set, query plans that are sent to the *.iqmsg* file or *.html* file include a line near the top of the plan that looks like:

```
Query_Name:  'my third query'
```

If the option is set to a different value before each query in a script, it is much easier to identify the correct query plan for a particular query. It also prevents previous query plans from being overwritten. This option has no other effect on the query.

QUERY_PLAN option

Function — Specifies whether or not additional query messages are produced.

Allowed values — ON or OFF

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — ON

Description — When this option is turned ON, Sybase IQ produces messages about queries. These include messages about using join indexes, the join order, join algorithms for the queries, and columns being extracted using the data extraction options. When this option is turned OFF, those messages are suppressed. The information is sent to the *<dbname>.iqmsg* file.

See also — “QUERY_DETAIL option”

“QUERY_PLAN_AS_HTML option”

“QUERY_PLAN_AFTER_RUN option”

QUERY_PLAN_AFTER_RUN option

Function — Prints the entire query plan after query execution is complete.

Allowed values: ON or OFF

Scope: DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default: OFF

Description: When this option is turned on, the query plan is printed after the query has finished running. This allows the query plan to include additional information, such as the actual number of rows passed on from each node of the query.

In order for this option to work, the QUERY_PLAN option must be set to ON (the default). This option can be used in conjunction with QUERY_DETAIL to generate additional information in the query plan report.

QUERY_PLAN_AS_HTML option

Function: Generates graphical query plans in HTML format for viewing in a web browser.

Allowed values: ON or OFF

Scope: DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default: OFF

Description: This option causes graphical query plans to be generated in HTML format.

When you set this option, you should also set the QUERY_NAME option for each query, so that you will know which query is associated with the query plan.

IQ writes the plans in the same directory as the *.iqmsg* file, in a file named:

user-name_query-name_YYYYMMDD_HHMMSS.html

For example, if the user DBA sets the temporary option QUERY_NAME to `'Query_1123'`, a file created on April 18, 2002 at exactly 8:30 a.m. is called *DBA_Query_1123_20020418_083000.html*. The date and time are appended to the file name automatically to ensure that existing files are not overwritten.

Note If you use this feature, be sure to monitor your disk space usage so that you leave enough room for your *.iqmsg* and log files to grow. Enabling IQ message log wrapping helps control the size of this file.

QUERY_PLAN_AS_HTML acts independently of the setting for the QUERY_PLAN option. In other words, if QUERY_PLAN_AS_HTML is ON, you get an HTML format query plan whether or not QUERY_PLAN is ON.

This feature is supported with newer versions of many commonly used browsers. Some browsers may experience problems with plans generated for very complicated queries.

QUERY_PLAN_AS_HTML_DIRECTORY option

Function	Specifies the directory into which IQ writes the HTML query plans.
Allowed values	String containing a directory pathname
Scope	Can be set temporary, for an individual connection, or for the PUBLIC group. DBA authority is required to set the option. Takes effect immediately.
Default	" (empty string)
Description	When the QUERY_PLAN_AS_HTML option is turned ON and a directory is specified with the QUERY_PLAN_AS_HTML_DIRECTORY option, Sybase IQ writes the HTML query plans in the specified directory. This option provides additional security, as query plans can contain sensitive data. When the QUERY_PLAN_AS_HTML_DIRECTORY option is not used, the query plans are sent to the default directory (the *.iqmsg* file directory). If the QUERY_PLAN_AS_HTML option is ON and QUERY_PLAN_AS_HTML_DIRECTORY is set to a directory that does not exist, then Sybase IQ does not save the HTML query plan and no error is generated. In this case, the query continues to run and a message is logged to the IQ message file, so the DBA knows that the HTML query plan was not written. If the directory path specified or permissions on the directory are not correct, the message “Error opening HTML Query plan: *file-name*” is written in the *.iqmsg* file.

Example	Create the example directory */system1/users/DBA/html_plans* and set the correct permissions on the directory. Then set the options and run the query:
	
	`SET TEMPORARY OPTION QUERY_PLAN_AS_HTML = ‘ON’;`
	`SET TEMPORARY OPTION QUERY_PLAN_AS_HTML_DIRECTORY = ‘/system1/users/DBA/html_plans’;`
	`SELECT col1 FROM tab1;`
	
	The HTML query plan is written to a file in the specified directory */system1/users/DBA/html_plans*.

See also "QUERY_PLAN_AS_HTML option"

QUERY_ROWS_RETURNED_LIMIT option

Function: Sets the row threshold for rejecting queries based on estimated size of result set.

Allowed values: Any integer

Scope: DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default: 0

Description: If Sybase IQ receives a query that has an estimated number of result rows greater than the value of this option, it rejects the query with the following message:

```
Query rejected because it exceeds resource:
Query_Rows_Returned_Limit
```

If you set this option to zero (the default), there is no limit and no queries will ever be rejected based on number of rows in their output.

QUERY_TEMP_SPACE_LIMIT option

Function: Constrains the use of temporary IQ dbspace by user queries.

Allowed values: Any integer

Scope: DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default: 2000 MB

Description: If Sybase IQ receives a query that requires a temporary result space larger than value of this option, it rejects the query with the following message:

```
Query rejected because it exceeds total space resource
limit
```

If you set this option to zero, there is no limit and no queries will ever be rejected based on their temporary dbspace requirements.

QUERY_TIMING option

Function	Determines whether or not to collect specific timing statistics.
Allowed values	ON or OFF
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	OFF
Description	This option controls the collection of timing statistics on subqueries and some other repetitive functions in the query engine. This parameter should normally be OFF (the default) because for very short correlated subqueries, timing every subquery execution can slow down a query.

QUOTED_IDENTIFIER option [TSQL]

Function	Controls the interpretation of strings that are enclosed in double quotes.
Allowed values	ON, OFF OFF for Open Client and JDBC connections
Default	ON
Description	This option controls whether strings enclosed in double quotes are interpreted as identifiers (ON) or as literal strings (OFF). The QUOTED_IDENTIFIER option is included for Transact-SQL compatibility. Sybase Central and Interactive SQL set QUOTED_IDENTIFER temporarily to ON if it is set to OFF. A message is displayed informing you of this change. The change is in effect only for the Sybase Central or Interactive SQL connection. For more information, see Appendix A, “Compatibility with Other Sybase Databases”.

RECOVERY_TIME option

Function	Sets the maximum length of time, in minutes, that the database server will take to recover from system failure.
Allowed values	Integer, in minutes

Scope	Can be set only for the PUBLIC group. Takes effect when the server is restarted.
Default	2
Description	This option is used with the CHECKPOINT_TIME option to decide when checkpoints should be done. A heuristic measures the recovery time based on the operations since the last checkpoint. Thus, the recovery time is not exact. For more information, see Chapter 10, "Transactions and Versioning" in the *Sybase IQ System Administration Guide*.

RETURN_DATE_TIME_AS_STRING option

Function	To control how a date, time, or timestamp value is passed to the client application when queried.
Allowed values	ON, OFF
Scope	Can be set as a temporary option only, for the duration of the current connection.
Default	OFF
Description	This option indicates whether date, time, and timestamp values are returned to applications as a date or time datatype or as a string. When this option is set to ON, the server converts the date, time, or timestamp value to a string before it is sent to the client in order to preserve the TIMESTAMP_FORMAT, DATE_FORMAT, or TIME_FORMAT option setting. Sybase Central and Interactive SQL automatically turn the RETURN_DATE_TIME_AS_STRING option ON.
See also	"DATE_FORMAT option" on page 47 "TIME_FORMAT option" on page 140 "TIMESTAMP_FORMAT option" on page 140

ROW_COUNT option

Function	Limits the number of rows returned from a query.

Allowed values	Integer.
Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	0 (no limit on rows returned).
Description	When this run-time option is set to a non-zero value, query processing stops after the specified number of rows. This option only affects statements with the keyword SELECT. It does not affect UPDATE and DELETE statements. The SELECT statement keywords FIRST and TOP also limit the number of rows returned from a query. FIRST returns the first row and is equivalent to setting ROW_COUNT equal to 1. TOP returns a specified number of rows and is the same as setting ROW_COUNT equal to the same number of rows. TOP has an upper limit of 32767, but ROW_COUNT has no upper limit. If both TOP and ROW_COUNT are set, the value of TOP takes precedence.
See also	"QUERY_ROWS_RETURNED_LIMIT option" on page 117 SELECT statement on page 559

SCALE option

Function	Specifies the minimum number of digits after the decimal point when an arithmetic result is truncated to the maximum PRECISION, for queries on the Catalog Store only.
Allowed values	Integer, with a maximum of 126.
Default	38
Description	This option specifies the minimum number of digits after the decimal point when an arithmetic result is truncated to the maximum PRECISION, for queries on the Catalog Store. Multiplication, division, addition, subtraction, and aggregate functions can all have results that exceed the maximum precision.
See also	"PRECISION option" on page 110 For queries on the IQ Store, see "MAX_CLIENT_NUMERIC_SCALE option"

SIGNIFICANTDIGITSFORDOUBLEEQUALITY option

Function
Specifies the number of significant digits to the right of the decimal in exponential notation are used in equality tests between two complex arithmetic expressions.

Allowed values
0 to 15

Scope
DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default
0

Description
Because doubles are stored in binary (base 2) instead of decimal (base 10), this setting gives the approximate number of significant decimal digits used. If set to 0, all digits are used.

For example, when the option is set to 12, the following numbers compare as equal. When set to 13, they do not:

- 1.23456789012345
- 1.23456789012389

This option affects equality tests between two complex arithmetic expressions, not those done by the indexes.

SORT_PHASE1_HELPERS option

Function
Specifies the number of threads to be used in a sort.

Allowed values
Integer.

Scope
DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default
3

Description
SORT_PHASE1_HELPERS is used to control the number of helper threads used by the sort object in phase1 (insertion). If set to 0, no helper threads are requested.

This option is used for performance analysis and tuning. If you change this option, you must experiment to find the best value to increase performance, as choosing the wrong value may decrease performance. Sybase recommends using the default value for SORT_PHASE1_HELPERS.

If your IQ temporary buffer cache is larger than 10GB, however, Sybase recommends setting the SORT_PHASE1_HELPERS option in the range of 5 to 10.

SORT_PINNABLE_CACHE_PERCENT option

Function — Specifies the maximum percentage of currently available buffers a sort object will try to pin.

Allowed values — 0 - 100

Scope — DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.

Default — 20

Description — For very large sorts a larger value may help reduce the number of merge phases required by the sort. A larger number, however, may impact other users' sorts and hashes running on the system. If you change this option, you must experiment to find the best value to increase performance, as choosing the wrong value may decrease performance. Sybase recommends using the default value for SORT_PINNABLE_CACHE_PERCENT.

This option is primarily for use by Sybase Technical Support. If you change the value of SORT_PINNABLE_CACHE_PERCENT, do so with extreme caution.

SQL_FLAGGER_ERROR_LEVEL option [TSQL]

Function — Controls the behavior in response to any SQL that is not part of a specified set of SQL/92.

Allowed values — E, I, F, or W.

Default — W

Description — This option flags any SQL that is not part of a specified set of SQL/92 as an error.

The allowed values of *level* and their meanings are as follows:

- **E** Flag syntax that is not entry-level SQL/92 syntax
- **I** Flag syntax that is not intermediate-level SQL/92 syntax
- **F** Flag syntax that is not full-SQL/92 syntax

- **W** Allow all supported syntax

SQL_FLAGGER_WARNING_LEVEL option [TSQL]

Function
Controls the behavior in response to any SQL that is not part of a specified set of SQL/92.

Allowed values
E, I, F, or W.

Default
W

Description
This option flags any SQL that is not part of a specified set of SQL/92 as a warning.

The allowed values of *level* and their meanings are as follows:

- **E** Flag syntax that is not entry-level SQL/92 syntax
- **I** Flag syntax that is not intermediate-level SQL/92 syntax
- **F** Flag syntax that is not full-SQL/92 syntax
- **W** Allow all supported syntax

STATISTICS option [DBISQL]

Function
Controls whether execution times, optimization strategies and other statistics will be displayed in the statistics window.

Allowed values
0, 3, 4, 5, or 6.

Default
3

Description
When the option is set to 0, the statistics window is not displayed. Otherwise, the value represents the height of the statistics window in lines.

STRING_RTRUNCATION option [TSQL]

Function
Determines whether an error is raised when an INSERT or UPDATE truncates a CHAR, VARCHAR, BINARY, or VARBINARY string.

Allowed values
ON, OFF

Default
OFF

Description

If the truncated characters consist only of spaces, no exception is raised. The setting of ON corresponds to ANSI/ISO SQL/92 behavior. When set to OFF, the exception is not raised and the character string is silently truncated. If the option is ON and an error is raised, a ROLLBACK occurs.

SUBQUERY_PLACEMENT_PREFERENCE option

Function

Controls the placement of correlated subquery predicate operators within a query plan.

Allowed Values

-1 to 1

Scope

Can be set for any scope, any user, takes immediate effect.

Default

0

Description

For correlated subquery operators within a query, the IQ optimizer may have a choice of several different valid locations within that query's plan. This option allows you to override the optimizer's cost-based decision when choosing the placement location. It does not override internal rules that determine whether a location is valid, and in some queries, there maybe only one valid choice. If you set this option to a non-zero value, it affects every correlated subquery predicate in a query; it cannot be used to selectively modify the placement of one subquery out of several in a query.

This option is normally used for internal testing, and only experienced DBAs should use it. The following table describes the valid values for this option and their actions.

Table 2-14: SUBQUERY_PLACEMENT_PREFERENCE values

Value	Action
0	Let the optimizer choose.
1	Prefer a location high in the query plan, thereby delaying the execution of the subquery to as late as possible within the query.
-1	Prefer a location as low as possible in the query plan, thereby placing the execution of the subquery as early as possible within the query.

The default setting of this option is almost always appropriate. Occasionally, Sybase Technical Support may ask you to change this value.

SUPPRESS_TDS_DEBUGGING option

Function	Determines whether TDS debugging information appears in the server window.
Allowed values	ON, OFF
Default	OFF
Description	When the server is started with the -z option, debugging information appears in the server window, including debugging information about the TDS protocol. The SUPPRESS_TDS_DEBUGGING option restricts the debugging information about TDS that appears in the server window. When this option is set to OFF (the default) TDS debugging information appears in the server window.

SWEEPER_THREADS_PERCENT option

Function	Specifies the percentage of IQ threads used to sweep out buffer caches
Allowed Values	1 to 40
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	10 (percent)
Description	Sybase IQ uses a small percentage of its processing threads as sweeper threads. These sweeper threads clean out dirty pages in the main and temp buffer caches. In the IQ Monitor -cache report, the GDirty column shows the number of times the LRU buffer was grabbed in a “dirty” (modified) state. If GDirty is greater than 0 for more than a brief time, you may need to increase SWEEPER_THREADS_PERCENT or WASH_AREA_BUFFERS_PERCENT. The default setting of this option is almost always appropriate. Occasionally, Sybase Technical Support may ask you to increase this value.
See also	“WASH_AREA_BUFFERS_PERCENT option” on page 144 Chapter 5, “Monitoring and Tuning Performance” in the *Sybase IQ Performance and Tuning Guide*

TDS_EMPTY_STRING_IS_NULL option [database]

Function	Controls whether empty strings are returned as NULL or a string containing one blank character for TDS connections.
Allowed values	ON, OFF
Default	OFF
Description	By default, this option is set to OFF and empty strings are returned as a string containing one blank character for TDS connections. When this option is set to ON, empty strings are returned as NULL strings for TDS connections. Non-TDS connections distinguish empty strings from NULL strings.

TEMP_CACHE_MEMORY_MB option

Function	Specifies the size of the temporary shared buffer cache, in MB.
Allowed values	1 to 4294967295 (2^{32} -1)
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	12MB
Description	This option sets the size of the temporary shared memory buffer cache for the database. Sybase recommends that you do not use this option; instead, set the temporary buffer cache size with the -iqtc server option. On 64-bit systems you can allocate as much physical memory as you have to IQ buffer caches; however, for values greater than 4GB, you must use the server options -iqmc and -iqtc to set main and temporary buffer cache sizes. On 32-bit systems, the operating system limits the amount of memory you can allocate. See the *Sybase IQ Installation and Configuration Guide* for your platform for details. In almost every case, the default temporary buffer cache size of 8MB is too low. For optimal performance, allocate as much memory as possible to the IQ main and temporary buffer caches. For example, if you have 4GB of shared memory on your machine available to Sybase IQ, you can split that amount between the main and temporary shared buffer caches. If your IQ temporary buffer cache is larger than 10GB, Sybase also recommends increasing the SORT_PHASE1_HELPERS database option.

When setting the temp cache size you must consider many factors, including total physical memory, swap space, memory for the main buffer cache, your indexes and query types, your mix of query and load processing, the number of concurrent users, as well as memory requirements of the operating system and other applications on the machine. See Chapter 4, "Managing System Resources" in the *Sybase IQ Performance and Tuning Guide* for important information about setting buffer cache sizes.

See also

"SORT_PHASE1_HELPERS option" on page 121

"Server command-line options" on page 7 in Chapter 1, "Running the Database Server" of the *Sybase IQ Utility Guide*

TEMP_KB_PER_STRIPE option

Function

Defines the number of kilobytes (KB) to write to each dbspace before the disk striping algorithm moves to the next stripe for the IQ Temporary Store.

Allowed values

Integer greater than zero, in kilobytes

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. Takes effect at the next checkpoint.

Default

1 (which rounds up to one page)

Description

This option lets you control the number of kilobytes written to each dbspace before the IQ disk striping algorithm moves to the next stripe for the IQ Temporary Store. The corresponding number of blocks is rounded up to a page boundary, so the actual amount written to each stripe may be slightly larger than requested. You can tune this option by measuring the time required to complete I/O intensive updates and adjusting the option value accordingly.

For more information, see Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide* and the section "Balancing I/O" in Chapter 4, "Managing System Resources" of the *Sybase IQ Performance and Tuning Guide*.

TEMP_EXTRACT_APPEND option

Function

Specifies that any rows extracted by the data extraction facility are added to the end of an output file.

Allowed values

ON or OFF

Scope
Can be set for an individual connection. Takes effect immediately.

Default
OFF

Description
This option specifies that any rows extracted by the data extraction facility are added to the end of an output file. You create the output file in a directory where you have write/execute permissions and you set write permission on the directory and output file for the user name used to start IQ (for example, **sybase**). You can give permissions on the output file to other users as appropriate. The name of the output file is specified in the TEMP_EXTRACT_NAME1 option. The data extraction facility creates the output file, if the file does not already exist.

TEMP_EXTRACT_APPEND is not compatible with the TEMP_EXTRACT_SIZEn options. If you try to restrict the size of the extract append output file, Sybase IQ reports an error.

See the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also the TEMP_EXTRACT_NAMEn options.

TEMP_EXTRACT_BINARY option

Function
Specifies in combination with the TEMP_EXTRACT_SWAP option the type of extraction performed by the data extraction facility.

Allowed values
ON or OFF

Scope
Can be set for an individual connection. Takes effect immediately.

Default
OFF

Description
This option is used with the TEMP_EXTRACT_SWAP option to specify the type of extraction performed by the data extraction facility.

Table 2-15: Extraction option settings for extraction type

Extraction type	Temp_Extract_Binary	Temp_Extract_Swap
binary	ON	OFF
binary/swap	ON	ON
ASCII	OFF	OFF

The default extraction type is ASCII.

See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also the TEMP_EXTRACT_SWAP option.

TEMP_EXTRACT_COLUMN_DELIMITER option

Function

Specifies the delimiter between columns in the output of the data extraction facility for an ASCII extraction.

Allowed values

string

Scope

Can be set for an individual connection. Takes effect immediately.

Default

','

Description

This option is used to specify the delimiter between columns in the output of the data extraction facility. In the case of an ASCII extraction, the default is to separate column values with commas. Strings are unquoted by default.

The delimiter must occupy from 1 to a maximum of 4 bytes and must be valid in the collation order you are using, if you are using a multibyte collation order. Be sure to choose a delimiter that does not occur in any of the data output strings themselves.

If this option is set to the empty string " for ASCII extractions, then the extracted data is written in fixed-width ASCII with no column delimiter. Numeric and binary data types are right-justified on a field of *n* blanks, where *n* is the maximum number of bytes needed for any value of that type. Character data types are left-justified on a field of *n* blanks.

Note The minimum column width in a fixed-width ASCII extraction is four bytes to allow the string “NULL” for a NULL value. For example, if the extracted column is CHAR(2) and Temp_Extract_Column_Delimiter is set to the empty string ", there are two spaces after the extracted data.

See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options.

See also TEMP_EXTRACT_ROW_DELIMITER option, TEMP_EXTRACT_QUOTE option, TEMP_EXTRACT_QUOTES option, and TEMP_EXTRACT_QUOTES_ALL option.

TEMP_EXTRACT_DIRECTORY option

Function	Controls whether a user is allowed to use the data extraction facility.
Allowed values	string
Scope	Can be set temporary, per user, or for the PUBLIC group. DBA authority is required to set the option. This option takes effect immediately.
Default	" (the empty string)
Description	If the TEMP_EXTRACT_DIRECTORY option is set to the string FORBIDDEN (case insensitive) for a user, then that user is not allowed to perform data extracts. An attempt by this user to use the data extraction facility results in an error. If TEMP_EXTRACT_DIRECTORY is set to FORBIDDEN for the PUBLIC group, then no one can run data extraction. This option provides increased security and helps control disk management by restricting the creation of large data extraction files to only the directories for which a user has write access. See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also “TEMP_EXTRACT_NAMEn options.”

TEMP_EXTRACT_NAMEn options

Function	Specifies the names of the output files or named pipes used by the data extraction facility. There are eight options: TEMP_EXTRACT_NAME1 through TEMP_EXTRACT_NAME8.
Allowed values	string
Scope	Can be set for an individual connection. Takes effect immediately.
Default	" (the empty string)
Description	TEMP_EXTRACT_NAME1 through TEMP_EXTRACT_NAME8 specify the names of the output files used by the data extraction facility. These options must be used sequentially. For example, TEMP_EXTRACT_NAME3 has no effect unless both the options TEMP_EXTRACT_NAME1 and TEMP_EXTRACT_NAME2 are already set.

The most important of these options is TEMP_EXTRACT_NAME1. If TEMP_EXTRACT_NAME1 is set to its default setting (the empty string), extraction is disabled and no output is redirected. To enable extraction, set TEMP_EXTRACT_NAME1 to a possible pathname. Extract starts extracting into a file with that name. Be sure to choose the pathname to a file that is not otherwise in use. Sybase recommends setting the TEMP_EXTRACT_NAME1 option as TEMPORARY.

TEMP_EXTRACT_NAME1 is also used to specify the name of the output file, when the TEMP_EXTRACT_APPEND option is set ON. In this case, before you execute the SELECT statement, set write permission for the user name used to start IQ (for example, **sybase**) on the directory or folder containing the named file and on the named file. In append mode, the data extraction facility adds extracted rows to the end of the file and does not overwrite the data that is already in the file. If the output file does not already exist, the data extraction facility creates the file.

Warning! If you choose the pathname of an existing file and the TEMP_EXTRACT_APPEND option is set OFF (the default), the file contents will be overwritten. This may be what you want if the file is for a weekly report, for example, but is not what you want if the file is one of your database files.

The options TEMP_EXTRACT_NAME2 through TEMP_EXTRACT_NAME8 can be used in addition to TEMP_EXTRACT_NAME1 to specify the names of multiple output files.

If you are extracting to a single disk file or a single named pipe, leave the options TEMP_EXTRACT_NAME2 through TEMP_EXTRACT_NAME8 and TEMP_EXTRACT_SIZE1 through TEMP_EXTRACT_SIZE8 at their default values.

When TEMP_EXTRACT_NAME1 is set, you cannot perform these operations:

- LOAD, DELETE, INSERT or INSERT...LOCATION to a table that is the top table in a join
- SYNCHRONIZE JOIN INDEX (issued explicitly or executed as part of CREATE JOIN INDEX)
- INSERT...SELECT

Also note the following restrictions on the data extraction facility:

- Extract works only with data stored in the IQ Store.

- Extract does not work on system tables or cross database joins.
- Extract does not work with queries that use user-defined functions or system functions, except for the system functions suser_id() and suser_name().
- If you run DBISQL (Interactive SQL Java) with the -q (quiet mode) option and the data extraction commands are in a command file, you must first set and make permanent the DBISQL option “Show multiple result sets.” If this option is not set, the output file is not created.

  To set the “Show multiple result sets” option, click Tools → Options in the DBISQL window, then check the box “Show multiple result sets” and click “Make permanent.”

See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also the TEMP_EXTRACT_SIZEn options and the TEMP_EXTRACT_APPEND option.

TEMP_EXTRACT_NULL_AS_EMPTY option

Function	Controls the representation of null values in the output of the data extraction facility for an ASCII extraction.
Allowed values	ON or OFF
Scope	Can be set for an individual connection. Takes effect immediately.
Default	OFF
Description	The TEMP_EXTRACT_NULL_AS_EMPTY option controls the representation of null values in the output of the data extraction facility for ASCII extractions. When the TEMP_EXTRACT_NULL_AS_EMPTY option is set to ON, a null value is represented as '' (the empty string) for all data types. Note that the quotes shown above are not present in the extract output file. When the TEMP_EXTRACT_NULL_AS_EMPTY option is set to OFF, the string 'NULL' is used in all cases to represent a NULL value. OFF is the default value. See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options.

TEMP_EXTRACT_NULL_AS_ZERO option

Function

Controls the representation of null values in the output of the data extraction facility for an ASCII extraction.

Allowed values

ON or OFF

Scope

Can be set for an individual connection. Takes effect immediately.

Default

OFF

Description

The TEMP_EXTRACT_NULL_AS_ZERO option controls the representation of null values in the output of the data extraction facility for ASCII extractions. When the TEMP_EXTRACT_NULL_AS_ZERO option is set to ON, a null value is represented as follows:

- '0' for arithmetic type
- '' (the empty string) for the CHAR and VARCHAR character types
- '' (the empty string) for dates
- '' (the empty string) for times
- '' (the empty string) for timestamps

Note that the quotes shown above are not present in the extract output file. When the TEMP_EXTRACT_NULL_AS_ZERO option is set to OFF, the string 'NULL' is used in all cases to represent a NULL value. OFF is the default value.

Note In Sybase IQ 12.5, an ASCII extract from a CHAR or VARCHAR column in a table always returns at least four characters to the output file. This is required if TEMP_EXTRACT_NULL_AS_ZERO option is set to OFF, because Sybase IQ needs to write out the word NULL for any row in a column that has a null value. Reserving four spaces is not required if TEMP_EXTRACT_NULL_AS_ZERO is set to ON.

In Sybase IQ 12.6, if TEMP_EXTRACT_NULL_AS_ZERO is set to ON, the number of characters that an ASCII extract writes to a file for a CHAR or VARCHAR column equals the number of characters in the column, even if that number is less than four.

See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options.

TEMP_EXTRACT_QUOTE option

Function	Specifies the string to be used as the quote to enclose fields in the output of the data extraction facility for an ASCII extraction, when either the TEMP_EXTRACT_QUOTES option or the TEMP_EXTRACT_QUOTES_ALL option is set ON.
Allowed values	string
Scope	Can be set for an individual connection. Takes effect immediately.
Default	" (the empty string)
Description	This option specifies the string to be used as the quote to enclose fields in the output of the data extraction facility for an ASCII extraction, if the default value is not suitable. TEMP_EXTRACT_QUOTE is used with the TEMP_EXTRACT_QUOTES and TEMP_EXTRACT_QUOTES_ALL options.The quote string specified in the TEMP_EXTRACT_QUOTE option has the same restrictions as the row and column delimiters. The default for this option is the empty string, which IQ converts to the single quote mark. The string specified in the TEMP_EXTRACT_QUOTE option must occupy from 1 to a maximum of 4 bytes and must be valid in the collation order you are using, if you are using a multibyte collation order. Be sure to choose a string that does not occur in any of the data output strings themselves. See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also TEMP_EXTRACT_COLUMN_DELIMITER option, TEMP_EXTRACT_ROW_DELIMITER option, TEMP_EXTRACT_QUOTES option, and TEMP_EXTRACT_QUOTES_ALL option.

TEMP_EXTRACT_QUOTES option

Function	Specifies that string fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction.
Allowed values	ON or OFF
Scope	Can be set for an individual connection. Takes effect immediately.
Default	OFF

Description

This option specifies that string fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction. The string used as the quote is specified in the TEMP_EXTRACT_QUOTE option, if the default is not suitable.

See the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options.

See also TEMP_EXTRACT_COLUMN_DELIMITER option, TEMP_EXTRACT_ROW_DELIMITER option, TEMP_EXTRACT_QUOTE option, and TEMP_EXTRACT_QUOTES_ALL option.

TEMP_EXTRACT_QUOTES_ALL option

Function

Specifies that all fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction.

Allowed values

ON or OFF

Scope

Can be set for an individual connection. Takes effect immediately.

Default

OFF

Description

This option specifies that all fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction. The string used as the quote is specified in the TEMP_EXTRACT_QUOTE option, if the default is not suitable.

See the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options.

See also TEMP_EXTRACT_COLUMN_DELIMITER option, TEMP_EXTRACT_ROW_DELIMITER option, TEMP_EXTRACT_QUOTE option, and TEMP_EXTRACT_QUOTES option.

TEMP_EXTRACT_ROW_DELIMITER option

Function

Specifies the delimiter between rows in the output of the data extraction facility for an ASCII extraction.

Allowed values	string
Scope	Can be set for an individual connection. Takes effect immediately.
Default	'' (the empty string)
Description	This option specifies the delimiter between rows in the output of the data extraction facility. In the case of an ASCII extraction, the default is to end the row with a newline on UNIX platforms and with a carriage return/newline pair on Windows platforms. The delimiter must occupy from 1 to a maximum of 4 bytes and must be valid in the collation order you are using, if you are using a multibyte collation order. Be sure to choose a delimiter that does not occur in any of the data output strings themselves. Note that the default for the TEMP_EXTRACT_ROW_DELIMITER option is the empty string. IQ converts the empty string default for this option to the newline on UNIX platforms and to the carriage return/newline pair on Windows platforms. See the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also TEMP_EXTRACT_COLUMN_DELIMITER option, TEMP_EXTRACT_QUOTE option, TEMP_EXTRACT_QUOTES option, and TEMP_EXTRACT_QUOTES_ALL option.

TEMP_EXTRACT_SIZEn options

Function	Specifies the maximum sizes of the corresponding output files used by the data extraction facility. There are eight options: TEMP_EXTRACT_SIZE1 through TEMP_EXTRACT_SIZE8.
Allowed values	AIX & HP-UX: 0 - 64GB Sun Solaris: 0 - 512GB Windows: 0 - 128GB
Scope	Can be set for an individual connection. Takes effect immediately.
Default	0

Description

TEMP_EXTRACT_SIZE1 through TEMP_EXTRACT_SIZE8 are used to specify the maximum sizes of the corresponding output files used by the data extraction facility. TEMP_EXTRACT_SIZE1 specifies the maximum size of the output file specified by TEMP_EXTRACT_NAME1, TEMP_EXTRACT_SIZE2 specifies the maximum size of the output file specified by TEMP_EXTRACT_NAME2, and so on.

Note that the default for the data extraction size options is 0. IQ converts this default to the following values:

device type	size
disk file	AIX & HP-UX: 0 - 64GB Sun Solaris: 0 - 512GB Windows: 0 - 128GB
tape*	524288KB (0.5GB)
other	9007199254740992KB (8192 Petabytes “unlimited”)

*Tape devices currently are not supported.

If you are extracting to a single disk file or a single named pipe, leave the options TEMP_EXTRACT_NAME2 through TEMP_EXTRACT_NAME8 and TEMP_EXTRACT_SIZE1 through TEMP_EXTRACT_SIZE8 at their default values.

The TEMP_EXTRACT_SIZE*n* options are not compatible with the TEMP_EXTRACT_APPEND option. If you try to restrict the size of the extract append output file, Sybase IQ reports an error.

See the section “Data extraction options” in Chapter 7, “Moving Data In and Out of Databases” of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also the TEMP_EXTRACT_NAMEn options.

TEMP_EXTRACT_SWAP option

Function

Specifies in combination with the TEMP_EXTRACT_BINARY option the type of extraction performed by the data extraction facility.

Allowed values

ON or OFF

Scope

Can be set for an individual connection. Takes effect immediately.

Default

OFF

Description

This option is used with the TEMP_EXTRACT_BINARY option to specify the type of extraction performed by the data extraction facility.

Table 2-16: Extraction option settings for extraction type

Extraction type	Temp_Extract_Binary	Temp_Extract_Swap
binary	ON	OFF
binary/swap	ON	ON
ASCII	OFF	OFF

The default extraction type is ASCII.

See the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide* for details on the data extraction facility and using the extraction options. See also the TEMP_EXTRACT_BINARY option.

TEMP_RESERVED_DBSPACE_MB option

Function

Controls the amount of space Sybase IQ reserves in the Temporary IQ Store.

Allowed values

Integer greater than zero, in megabytes

Scope

Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.

Default

200; IQ actually reserves the minimum of 200MB and 50% of the size of the last dbspace

Description

This option lets you control the amount of space Sybase IQ sets aside in your Main IQ Store for certain small but critical data structures used during release savepoint, commit, and checkpoint operations. For a production database, set this value to between 200MB and 1GB. The larger your IQ page size and number of concurrent connections, the more reserved space you need.

IQ reserves the minimum of 200MB and 50% of the size of the last dbspace, which helps DBAs avoid out-of-space conditions by reserving more space automatically.

See also

"Reserving space to handle out-of-space conditions" in Chapter 5, "Working with Database Objects," *Sybase IQ System Administration Guide*.

TEMP_SPACE_LIMIT_CHECK option

Function	Checks for Catalog Store temporary space on a per connection basis.
Allowed values	ON, OFF (no limit checking occurs)
Scope	Can be set only for the PUBLIC group only. DBA authority required.
Default	OFF
Description	When TEMP_SPACE_LIMIT_CHECK is ON, the database server checks the amount of Catalog Store temporary file space that a connection uses. If a connection requests more than its quota of temporary file space when this option is set to OFF, a fatal error can occur. When this option is set to ON, if a connection requests more than its quota of temporary file space, the request fails and the error "Temporary space limit exceeded" is returned. Two factors are used to determine the temporary file quota for a connection: the maximum size of the temporary file, and the number of active database connections. The maximum size of the temporary file is the sum of the current size of the file and the amount of disk space available on the partition containing the file. When limit checking is turned on, the server checks a connection for exceeding its quota when the temporary file has grown to 80% or more of its maximum size, and the connection requests more temporary file space. Once this happens, any connection fails that uses more than the maximum temporary file space divided by the number of active connections.

Note This option is unrelated to IQ Temporary Store space. To constrain the growth of IQ temporary space, see "QUERY_TEMP_SPACE_LIMIT option" on page 117.

Example

A database is started with the temporary file on a drive with 100MB free and no other active files on the same drive. The available temporary file space is thus 100MB. The DBA issues:

```
SET OPTION PUBLIC.TEMP_SPACE_LIMIT_CHECK = 'ON'
```

As long as the temporary file stays below 80MB, the server behaves as it did before. Once it reaches 80MB, the new behavior may occur. Assume that with 10 queries running, the temporary file needs to grow. When the server finds that one query is using more than 8MB of temporary file space, that query fails.

See also

You can obtain information about the space available for the temporary file using the sa_disk_free_space system procedure. For more information, see *Adaptive Server Anywhere SQL Reference*.

TIME_FORMAT option

Function — Sets the format used for times retrieved from the database.

Allowed values — A string composed of the symbols HH, NN, MM, SS, separated by colons.

Default — 'HH:NN:ss.SSS'

For Open Client and JDBC connections the default is set to HH:NN:SS.SSS.

Description — The format is a string using the following symbols:

- **hh** Two digit hours (24 hour clock)
- **nn** Two digit minutes
- **mm** Two digit minutes if following a colon (as in 'hh:mm')
- **ss[.s...s]** Two digit seconds plus optional fraction

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be put in uppercase which will cause the substituted characters to also be in uppercase. For numbers, using mixed case in the format string will suppress leading zeros.

Note that multibyte characters are not supported in format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN. See the section “DATE_FORMAT option” for more information.

TIMESTAMP_FORMAT option

Function — Sets the format used for timestamps retrieved from the database.

Allowed values — A string composed of the symbols listed below.

Default — 'YYYY-MM-DD HH:NN:ss.SSS'

Description — The format is a string using the following symbols:

Table 2-17: TIMESTAMP_FORMAT string symbols

Symbol	Description
yy	Two-digit year
yyyy	Four-digit year
mm	Two-digit month, or two digit minutes if following a colon (as in 'hh:mm')
mmm	Three-character short form for name of the month of year
mmmm[m...]	Character long form for month name—as many characters as there are m's, until the number of m's specified exceeds the number of characters in the month's name.
dd	Two-digit day of month
ddd	Three-character short form for name of the day of week
dddd[d...]	Character long form for day name—as many characters as there are d's, until the number of d's specified exceeds the number of characters in the day's name.
hh	Two-digit hours
nn	Two-digit minutes
ss.SSS	Seconds (ss) and fractions of a second (SSS), up to six decimal places. Not all platforms support timestamps to a precision of six places.
aa	Am or pm (12 hour clock)
pp	Pm if needed (12 hour clock)

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be put in uppercase which will cause the substituted characters to also be in uppercase. For numbers, using mixed case in the format string will suppress leading zeros.

Note that multibyte characters are not supported in format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN. See the section "DATE_FORMAT option" for more information.

TRIM_PARTIAL_MBC option

Function — Allows automatic trimming of partial multibyte character data.

Allowed values — ON, OFF

Scope — DBA permissions are not required to set this option. Can only be set for the PUBLIC group. Takes effect immediately.

Default: OFF

Description: Provides consistent loading of data for collations that contain both single-byte and multibyte characters. When TRIM_PARTIAL_MBC is ON:

- A partial multibyte character is replaced with a blank when loading into a CHAR column
- A partial multibyte character is truncated when loading into a VARCHAR column

When TRIM_PARTIAL_MBC is OFF, normal CONVERSION_ERROR semantics are in effect.

See also: "CONVERSION_ERROR option [TSQL]" on page 44

TRUNCATE_WITH_AUTO_COMMIT option

Function: To speed up TRUNCATE TABLE statements in the Catalog Store.

Allowed values: ON, OFF

Default: ON

See also: TRUNCATE TABLE statement on page 591

Description: In the Catalog Store only, if TRUNCATE_WITH_AUTO_COMMIT is set to ON, then a COMMIT is executed both before and after the TRUNCATE TABLE statement is executed. The primary purpose of the option is to enable faster table truncation (delete of all rows).

There are some cases where a fast TRUNCATE cannot be done:

- If there are foreign keys either to or from the table.
- If the TRUNCATE TABLE statement is executed within an atomic statement.

TRUNCATION_LENGTH option [DBISQL]

Function: Controls the truncation of wide columns for displays to fit on a screen.

Allowed values: Integer

Default: 256

Description

When SELECT statement results are displayed on the screen, each column of output is limited to the width of the screen. The TRUNCATION_LENGTH option is used to reduce the width of wide columns so that more than one column will fit on the screen. A value of 0 means that columns are not truncated.

The default TRUNCATION_LENGTH is 256. For character-mode systems, this is an actual number of characters. For windowing systems, TRUNCATION_LENGTH is used to estimate an area of the screen to be used for display since proportional fonts are used.

TSQL_HEX_CONSTANT option [TSQL]

Function

Controls whether hexadecimal constants are treated as binary typed constants.

Allowed values

ON, OFF

Default

ON

Description

When set to ON, hexadecimal constants are treated as binary typed constants.

TSQL_VARIABLES option [TSQL]

Function

Controls whether the @ sign can be used as a prefix for Embedded SQL host variable names.

Allowed values

ON, OFF

ON for Open Client and JDBC connections

Default

OFF

Description

When this option is set to ON, you can use the @ sign instead of the colon as a prefix for host variable names in Embedded SQL. This is implemented primarily for the Open Server Gateway.

USER_RESOURCE_RESERVATION option

Function

Adjust memory use for the number of current users.

Allowed values

Integer

Scope	DBA permissions are not required to set this option. Can be set temporary, for an individual connection, or for the PUBLIC group. Takes effect immediately.
Default	1
Description	Sybase IQ tracks the number of open cursors and allocates memory accordingly. In certain circumstances, this option can be used to adjust the minimum number of current cursors that IQ thinks is currently using the product and hence allocate memory from the temporary cache more sparingly. This option should only be set after careful analysis shows it is actually required. If you need to set this parameter, contact Sybase Technical Support with details.

WASH_AREA_BUFFERS_PERCENT option

Function	Specifies the percentage of the buffer caches above the wash marker.
Allowed Values	1 to 100
Scope	Can be set only for the PUBLIC group. DBA authority is required to set the option. You must shut down and restart the database server for the change to take effect.
Default	20 (percent)
Description	Sybase IQ buffer caches are organized as a long MRU/LRU chain. The area above the wash marker is used to sweep out (that is, write) dirty pages to disk. In the IQ Monitor -cache report, the Gdirty column shows the number of times the LRU buffer was grabbed in a "dirty" (modified) state. If GDirty is greater than 0 for more than a brief time, you may need to increase SWEEPER_THREADS_PERCENT or WASH_AREA_BUFFERS_PERCENT. The default setting of this option is almost always appropriate. Occasionally, Sybase Technical Support may ask you to increase this value.
See also	“SWEEPER_THREADS_PERCENT option” on page 125 Chapter 5, “Monitoring and Tuning Performance” in the *Sybase IQ Performance and Tuning Guide*

WAIT_FOR_COMMIT option

Function	Determines when foreign key integrity is checked as data is manipulated.
Allowed values	ON or OFF
Scope	Can be set for an individual connection or the PUBLIC group. Takes effect immediately.
Default	OFF
Description	If this option is set to ON, the database does not check foreign key integrity until the next COMMIT statement. Otherwise, all foreign keys not created with the CHECK ON COMMIT option are checked as they are inserted, updated or deleted.

CHAPTER 3

SQL Language Elements

About this chapter

This chapter presents detailed descriptions of the language elements and conventions of Sybase IQ SQL.

Keywords

Each SQL statement contains one or more keywords. SQL is not case sensitive to keywords, but throughout these manuals, keywords are indicated in upper case.

For example, in the following statement, SELECT and FROM are keywords:

```
SELECT *
FROM employee
```

The following statements are equivalent to the one above:

```
Select *
From employee
select * from employee
sELECT * FRoM employee
```

Some keywords cannot be used as identifiers without surrounding them in double quotes. These are called reserved words.

Reserved words

Some keywords in SQL are also **reserved words**. To use a reserved word in a SQL statement as an identifier, you must enclose the word in double quotes. Many, but not all, of the keywords that appear in SQL statements are reserved words. For example, you must use the following syntax to retrieve the contents of a table named SELECT.

```
SELECT *
FROM "SELECT"
```

Because SQL is not case sensitive with respect to keywords, each of the following words may appear in upper case, lower case, or any combination of the two. All strings that differ only in capitalization from one of the following words are reserved words.

If you are using Embedded SQL, you can use the database library function sql_needs_quotes to determine whether a string requires quotation marks. A string requires quotes if it is a reserved word or if it contains a character not ordinarily allowed in an identifier.

Table 3-1 lists the SQL reserved words in Sybase IQ.

Table 3-1: SQL reserved words

add	all	alter	and
any	as	asc	backup
begin	between	bigint	binary
bit	bottom	break	by
call	capability	cascade	case
cast	char	char_convert	character
check	checkpoint	close	comment
commit	connect	constraint	contains
continue	convert	create	cross
cube	current	current_timestamp	current_user
cursor	date	dbspace	deallocate
dec	decimal	declare	default
delete	deleting	desc	disable
distinct	do	double	drop
dynamic	else	elseif	enable
encrypted	end	endif	escape
except	exception	exec	execute
existing	exists	externlogin	fetch
first	float	for	force
foreign	forward	from	full
goto	grant	group	having
holdlock	identified	if	in
index	index_lparen	inner	inout
insensitive	insert	inserting	install
instead	int	integer	integrated
intersect	into	iq	is
isolation	join	key	lateral
left	like	lock	login
long	match	membership	message
mode	modify	natural	new
no	noholdlock	not	notify
null	numeric	of	off
on	open	option	options
or	order	others	out
outer	over	passthrough	precision
prepare	primary	print	privileges
proc	procedure	publication	raiserror

readtext	real	reference	references
release	remote	remove	rename
reorganize	resource	restore	restrict
return	revoke	right	rollback
rollup	save	savepoint	schedule
scroll	select	sensitive	session
set	setuser	share	smallint
some	sqlcode	sqlstate	start
stop	subtrans	subtransaction	synchronize
syntax_error	table	temporary	then
time	timestamp	tinyint	to
top	tran	transaction	trigger
truncate	tsequal	unbounded	union
unique	unknown	unsigned	update
updating	user	using	validate
values	varbinary	varchar	variable
varying	view	wait	waitfor
when	where	while	window
with	with_cube	with_lparen	with_rollup
within	work	writetext	

Identifiers

Function

Identifiers are names of objects in the database, such as user IDs, tables, and columns.

Description

Identifiers have a maximum length of 128 bytes. They must be enclosed in double quotes or square brackets if any of the following conditions are true:

- The identifier contains spaces.
- The first character of the identifier is not an alphabetic character (as defined below).
- The identifier contains a reserved word.
- The identifier contains characters other than alphabetic characters and digits.

Alphabetic characters include the alphabet, as well as the underscore character (_), at sign (@), number sign (#), and dollar sign ($). The database collation sequence dictates which characters are considered alphabetic or digit characters.

The following characters are not permitted in identifiers:

- Double quotes
- Control characters (any character less than 0x20)
- Double backslashes

You can use a single backslash in an identifier only if it is used as an escape character.

If the QUOTED_IDENTIFIER database option is set to OFF, double quotes are used to delimit SQL strings and cannot be used for identifiers. However, you can always use square brackets to delimit identifiers, regardless of the setting of QUOTED_IDENTIFIER. The default setting for the QUOTED_IDENTIFIER option is to OFF for Open Client and jConnect connections; otherwise the default is ON.

You can represent an apostrophe (single quote) inside an identifier by following it with another apostrophe.

Tables used with Component Integration Services (CIS) cannot have names longer than 30 bytes. This limit applies to tables referenced in cross-database joins, user-defined functions, or certain system functions, as well as tables created in the Catalog Store or ON SYSTEM, tables loaded using INSERT...LOCATION, and tables accessed via ISQL.

Column identifiers that start with at sign (@) are placeholders for the actual column name when they appear in column check constraints. Column identifiers that start with the at sign are *not* placeholders when they appear in table check constraints. For more information, see CREATE TABLE statement on page 435.

See also

For a complete list of the reserved words, see “Reserved words” on page 147.

For information on the QUOTED_IDENTIFIER option, see “The quoted_identifier option” on page 161.

For additional restrictions on server and database names, see the section “Server command-line options” on page 7 in Chapter 1, “Running the Database Server” of the *Sybase IQ Utility Guide*.

Examples

The following are all valid identifiers.

```
Surname
```

```
"Surname"
[Surname]
SomeBigName
"Client Number"
```

Strings

Strings are of the following types:

- literal strings
- expressions with CHAR or VARCHAR data types.

An expression with a CHAR data type may be a built-in or user-defined function, or one of the many other kinds of expressions available.

For more information on expressions, see “Expressions” on page 153.

A literal string is any sequence of characters enclosed in apostrophes ('single quotes'). A SQL variable of character data type can hold a string. The following is a simple example of a literal strings:

```
'This is a string.'
```

Special characters in strings

You represent special characters in strings by escape sequences, as follows:

- To represent an apostrophe inside a string, use two apostrophes in a row. For example:

  ```
  'John''s database'
  ```

- To represent a new line character, use a backslash followed by n (\n). For example:

  ```
  'First line:\nSecond line:'
  ```

- To represent a backslash character, use two backslashes in a row (\\). For example:

  ```
  'c:\\temp'
  ```

- Hexadecimal escape sequences can be used for any character, printable or not. A hexadecimal escape sequence is a backslash followed by an x followed by two hexadecimal digits (for example, \x6d represents the letter m). For example:

  ```
  '\x00\x01\x02\x03'
  ```

Compatibility

For compatibility with Adaptive Server Enterprise, you can set the QUOTED_IDENTIFIER database option to OFF. With this setting, you can also use double quotes to mark the beginning and end of strings. The option is set to ON by default.

Expressions

Syntax

expression:
case-expression
| *constant*
| [*correlation-name* .] *column-name* [*java-ref*]
| - *expression*
| *expression operator expression*
| (*expression*)
| *function-name* (*expression*, ...)
| *if-expression*
| [*java-package-name*.] *java-class-name java-ref*
| (*subquery*)
| *variable-name* [*java-ref*]

Parameters

case-expression:
{ **CASE** *search-condition*
... **WHEN** *expression* **THEN** *expression* [, ...]
... [**ELSE** *expression*]
END
| **CASE**
... **WHEN** *search-condition* **THEN** *expression* [, ...]
... [**ELSE** *expression*]
END }

constant:
{ *integer* | *number* | *'string'* | *special-constant*
| *host-variable* }

special-constant:
{ **CURRENT** { **DATE** | **TIME** | **TIMESTAMP** | **USER** }
| **LAST USER**
| **NULL**
| **SQLCODE**
| **SQLSTATE** }

if-expression:
IF *condition*
... **THEN** *expression*
... [**ELSE** *expression*]
ENDIF

java-ref:
{ **.***field-name* [*java-ref*]
| >> *field-name* [*java-ref*]
| **.***method-name* ([*expression*] [, ...]) [*java-ref*]
| >> *method-name* ([*expression*] [, ...]) [*java-ref*] }

operator:
{ **+** | **-** | ***** | **/** | **||** | **%** }

Usage
Anywhere

Authorization
Must be connected to the database.

Side effects
None

Description
Expressions are formed from several different kinds of element, discussed in the following sections.

Compatibility
- The IF condition is not supported in Adaptive Server Enterprise.
- Java expressions are not currently supported in Adaptive Server Enterprise.
- For other differences, see the separate descriptions of each class of expression, in the following sections.

Constants in expressions

Constants are numbers or strings. String constants are enclosed in apostrophes ('single quotes'). An apostrophe is represented inside the string by two apostrophes in a row.

Column names in expressions

A column name is an identifier preceded by an optional correlation name. (A correlation name is usually a table name. For more information on correlation names, see FROM clause on page 486.) If a column name has characters other than letters, digits, and underscore, the name must be surrounded by quotation marks (""). For example, the following are valid column names:

```
employee.name
address
"date hired"
"salary"."date paid"
```

For more information on Identifiers, see “Identifiers” on page 150.

Subqueries in expressions

A subquery is a SELECT statement enclosed in parentheses. The SELECT statement must contain one and only one select list item. When used as an expression, a scalar subquery is allowed to return only zero or one value;

Within the SELECT list of the top level SELECT, or in the SET clause of an UPDATE statement, a scalar subquery can be used anywhere that a column name can be used. However, the subquery cannot appear inside a conditional expression (CASE, IF, NULLIF, ARGN).

For example, the following statement returns the number of employees in each department, grouped by department name:

```
SELECT dept_name, COUNT(*), 'out of',
(SELECT COUNT(*) FROM employee)
FROM department AS D, employee AS E
WHERE D.dept_id = E.dept_id
GROUP BY dept_name;
```

For other uses of subqueries, see "Subqueries in search conditions" on page 165.

SQL Operators

This section describes the arithmetic, string, and bitwise operators available in Sybase IQ. For information on comparison operators, see the section "Search conditions" on page 162.

The normal precedence of operations applies. Expressions in parentheses are evaluated first; then multiplication and division before addition and subtraction. String concatenation happens after addition and subtraction.

Arithmetic operators

expression + expression Addition. If either expression is the NULL value, the result is the NULL value.

expression - expression Subtraction. If either expression is the NULL value, the result is the NULL value.

- expression Negation. If the expression is the NULL value, the result is the NULL value.

expression * expression Multiplication. If either expression is the NULL value, the result is the NULL value.

expression / expression Division. If either expression is the NULL value or if the second expression is 0, the result is the NULL value.

expression % expression Modulo finds the integer remainder after a division involving two whole numbers. For example, 21 % 11 = 10 because 21 divided by 11 equals 1 with a remainder of 10. You must turn off the PERCENT_AS_COMMENT option in order to use the '%' operator.

String operators

expression || expression String concatenation (two vertical bars). If either string is the NULL value, the string is treated as the empty string for concatenation.

expression + expression Alternative string concatenation. When using the + concatenation operator, you must ensure the operands are explicitly set to character data types rather than relying on implicit data conversion.

Standards and compatibility

- **SQL/92** The || operator is the SQL/92 string concatenation operator.
- **Sybase** The + operator is supported by Adaptive Server Enterprise.

Bitwise operators

The following operators can be used on all unscaled integer data types, in both Sybase IQ and Adaptive Server Enterprise.

Operator	Description
&	AND
|	OR
^	EXCLUSIVE OR
~	NOT

The AND Operator (&)

Bit 1	Bit 2	Bit 1 & Bit 2
0	0	0
0	1	0
1	0	0
1	1	1

The AND operator compares 2 bits. If they are both 1, the result is 1.

Bitwise OR (|)

Bit 1	Bit 2	Bit 1 | Bit 2
0	0	0
0	1	1
1	0	1
1	1	1

The OR operator compares 2 bits. If one or the other bit is 1, the result is 1.

EXCLUSIVE OR (^)

The EXCLUSIVE OR operator results in a 1 when either of its two operands is 1 but not both.

Bit 1	Bit 2	Bit 1 ^Bit 2
0	0	0
0	1	1
1	0	1
1	1	0

NOT (~)

The NOT operator is a unary operator that returns the inverse of its operand.

Bit	~ Bit
1	0
0	1

Join operators

The Transact-SQL outer join operators *= and =* are supported in Sybase IQ, in addition to the SQL/92 join syntax using a table expression in the FROM clause.

Compatibility

- **Modulo** The % operator can be used in Sybase IQ only if the PERCENT_AS_COMMENT option is set to OFF. The default value is OFF for new databases.
- **String concatenation** When using the + concatenation operator in Sybase IQ, you should ensure the operands are explicitly set to strings rather than relying on implicit data conversion. For example, the following query returns the integer value 579,

```
SELECT 123 + 456
```

whereas the following query returns the character string 123456:

```
SELECT '123' + '456'
```

You can use the CAST or CONVERT function to explicitly convert data types.

Note When used with BINARY or VARBINARY data types, the + operator is concatenation, not addition.

The || concatenation operator is not supported by Adaptive Server Enterprise.

Operator precedence

When using more than one operator in an expression, Sybase recommends that you make the order of operation explicit using parentheses, rather than relying on an identical operator precedence between Adaptive Server Enterprise and Sybase IQ.

IF expressions

The syntax of the IF expression is as follows:

IF *condition*
THEN *expression1*
[**ELSE** *expression2*]
ENDIF

This expression returns the following:

- If *condition* is TRUE, the IF expression returns *expression1*.
- If *condition* is FALSE, the IF expression returns *expression2*.
- If *condition* is FALSE, and there is no *expression2*, the IF expression returns NULL.
- If condition is NULL, the IF expression returns NULL.

For more information about TRUE, FALSE and UNKNOWN conditions, see “NULL value” on page 186 and “Search conditions” on page 162.

IF statement is different from IF expression
Do not confuse the syntax of the IF expression with that of the IF statement.

For information on the IF statement, see IF statement on page 497.

CASE expressions

The CASE expression provides conditional SQL expressions. Case expressions can be used anywhere an expression can be used.

The syntax of the CASE expression is as follows:

CASE *expression*
WHEN *expression* **THEN** *expression* [, . . .]
[**ELSE***expression*] **END**

A subquery cannot be used as a value expression in a CASE statement.

If the expression following the CASE statement is equal to the expression following the WHEN statement, then the expression following the THEN statement is returned. Otherwise the expression following the ELSE statement is returned, if it exists.

For example, the following code uses a case expression as the second clause in a SELECT statement.

```
SELECT id,
  (CASE name
  WHEN 'Tee Shirt' THEN 'Shirt'
  WHEN 'Sweatshirt' THEN 'Shirt'
  WHEN 'Baseball Cap' THEN 'Hat'
  ELSE 'Unknown'
  END) as Type
FROM "DBA".Product
```

An alternative syntax is as follows:

CASE
WHEN *search-condition* **THEN** *expression* [, . . .]
[**ELSE***expression*] **END**

If the search-condition following the WHEN statement is satisfied, the expression following the THEN statement is returned. Otherwise the expression following the ELSE statement is returned, if it exists.

For example, the following statement uses a case expression as the third clause of a SELECT statement to associate a string with a search-condition.

```
SELECT id, name,
  (CASE
  WHEN name='Tee Shirt' THEN 'Sale'
  WHEN quantity >= 50  THEN 'Big Sale'
  ELSE 'Regular price'
  END) as Type
FROM "DBA".Product
```

NULLIF function for abbreviated CASE expressions

The NULLIF function provides a way to write some CASE statements in short form. The syntax for NULLIF is as follows:

NULLIF (*expression-1*, *expression-2*)

NULLIF compares the values of the two expressions. If the first expression equals the second expression, NULLIF returns NULL. If the first expression does not equal the second expression, NULLIF returns the first expression.

Compatibility of expressions

Table 3-2 and Table 3-3 describe the compatibility of expressions and constants between Adaptive Server Enterprise and Sybase IQ. These tables are a guide only, and a marking of Both may not mean that the expression performs in an identical manner for all purposes under all circumstances. For detailed descriptions, you should refer to the Adaptive Server Enterprise documentation and the Sybase IQ documentation on the individual expression.

In the following table, expr represents an expression, and op represents an operator.

Table 3-2: Compatibility of expressions between ASE and IQ

Expression	Supported by
constant	Both
column name	Both
variable name	Both
function (expr)	Both
- expr	Both
expr op expr	Both
(expr)	Both
(subquery)	Both
if-expression	Sybase IQ only

Table 3-3: Compatibility of constants between ASE and IQ

Constant	Supported by
integer	Both
number	Both
'string'	Both
special-constant	Both
host-variable	Sybase IQ

Default interpretation of delimited strings

By default, Adaptive Server Enterprise and Sybase IQ give different meanings to delimited strings: that is, strings enclosed in apostrophes (single quotes) and in quotation marks (double quotes).

Sybase IQ employs the SQL/92 convention, that strings enclosed in apostrophes are constant expressions, and strings enclosed in quotation marks (double quotes) are delimited identifiers (names for database objects). Adaptive Server Enterprise employs the convention that strings enclosed in quotation marks are constants, while delimited identifiers are not allowed by default and are treated as strings.

The quoted_identifier option

Both Adaptive Server Enterprise and Sybase IQ provide a quoted_identifier option that allows the interpretation of delimited strings to be changed. By default, the quoted_identifier option is set to OFF in Adaptive Server Enterprise, and to ON in Sybase IQ.

You cannot use SQL reserved words as identifiers if the quoted_identifier option is off.

For a complete list of reserved words, see *Table 3-1: SQL reserved words*.

Setting the option

While the Transact-SQL SET statement is not supported for most Adaptive Server Enterprise connection options, SET is supported for the quoted_identifier option.

The following statement in either Sybase IQ or Adaptive Server Enterprise changes the setting of the quoted_identifier option to ON:

```
SET quoted_identifier ON
```

With the quoted_identifier option set to ON, Adaptive Server Enterprise allows table, view, and column names to be delimited by quotes. Other object names cannot be delimited in Adaptive Server Enterprise.

The following statement in Sybase IQ or Adaptive Server Enterprise changes the setting of the quoted_identifier option to OFF:

```
SET quoted_identifier OFF
```

Compatible interpretation of delimited strings

You can choose to use either the SQL/92 or the default Transact-SQL convention in both Adaptive Server Enterprise and Sybase IQ as long as the quoted_identifier option is set to the same value in each DBMS.

Examples

If you choose to operate with the quoted_identifier option on (the default Sybase IQ setting), then the following statements involving the SQL keyword user are valid for both types of DBMS.

```
CREATE TABLE "user" (
   col1 char(5)
) ;
INSERT "user" ( col1 )
VALUES ( 'abcde' ) ;
```

If you choose to operate with the quoted_identifier option off (the default Adaptive Server Enterprise setting), then the following statements are valid for both types of DBMS.

```
SELECT *
FROM employee
WHERE emp_lname = "Chin"
```

Search conditions

Function

To specify a search condition for a WHERE clause, a HAVING clause, a CHECK clause, a JOIN clause, or an IF expression.

Syntax

{ *expression compare expression*
| *expression compare* { **ANY** | **SOME**| **ALL** } (*subquery*)
| *expression* **IS** [**NOT**] **NULL**
| *expression* [**NOT**] **BETWEEN** *expression* **AND** *expression*
| *expression* [**NOT**] **LIKE** *expression* [**ESCAPE** *expression*]
| *expression* [**NOT**] **IN** ({ *expression* | *subquery* |
... *value-expr1* , *value-expr2* [, *value-expr3*]... })
| *column-name* [**NOT**] **CONTAINS** (... *word1* [, *word2*,] [, *word3*]...)
| **EXISTS** (*subquery*)
| **NOT** *condition*
| *condition* **AND** *condition*
| *condition* **OR** *condition*
| (*condition*)
| (*condition* , *estimate*)
| *condition* **IS** [**NOT**] { **TRUE** | **FALSE** | **UNKNOWN** }

Parameters

compare:
{ **=** | **>** | **<** | **>=** | **<=** | **<>** | **!=** | **!<** | **!>** }

Usage	Anywhere
Authorization	Must be connected to the database.

Example	For example, the following query retrieves the names and birth years of the oldest employees:
	`SELECT name, year_of_birth`
	`FROM employees`
	`WHERE year_of_birth <= ALL (SELECT year_of_birth FROM employees);`
	The subqueries that provide comparison values for quantified comparison predicates may retrieve multiple rows but can only have one column.

Side effects	None
See also	"Expressions" on page 153
Description	Conditions are used to choose a subset of the rows from a table, or in a control statement such as an IF statement to determine control of flow. SQL conditions do not follow boolean logic, where conditions are either true or false. In SQL, every condition evaluates as one of TRUE, FALSE, or UNKNOWN. This is called three-valued logic. The result of a comparison is UNKNOWN if either value being compared is the NULL value. For tables showing how logical operators combine in three-valued logic, see "Three-valued logic" on page 172. Rows satisfy a search condition if and only if the result of the condition is TRUE. Rows for which the condition is UNKNOWN do not satisfy the search condition. For more information about NULL, see "NULL value" on page 186. Subqueries form an important class of expression that is used in many search conditions. For information about using subqueries in search conditions, see "Subqueries in search conditions" on page 165. The different types of search condition are discussed in the following sections.

Comparison conditions

The syntax for comparison conditions is as follows:

expression compare expression

where *compare* is a comparison operator. Table 3-4 lists the comparison operators available in IQ.

Table 3-4: Comparison operators available in IQ

operator	description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
!=	Not equal to
<>	Not equal to
!>	Not greater than
!<	Not less than

Example

For example, the following query retrieves the names and birth years of the oldest employees:

```
SELECT name, year_of_birth
FROM employees
WHERE year_of_birth <= ALL (SELECT MIN(year_of_birth)
FROM employees);
```

The subqueries that provide comparison values for quantified comparison predicates, as in the preceding example, may retrieve multiple rows but can only have one column.

Note All string comparisons are:

- *Case sensitive* if the database was created as case respect (the default)
- *Case insensitive* if the database was created as case ignore

---

Compatibility

- **Trailing blanks** Any trailing blanks in character data are ignored for comparison purposes by Adaptive Server Enterprise. The behavior of Sybase IQ when comparing strings is controlled by an option when creating the database.
- **Case sensitivity** By default, Sybase IQ databases, like Adaptive Server Enterprise databases, are created as case sensitive. Comparisons are carried out with the same attention to case as the database they are operating on. You can control the case sensitivity of Sybase IQ databases when creating the database.

Subqueries in search conditions

A subquery is a SELECT statement enclosed in parentheses. Such a SELECT statement must contain one and only one select list item.

A column can be compared to a subquery in a comparison condition (for example, >,<, or !=) as long as the subquery returns no more than one row. If the subquery (which must have one column) returns one row, then the value of that row is compared to the expression. If a subquery returns no rows, its value is NULL.

Subqueries that return exactly one column and any number of rows can be used in IN conditions, ANY conditions, ALL conditions, or EXISTS conditions. These conditions are discussed in the following sections.

Sybase IQ supports UNION only in uncorrelated subquery predicates, not in scalar value subqueries or correlated subquery predicates.

Subqueries cannot be used inside a BETWEEN, CONTAINS, or LIKE predicate.

Sybase IQ does not support multiple subqueries in a single OR clause. For example, the following query has two subqueries joined by an OR:

```
CREATE VARIABLE @ln int;

SELECT @ln = 1;select count(*) FROM lineitem

WHERE l_shipdate IN (select l_shipdate FROM lineitem
WHERE l_orderkey IN (2,4,6))

OR l_shipdate IN (select l_shipdate FROM lineitem WHERE
l_orderkey IN (1,3,5))

OR l_linenumber = @ln;
```

Similar subqueries joined by AND are allowed.

For more information see “Comparison conditions” on page 163.

ALL or ANY conditions

The syntax for ANY conditions is

expression compare **ANY** (*subquery*)

where *compare* is a comparison operator.

For example, an ANY condition with an equality operator:

expression = **ANY** (*subquery*)

is TRUE if *expression* is equal to any of the values in the result of the subquery, and FALSE if the expression is not NULL and does not equal any of the columns of the subquery. The ANY condition is UNKNOWN if *expression* is the NULL value, unless the result of the subquery has no rows, in which case the condition is always FALSE.

The keyword SOME can be used instead of ANY.

Restrictions

If there is more than one expression on either side of a quantified comparison predicate, then an error message is returned. For example:

```
Subquery allowed only one select list item
```

Queries of this type can always be expressed in terms of IN subqueries or scalar subqueries using MIN and MAX set functions.

Compatibility

ANY and ALL subqueries are compatible between Adaptive Server Enterprise and Sybase IQ. Only Sybase IQ supports SOME as a synonym for ANY.

BETWEEN conditions

The syntax for BETWEEN conditions is as follows:

expr [**NOT**] **BETWEEN** *start-expr* **AND** *end-expr*

The BETWEEN condition can evaluate as TRUE, FALSE, or UNKNOWN. Without the NOT keyword, the condition evaluates as TRUE if *expr* is between *start-expr* and *end-expr*. The NOT keyword reverses the meaning of the condition but leaves UNKNOWN unchanged.

The BETWEEN conditions is equivalent to a combination of two inequalities:

expr >= *start-expr* **AND** *expr* <= *end-expr*

Subqueries cannot be used inside a BETWEEN predicate.

Compatibility

The BETWEEN condition is compatible between Sybase IQ and Adaptive Server Enterprise.

LIKE conditions

The syntax for LIKE conditions is as follows:

expression [**NOT**] **LIKE** *pattern* [**ESCAPE** *escape-expr*]

The LIKE condition can evaluate as TRUE, FALSE, or UNKNOWN. LIKE can only be used on string data.

Subqueries cannot be used inside a LIKE predicate.

Certain LIKE predicates execute faster, if a WD index is available.

Without the NOT keyword, the condition evaluates as TRUE if *expression* matches the *pattern*. If either *expression* or *pattern* is the NULL value, this condition is UNKNOWN. The NOT keyword reverses the meaning of the condition but leaves UNKNOWN unchanged.

The pattern may contain any number of wildcard characters. The wildcard characters are:

Wildcard	Matches
_ (underscore)	Any one character
% (percent)	Any string of zero or more characters
[]	Any single character in the specified range or set
[^]	Any single character not in the specified range or set

All other characters must match exactly.

For example, the search condition

```
name LIKE 'a%b_'
```

is TRUE for any row where name starts with the letter a and has the letter b as its second last character.

If an *escape-expr* is specified, it must evaluate to a single character. The character can precede a percent, an underscore, a left square bracket, or another escape character in the *pattern* to prevent the special character from having its special meaning. When escaped in this manner, a percent will match a percent, and an underscore will match an underscore.

All patterns of length 126 characters or less are supported. Patterns of length greater than 254 characters are not supported. Some patterns of length between 127 and 254 characters are supported, depending on the contents of the pattern.

Searching for one of a set of characters

A set of characters to look for is specified by listing the characters inside square brackets. For example, the following condition finds the strings *smith* and *smyth*:

```
LIKE 'sm[iy]th'
```

Searching for one of a range of characters

A range of characters to look for is specified by giving the ends of the range inside square brackets, separated by a hyphen. For example, the following condition finds the strings *bough* and *rough*, but not *tough*:

```
LIKE '[a-r]ough'
```

The range of characters [a-z] is interpreted as “greater than or equal to a, and less than or equal to z”, where the greater than and less than operations are carried out within the collation of the database. For information on ordering of characters within a collation, see Chapter 11, “International Languages and Character Sets” in the *Sybase IQ System Administration Guide*.

The lower end of the range must precede the higher end of the range. For example, a LIKE condition containing the expression [z-a] returns no rows, because no character matches the [z-a] range.

Unless the database is created as case-sensitive, the range of characters is case insensitive. For example, the following condition finds the strings *Bough*, *rough*, and *TOUGH*:

```
LIKE '[a-z]ough'
```

If the database is created as a case-sensitive database, the search condition is case sensitive also.

Combining searches for ranges and sets

You can combine ranges and sets within a square bracket. For example, the following condition finds the strings *bough*, *rough*, and *tough*:

```
LIKE '[a-rt]ough'
```

The bracket *[a-mpqs-z]* is interpreted as “exactly one character that is either in the range *a* to *m* inclusive, or is *p*, or is *q*, or is in the range *s* to *z* inclusive”.

Searching for one character not in a range

The caret character (^) is used to specify a range of characters that is excluded from a search. For example, the following condition finds the string *tough*, but not the strings *rough*, or *bough*:

```
LIKE '[^a-r]ough'
```

The caret negates the entire rest of the contents of the brackets. For example, the bracket *[^a-mpqs-z]* is interpreted as “exactly one character that is not in the range *a* to *m* inclusive, is not *p*, is not *q*, and is not in the range *s* to *z* inclusive”.

Special cases of ranges and sets

Any single character in square brackets means that character. For example, *[a]* matches just the character *a*. *[^]* matches just the caret character, *[%]* matches just the percent character (the percent character does not act as a wildcard character in this context), and *[_]* matches just the underscore character. Also, *[[]* matches just the character *[*.

Other special cases are as follows:

- The expression *[a-]* matches either of the characters *a* or -.
- The expression *[]* is never matched and always returns no rows.

- The expressions *[* or *[abp-q* are ill-formed expressions, and give syntax errors.
- You cannot use wildcard characters inside square brackets. The expression *[a%b]* finds one of *a*, *%*, or *b*.
- You cannot use the caret character to negate ranges except as the first character in the bracket. The expression *[a^b]* finds one of *a*, ^, or *b*.

Compatibility

The ESCAPE clause is supported by Sybase IQ only.

IN conditions

The syntax for IN conditions is as follows:

{ *expression* [**NOT**] **IN** (*subquery*)
| *expression* [**NOT**] **IN** (*expression*)
| *expression* [**NOT**] **IN** (*value-expr1* , *value-expr2*
[, *value-expr3*]...) }

Without the NOT keyword, the IN condition is TRUE if *expression* equals any of the listed values, UNKNOWN if *expression* is the NULL value, and FALSE otherwise. The NOT keyword reverses the meaning of the condition but leaves UNKNOWN unchanged.

The maximum number of values allowed in an IN condition list is 250,000.

Compatibility

IN conditions are compatible between Adaptive Server Enterprise and Sybase IQ.

CONTAINS conditions

The syntax for CONTAINS conditions is as follows:

{ *column-name* [**NOT**] **CONTAINS** ((*word1* [,*word2*
] [, *word3*]
...)

The *column-name* must be either a CHAR or VARCHAR column in a base table and must have a WD index. The *word1*, *word2* and *word3* expressions must be string constants no longer than 255 bytes, each containing exactly one word. That word's length must not exceed the maximum permitted word length of the column's word index.

Without the NOT keyword, the CONTAINS condition is TRUE if *column-name* contains each of the words, UNKNOWN if *column-name* is the NULL value, and FALSE otherwise. The NOT keyword reverses these values but leaves UNKNOWN unchanged.

For example, the search condition

```
varchar_col CONTAINS ('cat', 'mat')
```

would be true if the value of *varchar_col* is `The cat is on the mat`. If the value of *varchar_col* is `The cat chased the mouse`, this condition is false.

When Sybase IQ executes a statement containing both LIKE and CONTAINS, the CONTAINS condition takes precedence.

Avoid using the CONTAINS predicate in a view that has a user-defined function, because the CONTAINS criteria will be ignored. Use the LIKE predicate with wildcards instead, or issue the query outside of a view.

EXISTS conditions

The syntax for EXISTS conditions is as follows:

EXISTS(*subquery*)

The EXISTS condition is TRUE if the subquery result contains at least one row, and FALSE if the subquery result does not contain any rows. The EXISTS condition cannot be UNKNOWN.

Compatibility

The EXISTS condition is compatible between Adaptive Server Enterprise and Sybase IQ.

IS NULL conditions

The syntax for IS NULL conditions is as follows:

expression **IS** [**NOT**] **NULL**

Without the NOT keyword, the IS NULL condition is TRUE if the expression is the NULL value, and FALSE otherwise. The NOT keyword reverses the meaning of the condition.

Compatibility

The IS NULL condition is compatible between Adaptive Server Enterprise and Sybase IQ.

Conditions with logical operators

Search conditions can be combined using AND, OR, and NOT.

Conditions are combined using AND as follows:

condition1 **AND** *condition2*

The combined condition is TRUE if both conditions are TRUE, FALSE if either condition is FALSE, and UNKNOWN otherwise.

Conditions are combined using OR as follows:

condition1 **OR** *condition2*

The combined condition is TRUE if either condition is TRUE, FALSE if both conditions are FALSE, and UNKNOWN otherwise.

Compatibility

The AND and OR operators are compatible between Sybase IQ and Adaptive Server Enterprise.

NOT conditions

The syntax for NOT conditions is as follows:

NOT *condition1*

The NOT condition is TRUE if *condition1* is FALSE, FALSE if *condition1* is TRUE, and UNKNOWN if *condition1* is UNKNOWN.

Truth value conditions

The syntax for truth value conditions is as follows:

IS [**NOT**] *truth-value*

Without the NOT keyword, the condition is TRUE if the *condition* evaluates to the supplied *truth-value*, which must be one of TRUE, FALSE, or UNKNOWN. Otherwise, the value is FALSE. The NOT keyword reverses the meaning of the condition but leaves UNKNOWN unchanged.

Compatibility

Truth-valued conditions are supported by Sybase IQ only.

Three-valued logic

The following tables show how the AND, OR, NOT, and IS logical operators of SQL work in three-valued logic.

AND operator

AND	TRUE	FALSE	UNKNOWN
TRUE	TRUE	FALSE	UNKNOWN
FALSE	FALSE	FALSE	FALSE
UNKNOWN	UNKNOWN	FALSE	UNKNOWN

OR operator

OR	TRUE	FALSE	UNKNOWN
TRUE	TRUE	TRUE	TRUE
FALSE	TRUE	FALSE	UNKNOWN
UNKNOWN	TRUE	UNKNOWN	UNKNOWN

NOT operator

TRUE	FALSE	UNKNOWN
FALSE	TRUE	UNKNOWN

IS operator

IS	TRUE	FALSE	UNKNOWN
TRUE	TRUE	FALSE	FALSE
FALSE	FALSE	TRUE	FALSE
UNKNOWN	FALSE	FALSE	TRUE

User-supplied estimates

The Sybase IQ query optimizer uses educated guesses to help decide the best strategy for executing a query. For each table in a potential execution plan, the optimizer must estimate the number of rows that will be part of the results. If you know that a condition has a success rate that differs from the optimizer rule, you can tell the database this information by using an estimate in the search condition.

The estimate is a percentage, which can be a positive integer or can contain fractional values.

Examples

- The following query provides an estimate that one percent of the ship_date values will be later than 1994/06/30:

```
SELECT  ship_date
FROM  sales_order_items
WHERE ( ship_date > '1994/06/30', 1 )
```

```
ORDER BY ship_date DESC
```

- The following query estimates that half a percent of the rows will satisfy the condition:

```
SELECT *
FROM customer c, sales_order o
WHERE (c.id = o.cust_id, 0.5)
```

Fractional values enable more accurate user estimates for joins, particularly for large tables.

Compatibility

Adaptive Server Enterprise does not support explicit estimates.

Special values

Special values can be used in expressions, and as column defaults when creating tables.

CURRENT DATE special value

Function

The current year, month and day.

Data type

DATE

See also

"Expressions" on page 153

Date and time data types on page 199

CURRENT TIME special value

Function

The current hour, minute, second and fraction of a second.

Data type

TIME.

Description

The fraction of a second is stored to 6 decimal places, but the accuracy of the current time is limited by the accuracy of the system clock.

See also

"Expressions" on page 153

Date and time data types on page 199

CURRENT TIMESTAMP special value

Function	Combines CURRENT DATE and CURRENT TIME to form a TIMESTAMP value containing the year, month, day, hour, minute, second and fraction of a second. Like CURRENT TIME, the accuracy of the fraction of a second is limited by the system clock. CURRENT TIMESTAMP defaults to 3 digits.
Data type	TIMESTAMP
See also	"Expressions" on page 153 Date and time data types on page 199

SQLCODE special value

Function	Current SQLCODE value.
Data type	String.
Description	The SQLCODE value is set after each statement. You can check the SQLCODE to see whether or not the statement succeeded.
See also	"Expressions" on page 153 *Sybase IQ Troubleshooting and Error Messages Guide*

SQLSTATE special value

Function	Current SQLSTATE value
Data type	String.
Description	The SQLSTATE value is set after each statement. You can check the SQLSTATE to see whether or not the statement succeeded.
See also	"Expressions" on page 153 *Sybase IQ Troubleshooting and Error Messages Guide*

CURRENT USER special value

Function	A string containing the user ID of the current connection.

Data type: String.

CURRENT USER can be used as a default in columns with character data types.

Description: On UPDATE, columns with a default of CURRENT USER automatically update to reflect the current connection.

See also: "Expressions" on page 153

CURRENT PUBLISHER special value

Function: A string containing the publisher user ID of the database for SQL Remote replications.

Data type: String.

CURRENT PUBLISHER can be used as a default in columns with character data types.

See also: "Expressions" on page 153

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Variables

Sybase IQ supports three levels of variables:

- **Local variables** These are defined inside a compound statement in a procedure or batch using the DECLARE statement. They exist only inside the compound statement.
- **Connection-level variables** These are defined with a CREATE VARIABLE statement. They belong to the current connection, and disappear when you disconnect from the database or when you use the DROP VARIABLE statement.
- **Global variables** These are variables that have system-supplied values.

Local and connection-level variables are declared by the user, and can be used in procedures or in batches of SQL statements to hold information. Global variables are system-supplied variables that provide system-supplied values. All global variables have names beginning with two @ signs. For example, the global variable *@@version* has a value that is the current version number of the database server. Users cannot define global variables.

Local variables

Local variables are declared using the DECLARE statement, which can be used only within a compound statement (that is, bracketed by the BEGIN and END keywords). The variable is initially set as NULL. The value of the variable can be set using the SET statement, or can be assigned using a SELECT statement with an INTO clause.

The syntax of the DECLARE statement is as follows:

```
DECLARE variable-name data-type
```

Local variables can be passed as arguments to procedures, as long as the procedure is called from within the compound statement.

Examples

- The following batch illustrates the use of local variables.

  ```
  BEGIN
  DECLARE local_var INT ;
  SET local_var = 10 ;
  MESSAGE 'local_var = ', local_var ;
  END
  ```

  Running this batch from ISQL gives the message

  ```
  local_var = 10
  ```

  on the server window.

- The variable local_var does not exist outside the compound statement in which it is declared. The following batch is invalid, and gives a column not found error.

  ```
  -- This batch is invalid.
  BEGIN
  DECLARE local_var INT ;
  SET local_var = 10 ;
  MESSAGE 'local_var = ', local_var ;
  END;
  MESSAGE 'local_var = ', local_var ;
  ```

- The following example illustrates the use of SELECT with an INTO clause to set the value of a local variable:

```
BEGIN
DECLARE local_var INT ;
SELECT 10 INTO local_var ;
MESSAGE 'local_var = ', local_var ;
END
```

Running this batch from ISQL gives the message

```
local_var = 10
```

on the server window.

Compatibility

- **Names** Adaptive Server Enterprise and Sybase IQ both support local variables. In Adaptive Server Enterprise, all variables must be prefixed with an @ sign. In Sybase IQ the @ prefix is optional. To write compatible SQL, ensure all your variables have the @ prefix.
- **Scope** The scope of local variables is different in Sybase IQ and Adaptive Server Enterprise. Sybase IQ supports the use of the DECLARE statement to declare local variables within a batch. However, if the DECLARE is executed within a compound statement, the scope is limited to the compound statement.
- **Declaration** Only one variable can be declared for each DECLARE statement in Sybase IQ. In Adaptive Server Enterprise, more than one variable can be declared in a single statement.

Connection-level variables

Connection-level variables are declared with the CREATE VARIABLE statement. The CREATE VARIABLE statement can be used anywhere except inside compound statements. Connection-level variables can be passed as parameters to procedures.

The syntax for the CREATE VARIABLE statement is as follows:

```
CREATE VARIABLE variable-name data-type
```

When a variable is created, it is initially set to NULL. The value of connection-level variables can be set in the same way as local variables, using the SET statement or using a SELECT statement with an INTO clause.

Connection-level variables exist until the connection is terminated, or until the variable is explicitly dropped using the DROP VARIABLE statement. The following statement drops the variable con_var:

```
DROP VARIABLE con_var
```

Example

- The following batch of SQL statements illustrates the use of connection-level variables.

  ```
  CREATE VARIABLE con_var INT;
  SET con_var = 10;
  MESSAGE 'con_var = ', con_var;
  ```

  Running this batch from ISQL gives the message

  ```
  con_var = 10
  ```

  on the server window.

Compatibility

Adaptive Server Enterprise does not support connection-level variables.

Global variables

Global variables have values set by Sybase IQ. For example, the global variable *@@version* has a value that is the current version number of the database server.

Global variables are distinguished from local and connection-level variables by having two @ signs preceding their names. For example, *@@error* is a global variable. Users cannot create global variables, and cannot update the value of global variables directly.

Some global variables, such as *@@spid*, hold connection-specific information, and so have connection-specific values. Other variables, such as *@@connections*, have values that are common to all connections.

Global variable and special constants

The special constants such as CURRENT DATE, CURRENT TIME, USER, SQLSTATE, and so on are similar to global variables.

The following statement retrieves a value of the version global variable.

```
SELECT @@version
```

In procedures, global variables can be selected into a variable list. The following procedure returns the server version number in the *ver* parameter.

```
CREATE PROCEDURE VersionProc ( OUT ver
                NUMERIC ( 5, 2 ) )
BEGIN
```

```
        SELECT @@version
        INTO ver;
    END
```

In Embedded SQL, global variables can be selected into a host variable list.

List of global variables

Table 3-5 lists the global variables available in Sybase IQ.

Table 3-5: Sybase IQ global variables

Variable name	Meaning
@@error	Commonly used to check the error status (succeeded or failed) of the most recently executed statement. Contains 0 if the previous transaction succeeded; otherwise, contains the last error number generated by the system. A statement such as if @@error != 0 return causes an exit if an error occurs. Every SQL statement resets @@error, so the status check must immediately follow the statement whose success is in question.
@@fetch_status	Contains status information resulting from the last fetch statement. @@fetch_status may contain the following values • 0 The fetch statement completed successfully. • -1 The fetch statement resulted in an error. • -2 There is no more data in the result set. This feature is the same as @@sqlstatus, except that it returns different values. It is for Microsoft SQL Server compatibility.
@@identity	The last value inserted into an Identity/Autoincrement column by an insert, load or update statement. *@@identity* is reset each time a row is inserted into a table. If a statement inserts multiple rows, *@@identity* reflects the Identity/Autoincrement value for the last row inserted. If the affected table does not contain an Identity/Autoincrement column, *@@identity* is set to 0. The value of *@@identity* is not affected by the failure of an insert, load, or update statement, or the rollback of the transaction that contained the failed statement. *@@identity* retains the last value inserted into an Identity/Autoincrement column, even if the statement that inserted that value fails to commit.
@@isolation	Current isolation level. @@isolation takes the value of the active level.
@@procid	Stored procedure ID of the currently executing procedure.
@@servername	Name of the current database server.
@@sqlstatus	Contains status information resulting from the last FETCH statement.
@@version	Version number of the current version of Sybase IQ.

Compatibility

Table 3-6 includes all Adaptive Server Enterprise global variables supported in Sybase IQ. Adaptive Server Enterprise global variables not supported by

Sybase IQ are not included in the list. In contrast to the above table, this list includes all global variables that return a value, including those for which the value is fixed at NULL, 1, -1, or 0, and may not be meaningful.

Table 3-6: ASE global variables supported in IQ

Global variable	Returns
@@char_convert	Returns 0.
@@client_csname	In Adaptive Server Enterprise, the client's character set name. Set to NULL if client character set has never been initialized; otherwise, contains the name of the most recently used character set. Returns NULL in Sybase IQ.
@@client_csid	In Adaptive Server Enterprise, the client's character set ID. Set to -1 if client character set has never been initialized; otherwise, contains the most recently used client character set ID from syscharsets. Returns -1 in Sybase IQ.
@@connections	The number of logins since the server was last started.
@@cpu_busy	In Adaptive Server Enterprise, the amount of time, in ticks, that the CPU has spent doing Adaptive Server Enterprise work since the last time Adaptive Server Enterprise was started. In Sybase IQ, returns 0.
@@error	Commonly used to check the error status (succeeded or failed) of the most recently executed statement. Contains 0 if the previous transaction succeeded; otherwise, contains the last error number generated by the system. A statement such as: `if @@error != 0 return` causes an exit if an error occurs. Every statement resets @@error, including PRINT statements or IF tests, so the status check must immediately follow the statement whose success is in question.
@@identity	In Adaptive Server Enterprise, the last value inserted into an IDENTITY column by an INSERT, LOAD, or SELECT INTO statement. *@@identity* is reset each time a row is inserted into a table. If a statement inserts multiple rows, *@@identity* reflects the IDENTITY value for the last row inserted. If the affected table does not contain an IDENTITY column, *@@identity* is set to 0. The value of *@@identity* is not affected by the failure of an INSERT or SELECT INTO statement, or the rollback of the transaction that contained the failed statement. *@@identity* retains the last value inserted into an IDENTITY column, even if the statement that inserted that value fails to commit.
@@idle	In Adaptive Server Enterprise, the amount of time, in ticks, that Adaptive Server Enterprise has been idle since the server was last started. In Sybase IQ, returns 0.

Global variable	Returns
@@io_busy	In Adaptive Server Enterprise, the amount of time in ticks that Adaptive Server Enterprise has spent doing input and output operations since the server was last started. In Sybase IQ, returns 0.
@@isolation	Current isolation level of the connection. In Adaptive Server Enterprise, *@@isolation* takes the value of the active level.
@@langid	In Adaptive Server Enterprise, defines the local language ID of the language currently in use. In Sybase IQ, returns 0.
@@language	In Adaptive Server Enterprise, defines the name of the language currently in use. In Sybase IQ, returns “English”.
@@maxcharlen	In Adaptive Server Enterprise, maximum length, in bytes, of a character in Adaptive Server Enterprise's default character set. In Sybase IQ, returns 1.
@@max_ connections	For the network server, the maximum number of active clients (not database connections, as each client can support multiple connections). For Adaptive Server Enterprise, the maximum number of connections to the server.
@@ncharsize	In Adaptive Server Enterprise, average length, in bytes, of a national character. In Sybase IQ, returns 1.
@@nestlevel	In Adaptive Server Enterprise, nesting level of current execution (initially 0). Each time a stored procedure or trigger calls another stored procedure or trigger, the nesting level is incremented. In Sybase IQ, returns -1.
@@pack_received	In Adaptive Server Enterprise, number of input packets read by Adaptive Server Enterprise since the server was last started. In Sybase IQ, returns 0.
@@pack_sent	In Adaptive Server Enterprise, number of output packets written by Adaptive Server Enterprise since the server was last started. In Sybase IQ, returns 0.
@@packet_errors	In Adaptive Server Enterprise, number of errors that have occurred while Adaptive Server Enterprise was sending and receiving packets. In Sybase IQ, returns 0.
@@procid	Stored procedure ID of the currently executing procedure.
@@servername	Name of the local Adaptive Server Enterprise or Sybase IQ server.
@@spid	In Adaptive Server Enterprise, server process ID number of the current process. In Sybase IQ, the connection handle for the current connection. This is the same value as that displayed by the sa_conn_info procedure.

Global variable	Returns
@@sqlstatus	Contains status information resulting from the last FETCH statement. *@@sqlstatus* may contain the following values: • 0 — the FETCH statement completed successfully • 1 — the FETCH statement resulted in an error • 2 — there is no more data in the result set
@@thresh_hysteresis	In Adaptive Server Enterprise, change in free space required to activate a threshold. In Sybase IQ, returns 0.
@@timeticks	In Adaptive Server Enterprise, number of microseconds per tick. The amount of time per tick is machine-dependent. In Sybase IQ, returns 0.
@@total_errors	In Adaptive Server Enterprise, number of errors that have occurred while Adaptive Server Enterprise was reading or writing. In Sybase IQ, returns 0.
@@total_read	In Adaptive Server Enterprise, number of disk reads by Adaptive Server Enterprise since the server was last started. In Sybase IQ, returns 0.
@@total_write	In Adaptive Server Enterprise, number of disk writes by Adaptive Server Enterprise since the server was last started. In Sybase IQ, returns 0.
@@tranchained	Current transaction mode of the Transact-SQL program. @@tranchained returns 0 for unchained or 1 for chained.
@@trancount	Nesting level of transactions. Each BEGIN TRANSACTION in a batch increments the transaction count.
@@transtate	In Adaptive Server Enterprise, current state of a transaction after a statement executes. In Sybase IQ, returns -1.
@@version	Information on the current version of Adaptive Server Enterprise or Sybase IQ.

Comments

Comments are used to attach explanatory text to SQL statements or statement blocks. The database server does not execute comments.

Several comment indicators are available in Sybase IQ:

- **-- (Double hyphen)** The database server ignores any remaining characters on the line. This is the SQL/92 comment indicator.

- **// (Double slash)** The double slash has the same meaning as the double hyphen.
- **/* ... */ (Slash-asterisk)** Any characters between the two comment markers are ignored. The two comment markers may be on the same or different lines. Comments indicated in this style can be nested. This style of commenting is also called C-style comments.
- **% (Percent sign)** The percent sign has the same meaning as the double hyphen, if the PERCENT_AS_COMMENT option is set to ON. Using % as a comment indicator is not recommended.

Note The double-hyphen and the slash-asterisk comment styles are compatible with Adaptive Server Enterprise.

Examples

- The following example illustrates the use of double-dash comments:

```
CREATE FUNCTION fullname (firstname CHAR(30),
          lastname CHAR(30))
RETURNS CHAR(61)
-- fullname concatenates the firstname and lastname
-- arguments with a single space between.
BEGIN
    DECLARE name CHAR(61);
    SET name = firstname || ' ' || lastname;
    RETURN ( name );
END
```

- The following example illustrates the use of C-style comments:

```
/*
    Lists the names and employee IDs of employees
    who work in the sales department.
*/
CREATE VIEW SalesEmployee AS
SELECT emp_id, emp_lname, emp_fname
FROM "dba".employee
WHERE dept_id = 200
```

NULL value

Function

To specify a value that is unknown or not applicable.

Syntax

NULL

Usage

Anywhere

Permissions

Must be connected to the database.

Side effects

None

Description

The NULL value is a special value which is different from any valid value for any data type. However, the NULL value is a legal value in any data type. The NULL value is used to represent missing or inapplicable information. Note that these are two separate and distinct cases where NULL is used:

Situation	Description
missing	The field does have a value, but that value is unknown.
inapplicable	The field does not apply for this particular row.

SQL allows columns to be created with the NOT NULL restriction. This means that those particular columns cannot contain the NULL value.

The NULL value introduces the concept of three valued logic to SQL. The NULL value compared using any comparison operator with any value including the NULL value is "UNKNOWN." The only search condition that returns "TRUE" is the IS NULL predicate. In SQL, rows are selected only if the search condition in the WHERE clause evaluates to TRUE; rows that evaluate to UNKNOWN or FALSE are not selected.

The IS [NOT] *truth-value* clause, where *truth-value* is one of TRUE, FALSE or UNKNOWN can also be used to select rows where the NULL value is involved. See "Search conditions" on page 162 for a description of this clause.

In the following examples, the column Salary contains the NULL value.

Condition	Truth value	Selected?
Salary = NULL	UNKNOWN	NO
Salary <> NULL	UNKNOWN	NO
NOT (Salary = NULL)	UNKNOWN	NO
NOT (Salary <> NULL)	UNKNOWN	NO
Salary = 1000	UNKNOWN	NO
Salary IS NULL	TRUE	YES
Salary IS NOT NULL	FALSE	NO

Condition	Truth value	Selected?
Salary = 1000 IS UNKNOWN	TRUE	YES

The same rules apply when comparing columns from two different tables. Therefore, joining two tables together will not select rows where any of the columns compared contain the NULL value.

The NULL value also has an interesting property when used in numeric expressions. The result of *any* numeric expression involving the NULL value is the NULL value. This means that if the NULL value is added to a number, the result is the NULL value—not a number. If you want the NULL value to be treated as 0, you must use the ISNULL(*expression*, 0) function (see Chapter 5, "SQL Functions").

Many common errors in formulating SQL queries are caused by the behavior of NULL. You need to be careful to avoid these problem areas. See "Search conditions" on page 162 for a description of the effect of three-valued logic when combining search conditions.

Example

The following INSERT statement inserts a NULL into the date_returned column of the Borrowed_book table.

```
INSERT
INTO Borrowed_book
( date_borrowed, date_returned, book )
VALUES ( CURRENT DATE, NULL, '1234' )
```

CHAPTER 4

SQL Data Types

About this chapter

This chapter describes the data types supported by Sybase IQ.

Character data types

Description

For storing strings of letters, numbers and symbols.

Syntax

CHAR [(*max-length*)]

CHARACTER [(*max-length*)]

CHARACTER VARYING [(*max-length*)]

VARCHAR [(*max-length*)]

UNIQUEIDENTIFIERSTR

Usage

CHAR Character data of maximum length *max-length* bytes. If *max-length* is omitted, the default is 1. The maximum size allowed is 32KB-1. See Notes for restrictions on CHAR data greater than 255 bytes.

All CHAR values are blank padded up to *max-length*, regardless of whether the BLANK PADDING option is specified. When multibyte character strings are held as a CHAR type, the maximum length is still in bytes, not characters.

CHARACTER Same as CHAR.

CHARACTER VARYING Same as VARCHAR.

VARCHAR Same as CHAR, except that no blank padding is added to the storage of these strings, and VARCHAR strings can have a maximum length of (32KB - 1). See Notes for restrictions on VARCHAR data greater than 255 bytes.

UNIQUEIDENTIFIERSTR Domain implemented as CHAR(36). This data type is used for remote data access, when mapping Microsoft SQL Server uniqueidentifier columns.

Notes

As a separately licensed option, Sybase IQ supports Character Large Object (CLOB) data with a length ranging from zero (0) to 512TB (terabytes) for an IQ page size of 128KB or 2PB (petabytes) for an IQ page size of 512KB. (The maximum length is equal to 4GB multiplied by the database page size.) For more information, see *Large Objects Management in Sybase IQ*.

Storage sizes

Table 4-1 lists the storage size of character data.

Table 4-1: Storage size of character data

Data type	Column definition	Input data	Storage
CHARACTER, CHAR	width of (32K-1) bytes	(32K-1) bytes	(32K-1) bytes
VARCHAR, CHARACTER VARYING	width of (32K -1) bytes	(32K -1) bytes	(32K -1) bytes

Character sets and code pages

Character data is placed in the database using the exact binary representation that is passed from the application. This usually means that character data is stored in the database with the binary representation of the character set used by your system. You can find documentation about character sets in the documentation for your operating system.

For Windows, its code pages are the same for the first 128 characters. If you use special characters from the top half of the code page (accented international language characters), you must be careful with your databases. In particular, if you copy the database to a different machine using a different code page, those special characters are retrieved from the database using the original code page representation. With the new code page, they appear on the screen to be the wrong characters.

This problem also appears if you have two clients using the same multi-user server, but running with different code pages. Data inserted or updated by one client may appear incorrect to another.

This problem also shows up if a database is used across platforms. PowerBuilder and many other Windows applications insert data into the database in the standard ANSI character set. If non-Windows applications attempt to use this data, they do not properly display or update the extended characters.

This problem is quite complex. If any of your applications use the extended characters in the upper half of the code page, make sure that all clients and all machines using the database use the same or a compatible code page.

Indexes

All index types, except DATE, TIME, and DTTM, are supported for CHAR data and VARCHAR data less than or equal to 255 bytes in length.

Restriction on CHAR and VARCHAR data over 255 bytes

Only the default index, WD, and CMP index types are supported for CHAR and VARCHAR columns over 255 bytes. You cannot create an LF, HG, HNG, DATE, TIME, or DTTM index for these columns.

Compatibility

- The CHARACTER (*n*) alternative for CHAR is not supported in Adaptive Server Enterprise.
- Sybase IQ does not support the NCHAR , NVARCHAR, UNICHAR, and UNIVARCHAR data types provided by Adaptive Server Enterprise. Sybase IQ supports Unicode in the CHAR and VARCHAR data types.
- Sybase IQ supports a longer LONG VARCHAR data type than Adaptive Server Anywhere. For more information on the Sybase IQ data type LONG VARCHAR, see *Large Objects Management in Sybase IQ*.
- For compatibility between Sybase IQ and Adaptive Server Enterprise, always specify a length for character data types.

Numeric data types

Description

For storing numerical data.

Syntax

[**UNSIGNED**] **BIGINT**

[**UNSIGNED**] { **INT** | **INTEGER** }

SMALLINT

TINYINT

DECIMAL [(*precision* [, *scale*])]

NUMERIC [(*precision* [, *scale*])]

DOUBLE

FLOAT [(*precision*)]

REAL

Usage

BIGINT A signed 64-bit integer, requiring 8 bytes of storage.

You can specify integers as UNSIGNED. By default the data type is signed. Its range is between -9223372036854775808 and 9223372036854775807 (signed) or from 0 to 18446744073709551615 (unsigned).

INT** or **INTEGER A signed 32-bit integer with a range of values between -2147483648 and 2147483647 requiring 4 bytes of storage.

The INTEGER data type is an exact numeric data type; its accuracy is preserved after arithmetic operations.

You can specify integers as UNSIGNED; by default the data type is signed. The range of values for an unsigned integer is between 0 and 4294967295.

SMALLINT A signed 16-bit integer with a range between -32768 and 32767, requiring 2 bytes of storage.

The SMALLINT data type is an exact numeric data type; its accuracy is preserved after arithmetic operations.

TINYINT An unsigned 8-bit integer with a range between 0 and 255, requiring 1 byte of storage.

The TINYINT data type is an exact numeric data type; its accuracy is preserved after arithmetic operations.

DECIMAL A signed decimal number with *precision* total digits and with *scale* of the digits after the decimal point. The precision can equal 1 to 126, and the scale can equal 0 up to precision value. The defaults are scale = 38 and precision = 126. Results are calculated based on the actual data type of the column to ensure accuracy, but you can set the maximum scale of the result returned to the application. For more information, see "MAX_CLIENT_NUMERIC_SCALE option" on page 89 and SET OPTION statement on page 579.

Table 4-2 lists the storage required for a decimal number.

Table 4-2: Storage size for a decimal number

Precision	Storage
1 to 4	2 bytes
5 to 9	4 bytes
10 to 18	8 bytes
19 to 126	See below

The storage requirement in bytes for a decimal value with a precision greater than 18 can be calculated using the following formula:

```
4 + 2 * (int(((prec - scale) + 3) / 4) +
int((scale + 3) / 4) + 1)
```

where *int* takes the integer portion of its argument. Note that the storage used by a column is based upon the precision and scale of the column. Each cell in the column has enough space to hold the largest value of that precision and scale. For example:

```
NUMERIC(18,4) takes 8 bytes per cell
NUMERIC(19,4) takes 16 bytes per cell
```

The DECIMAL data type is an exact numeric data type; its accuracy is preserved to the least significant digit after arithmetic operations. Its maximum absolute value is the number of nines defined by [*precision* - *scale*], followed by the decimal point, and then followed by the number of nines defined by *scale*. The minimum absolute non-zero value is the decimal point, followed by the number of zeros defined by [*scale* - 1], then followed by a single one. For example:

```
NUMERIC (3,2) Max positive = 9.99 Min non-zero = 0.01
Max negative = -9.99
```

If neither precision nor scale is specified for the explicit conversion of NULL to NUMERIC, the default is NUMERIC(1,0). For example,

```
SELECT CAST( NULL AS NUMERIC ) A,
       CAST( NULL AS NUMERIC(15,2) ) B
```

is described as:

```
A NUMERIC(1,0)
B NUMERIC(15,2)
```

NUMERIC Same as DECIMAL.

DOUBLE A signed double precision floating-point number stored in 8 bytes. The range of absolute, non-zero values is between 2.2250738585072014e-308 and 1.79769313486231570e+308. Values held as DOUBLE are accurate to 15 significant digits, but may be subject to round-off error beyond the fifteenth digit.

The DOUBLE data type is an approximate numeric data type; it is subject to roundoff errors after arithmetic operations.

FLOAT If *precision* is not supplied, the FLOAT data type is the same as the REAL data type. If *precision* supplied, then the FLOAT data type is the same as the REAL or DOUBLE data type, depending on the value of the precision. The cutoff between REAL and DOUBLE is platform dependent, and it is the number of bits used in the mantissa of single-precision floating point number on the platform.

The FLOAT data type is an approximate numeric data type; it is subject to roundoff errors after arithmetic operations.

You can tune the behavior of the FLOAT data type for compatibility with Adaptive Server Enterprise using the "FLOAT_AS_DOUBLE option [TSQL]".

REAL A signed single precision floating-point number stored in 4 bytes. The range of absolute, non-zero values is 1.175494351e-38 to 3.402823466e+38. Values held as REAL are accurate to 6 significant digits, but may be subject to round-off error beyond the sixth digit.

The REAL data type is an approximate numeric data type; it is subject to roundoff errors after arithmetic operations.

Notes

- The INTEGER, NUMERIC and DECIMAL data types are sometimes called exact numeric data types, in contrast to the approximate numeric data types FLOAT, DOUBLE, and REAL. *Only exact numeric data is guaranteed accurate to the least significant digit specified after arithmetic operations*.
- TINYINT columns should not be fetched into Embedded SQL variables defined as CHAR or UNSIGNED CHAR, since the result is an attempt to convert the value of the column to a string and then assign the first byte to the variable in the program.

Indexes

- The CMP and HNG index types do not support the FLOAT, DOUBLE, and REAL data types, and the HG index type is not recommended.
- The WD, DATE, TIME, and DTTM index types do not support the numeric data types.

Compatibility

- Embedded SQL TINYINT columns should be fetched into 2-byte or 4-byte integer columns. Also, to send a TINYINT value to a database the C variable should be an integer.
- Adaptive Server Enterprise 12.5.x versions do not support unsigned integers. You can map IQ unsigned integers to Adaptive Server Enterprise signed integers or numeric data, and the data will be converted implicitly.
    - Map IQ UNSIGNED SMALLINT data to ASE INT
    - If you have negative values, map IQ UNSIGNED BIGINT to ASE NUMERIC (*precision, scale*)

To avoid performance issues for cross-database joins on UNSIGNED BIGINT columns, the best approach is to cast to a (signed) BIGINT on the IQ side.

- You should avoid default precision and scale settings for NUMERIC and DECIMAL data types, as these differ by product:

Database	Default precision	Default scale
Sybase IQ	126	38
Adaptive Server Enterprise	18	0
Adaptive Server Anywhere	3	6

- The FLOAT (*p*) data type is a synonym for REAL or DOUBLE, depending on the value of *p*. For Adaptive Server Enterprise, REAL is used for p less than or equal to 15, and DOUBLE for p greater than 15. For Sybase IQ, the cutoff is platform-dependent, but on all platforms the cutoff value is greater than 22.
- Sybase IQ includes two user-defined data types, MONEY and SMALLMONEY, which are implemented as NUMERIC(19,4) and NUMERIC(10,4) respectively. They are provided primarily for compatibility with Adaptive Server Enterprise.

Binary data types

Description

For storing raw binary data, such as pictures, in a hexadecimal-like notation, up to a length of (32K - 1) bytes.

Syntax

BINARY [(*length*)]

VARBINARY [(*max-length*)]

Usage

Binary data begins with the characters “0x” or “0X” and can include any combination of digits and the uppercase and lowercase letters A through F. You can specify the column length in bytes, or use the default length of 1 byte. Each byte stores 2 hexadecimal digits. Even though the default length is 1 byte, always specifying an even number of characters for BINARY and VARBINARY column length is recommended. If you enter a value longer than the specified column length, Sybase IQ truncates the entry to the specified length without warning or error.

BINARY Binary data of length *length* bytes. If *length* is omitted, the default is 1 byte. The maximum size allowed is 255. Use the fixed-length binary type BINARY for data in which all entries are expected to be approximately equal in length. Because entries in BINARY columns are zero-padded to the column length *length*, they may require more storage space than entries in VARBINARY columns.

VARBINARY Binary data up to a length of *max-length* bytes. If *max-length* is omitted, the default is 1 byte. The maximum size allowed is (32K - 1) bytes. Use the variable-length binary type VARBINARY for data that is expected to vary greatly in length.

Notes

As a separately licensed option, Sybase IQ supports Binary Large Object (BLOB) data with a length ranging from zero (0) to 512TB (terabytes) for an IQ page size of 128KB or 2PB (petabytes) for an IQ page size of 512KB. (The maximum length is equal to 4GB multiplied by the database page size.) For more information, see *Large Objects Management in Sybase IQ*.

Treatment of trailing zeros All BINARY columns are padded with zeros to the full width of the column. Trailing zeros are truncated in all VARBINARY columns.

The following example creates a table with all four variations of BINARY and VARBINARY data types defined with NULL and NOT NULL. The same data is inserted in all four columns and is padded or truncated according to the data type of the column.

```
CREATE TABLE zeros (bnot BINARY(5) NOT NULL,
        bnull BINARY(5) NULL,
        vbnot VARBINARY(5) NOT NULL,
        vbnull VARBINARY(5) NULL);
INSERT zeros VALUES (0x12345000, 0x12345000,
        0x12345000, 0x12345000);
INSERT zeros VALUES (0x123, 0x123, 0x123, 0x123);
INSERT zeros VALUES (0x0, 0x0, 0x0, 0x0);
INSERT zeros VALUES ('002710000000ae1b',
'002710000000ae1b', '002710000000ae1b',
'002710000000ae1b');
SELECT * FROM zeros;
```

bnot	bnull	vbnot	vbnull
0x1234500000	0x1234500000	0x12345000	0x12345000
0x0123000000	0x0123000000	0x0123	0x0123
0x0000000000	0x0000000000	0x00	0x00
0x3030323731	0x3030323731	0x3030323731	0x3030323731

Because each byte of storage holds 2 hexadecimal digits, Sybase IQ expects binary entries to consist of the characters “0x” followed by an even number of digits. When the “0x” is followed by an odd number of digits, IQ assumes that you omitted the leading 0 and adds it for you.

Input values “0x00” and “0x0” are stored as “0x00” in variable-length binary columns (VARBINARY). In fixed-length binary columns (BINARY), the value is padded with zeros to the full length of the field:

```
INSERT zeros VALUES (0x0, 0x0, 0x0, 0x0);
SELECT * FROM zeros WHERE bnot = 0x00;
```

bnot	bnull	vbnot	vbnull
0x0000000000	0x0000000000	0x00	0x00

If the input value does not include the “0x”, Sybase IQ assumes that the value is an ASCII value and converts it. For example:

```
CREATE TABLE sample (col_bin BINARY(8));
INSERT sample VALUES ('002710000000ae1b');
SELECT * FROM sample;
```

col_bin
0x3030323731303030

Loading ASCII data from a flat file Any ASCII data loaded from a flat file into a binary type column (BINARY or VARBINARY) is stored as nibbles. For example, if 0x1234 or 1234 is read from a flat file into a binary column, IQ stores the value as hexadecimal 1234. IQ ignores the “0x” prefix. If the input data contains any characters out of the range 0 - 9, a - f, and A - F, the data is rejected.

Storage size Table 4-3 lists the storage size of binary data.

Table 4-3: Storage size of binary data

Data type	Column definition	Input data	Storage
VARBINARY	width of (32K - 1) bytes	(32K - 1) bytes binary	(32K - 1) bytes
VARBINARY	width of (32K - 1) bytes	(64K - 2) bytes ASCII	(32K - 1) bytes
BINARY	width of 255 bytes	255 bytes binary	255 bytes
BINARY	width of 255 byte	510 bytes ASCII	255 bytes

Platform dependence The exact form in which you enter a particular value depends on the platform you are using. Therefore, calculations involving binary data can produce different results on different machines.

For platform-independent conversions between hexadecimal strings and integers, use the INTTOHEX and HEXTOINT functions rather than the platform-specific CONVERT function. For details, see the section "Data type conversion functions" on page 224.

String operators The concatenation string operators || and + both support binary type data. Explicit conversion of binary operands to character data types is not necessary with the || operator. Explicit and implicit data conversion produce different results, however.

Restrictions on BINARY and VARBINARY data

The following restrictions apply to columns containing BINARY and VARBINARY data:

- You cannot use the aggregate functions SUM, AVG, STDDEV, or VARIANCE with the binary data types. The aggregate functions MIN, MAX, and COUNT *do* support the binary data types BINARY and VARBINARY.
- HNG, WD, DATE, TIME, and DTTM indexes do not support BINARY or VARBINARY data.
- Only the default index and CMP index types are supported for VARBINARY data greater than 255 bytes in length.
- Bit operations are supported on BINARY and VARBINARY data that is 8 bytes or less in length.

Compatibility

The treatment of trailing zeros in binary data types is the same in Adaptive Server Anywhere and Sybase IQ, but is different in Adaptive Server Enterprise. Table 4-4 shows the differences.

Table 4-4: Treatment of trailing zeros

Data type	ASA and IQ	ASE
BINARY NOT NULL	padded	padded
BINARY NULL	padded	truncated
VARBINARY NOT NULL	not padded, not truncated	truncated
VARBINARY NULL	not padded, not truncated	truncated

Adaptive Server Enterprise, Adaptive Server Anywhere, and Sybase IQ all support the STRING_RTRUNCATION database option, which affects error message reporting when an INSERT or UPDATE string is truncated. For Transact-SQL compatible string comparisons, set the STRING_RTRUNCATION option to the same value in both databases.

You can also set the STRING_RTRUNCATION option ON when loading data into a table, to alert you that the data is too large to load into the field. The default value is OFF.

Bit operations on binary type data are not supported by ASE. ASA only supports bit operations against the first four bytes of binary type data. IQ supports bit operations against the first 8 bytes of binary type data.

Bit data type

Description

For storing Boolean values.

Data type	Values	Supported by
BIT	0 or 1	Sybase IQ and Enterprise

Usage

BIT stores only the values 0 or 1. Inserting any non-zero value into a BIT column stores a 1 in the column. Inserting any zero value into a BIT column stores a 0.

Only the default index type is supported for BIT data.

Compatibility

Adaptive Server Enterprise BIT datatypes only allow 0 or 1 values.

Date and time data types

Description

For storing dates and times.

Syntax

DATE

DATETIME

SMALLDATETIME

TIME

TIMESTAMP

Usage

DATE A calendar date, such as a year, month and day. The year can be from the year 0001 to 9999. The day must be a non-zero value, so that the minimum date is 0001-01-01. A DATE value requires 4 bytes of storage.

DATETIME A domain, implemented as TIMESTAMP. DATETIME is provided primarily for compatibility with Adaptive Server Enterprise. For an exception, see “Compatibility of string to datetime conversions” on page 206.

SMALLDATETIME A domain, implemented as TIMESTAMP. SMALLDATETIME is provided primarily for compatibility with Adaptive Server Enterprise. For an exception, see “Compatibility of string to datetime conversions” on page 206.

TIME Time of day, containing hour, minute, second and fraction of a second. The fraction is stored to 6 decimal places. A TIME value requires 8 bytes of storage. (ODBC standards restrict TIME data type to an accuracy of seconds. For this reason you should not use TIME data types in WHERE clause comparisons that rely on a higher accuracy than seconds.)

TIMESTAMP Point in time, containing year, month, day, hour, minute, second and fraction of a second. The fraction is stored to 6 decimal places. The day must be a non-zero value. A TIMESTAMP value requires 8 bytes of storage.

The valid range of the TIMESTAMP data type is from 0001-01-01 00:00:00.000000 to 9999-12-31 23:59:59.999999. The display of TIMESTAMP data outside the range of 1600-02-28 23:59:59 to 7911-01-01 00:00:00 may be incomplete, but the complete datetime value is stored in the database; you can see the complete value by first converting it to a character string. You can use the CAST() function to do this, as in the following example.

This example first creates a table with DATETIME and TIMESTAMP columns, and inserts values where the date is greater 7911-01-01.

```
create table mydates (id int, descript char(20),
  datetime_null datatime, timestamp_null timestamp);
insert into mydates values (1, 'example', '7911-12-30
  23:59:59','7911-12-30 06:03:44');
commit;
```

When you select without using cast, the hours and minutes are set to 00:00:

```
select * from mydates;
```

```
1, 'example', '7911-12-30 00:00:59', '7911-12-30 00:00:44'
```

When you select using cast, you see the complete timestamp:

```
select id, descript, cast(datatime_null as char(21)),
  cast(timestamp_null as char(21)) from mydates;
```

```
1, 'example', '7911-12-30 23:59:59', '7911-12-30 06:03:44'
```

Index types supported by date and time data

The following index types are supported by date and time data:

- All date and time data types support the CMP, HG, HNG, and LF index types; the WD index type is not supported.
- DATE data supports the DATE index.
- TIME data supports the TIME index.
- DATETIME and TIMESTAMP data support the DTTM index.

Sending dates and times to the database

Description

Dates and times may be sent to the database in one of the following ways:

- Using any interface, as a string
- Using ODBC, as a TIMESTAMP structure
- Using Embedded SQL, as a SQLDATETIME structure

When a time is sent to the database as a string (for the TIME data type) or as part of a string (for TIMESTAMP or DATE data types), the hours, minutes, and seconds must be separated by colons in the format *hh*:*mm*:*ss*:*sss*, but can appear anywhere in the string. As an option, a period can separate the seconds from fractions of a second, as in *hh*:*mm*:*ss.sss*. The following are valid and unambiguous strings for specifying times:

```
21:35 -- 24 hour clock if no am or pm specified
10:00pm -- pm specified, so interpreted as 12 hour clock
10:00 -- 10:00am in the absence of pm
10:23:32.234 -- seconds and fractions of a
                    second included
```

When a date is sent to the database as a string, conversion to a date is automatic. The string can be supplied in one of two ways:

- As a string of format *yyyy/mm/dd* or *yyyy-mm-dd*, which is interpreted unambiguously by the database
- As a string interpreted according to the DATE_ORDER database option

Date format strings must not contain any multibyte characters. Only single-byte characters are allowed in a date/time/datetime format string, even when the collation order of the database is a multibyte collation order like 932JPN.

Retrieving dates and times from the database

Description

Dates and times may be retrieved from the database in one of the following ways:

- Using any interface, as a string
- Using ODBC, as a TIMESTAMP structure
- Using embedded SQL, as a SQLDATETIME structure

When a date or time is retrieved as a string, it is retrieved in the format specified by the database options DATE_FORMAT, TIME_FORMAT and TIMESTAMP_FORMAT. For descriptions of these options, see SET OPTION statement.

For information on functions dealing with dates and times, see “Date and time functions” on page 219. The following operators are allowed on dates:

- **timestamp + integer** Add the specified number of days to a date or timestamp.
- **timestamp - integer** Subtract the specified number of days from a date or timestamp.
- **date - date** Compute the number of days between two dates or timestamps.
- **date + time** Create a timestamp combining the given date and time.

Comparing dates and times

Description

If you wish to compare a date to a string *as a string*, you must use the DATEFORMAT function or CAST function to convert the date to a string before comparing. For example:

```
DATEFORMAT(invoice_date,'yyyy/mm/dd') = '1992/05/23'
```

Any allowable date format can be used for the DATEFORMAT string expression.

Date format strings must not contain any multibyte characters. Only single-byte characters are allowed in a date/time/datetime format string, even when the collation order of the database is a multi-bye collation order like SJIS2.

If '?' represents a multibyte character, then the following query fails:

```
SELECT DATEFORMAT ( start_date, 'yy?') FROM employee;
```

Instead, move the multibyte character outside of the date format string using the concatenation operator:

```
SELECT DATEFORMAT (start_date, 'yy') + '?' FROM
employee;
```

Using unambiguous dates and times

Description

Dates in the format *yyyy/mm/dd* or *yyyy-mm-dd* are always recognized unambiguously as dates regardless of the DATE_ORDER setting. Other characters can be used as separators instead of "/" or "-"; for example, "?", a space character, or ",". You should use this format in any context where different users may be employing different DATE_ORDER settings. For example, in stored procedures, use of the unambiguous date format prevents misinterpretation of dates according to the user's DATE_ORDER setting.

Also, a string of the form *hh*:*mm*:*ss*.*sss* is interpreted unambiguously as a time.

For combinations of dates and times, any unambiguous date and any unambiguous time yield an unambiguous date-time value. Also, the form

```
YYYY-MM-DD HH.MM.SS.SSSSSS
```

is an unambiguous date-time value. Periods can be used in the time only in combination with a date.

In other contexts, a more flexible date format can be used. Sybase IQ can interpret a wide range of strings as formats. The interpretation depends on the setting of the database option DATE_ORDER. The DATE_ORDER database option can have the value 'MDY', 'YMD', or 'DMY' (see SET OPTION statement). For example, the following statement sets the DATE_ORDER option to 'DMY':

```
SET OPTION DATE_ORDER = 'DMY' ;
```

The default DATE_ORDER setting is 'YMD'. The ODBC driver sets the DATE_ORDER option to 'YMD' whenever a connection is made. The value can still be changed using the SET OPTION statement.

The database option DATE_ORDER determines whether the string 10/11/12 is interpreted by the database as Oct 11 1912, Nov 12 1910, or Nov 10 1912. The year, month, and day of a date string should be separated by some character (for example /, -, or space) and appear in the order specified by the DATE_ORDER option.

The year can be supplied as either 2 or 4 digits. The value of the option NEAREST_CENTURY affects the interpretation of 2-digit years: 2000 is added to values less than NEAREST_CENTURY, and 1900 is added to all other values. The default value of this option is 50. Thus, by default, 50 is interpreted as 1950 and 49 is interpreted as 2049. For more information, see the "NEAREST_CENTURY option [TSQL]".

The month can be the name or number of the month. The hours and minutes are separated by a colon, but can appear anywhere in the string.

Sybase recommends that you always specify the year using the 4-digit format.

With an appropriate setting of DATE_ORDER, the following strings are all valid dates:

```
99-05-23 21:35
99/5/23
1999/05/23
May 23 1999
23-May-1999
Tuesday May 23, 1999 10:00pm
```

If a string contains only a partial date specification, default values are used to fill out the date. The following defaults are used:

year 1900

month No default

day 1 (useful for month fields; for example, 'May 1999' is the date '1999-05-01 00:00')

hour, minute, second, fraction 0

Domains

Description

Domains are aliases for built-in data types, including precision and scale values where applicable.

Domains, also called user-defined data types, allow columns throughout a database to be automatically defined on the same data type, with the same NULL or NOT NULL condition. This encourages consistency throughout the database.

Simple domains

Domains are created using the CREATE DOMAIN statement. For a full description of the syntax, see CREATE DOMAIN statement.

The following statement creates a data type named street_address, which is a 35-character string.

```
CREATE DOMAIN street_address CHAR( 35 )
```

CREATE DATATYPE can be used as an alternative to CREATE DOMAIN, but is not recommended, as CREATE DOMAIN is the syntax used in the draft SQL/3 standard.

Resource authority is required to create data types. Once a data type is created, the user ID that executed the CREATE DOMAIN statement is the owner of that data type. Any user can use the data type, and unlike other database objects, the owner name is never used to prefix the data type name.

The street_address data type may be used in exactly the same way as any other data type when defining columns. For example, the following table with two columns has the second column as a street_address column:

```
CREATE TABLE twocol (id INT,
street street_address)
```

Domains can be dropped by their owner or by the DBA using the DROP DOMAIN statement:

```
DROP DOMAIN street_address
```

This statement can be carried out only if the data type is not used in any table in the database.

Compatibility

- **Named constraints and defaults** In Sybase IQ, user-defined data types are created with a base data type, and optionally a NULL or NOT NULL condition. Named constraints and named defaults are not supported.
- **Creating data types** In Sybase IQ, you can use the sp_addtype system procedure to add a domain, or you can use the CREATE DOMAIN statement. In Adaptive Server Enterprise, you must use sp_addtype.

Data type conversions

Description

Type conversions happen automatically, or they can be explicitly requested using the CAST or CONVERT function.

All date constants are specified as strings. The string is automatically converted to a date before use.

There are certain cases where the automatic data type conversions are not appropriate.

```
'12/31/90' + 5 -- Tries to convert the string to a number
'a' > 0        -- Tries to convert 'a' to a number
```

You can use the CAST or CONVERT function to force type conversions.

The following functions can also be used to force type conversion:

- DATE(expression)— Converts the expression into a date, and removes any hours, minutes or seconds. Conversion errors may be reported.
- DATETIME(expression)— Converts the expression into a timestamp. Conversion errors may be reported.
- STRING(expression)— Similar to `CAST(value AS CHAR)`, except that `string(NULL)` is the empty string (''), while `CAST(NULL AS CHAR)` is the NULL value.

For information about the CAST and CONVERT functions, see “Data type conversion functions” on page 224.

Compatibility of string to datetime conversions

There are some differences in behavior between Sybase IQ and Enterprise when converting strings to date and time data types.

If a string containing only a time value (no date) is converted to a date/time data type, Sybase IQ and Adaptive Server Enterprise use a default date of January 1, 1900. Adaptive Server Anywhere uses the current date.

If the milliseconds portion of a time is less than 3 digits, Adaptive Server Enterprise interprets the value differently depending on whether it was preceded by a period or a colon. If preceded by a colon, the value means thousandths of a second. If preceded by a period, one digit means tenths, two digits mean hundredths, and three digits mean thousandths. Sybase IQ and Adaptive Server Anywhere interpret the value the same way, regardless of the separator.

Example

- Adaptive Server Enterprise converts the values below as shown.

```
12:34:56.7 to 12:34:56.700
12.34.56.78 to 12:34:56.780
```

```
12:34:56.789 to 12:34:56.789
12:34:56:7 to 12:34:56.007
12.34.56:78 to 12:34:56.078
12:34:56:789 to 12:34:56.789
```

- Sybase IQ converts the milliseconds value in the manner that Adaptive Server Enterprise does for values preceded by a period, in both cases:

```
12:34:56.7 to 12:34:56.700
12.34.56.78 to 12:34:56.780
12:34:56.789 to 12:34:56.789
12:34:56:7 to 12:34:56.700
12.34.56:78 to 12:34:56.780
12:34:56:789 to 12:34:56.789
```

Compatibility of exported dates

For dates in the first 9 days of a month and hours less than 10, Adaptive Server Enterprise supports a blank for the first digit; IQ supports a zero or a blank. For details on how to load such data from Adaptive Server Enterprise into IQ, see Chapter 7, "Moving Data In and Out of Databases" in *Sybase IQ System Administration Guide*.

Year 2000 compliance

Description

The problem of handling dates, in particular year values beyond the year 2000, is a significant issue for the computer industry.

This section examines the year 2000 compliance of Sybase IQ. It illustrates how Sybase IQ handles date values internally, and how it handles ambiguous date information such as the conversion of a 2-digit year string value.

Consider the following measurements of Sybase IQ year 2000 compliance:

- It always returns correct values for any legal arithmetic and logical operations on dates, regardless of whether the calculated values span different centuries.
- At all times the internal storage of dates explicitly includes the century portion of a year value.
- The operation is unaffected by any return value, including the current date.
- Date values can always be output in full century format.

Many of the date-related topics summarized in this section are explained in greater detail in other parts of the documentation.

How dates and times are stored

Dates containing year values are used internally and stored in IQ databases using the data types listed in Table 4-5.

Table 4-5: Storage of dates containing year values

Data type	Contains	Stored in	Range of possible values
DATE	Calendar date (year, month, day)	4-bytes	0001-01-01 to 9999-12-31
TIMESTAMP	Time stamp (year, month, day, hour minute, second, and fraction of second accurate to 6 decimal places)	8-bytes	0001-01-01 00:00:00.000000 to 9999-12-31 23:59:59.999999
TIME	Time of day (hour minute, second, and fraction of second accurate to 6 decimal places) since midnight	8-bytes	00:00:00.000000 to 23:59:59.999999

For more information on IQ date and time data types see Date and time data types on page 199.

Sending and retrieving date values

Date values are stored within Sybase IQ as either a DATE or TIMESTAMP data type. Time values are stored as a TIME or TIMESTAMP data type. They are passed to and retrieved from it using either of three methods:

- As a string, using any IQ programming interface.
- As a TIMESTAMP structure using ODBC.
- As a SQLDATETIME structure using Embedded SQL.

A string containing a date value is considered unambiguous and is automatically converted to a DATE or TIMESTAMP data type without potential for misinterpretation if it is passed using the following format: *yyyy-mm-dd* (the "-" dash separator is one of several characters that are permitted).

To use date formats other than *yyyy-mm-dd* set the DATE_FORMAT database option (see SET OPTION statement).

Similarly, a string containing a time value is considered unambiguous and is automatically converted to a TIME or TIMESTAMP data type without potential for misinterpretation if it is passed using the following format: *hh:mm:ss.ssssss*.

For more information on unambiguous date formats, see the section Using unambiguous dates and times, above.

For more information on the ODBC TIMESTAMP structure see the Microsoft Open Database Connectivity SDK, or the section Sending dates and times to the database, above.

Used in the development of C programs, an embedded SQL SQLDATETIME structure's year value is a 16-bit signed integer.

Leap years

The year 2000 is also a leap year, with an additional day in the month of February. Sybase IQ uses a globally accepted algorithm for determining which years are leap years. Using this algorithm, a year is considered a leap year if it is divisible by four, unless the year is a century date (such as the year 1900), in which case it is a leap year if it is divisible by 400.

Sybase IQ handles all leap years correctly. For example:

The following SQL statement results in a return value of “Tuesday”:

```
SELECT DAYNAME('2000-02-29');
```

It accepts Feb 29, 2000 — a leap year — as a date and using this date determines the day of the week on which that date occurs.

However, the following statement is rejected:

```
SELECT DAYNAME('2001-02-29');
```

This statement results in an error (cannot convert '2001-02-29' to a date) because Feb 29 does not exist in the year 2001.

Ambiguous string to date conversions

Sybase IQ automatically converts a string into a date when a date value is expected, even if the year is represented in the string by only two digits.

If the century portion of a year value is omitted, the conversion method is determined by the NEAREST_CENTURY database option.

The NEAREST_CENTURY database option is a numeric value that acts as a break point between *19yy* date values and *20yy* date values.

Two digit years less than the NEAREST_CENTURY value are converted to *20yy*, while years greater than or equal to the value are converted to *19yy*.

If this option is not set, the default setting of 50 is assumed (0 to 49 are in the 21st century, 50 to 99 are in the 20th century).

Ambiguous date conversion example

The following statement creates a table that can be used to illustrate the conversion of ambiguous date information in Sybase IQ.

```
CREATE TABLE T1 (C1 DATE);
```

The table T1 contains one column, C1, of the type DATE.

The following statement inserts a date value into the column C1. It automatically converts a string that contains an ambiguous year value, one with two digits representing the year but nothing to indicate the century.

```
INSERT INTO T1 VALUES('00-01-01');
```

By default, the NEAREST_CENTURY option is set to 50, thus Sybase IQ converts the string into the date 2000-01-01. The following statement verifies the result of this insert.

```
SELECT * FROM T1;
```

Changing the NEAREST_CENTURY option using the following statement alters the conversion process.

```
SET OPTION NEAREST_CENTURY = 0;
```

When NEAREST_CENTURY option is set to 0, executing the previous insert using the same statement creates a different date value:

```
INSERT INTO T1 VALUES('00-01-01');
```

The above statement now results in the insertion of the date 1900-01-01. Use the following statement to verify the results.

```
SELECT * FROM T1;
```

Date to string conversions

Sybase IQ provides several functions for converting date and time values into a wide variety of strings and other expressions. It is possible in converting a date value into a string to reduce the year portion into a two digit number representing the year, thereby losing the century portion of the date.

Wrong century values

Consider the following statement, which incorrectly converts a string representing the date Jan 1, 1900 into a string representing the date Jan 1, 2000 even though no database error occurs.

```
SELECT DATEFORMAT (DATEFORMAT('1900-01-01',
'Mmm dd/yy' ), 'yyyy-Mmm-dd' ) AS Wrong_year;
```

Although the unambiguous date string 1900-01-01 is automatically and correctly converted by Sybase IQ into a date value, the 'Mmm dd/yy' formatting of the inner, or nested DATEFORMAT function drops the century portion of the date when it is converted back to a string and passed to the outer DATEFORMAT function.

Because the database option NEAREST_CENTURY, in this case, is set to 50 the outer DATEFORMAT function converts the string representing a date with a two digit year value into a year in the 21st century.

For more information about ambiguous string conversions, see the section “Ambiguous string to date conversions” above.

For more information on date and time functions, see “Date and time functions” on page 219.

CHAPTER 5

SQL Functions

About this chapter

This chapter describes the built-in functions supported by Sybase IQ. Functions are used to return information from the database. They are allowed anywhere an expression is allowed.

Note Unless otherwise stated, any function that receives the NULL value as a parameter returns a NULL value.

If you omit the FROM clause, or if all tables in the query are in the SYSTEM dbspace, the query is processed by Adaptive Server Anywhere instead of Sybase IQ and may behave differently, especially with respect to syntactic and semantic restrictions and the effects of option settings. See the Adaptive Server Anywhere documentation for rules that may apply to processing.

If you have a query that does not require a FROM clause, you can force the query to be processed by Sybase IQ by adding the clause "FROM iq_dummy," where iq_dummy is a one-row, one-column table that you create in your database.

The section "Alphabetical list of functions" on page 232 describes each function individually.

Aggregate functions

Function

Aggregate functions summarize data over a group of rows from the database. The groups are formed using the GROUP BY clause of the SELECT statement. Aggregate functions are only allowed in the select list and in the HAVING and ORDER BY clauses of a SELECT statement.

The aggregate functions AVG, SUM, STDDEV, and VARIANCE do not support the binary data types (BINARY and VARBINARY).

Table 5-1 lists all aggregate functions and their parameters.

Table 5-1: Aggregate functions

Aggregate function	Parameters
AVG	({ DISTINCT*column-name* | *numeric-expr* })
COUNT	(*)
COUNT	({ DISTINCT*column-name* | *expression* })
MAX	({ DISTINCT*column-name* | *expression* })
MIN	({ DISTINCT*column-name* | *expression* })
STDDEV	([ALL] *expression*)
SUM	({ DISTINCT*column-name* | *expression* })
VARIANCE	([ALL] *expression*)

HTTP functions

Function

HTTP functions facilitate the handling of HTTP requests within web services.

Table 5-1 lists all HTTP functions and their parameters.

Table 5-2: HTTP functions

HTTP function	Parameters
HTTP_DECODE	(*string*)
HTTP_ENCODE	(*string*)
HTTP_VARIABLE	(*var-name* [[, *instance*], *header-field*])
NEXT_HTTP_HEADER	*header-name*
NEXT_HTTP_VARIABLE	*var-name*

Numeric functions

Function

Numeric functions perform mathematical operations on numerical data types or return numeric information.

Sybase IQ does not have the same constants or data type promotions as Adaptive Server Anywhere, with which it shares a common user interface. If you issue a SELECT statement without a FROM clause, the statement is passed through to Adaptive Server Anywhere. For the most consistent results, therefore, you should always include the table name in the FROM clause whether you need it or not. (You may create a dummy table just to use in such cases.)

Table 5-3 lists all numeric functions and their parameters.

Table 5-3: Numeric functions

Numeric function	Parameters
ABS	(*numeric-expr*)
ACOS	(*numeric-expr*)
ASIN	(*numeric-expr*)
ATAN	(*numeric-expr*)
ATAN2	(*numeric-expr1*, *numeric-expr2*)
CEILING	(*numeric-expr*)
COS	(*numeric-expr*)
COT	(*numeric-expr*)
DEGREES	(*numeric-expr*)
EXP	(*numeric-expr*)
FLOOR	(*numeric-expr*)
LOG	(*numeric-expr*)
LOG10	(*numeric-expr*)
MOD	(*dividend*, *divisor*)
PI	(*)
POWER	(*numeric-expr1*, *numeric-expr2*)
RADIANS	(*numeric-expr*)
RAND	([*integer-expr*])
REMAINDER	(*numeric-expr*, *numeric-expr*)
ROUND	(*numeric-expr*, *integer-expr*)
SIGN	(*numeric-expr*)
SIN	(*numeric-expr*)
SQRT	(*numeric-expr*)
TAN	(*numeric-expr*)
“TRUNCATE”	(*numeric-expr*, *integer-expr*)
TRUNCNUM	(*numeric-expression*, *integer-expression*)

String functions

Function

String functions perform conversion, extraction, or manipulation operations on strings or return information about strings.

When working in a multibyte character set, check carefully whether the function being used returns information concerning characters or bytes.

Most of the string functions accept binary data (hexadecimal strings) in the *string-expr* parameter, but some of the functions, such as LCASE, UCASE, LOWER, and LTRIM, expect the string expression to be a character string.

Table 5-4 lists all string functions and their parameters.

Table 5-4: String functions

String function	Parameters
ASCII	(*string-expr*)
BIT_LENGTH	(*column-name*)
BYTE_LENGTH	(*string-expr*)
CHAR	(*integer-expr*)
CHAR_LENGTH	(*string-expr*)
CHARINDEX	(*string-expr1*, *string-expr2*)
DIFFERENCE	(*string-expr1*, *string-expr2*)
INSERTSTR	(*numeric-expr*, *string-expr1*, *string-expr2*)
LCASE	(*string-expr*)
LEFT	(*string-expr*, *numeric-expr*)
LENGTH	(*string-expr*)
LOCATE	(*string-expr1*, *string-expr2* [, *numeric-expr*])
LOWER	(*string-expr*)
LTRIM	(*string-expr*)
OCTET_LENGTH	(*column-name*)
PATINDEX	('%*pattern*%', *string_expr*)
REPEAT	(*string-expr*, *numeric-expr*)
REPLACE	(*original-string*, *search-string*, *replace-string*)
REPLICATE	(*string-expr*, *integer-expr*)
RIGHT	(*string-expr*, *numeric-expr*)
RTRIM	(*string-expr*)
SIMILAR	(*string-expr1*, *string-expr2*)
SORTKEY	(*string_expr* [*collation-name*])
SOUNDEX	(*string-expr*)
SPACE	(*integer-expr*)
STR	(*numeric_expr* [, *length* [, *decimal*]])
STRING	(*string1* [, *string2*, ..., *string99*])
STUFF	(*string-expr1*, *start*, *length*, *string-expr2*)
SUBSTRING	(*string-expr*, *integer-expr* [, *integer-expr*])
TRIM	(*string-expr*)
UCASE	(*string-expr*)
UPPER	(*string-expr*)

Date and time functions

Function

Date and time functions perform conversion, extraction, or manipulation operations on date and time data types and can return date and time information.

Table 5-5 and Table 5-6 list the date and time functions and their parameters.

Syntax 1

Table 5-5: Date and time functions

Date and time functions	Parameters
DATE	(*expression*)
DATEFORMAT	(*datetime-expr*, *string-expr*)
DATENAME	(*date-part*, *date-expr*)
DATETIME	(*expression*)
DAY	(*date-expr*)
DAYNAME	(*date-expr*)
DAYS	(*date-expr*)
DAYS	(*date-expr*, *date-expr*)
DAYS	(*date-expr*, *integer-expr*)
DOW	(*date-expr*)
HOUR	(*datetime-expr*)
HOURS	(*datetime-expr*)
HOURS	(*datetime-expr*, *datetime-expr*)
HOURS	(*datetime-expr*, *integer-expr*)
ISDATE	(*string*)
MINUTE	(*datetime-expr*)
MINUTES	(*datetime-expr*)
MINUTES	(*datetime-expr*, *datetime-expr*)
MINUTES	(*datetime-expr*, *integer-expr*)
MONTH	(*date-expr*)
MONTHNAME	(*date-expr*)
MONTHS	(*date-expr*)
MONTHS	(*date-expr*, *date-expr*)
MONTHS	(*date-expr*, *integer-expr*)
NOW	(*)
QUARTER	(*date-expr*)
SECOND	(*datetime-expr*)
SECONDS	(*datetime-expr*)
SECONDS	(*datetime-expr*, *datetime-expr*)
SECONDS	(*datetime-expr*, *integer-expr*)
TODAY	(*)
WEEKS	(*date-expr*)
WEEKS	(*date-expr*, *date-expr*)
WEEKS	(*date-expr*, *integer-expr*)
YEAR	(*date-expr*)
YEARS	(*date-expr*)

Date and time functions	Parameters
YEARS	(*date-expr*, *date-expr*)
YEARS	(*date-expr*, *integer-expr*)
YMD	(*year-num*, *month-num*, *day-num*)

Syntax 2

Table 5-6: Transact-SQL compatible date and time functions

Transact-SQL compatible date and time functions	Parameters
DATEADD	(*date-part*, *numeric-expression*, *date-expr*)
DATEDIFF	(*date-part*, *date-expr1*, *date-expr2*)
DATENAME	(*date-part*, *date-expr*)
DATEPART	(*date-part*, *date-expr*)
GETDATE	()

Description

Sybase IQ provides two classes of date and time functions. While they can be used interchangeably, they have different styles. One set is Transact-SQL compatible.

The date and time functions listed in Syntax 1 allow manipulation of time units. Most time units (such as MONTH) have four functions for time manipulation, although only two names are used (such as MONTH and MONTHS).

The functions listed in Syntax 2 are the Transact-SQL date and time functions. They allow an alternative way of accessing and manipulating date and time functions.

Arguments to date functions should be converted to dates before being used. Thus, the following is not correct:

```
days ( '1995-11-17', 2 )
```

But the following is correct.

```
days ( date( '1995-11-17' ), 2 )
```

Sybase IQ does not have the same constants or data type promotions as Adaptive Server Anywhere, with which it shares a common user interface. If you issue a SELECT statement without a FROM clause, the statement is passed through to Adaptive Server Anywhere. The following statement is handled exclusively by Adaptive Server Anywhere:

```
SELECT WEEKS('1998/11/01');
```

The following statement, processed by Sybase IQ, uses a different starting point for the WEEKS function and returns a different result from the statement above:

```
SELECT WEEKS('1998/11/01') FROM iq_dummy;
```

Consider another example. The MONTHS function returns the number of months since an "arbitrary starting date". The "arbitrary starting date" of Sybase IQ, the imaginary date 0000-01-01, is chosen to produce the most efficient date calculations and is consistent across various data parts. Adaptive Server Anywhere doesn't have a single starting date. The following statements, the first processed by Adaptive Server Anywhere, the second by Sybase IQ, both return the answer 12:

```
SELECT MONTHS('0001/01/01');
SELECT MONTHS('0001/01/01') FROM iq_dummy;
```

For the most consistent results, therefore, you should always include the table name in the FROM clause whether you need it or not.

On the other hand, these statements yield the values 307 (Adaptive Server Anywhere) and 166 (Sybase IQ) respectively:

```
SELECT DAYS('0001/01/01');
SELECT DAYS('0001/01/01') FROM iq_dummy;
```

For the most consistent results, therefore, you should always include the table name in the FROM clause whether you need it or not.

Note Create a dummy table with only one column and row. You can then reference this table in the FROM clause for any SELECT statement with date or time functions, thus insuring processing by Sybase IQ, and consistent results.

Date parts

Many of the date functions use dates built from date parts. Table 5-7 displays allowed values of *date-part*.

Table 5-7: Date part values

Date Part	Abbreviation	Values
Year	yy	0001 – 9999
Quarter	qq	1 - 4
Month	mm	1 - 12
Week	wk	1 - 54
Day	dd	1 - 31
Dayofyear	dy	1 - 366
Weekday	dw	1 - 7 (Sun.-Sat.)
Hour	hh	0 - 23
Minute	mi	0 - 59
Second	ss	0 - 59
Millisecond	ms	0 – 999
Calyearofweek	cyr	Integer. The year in which the week begins. The week containing the first few days of the year can be part of the last week of the previous year, depending on the weekday on which the year started. Years starting on Sunday through Wednesday have no days that are part of the previous year, but years starting on Thursday through Saturday start their first week on the last sunday of the previous year.
Calweekofyear	cwk	An integer from 1 to 54 representing the week number within the year that contains the specified date.
Caldayofweek	cdw	The day number within the week (Sunday = 1, Saturday = 7)

Note By default, Sunday is the first day of the week. To make Monday be the first day, set the following option:

```
set option 'Date_First_Day_Of_Week' = '1'
```

For more information on specifying which day is the first day of the week, see the "DATE_FIRST_DAY_OF_WEEK option" on page 46.

Compatibility

For compatibility with Adaptive Server Enterprise, use the Transact-SQL date and time functions.

Data type conversion functions

Function

Data type conversion functions convert arguments from one data type to another.

Table 5-8 lists the data type conversion functions and their parameters.

Table 5-8: Date type conversion functions

Data type conversion function	Parameters
CAST	(*expression* AS *datatype*)
CONVERT	(*datatype*, *expression* [, *format-style*])
HEXTOINT	(*hexadecimal-string*)
INTTOHEX	(*integer-expr*)
ISDATE	(*string*)
ISNUMERIC	(*string*)

Description

The DATE, DATETIME, DATEFORMAT, and YMD functions which convert expressions to dates, timestamps, or strings based on a date format are listed in the section “Date and time functions” on page 219. The STRING function, which converts expressions to a string, is discussed in the section “String functions” on page 216.

The database server carries out many type conversions automatically. For example, if a string is supplied where a numerical expression is required, the string is automatically converted to a number. For more information on automatic data type conversions carried out by Sybase IQ, see the section Data type conversions on page 206.

System functions

Function

System functions return system information.

Table 5-9 lists the system functions and their parameters.

Table 5-9: System functions

System function	Parameters
COL_LENGTH	(*table-name*, *column-name*)
COL_NAME	(*table-id*, *column-id* [,*database-id*])
CONNECTION_PROPERTY	({ *property-id* | *property-name* } ... [, *connection-id*])
DATALENGTH	(*expression*)
DB_ID	([*database-name*])
DB_NAME	([*database-id*])
DB_PROPERTY	({ *property-id* | *property-name* } ... [,{*database-id* | *database-name* }])
EVENT_CONDITION	(*condition-name*)
EVENT_CONDITION_NAME	(*integer*)
EVENT_PARAMETER	(*context-name*)
INDEX_COL	(*table-name*, *index-id*, *key_#* [,*user-id*])
NEXT_CONNECTION	({ NULL | *connection-id* })
NEXT_DATABASE	({ NULL | *database-id* })
OBJECT_ID	(*object-name*)
OBJECT_NAME	(*object-id* [, *database-id*])
PROPERTY	({ *property-number* | *property-name* })
PROPERTY_DESCRIPTION	({ *property-number* | *property-name* })
PROPERTY_NAME	(*property-number*)
PROPERTY_NUMBER	(*property-name*)
SUSER_ID	([*user-name*])
SUSER_NAME	([*user-id*])
USER_ID	([*user-name*])
USER_NAME	([*user-id*])

Description

Databases currently running on a server are identified by a database name and a database ID number. The db_id and db_name functions provide information on these values.

A set of system functions provides information about properties of a currently running database, or of a connection, on the database server. These system functions take the database name or ID, or the connection name, as an optional argument to identify the database or connection for which the property is requested.

Performance

System functions are processed differently from other Sybase IQ functions. For this reason, when queries to Sybase IQ tables include system functions their performance is reduced.

Compatibility

Table 5-10 shows the Adaptive Server Enterprise system functions and their status in Sybase IQ:

Table 5-10: Status of ASE system functions in IQ

Function	Status
col_length	Implemented
col_name	Implemented
db_id	Implemented
db_name	Implemented
index_col	Implemented
object_id	Implemented
object_name	Implemented
proc_role	Always returns 0
show_role	Always returns NULL
tsequal	Not implemented
user_id	Implemented
user_name	Implemented
suser_id	Implemented
suser_name	Implemented
datalength	Implemented
curunreservedpgs	Not implemented
data_pgs	Not implemented
host_id	Not implemented
host_name	Not implemented
lct_admin	Not implemented
reserved_pgs	Not implemented
rowcnt	Not implemented
used_pgs	Not implemented
valid_name	Not implemented
valid_user	Not implemented

Notes

- Some of the system functions are implemented in Sybase IQ as system stored procedures.
- The db_id, db_name, datalength, suser_id, and suser_name functions are implemented as built-in functions.

Connection properties

Connection properties apply to an individual connection. This section describes how to retrieve the value of a specific connection property or the values of all connection properties. For descriptions of all of the connection properties, see the section “Database properties” in the chapter “Database Performance and Connection Properties” in the *Adaptive Server Anywhere Database Administration Guide*.

Examples

❖ **Retrieving the value of a connection property**

- Use the connection_property system function. The following statement returns the number of pages that have been read from file by the current connection.

```
select connection_property ( 'DiskRead' )
```

❖ **Retrieving the values of all connection properties**

- Use the sa_conn_properties system procedure.

```
call sa_conn_properties
```

A separate row is displayed for each connection, for each property.

Properties available for the server

Server properties apply across the server as a whole.This section describes how to retrieve the value of a specific server property or the values of all server properties. For descriptions of all of the server properties, see the section “Database properties” in the chapter “Database Performance and Connection Properties” in the *Adaptive Server Anywhere Database Administration Guide*.

Examples

❖ **Retrieving the value of a server property**

- Use the property system function. The following statement returns the number of cache pages being used to hold the main heap.

```
select property ( 'MainHeapPages') from iq_dummy
```

❖ **Retrieving the values of all server properties**

- Use the sa_eng_properties system procedure.

```
call sa_eng_properties
```

Properties available for each database

Database properties apply to an entire database. This section describes how to retrieve the value of a specific database property or the values of all database properties. For descriptions of all of the database properties, see the section "Database properties" in the chapter "Database Performance and Connection Properties" in the *Adaptive Server Anywhere Database Administration Guide*

Examples

❖ **Retrieving the value of a database property**

- Use the db_property system function. The following statement returns the page size of the current database.

```
select db_property ( 'PageSize') from iq_dummy
```

❖ **Retrieving the values of all database properties**

- Use the sa_db_properties system procedure.

```
call sa_db_properties
```

Analytical functions

Function

There are two types of analytical functions: rank and inverse distribution. The rank analytical functions rank items in a group, compute distribution, and divide a result set into a number of groupings. The inverse distribution analytical functions return a k-th percentile value, which can be used to help establish a threshold acceptance value for a set of data.

The rank analytical functions are RANK, DENSE_RANK, PERCENT_RANK, and NTILE. The inverse distribution analytical functions are PERCENTILE_CONT and PERCENTILE_DISC.

Table 5-11 lists the analytical functions and their parameters.

Table 5-11: Analytical functions

Analytical function	Parameters
DENSE_RANK	()
NTILE	(*integer*)
PERCENT_RANK	()
PERCENTILE_CONT	(*numeric-expr*)
PERCENTILE_DISC	(*numeric-expr*)

Analytical function	Parameters
RANK	()

Rank analytical functions usage

The rank analytical functions RANK, DENSE_RANK, PERCENT_RANK, and NTILE all require an OVER (ORDER BY) clause. For example:

```
RANK() OVER ( ORDER BY <expression> [ ASC | DESC ] )
```

The ORDER BY clause specifies the parameter on which ranking is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the OVER clause and is *not* an ORDER BY for the SELECT. No aggregation functions in the rank query are allowed to specify DISTINCT.

The OVER clause indicates that the function operates on a query result set. The result set is the rows that are returned after the FROM, WHERE, GROUP BY, and HAVING clauses have all been evaluated. The OVER clause defines the data set of the rows to include in the computation of the rank analytical function.

The value *expression* is a sort specification that can be any valid expression involving a column reference, aggregates, or expressions invoking these items.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

Rank analytical functions are only allowed in the select list of a SELECT or INSERT statement or in the ORDER BY clause of the SELECT statement. Rank functions can be in a view or a union. Rank functions cannot be used in a subquery, a HAVING clause, or in the select list of an UPDATE or DELETE statement. Only one rank analytical function is allowed per query.

Inverse distribution analytical functions usage

The inverse distribution analytical functions PERCENTILE_CONT and PERCENTILE_DISC take a percentile value as the function argument and operate on a group of data specified in the WITHIN GROUP clause or operate on the entire data set. These functions return one value per group. For PERCENTILE_DISC, the data type of the results is the same as the data type of its ORDER BY item specified in the WITHIN GROUP clause. For PERCENTILE_CONT, the data type of the results is either numeric, if the ORDER BY item in the WITHIN GROUP clause is a numeric, or double, if the ORDER BY item is an integer or floating point.

The inverse distribution analytical functions require a WITHIN GROUP (ORDER BY) clause. For example:

```
PERCENTILE_CONT ( expression1 )
WITHIN GROUP ( ORDER BY expression2 [ASC | DESC ] )
```

The value of *expression1* must be a constant of numeric data type and range from 0 to 1 (inclusive). If the argument is NULL, then a “wrong argument for percentile” error is returned. If the argument value is less than 0 or greater than 1, then a “data value out of range” error is returned.

The ORDER BY clause, which must be present, specifies the expression on which the percentile function is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the WITHIN GROUP clause and is *not* an ORDER BY for the SELECT.

The WITHIN GROUP clause distributes the query result into an ordered data set from which the function calculates a result.

The value *expression2* is a sort specification that must be a single expression involving a column reference. Multiple expressions are not allowed and no rank analytical functions, set functions, or subqueries are allowed in this sort expression.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

Inverse distribution analytical functions are allowed in a subquery, a HAVING clause, a view or a union. The inverse distribution functions can be used anywhere the simple non-analytical aggregate functions are used. The inverse distribution functions ignore the NULL value in the data set.

Compatibility

The rank and inverse distribution analytical functions are not supported by Adaptive Server Anywhere or Adaptive Server Enterprise.

See also

See the individual analytical function descriptions for specific details on the use of each function.

Miscellaneous functions

Function

Miscellaneous functions perform operations on arithmetic, string, or date/time expressions, including the return values of other functions.

Table 5-12 lists the miscellaneous functions and their parameters.

Table 5-12: Miscellaneous functions

Miscellaneous functions	Parameters
ARGN	(*integer-expr*, *expression* [, ...])
COALESCE	(*expression*, *expression* [, *expression* ...])
IFNULL	(*expression1*, *expression2* [, *expression3*])
ISNULL	(*expression*, *expression* [, *expression* ...])
NULLIF	(*expression1*, *expression2*)
NUMBER	(*)
ROWID	(*table-name*)

Compatibility

Adaptive Server Enterprise does not support these miscellaneous functions.

Java and SQL user-defined functions

There are two mechanisms for creating user-defined functions in Sybase IQ. You can use the SQL language to write the function, or you can use Java.

Note User-defined functions are processed by the Adaptive Server Anywhere portion of the product. They do not take advantage of the performance features of Sybase IQ. Queries that include user-defined functions run at least 10 times slower than queries without them.

In very few cases, differences in semantics between ASA and Sybase IQ can produce different results for a query if it is issued in a user-defined function. For example, IQ treats the CHAR and VARCHAR data types as distinct and different, while Anywhere treats CHAR data as if it were VARCHAR.

User-defined functions in SQL

You can implement your own functions in SQL using the CREATE FUNCTION statement. The RETURN statement inside the CREATE FUNCTION statement determines the data type of the function.

Once a SQL user-defined function is created, it can be used anywhere a built-in function of the same data type is used.

Note Avoid using the CONTAINS predicate in a view that has a user-defined function, because the CONTAINS criteria is ignored. Use the LIKE predicate instead, or issue the query outside of a view.

For more information on creating SQL functions, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*.

User-defined functions in Java

Although SQL functions are useful, Java classes provide a more powerful and flexible way of implementing user-defined functions, with the additional advantage that they can be moved from the database server to a client application if desired.

Any **class method** of an installed Java class can be used as a user-defined function anywhere a built-in function of the same data type is used.

Instance methods are tied to particular instances of a class, and so have different behavior from standard user-defined functions.

For more information on creating Java classes, and on class methods, see "A Java Seminar" in the chapter "Introduction to Java in the Database" in the *Adaptive Server Anywhere Programming Guide*.

Alphabetical list of functions

This section describes each function individually. The function type, for example, Numeric or String, is indicated in brackets next to the function name.

Note that some of the results in the examples have been rounded or truncated.

Also note that the actual values of database object IDs, such as the object ID of a table or the column ID of a column, may be different from the values shown in the examples.

ABS function [Numeric]

Function

Returns the absolute value of a numeric expression.

Syntax

ABS (*numeric-expression*)

Parameters

numeric-expression The number whose absolute value is to be returned.

Example

The following statement returns the value 66.

```
SELECT ABS( -66 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

ACOS function [Numeric]

Function — Returns the arc-cosine, in radians, of a numeric expression.

Syntax — **ACOS** (*numeric-expression*)

Parameters — **numeric-expression** The cosine of the angle.

Example — The following statement returns the value 1.023945.

```
SELECT ACOS( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
- "ASIN function [Numeric]"
- "ATAN function [Numeric]"
- "ATAN2 function [Numeric]"
- "COS function [Numeric]"

ARGN function [Miscellaneous]

Function — Returns a selected argument from a list of arguments.

Syntax — **ARGN** (*integer-expression*, *expression* [, ...])

Parameters — **integer-expression** The position of an argument within the list of expressions.

expression An expression of any data type passed into the function. All supplied expressions must be of the same data type.

Example — The following statement returns the value 6.

```
SELECT ARGN( 6, 1,2,3,4,5,6 ) FROM iq_dummy
```

Usage — Using the value of *integer-expression* as *n*, returns the *n*th argument (starting at 1) from the remaining list of arguments. While the expressions can be of any data type, they must all be of the same data type. The integer expression must be from one to the number of expressions in the list or NULL is returned. Multiple expressions are separated by a comma.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

ASCII function [String]

Function — Returns the integer ASCII value of the first byte in a string-expression.

Syntax — **ASCII** (*string-expression*)

Parameters — **string-expression** The string.

Example — The following statement returns the value 90, when the collation sequence is set to the default ISO_BINENG.

```
SELECT ASCII( 'Z' ) FROM iq_dummy
```

Usage — If the string is empty, then ASCII returns zero. Literal strings must be enclosed in quotes.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

ASIN function [Numeric]

Function — Returns the arc-sine, in radians, of a number.

Syntax — **ASIN** (*numeric-expression*)

Parameters — **numeric-expression** The sine of the angle.

Example — The following statement returns the value 0.546850.

```
SELECT ASIN( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also — "ACOS function [Numeric]"

"ATAN function [Numeric]"

"ATAN2 function [Numeric]"

"SIN function [Numeric]"

ATAN function [Numeric]

Function — Returns the arc-tangent, in radians, of a number.

Syntax — **ATAN** (*numeric-expression*)

Parameters — **numeric-expression** The tangent of the angle.

Example

The following statement returns the value 0.479519.

```
SELECT ATAN( 0.52 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"ACOS function [Numeric]"

"ASIN function [Numeric]"

"ATAN2 function [Numeric]"

"TAN function [Numeric]"

ATAN2 function [Numeric]

Function

Returns the arc-tangent, in radians, of the ratio of two numbers.

Syntax

ATAN2 (*numeric-expression1*, *numeric-expression2*)

Parameters

numeric-expression1 The numerator in the ratio whose arc tangent is calculated.

numeric-expression2 The denominator in the ratio whose arc-tangent is calculated.

Example

The following statement returns the value 0.00866644968879073143.

```
SELECT ATAN2( 0.52, 060 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** ATAN2 is not supported by Adaptive Server Enterprise.

See also

"ACOS function [Numeric]"

"ASIN function [Numeric]"

"ATAN function [Numeric]"

"TAN function [Numeric]"

AVG function [Aggregate]

Function

Computes the average of a numeric expression for a set of rows, or computes the average of a set of unique values.

Syntax

AVG (*numeric-expression* | **DISTINCT** *column-name*)

Parameters

numeric-expression The value whose average is calculated over a set of rows.

DISTINCT column-name Computes the average of the unique values in *column-name*. This is of limited usefulness, but is included for completeness.

Example

The following statement returns the value 49988.6.

```
SELECT AVG ( salary ) FROM employee
```

Usage

This average does not include rows where *numeric -expression* is the NULL value. Returns the NULL value for a group containing no rows.

Standards and compatibility

- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"SUM function [Aggregate]"

"COUNT function [Aggregate]"

BIT_LENGTH function [String]

Function

Returns an unsigned 64 bit value containing the bit length of the column parameter.

Syntax

BIT_LENGTH(*column-name*)

Parameters

column-name The name of a column.

Usage

The return value of a NULL argument is NULL.

The BIT_LENGTH function supports all Sybase IQ data types.

Standards and compatibility

Sybase Not supported by Adaptive Server Anywhere or Adaptive Server Enterprise.

See also

"OCTET_LENGTH function [String]"

BYTE_LENGTH function [String]

Function

Returns the number of bytes in a string.

Syntax

BYTE_LENGTH (*string-expression*)

Parameters

string-expression The string whose length is to be calculated.

Example

The following statement returns the value 12.

```
SELECT BYTE_LENGTH( 'Test Message' ) FROM iq_dummy
```

Usage

Trailing white space characters are included in the length returned.

The return value of a NULL string is NULL.

If the string is in a multibyte character set, the BYTE_LENGTH value differs from the number of characters returned by CHAR_LENGTH.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"CHAR_LENGTH function [String]"

"DATALENGTH function [System]"

"LENGTH function [String]"

CAST function [Data type conversion]

Function

Returns the value of an expression converted to a supplied data type.

Syntax

CAST (*expression* **AS** *data type*)

Parameters

expression The expression to be converted.

data type The target data type.

Examples

The following function ensures a string is used as a date:

```
CAST( '2000-10-31' AS DATE )
```

The value of the expression `1 + 2` is calculated, and the result cast into a single-character string, the length the data server assigns:

```
CAST( 1 + 2 AS CHAR )
```

You can use the CAST function to shorten strings:

```
SELECT CAST( lname AS CHAR(5) ) FROM customer
```

Usage

If you do not indicate a length for character string types, Sybase IQ chooses an appropriate length. If neither precision nor scale is specified for a DECIMAL conversion, the database server selects appropriate values.

If neither precision nor scale is specified for the explicit conversion of NULL to NUMERIC, the default is NUMERIC(1,0). For example,

```
SELECT CAST( NULL AS NUMERIC ) A,
       CAST( NULL AS NUMERIC(15,2) ) B
```

is described as:

```
A NUMERIC(1,0)
B NUMERIC(15,2)
```

Standards and compatibility

- **SQL/92** This function is SQL/92 compatible.
- **Sybase** Not supported in Adaptive Server Enterprise.

See also "CONVERT function [Data type conversion]"

CEILING function [Numeric]

Function Returns the ceiling (smallest integer not less than) of a number.

Syntax **CEILING** (*numeric-expression*)

Parameters **numeric-expression** The number whose ceiling is to be calculated.

Examples The following statement returns the value 60.00000.

```
SELECT CEILING( 59.84567 ) FROM iq_dummy
```

The following statement returns the value 123.

```
SELECT CEILING( 123 ) FROM iq_dummy
```

The following statement returns the value 124.00.

```
SELECT CEILING( 123.45 ) FROM iq_dummy
```

The following statement returns the value -123.00.

```
SELECT CEILING( -123.45 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "FLOOR function [Numeric]"

CHAR function [String]

Function Returns the character with the ASCII value of a number.

Syntax **CHAR** (*integer-expression*)

Parameters **integer-expression** The number to be converted to an ASCII character. The number must be in the range 0 to 255, inclusive.

Examples The following statement returns the value Y.

```
SELECT CHAR( 89 ) FROM iq_dummy
```

The following statement returns the value S.

```
SELECT CHAR( 83 ) FROM iq_dummy
```

Usage

The character in the current database character set corresponding to the supplied numeric expression modulo 256 is returned.

CHAR returns NULL for integer expressions with values greater than 255 or less than zero.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

CHAR_LENGTH function [String]

Function

Returns the number of characters in a string.

Syntax

CHAR_LENGTH (*string-expression*)

Parameters

string-expression The string whose length is to be calculated.

Usage

Trailing white space characters are included in the length returned.

The return value of a NULL string is NULL.

If the string is in a multibyte character set, the CHAR_LENGTH value may be less than the BYTE_LENGTH value.

Example

The following statement returns the value 8.

```
SELECT CHAR_LENGTH( 'Chemical' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** This function is SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"BYTE_LENGTH function [String]"

CHARINDEX function [String]

Function

Returns the position of the first occurrence of one string in another.

Syntax

CHARINDEX (*string-expression1*, *string-expression2*)

Parameters

string-expression1 The string you are searching for. This string is limited to 255 bytes.

string-expression2 The string to be searched.

Example

The statement:

```
SELECT emp_lname, emp_fname
FROM employee
WHERE CHARINDEX('K', emp_lname ) = 1
```

returns the following values:

emp_lname	emp_fname
Klobucher	James
Kuo	Felicia
Kelly	Moira

The position of the first character in the string being searched is 1.

Usage

If the string being searched contains more than one instance of the other string, then CHARINDEX returns the position of the first instance.

If the string being searched does not contain the other string, then CHARINDEX returns 0.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"SUBSTRING function [String]"

COALESCE function [Miscellaneous]

Function

Returns the first non-NULL expression from a list.

Syntax

COALESCE (*expression*, *expression* [, ...])

Parameters

expression Any expression.

Example

The following statement returns the value 34.

```
SELECT COALESCE( NULL, 34, 13, 0 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** SQL/92.
- **Sybase** Not supported by Adaptive Server Enterprise.

COL_LENGTH function [System]

Function
Returns the defined length of a column.

Syntax
COL_LENGTH (*table-name*, *column-name*)

Parameters
table-name The table name.

column-name The column name.

Example
The following statement returns the column length 35.

```
SELECT COL_LENGTH ( 'CUSTOMER', 'ADDRESS' ) FROM
iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also
"DATALENGTH function [System]"

COL_NAME function [System]

Function
Returns the column name.

Syntax
COL_NAME (*table-id*, *column-id* [, *database-id*])

Parameters
table-id The object ID of the table.

column-id The column ID of the column.

database-id The database ID.

Examples
The following statement returns the column name lname. The object ID of the customer table is 100209, as returned by the OBJECT_ID function. The column ID is stored in the *column_id* column of the *syscolumn* system table. The database ID of the asiqdemo database is 0, as returned by the DB_ID function.

```
SELECT COL_NAME( 100209, 3, 0 ) FROM iq_dummy
```

The following statement returns the column name city.

```
SELECT COL_NAME ( 100209, 5 )FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also
"OBJECT_ID function [System]"

"DB_ID function [System]"

"SYSCOLUMN system table" on page 729

CONNECTION_PROPERTY function [System]

Function

Returns the value of a given connection property as a string.

Syntax

CONNECTION_PROPERTY ({ *integer-expression1* | *string-expression* } ... [, *integer-expression2*])

Parameters

integer-expression1 In most cases it is more convenient to supply a string expression as the first argument. If you do supply *integer-expression1*, it is the connection property ID. You can determine this using the PROPERTY_NUMBER function.

string-expression The connection property name. Either the property ID or the property name must be specified.

For a list of connection properties, see the section "Connection properties" on page 227.

integer-expression2 The connection ID of the current database connection. The current connection is used if this argument is omitted.

Example

The following statement returns the number of prepared statements being maintained, for example 4.

```
SELECT connection_property( 'PrepStmt' )FROM iq_dummy
```

Usage

The current connection is used if the second argument is omitted.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"Connection properties" on page 227

"PROPERTY_NUMBER function [System]"

CONVERT function [Data type conversion]

Function

Returns an expression converted to a supplied data type.

Syntax

CONVERT (*data-type*, *expression* [, *format-style*])

Parameters

data-type The data type to which the expression is converted.

expression The expression to be converted.

format-style For converting strings to date or time data types and vice versa, the *format-style* is a style code number that describes the date format string to be used. Table 5-13 lists the meanings of the values of the *format-style* argument.

Table 5-13: CONVERT format style code output

Without century (yy)	With century (yyyy)	Output
-	0 or 100	mmm dd yyyy hh:nnAM (or PM)
1	101	mm/dd/yy[yy]
2	102	[yy]yy.mm.dd
3	103	dd/mm/yy[yy]
4	104	dd.mm.yy[yy]
5	105	dd-mm-yy[yy]
6	106	dd mmm yy[yy]
7	107	mmm dd, yy[yy]
8	108	hh:nn:ss
-	9 or 109	mmm dd yyyy hh:nn:ss:sssAM (or PM)
10	110	mm-dd-yy[yy]
11	111	[yy]yy/mm/dd
12	112	[yy]yymmdd
13	113	dd mmm yyyy hh:nn:ss:sss (24 hour clock, Europe default + milliseconds, 4-digit year)
14	114	hh:nn:ss (24 hour clock)
20	120	yyyy-mm-dd hh:nn:ss (24-hour clock, ODBC canonical, 4-digit year)
21	121	yyyy-mm-dd hh:nn:ss.sss (24 hour clock, ODBC canonical with milliseconds, 4-digit year)
-	365	yyyyjjj (as a string or integer, where jjj is the Julian day number from 1 to 366 within the year)

If no *format-style* argument is provided, Style Code 0 is used.

Examples

The following statements illustrate the use of format styles.

```
SELECT CONVERT( CHAR( 20 ), order_date, 104 )
FROM sales_order
```

order_date
16.03.1993
20.03.1993

order_date
23.03.1993
25.03.1993
...

```
SELECT CONVERT( CHAR( 20 ), order_date, 7 )
FROM sales_order
```

order_date
mar 16, 93
mar 20, 93
mar 23, 93
mar 25, 93
...

The following statements illustrate the use of the format style 365, which converts data of type DATE and DATETIME to and from either string or integer type data.

```
CREATE TABLE tab
   (date_col DATE, int_col INT, char7_col CHAR(7));
INSERT INTO tab (date_col, int_col, char7_col)
   VALUES ('Dec 17, 2004', 2004352, '2004352');
```

`SELECT CONVERT(VARCHAR(8), tab.date_col, 365) FROM tab;`
returns `'2004352'`

`SELECT CONVERT(INT, tab.date_col, 365) from tab;`
returns `2004352`

`SELECT CONVERT(DATE, tab.int_col, 365) FROM TAB;`
returns `2004-12-17`

`SELECT CONVERT(DATE, tab.char7_col, 365) FROM tab;`
returns `2004-12-17`

The following statement illustrates conversion to an integer, and returns the value 5.

```
SELECT CONVERT( integer, 5.2 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise and Adaptive Server Anywhere, except for format style 365, which is an IQ only extension.

See also "CAST function [Data type conversion]"

COS function [Numeric]

Function Returns the cosine of a number, expressed in radians.

Syntax **COS** (*numeric-expression*)

Parameters **numeric-expression** The angle, in radians.

Example The following statement returns the value 0.86781.

```
SELECT COS( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "ACOS function [Numeric]"

"COT function [Numeric]"

"SIN function [Numeric]"

"TAN function [Numeric]"

COT function [Numeric]

Function Returns the cotangent of a number, expressed in radians.

Syntax **COT** (*numeric-expression*)

Parameters **numeric-expression** The angle, in radians.

Example The following statement returns the value 1.74653.

```
SELECT COT( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "COS function [Numeric]"

"SIN function [Numeric]"

"TAN function [Numeric]"

COUNT function [Aggregate]

Function
Counts the number of rows in a group depending on the specified parameters.

Syntax
COUNT (* | *expression* | **DISTINCT** *column-name*)

Parameters
***** Returns the number of rows in each group.

expression Returns the number of rows in each group where *expression* is not the NULL value.

DISTINCT column-name Returns the number of different values in the column with name *column-name*. Rows where the value is the NULL value are not included in the count.

Example
The following statement returns each unique city, and the number of rows with that city value:

```
SELECT city , Count(*)
FROM employee
GROUP BY city
```

Standards and compatibility
- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"AVG function [Aggregate]"

"SUM function [Aggregate]"

DATALENGTH function [System]

Function
Returns the length of the expression in bytes.

Syntax
DATALENGTH (*expression*)

Parameters
expression The expression is usually a column name. If the expression is a string constant, it must be enclosed in quotes.

Usage
Table 5-14 lists the return values of DATALENGTH.

Table 5-14: DATALENGTH return values

Data type	DATALENGTH
SMALLINT	2
INTEGER	4
DOUBLE	8
CHAR	Length of the data
BINARY	Length of the data

Example

The following statement returns the value 35, the longest string in the company_name column.

```
SELECT MAX( DATALENGTH( company_name ) )
FROM customer
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also

"CHAR_LENGTH function [String]"

"COL_LENGTH function [System]"

DATE function [Date and time]

Function

Converts the expression into a date, and removes any hours, minutes or seconds.

Syntax

DATE (*expression*)

Parameters

expression The value to be converted to date format. The expression is usually a string.

Example

The following statement returns the value 1988-11-26 as a date.

```
SELECT DATE( '1988-11-26 21:20:53' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

DATEADD function [Date and time]

Function

Returns the date produced by adding the specified number of the specified date parts to a date.

Syntax

DATEADD (*date-part*, *numeric-expression*, *date-expression*)

Parameters

date-part The date-part to be added to the date.

For a complete listing of allowed date-parts, see the section "Date parts" on page 222.

numeric-expression The number of *date-parts* to be added to the date. The *numeric_expression* can be any numeric type; the value is truncated to an integer.

date-expression The date to be modified.

Example

The following statement returns the value 1995-11-02 00:00:00.000.

```
SELECT DATEADD( month, 102, '1987/05/02' ) FROM iq_dummy
```

Usage

DATEADD is a Transact-SQL compatible data manipulation function.

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

DATEDIFF function [Date and time]

Function

Returns the interval between two dates.

Syntax

DATEDIFF (*date-part*, *date-expression1*, *date-expression2*)

Parameters

date-part Specifies the date-part in which the interval is to be measured.

For a complete listing of allowed date-parts, see the section "Date parts" on page 222.

date-expression1 The starting date for the interval. This value is subtracted from *date-expression2* to return the number of *date-parts* between the two arguments.

date-expression2 The ending date for the interval. *Date-expression1* is subtracted from this value to return the number of *date-parts* between the two arguments.

Examples

The following statement returns 1:

```
SELECT DATEDIFF( hour, '4:00AM', '5:50AM' ) FROM
iq_dummy
```

The following statement returns 102:

```
SELECT DATEDIFF( month, '1987/05/02', '1995/11/15' )
FROM iq_dummy
```

The following statement returns 0:

```
SELECT DATEDIFF( day, '00:00', '23:59' ) FROM iq_dummy
```

The following statement returns 4:

```
SELECT DATEDIFF( day, '1999/07/19 00:00', '1999/07/23
23:59' ) FROM iq_dummy
```

The following statement returns 0:

```
SELECT DATEDIFF( month, '1999/07/19', '1999/07/23' )
FROM iq_dummy
```

The following statement returns 1:

```
SELECT DATEDIFF( month, '1999/07/19', '1999/08/23' )
FROM iq_dummy
```

Usage

This function calculates the number of date parts between two specified dates. The result is a signed integer value equal to (date2 - date1), in date parts.

DATEDIFF results are truncated, not rounded, when the result is not an even multiple of the date part.

When you use day as the date part, DATEDIFF returns the number of midnights between the two times specified, including the second date, but not the first. For example, the following statement returns the value 5. Midnight of the first day 2003/08/03 is not included in the result. Midnight of the second day *is* included, even though the time specified is before midnight.

```
SELECT DATEDIFF( day, '2003/08/03 14:00', '2003/08/08
14:00' ) FROM iq_dummy
```

When you use month as the date part, DATEDIFF returns the number of first-of-the-months between two dates, including the second date but not the first. For example, both of the following statements return the value 9:

```
SELECT DATEDIFF( month, '2003/02/01', '2003/11/15' )
FROM iq_dummy;
SELECT DATEDIFF( month, '2003/02/01', '2003/11/01' )
FROM iq_dummy;
```

The first date 2003/02/01 is a first-of-month, but is not included in the result of either query. The second date 2003/11/01 in the second query is also a first-of-month and *is* included in the result.

When you use week as the date part, DATEDIFF returns the number of Sundays between the two dates, including the second date but not the first. For example, in the month 2003/08, the dates of the Sundays are 03, 10, 17, 24, and 31. The following query returns the value 4.:

```
SELECT DATEDIFF( week, '2003/08/03', '2003/08/31' )
FROM iq_dummy;
```

The first Sunday (2003/08/03) is not included in the result.

For the smaller time units there are overflow values:

- **milliseconds** 24 days
- **seconds** 68 years
- **minutes** 4083 years
- **others** No overflow limit

The function returns an overflow error if you exceed these limits.

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

DATEFORMAT function [Date and time]

Function

Returns a string representing a date-expression in the specified format.

Syntax

DATEFORMAT (*datetime-expression*, *string-expression*)

Parameters

datetime-expression The date/time to be converted. Must be a date, time, timestamp, or character string.

string-expression The format of the converted date.

For information on date format descriptions, see the section “DATE_FORMAT option” on page 47.

Example

The following statement returns string values like Jan 01, 1989.

```
SELECT DATEFORMAT( start_date, 'Mmm dd, yyyy' ) from
employee;
```

The following statement returns the string Feb 19, 1987.

```
SELECT DATEFORMAT( CAST ( ‘1987/02/19’ AS DATE ), ‘Mmm
Dd, yyyy’ ) FROM iq_dummy
```

Usage

The *datetime-expression* to convert must be a date, time, or timestamp data type, but can also be a CHAR or VARCHAR character string. If the date is a character string, Sybase IQ implicitly converts the character string to date, time, or timestamp data type, so an explicit cast, as in the example above, is not necessary.

Any allowable date format can be used for *string-expression*. Date format strings must not contain any multibyte characters. Only single-byte characters are allowed in a date/time/datetime format string, even when the collation order of the database is a multibyte collation order like SJIS2.

If '*?*' represents a multibyte character, then the following query fails:

```
SELECT DATEFORMAT ( start_date, 'yy?') FROM employee;
```

Instead, move the multibyte character outside of the date format string using the concatenation operator:

```
SELECT DATEFORMAT (start_date, 'yy') + '?' FROM
employee;
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Anywhere.

Year 2000 compliance

It is possible to use the DATEFORMAT function to produce a string with the year value represented by only two digits. This can cause problems with year 2000 compliance even though no error has occurred.

For more information on year 2000 compliance, see the section Year 2000 compliance on page 207.

See also

"DATE_FORMAT option" on page 47

DATENAME function [Date and time]

Function

Returns the name of the specified part (such as the month "June") of a date/time value, as a character string.

Syntax

DATENAME (*date-part*, *date-expression*)

Parameters

date-part The date-part to be named.

For a complete listing of allowed date-parts, see the section "Date parts" on page 222.

date-expression The date for which the date-part name is to be returned. The date must contain the requested *date-part*.

Example

The following statement returns the value May.

```
SELECT datename( month , '1987/05/02' ) FROM iq_dummy
```

Usage

DATENAME returns a character string, even if the result is numeric, such as 23 for the day.

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

DATEPART function [Date and time]

Function

Returns an integer value for the specified part of a date/time value.

Syntax

DATEPART (*date-part*, *date-expression*)

Parameters

date-part The date-part to be returned.

For a complete listing of allowed date-parts, see the section “Date parts” on page 222.

date-expression The date for which the part is to be returned. The date must contain the *date-part* field.

Example

The following statement returns the value 5.

```
SELECT DATEPART( month , '1987/05/02' ) FROM iq_dummy
```

Usage

Note that the DATE, TIME, and DTTM indexes do not support some date parts (Calyearofweek, Calweekofyear, Caldayofweek, Dayofyear, Millisecond).

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

DATETIME function [Date and time]

Function

Converts an expression into a timestamp.

Syntax

DATETIME (*expression*)

Parameters

expression The *expression* to be converted. The expression is usually a string. Conversion errors may be reported.

Example

The statement

```
SELECT DATETIME( '1998-09-09 12:12:12.000' ) FROM
iq_dummy
```

returns a timestamp with value 1998-09-09 12:12:12.000.

Standards and compatibility

- **SQL/92** Vendor extension.

- **Sybase** Not supported by Adaptive Server Enterprise.

DAY function [Date and time]

Function
Returns an integer from 1 to 31 corresponding to the day of the month of the date specified.

Syntax
DAY (*date-expression*)

Parameters
date-expression The date.

Example
The following statement returns the value 12.

```
SELECT DAY( '2001-09-12' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

DAYNAME function [Date and time]

Function
Returns the name of the day of the week from the specified date.

Syntax
DAYNAME(*date-expression*)

Parameters
date-expression The date.

Example
The following statement returns the value Saturday.

```
SELECT DAYNAME ( '1987/05/02' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

DAYS function [Date and time]

Function
Returns the number of days since an arbitrary starting date, returns the number of days between two specified dates, or adds the specified *integer-expression* number of days to a given date.

Syntax
DAYS (*datetime-expression*)
| (*datetime-expression*, *datetime-expression*)
| (*datetime-expression*, *integer-expression*)

Parameters
datetime-expression A date and time.

integer-expression The number of days to be added to the *datetime-expression.* If the *integer-expression* is negative, the appropriate number of days are subtracted from the date/time. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a date.

For information on casting data types, see the section "CAST function [Data type conversion]" on page 237.

DAYS ignores hours, minutes, and seconds.

Examples

The following statement returns the integer value 729948.

```
SELECT DAYS( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the integer value -366, which is the difference between the two dates.

```
SELECT DAYS( '1998-07-13 06:07:12',
'1997-07-12 10:07:12' ) FROM iq_dummy
```

The following statement returns the value 1999-07-14:

```
SELECT DAYS( CAST('1998-07-13' AS DATE ), 366 )
FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

DB_ID function [System]

Function

Returns the database ID number.

Syntax

DB_ID ([*database-name*])

Parameters

database-name A string expression containing the database name. If *database-name* is a string constant, it must be enclosed in quotes. If no *database-name* is supplied, the ID number of the current database is returned.

Examples

The following statement returns the value 0, if asiqdemo is the only running database:

```
SELECT DB_ID( 'asiqdemo' ) FROM iq_dummy
```

The following statement returns the value 0, if executed against the only running database.

```
SELECT DB_ID() FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.

- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also

"DB_NAME function [System]"

"OBJECT_ID function [System]"

DB_NAME function [System]

Function

Returns the database name.

Syntax

DB_NAME ([*database-id*])

Parameters

database-id The ID of the database. The *database-id* must be a numeric expression.

Example

The following statement returns the database name asiqdemo, when executed against the sample database.

```
SELECT DB_NAME( 0 ) FROM iq_dummy
```

Usage

If no *database-id* is supplied, the name of the current database is returned.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also

"DB_ID function [System]"

"COL_NAME function [System]"

"OBJECT_NAME function [System]"

DB_PROPERTY function [System]

Function

Returns the value of the given property.

Syntax

DB_PROPERTY ({ *property-id* | *property-name* }
[, { *database-id* | *database-name* }])

Parameters

property-id The database property ID.

property-name The database property name.

database-id The database ID number, as returned by DB_ID. Typically, the database name is used.

database-name The name of the database, as returned by DB_NAME.

Example
The following statement returns the page size of the current database, in bytes.

```
SELECT DB_PROPERTY( 'PAGESIZE' ) FROM iq_dummy
```

Usage
Returns a string. The current database is used if the second argument is omitted.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"DB_ID function [System]"

"DB_NAME function [System]"

"Properties available for each database" on page 228

DEGREES function [Numeric]

Function
Converts a number from radians to degrees.

Syntax
DEGREES (*numeric-expression*)

Parameters
numeric-expression An angle in radians.

Example
The following statement returns the value 29.793805.

```
SELECT DEGREES( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

DENSE_RANK function [Analytical]

Function
Ranks items in a group.

Syntax
DENSE_RANK () **OVER** (**ORDER BY** *expression* [**ASC** | **DESC**])

Parameters
expression A sort specification that can be any valid expression involving a column reference, aggregates, or expressions invoking these items.

Example
The following statement illustrates the use of the DENSE_RANK function:

```
SELECT s_suppkey, DENSE_RANK()
OVER ( ORDER BY ( SUM(s_acctBal) DESC )
AS rank_dense FROM supplier GROUP BY s_suppkey;

s_suppkey        sum_acctBal       rank_dense
supplier#011     200000            1
```

```
supplier#002     200000          1
supplier#013     123000          2
supplier#004     110000          3
supplier#035     110000          3
supplier#006     50000           4
supplier#021     10000           5
```

Usage

DENSE_RANK is a rank analytical function. The dense rank of row R is defined as the number of rows preceding and including R that are distinct within the groups specified in the OVER clause or distinct over the entire result set. The difference between DENSE_RANK and RANK is that DENSE_RANK leaves no gap in the ranking sequence when there is a tie. RANK leaves a gap when there is a tie.

DENSE_RANK requires an OVER (ORDER BY) clause. The ORDER BY clause specifies the parameter on which ranking is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the OVER clause and is *not* an ORDER BY for the SELECT. No aggregation functions in the rank query are allowed to specify DISTINCT.

The OVER clause indicates that the function operates on a query result set. The result set is the rows that are returned after the FROM, WHERE, GROUP BY, and HAVING clauses have all been evaluated. The OVER clause defines the data set of the rows to include in the computation of the rank analytical function.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

DENSE_RANK is only allowed in the select list of a SELECT or INSERT statement or in the ORDER BY clause of the SELECT statement. DENSE_RANK can be in a view or a union. The DENSE_RANK function cannot be used in a subquery, a HAVING clause, or in the select list of an UPDATE or DELETE statement. Only one rank analytical function is allowed per query.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

“RANK function [Analytical]”

“Analytical functions”

DIFFERENCE function [String]

Function
Compares two strings, evaluates the similarity between them, and returns a value from 0 to 4. The best match is 4.

Syntax
DIFFERENCE (*string-expression1*, *string-expression2*)

Parameters
string-expression1 The first string to compare.

string-expression2 The second string to compare.

Examples
The following statement returns the value 4.

```
SELECT DIFFERENCE( 'Smith', 'Smith' ) FROM iq_dummy
```

The following statement returns the value 4.

```
SELECT DIFFERENCE( 'Smith', 'Smyth' ) FROM iq_dummy
```

The following statement returns the value 3.

```
SELECT DIFFERENCE( 'Smith', 'Sweeney' ) FROM iq_dummy
```

The following statement returns the value 2.

```
SELECT DIFFERENCE( 'Smith', 'Jones' ) FROM iq_dummy
```

The following statement returns the value 1.

```
SELECT DIFFERENCE( 'Smith', 'Rubin' ) FROM iq_dummy
```

The following statement returns the value 0.

```
SELECT DIFFERENCE( 'Smith', 'Wilkins' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"SOUNDEX function [String]"

DOW function [Date and time]

Function
Returns a number from 1 to 7 representing the day of the week of the specified date, with Sunday=1, Monday=2, and so on.

Syntax
DOW (*date-expression*)

Parameters
date-expression The date.

Example
The following statement returns the value 5.

```
SELECT DOW( '1998-07-09' ) FROM iq_dummy
```

Usage

See the section “DATE_FIRST_DAY_OF_WEEK option” on page 46, if you need Monday (or another day) to be the first day of the week.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

EVENT_CONDITION function [System]

Function

To specify when an event handler is triggered.

Syntax

EVENT_CONDITION (*condition-name*)

Parameters

condition-name The condition triggering the event. The possible values are preset in the database, and are case insensitive. Each condition is valid only for certain event types. Table 5-15 lists the conditions and the events for which they are valid.

Table 5-15: Valid conditions for events

Condition name	Units	Valid for...	Comment
DBFreePercent	N/A	DBDiskSpace	DBDiskSpace shows free space in the system database file (.db file), not the IQ Store
DBFreeSpace	Megabytes	DBDiskSpace	
DBSize	Megabytes	GrowDB	
ErrorNumber	N/A	RAISERROR	
IdleTime	Seconds	ServerIdle	
Interval	Seconds	All	Time since handler last executed.
LogFreePercent	N/A	LogDiskSpace	
LogFreeSpace	Megabytes	LogDiskSpace	
LogSize	Megabytes	GrowLog	
RemainingValues	Integer	GlobalAutoincrement	The number of remaining values.
TempFreePercent	N/A	TempDiskSpace	TempDiskSpace shows free space in the system temporary file (pointed to by TEMP or ASTMP environment variable), not the IQ Temporary Store
TempFreeSpace	Megabytes	TempDiskSpace	
TempSize	Megabytes	GrowTemp	

Example

The following event definition uses the EVENT_CONDITION function:

```
create event LogNotifier
type LogDiskSpace
where event_condition( 'LogFreePercent' ) < 50
handler
begin
   message 'LogNotifier message'
end
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

CREATE EVENT statement

EVENT_CONDITION_NAME function [System]

Function — Can be used to list the possible parameters for EVENT_CONDITION.

Syntax

EVENT_CONDITION_NAME (*integer*)

Parameters — **integer** Must be greater than or equal to zero.

Usage — You can use EVENT_CONDITION_NAME to obtain a list of all EVENT_CONDITION arguments by looping over integers until the function returns NULL.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also — CREATE EVENT statement

EVENT_PARAMETER function [System]

Function — Provides context information for event handlers.

Syntax

EVENT_PARAMETER (*context-name*)

context-name:
'ConnectionID'
| **'User'**
| **'EventName'**
| **'Executions'**
| **'NumActive'**
| **'TableName'**
| *condition-name*

Parameters — **context-name** One of the preset strings. The strings are case insensitive, and carry the following information:

- **ConnectionId** The connection ID, as returned by `connection_property( 'id' )`
- **User** The user ID for the user that caused the event to be triggered.
- **EventName** The name of the event that has been triggered.
- **Executions** The number of times the event handler has been executed.
- **NumActive** The number of active instances of an event handler. This is useful if you want to limit an event handler so that only one instance executes at any given time.
- **TableName** The name of the table, for use with RemainingValues.

In addition, you can access any of the valid *condition-name* arguments to the EVENT_CONDITION function from the EVENT_PARAMETER function.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"EVENT_CONDITION function [System]" on page 259

CREATE EVENT statement

EXP function [Numeric]

Function

Returns the exponential function, e to the power of a number.

Syntax

EXP (*numeric-expression*)

Parameters

numeric-expression The exponent.

Example

The following statement returns the value 3269017.372472109.

```
SELECT EXP( 15 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

FLOOR function [Numeric]

Function

Returns the floor of (largest integer not greater than) a number.

Syntax

FLOOR (*numeric-expression*)

Parameters

numeric-expression The number, usually a float.

Examples

The following statement returns the value 123.00.

```
SELECT FLOOR ( 123 ) FROM iq_dummy
```

The following statement returns the value 123.

```
SELECT FLOOR ( 123.45 ) FROM iq_dummy
```

The following statement returns the value -124.00.

```
SELECT FLOOR ( -123.45 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "CEILING function [Numeric]"

GETDATE function [Date and time]

Function Returns the current date and time.

Syntax **GETDATE** ()

Example The following statement returns the system date and time.

```
SELECT GETDATE( ) FROM iq_dummy
```

Usage GETDATE is a Transact-SQL compatible data manipulation function.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

GROUPING function [Aggregate]

Function Identifies whether a column in a ROLLUP or CUBE operation result set is NULL because it is part of a subtotal row, or NULL because of the underlying data.

Syntax **GROUPING (** *group-by-expression* **)**

Parameters **group-by-expression** An expression appearing as a grouping column in the result set of a query that uses a GROUP BY clause with the ROLLUP or CUBE keyword. The function identifies subtotal rows added to the result set by a ROLLUP or CUBE operation.

Return value
- **1** Indicates that *group-by-expression* is NULL because it is part of a subtotal row. The column is not a prefix column for that row.
- **0** Indicates that *group-by-expression* is a prefix column of a subtotal row.

Standards and compatibility
- **SQL/92** Vendor extension.
- **SQL/99** SQL/foundation feature outside of core SQL.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also SELECT statement in Chapter 6, "SQL Statements" in *Sybase IQ Reference Manual*

HEXTOINT function [Data type conversion]

Function
Returns the unsigned bigint equivalent of a hexadecimal string.

Syntax
HEXTOINT (*hexadecimal-string*)

Parameters
hexadecimal-string The string to be converted to an integer. Input can be in the following forms, with either a lower or upper case "x" in the prefix or no prefix:

```
0xhex-string
0Xhex-string
hex-string
```

Examples
The following statements all return the value 420.

```
SELECT HEXTOINT ( '0x1A4' ) FROM iq_dummy
SELECT HEXTOINT ( '0X1A4' ) FROM iq_dummy
SELECT HEXTOINT ( '1A4' ) FROM iq_dummy
```

Usage
For invalid hexadecimal input, Sybase IQ returns an error unless the CONVERSION_ERROR option is set to OFF. When CONVERSION_ERROR is OFF, invalid hexadecimal input returns NULL.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"CONVERSION_ERROR option [TSQL]" on page 44

"INTTOHEX function [Data type conversion]"

HOUR function [Date and time]

Function
Returns a number from 0 to 23 corresponding to the hour component of the specified date/time.

Syntax
HOUR (*datetime-expression*)

Parameters
datetime-expression The date/time.

Example
The following statement returns the value 21:

```
SELECT HOUR( '1998-07-09 21:12:13' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

HOURS function [Date and time]

Function

Returns the number of hours since an arbitrary starting date and time, the number of whole hours between two specified times, or adds the specified integer-expression number of hours to a time.

Syntax

HOURS (*datetime-expression*
| *datetime-expression*, *datetime-expression*
| *datetime-expression*, *integer-expression*)

Parameters

datetime-expression A date and time.

integer-expression The number of hours to be added to the *datetime-expression.* If *integer-expression* is negative, the appropriate number of hours are subtracted from the date/time. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section "CAST function [Data type conversion]" on page 237.

Examples

The following statement returns the value 17518758:

```
SELECT HOURS( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the value 4, to signify the difference between the two times:

```
SELECT HOURS( '1999-07-13 06:07:12',
    '1999-07-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the datetime value 1999-05-13 02:05:07.000.

```
SELECT HOURS( CAST( '1999-05-12 21:05:07'
AS DATETIME ), 5 ) FROM iq_dummy
```

Usage

The second syntax returns the number of whole hours from the first date/time to the second date/time. The number may be negative.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

HTML_DECODE function [HTTP]

Function

Decodes special character entities that appear in HTML literal strings.

Syntax

HTML_DECODE (*string*)

Parameters

string An arbitrary literal string used in an HTML document.

Usage

This function returns the string argument after making the following set of substitutions:

Characters	Substitution
&quot;	&quot;
&#39;	&#39;
&amp;	&
&lt;	<
&gt;	>
&#xnn;	character nn

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"HTML_ENCODE function [HTTP]"

"HTTP_ENCODE function [HTTP]"

HTML_ENCODE function [HTTP]

Function

Encodes special characters within strings to be inserted into HTML documents.

Syntax

HTML_ENCODE (*string*)

Parameters

string An arbitrary literal string used in an HTML document.

Usage

This function returns the string argument after making the following set of substitutions:

Characters	Substitution
"	&quot;
'	&#39;
&	&amp;
<	&lt;
>	&gt;
codes no less than 0X20	&#xnn

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"HTML_DECODE function [HTTP]"

"HTTP_ENCODE function [HTTP]"

HTTP_DECODE function [HTTP]

Function — Decodes special characters within strings for use with HTTP.

Syntax — **HTTP_DECODE** (*string*)

Parameters — **string** Arbitrary string to be used in an HTTP request.

Usage — This function returns the string argument after replacing all character sequences of the form %*nn*, where *nn* is a hexadecimal value, with the character with code *nn*. In addition, all plus signs (+) are replaced with spaces.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also — "HTTP_ENCODE function [HTTP]"

"HTML_ENCODE function [HTTP]"

HTTP_ENCODE function [HTTP]

Function — Encodes special characters in strings for use with HTTP.

Syntax — **HTML_ENCODE** (*string*)

Parameters — **string** Arbitrary string to be used in an HTTP request.

Usage — This function returns the string argument after making the following set of substitutions. In addition, all characters with hexadecimal codes less than 1F or greater than 7E are replaced with %*nn*, where *nn* is the character code.

Character	Substitution
space	%20
"	%22
#	%23
&	%26
,	%2C
;	%3B
<	%3C
>	%3E
[	%5B
\	%5C
]	%5D
`	%60
{	%7B

Character	Substitution
|	%7C
}	%7D

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"HTTP_DECODE function [HTTP]"

"HTML_ENCODE function [HTTP]"

HTTP_HEADER function [HTTP]

Function

Gets the value of an HTTP header.

Syntax

HTML_HEADER (*field-name*)

Parameters

field-name The name of an HTTP header field.

Usage

This function returns the value of the named HTTP header field. It is used when processing an HTTP request via a web service.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"HTTP_VARIABLE function [HTTP]"

"NEXT_HTTP_HEADER function [HTTP]"

"NEXT_HTTP_VARIABLE function [HTTP]"

HTTP_VARIABLE function [HTTP]

Function

Gets the value of an HTTP variable.

Syntax

HTML_VARIABLE (*var-name* [[, *instance*] , *header-field*)

Parameters

var-name The name of the an HTTP variable.

instance If more than one variable has the same name, the instance number of the field instance, or NULL to get the first one. Useful for select lists that permit multiple selections.

header-field In a multi-part request, a header field name associated with the named field.

Usage

This function returns the value of the named HTTP variable. It is used when processing an HTTP request via a web service.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

"HTML_DECODE function [HTTP]"

"NEXT_HTTP_HEADER function [HTTP]"

"NEXT_HTTP_VARIABLE function [HTTP]"

IFNULL function [Miscellaneous]

Function

If the first expression is the NULL value, then the value of the second expression is returned. If the first expression is not NULL, the value of the third expression is returned. If the first expression is not NULL and there is no third expression, then the NULL value is returned.

Syntax

IFNULL (*expression1*, *expression2* [, *expression3*])

Parameters

expression1 The expression to be evaluated. Its value determines whether *expression2* or *expression3* is returned.

expression2 The return value if *expression1* is NULL.

expression3 The return value if *expression1* is not NULL.

Examples

The following statement returns the value -66:

```
SELECT IFNULL( NULL, -66 ) FROM iq_dummy
```

The following statement returns NULL, because the first expression is not NULL and there is no third expression:

```
SELECT IFNULL( -66, -66 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

INDEX_COL function [System]

Function

Returns the name of the indexed column.

Syntax

INDEX_COL (*table-name*, *index-id*, *key_#* [, *user-id*])

Parameters

table-name A table name.

index-id The index ID of an index of *table-name*.

key_# A key in the index specified by *index-id*. This parameter specifies the column number in the index. For a single column index, *key_#* is equal to 0. For a multicolumn index, *key_#* is equal to 0 for the first column, 1 for the second column, and so on.

user-id The user ID of the owner of *table-name*. If *user-id* is not specified, this value defaults to the caller's user ID.

Examples

The following statement returns the indexed column name id, which is the first column of the multicolumn index with *index-id* equal to 6.

```
SELECT INDEX_COL( 'sales_order_items', 6, 0)
```

The following statement returns the indexed column name line_id, which is the second column of the multicolumn index with *index-id* equal to 6.

```
SELECT INDEX_COL( 'sales_order_items', 6, 1)
```

The following statement returns the indexed column name file_id, which is the only column in the single column index with *index-id* equal to 1.

```
SELECT INDEX_COL( 'ul_statement', 1, 0, 3)
```

The following statement returns the indexed column name quantity, which is the only column in the single column index with *index-id* equal to 4.

```
SELECT INDEX_COL( 'sales_order_items', 4, 0, 1)
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also

"OBJECT_ID function [System]"

INSERTSTR function [String]

Function

Inserts a string into another string at a specified position.

Syntax

INSERTSTR (*numeric-expression*, *string-expression1*, *string-expression2*)

Parameters

numeric-expression The position after which *string-expression2* is to be inserted. Use zero to insert a string at the beginning.

string-expression1 The string into which *string-expression2* is to be inserted.

string-expression2 The string to be inserted.

Example
The following statement returns the value backoffice.

```
SELECT INSERTSTR( 0, 'office ', 'back' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise. The STUFF function is equivalent and is supported in both Adaptive Server Enterprise and Sybase IQ.

See also
"STUFF function [String]"

INTTOHEX function [Data type conversion]

Function
Returns the hexadecimal equivalent of a decimal integer.

Syntax
INTTOHEX (*integer-expression*)

Parameters
integer-expression The integer to be converted to hexadecimal.

Examples
The following statement returns the value 0x000000000000009c:

```
SELECT INTTOHEX( 156 ) FROM iq_dummy
```

The following statement returns the value 0x0000000000000064:

```
SELECT INTTOHEX ( 100) FROM iq_dummy
```

Usage
The '0x' or '0X' prefix and leading zeroes are included in the result.

Note The INTTOHEX function in Sybase IQ returns a binary(8) value. Unlike Sybase IQ, Adaptive Server Anywhere returns a varchar(8). If conversion fails, Sybase IQ returns an error unless CONVERSION_ERROR is OFF. In that case the result is NULL.

Standards and compatibility
- **SQL/92** Transact-SQL extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"HEXTOINT function [Data type conversion]"

ISDATE function [Date and time]

Function
Tests if a string argument can be converted to a date. If a conversion is possible, the function returns 1; otherwise, 0 is returned. If the argument is null, 0 is returned.

Syntax

ISDATE (*string* **)**

Parameters

string The string to be analyzed to determine if the string represents a valid date.

Example

The following example tests whether the birth_date column holds valid dates, returning invalid dates as NULL, and valid dates in date format.

```
select birth_date from MyData;
-----------------------------
1990/32/89,
0101/32/89,
1990/12/09,

select
  case when isdate(birth_date)=0 then NULL
  else cast(birth_date as date)
  end
  from MyData;
-----------------------------------
(NULL)
(NULL)
1990-12-09
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

ISNULL function [Miscellaneous]

Function

Returns the value of the first non-NULL expression in the parameter list.

Syntax

ISNULL (*expression*, *expression* [... , *expression*])

Parameters

expression An expression to be tested against NULL.

At least two expressions must be passed to the function.

Example

The following statement returns the value -66.

```
SELECT ISNULL( NULL ,-66, 55, 45, NULL, 16 ) FROM
iq_dummy
```

Usage

The ISNULL function is the same as the COALESCE function.

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also "COALESCE function [Miscellaneous]"

ISNUMERIC function [Miscellaneous]

Function Tests if a string argument can be converted to a numeric. If a conversion is possible, the function returns 1; otherwise, 0 is returned. If the argument is null, 0 is returned.

Syntax **ISNUMERIC (** *string* **)**

Parameters **string** The string to be analyzed to determine if the string represents a valid numeric value.

Usage For optimal performance, avoid using ISNUMERIC in predicates, where it is processed by the Adaptive Server Anywhere portion of the product, and cannot take advantage of the performance features of Sybase IQ.

Example The following example tests whether the height_in_cms column holds valid numeric data, returning invalid numeric data as NULL, and valid numeric data in int format.

```
data height_in_cms
------------------------
asde
asde
180
156

select case
   when isnumeric(height_in_cms)=0
   then NULL
   else cast(height_in_cms as int)
   end
from MyData
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

LCASE function [String]

Function Converts all characters in a string to lower case.

Syntax **LCASE** (*string-expression*)

Parameters **string-expression** The string to be converted to lower case.

Example The following statement returns the value lower case.

```
SELECT LCASE( 'LOWER CasE' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** LCASE is not supported in Adaptive Server Enterprise; you can use LOWER to get the same functionality.

See also "LOWER function [String]"

"UCASE function [String]"

"UPPER function [String]"

LEFT function [String]

Function Returns a specified number of characters from the beginning of a string.

Syntax **LEFT** (*string-expression*, *numeric-expression*)

Parameters **string-expression** The string.

numeric-expression The number of characters to return.

Example The following statement returns the value choco.

```
SELECT LEFT( 'chocolate', 5 ) FROM iq_dummy
```

Usage If the string contains multibyte characters, and the proper collation is being used, the number of bytes returned may be greater than the specified number of characters.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also "RIGHT function [String]"

Chapter 11, "International Languages and Character Sets" in the *Sybase IQ System Administration Guide*

LENGTH function [String]

Function Returns the number of characters in the specified string.

Syntax **LENGTH** (*string-expression*)

Parameters **string-expression** The string.

Example The following statement returns the value 9.

```
SELECT LENGTH( 'chocolate' ) FROM iq_dummy
```

Usage If the string contains multibyte characters, and the proper collation is being used, LENGTH returns the number of characters, not the number of bytes. If the string is of BINARY data type, the LENGTH function behaves as BYTE_LENGTH.

The LENGTH function is the same as the CHAR_LENGTH function.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise. Use the CHAR_LENGTH function instead.

See also "CHAR_LENGTH function [String]"

"BYTE_LENGTH function [String]"

Chapter 11, "International Languages and Character Sets" in the *Sybase IQ System Administration Guide*

LOCATE function [String]

Function Returns the position of one string within another.

Syntax **LOCATE** (*string-expression1*, *string-expression2* [, *numeric-expression*])

Parameters **string-expression1** The string to be searched.

string-expression2 The string to be searched for. This string is limited to 255 bytes.

numeric-expression The character position at which to begin the search in the string. The first character is position 1. If the starting offset is negative, LOCATE returns the last matching string offset, rather than the first. A negative offset indicates how much of the end of the string to exclude from the search. The number of bytes excluded is calculated as (-1 * offset) - 1.

Examples The following statement returns the value 8.

```
SELECT LOCATE( 'office party this week – rsvp as soon
as possible', 'party', 2 ) FROM iq_dummy
```

In the second example, the *numeric-expression* starting offset for the search is a negative number.

```
CREATE TABLE t1(name VARCHAR(20), dirname VARCHAR(60));
  INSERT INTO t1
    VALUES('m1000','c:\test\functions\locate.sql');
  INSERT INTO t1
    VALUES('m1001','d:\test\functions\trim.sql');
COMMIT;

SELECT LOCATE(dirname, '\', -1), dirname FROM t1;
```

The result is:

```
18   c:\test\functions\locate.sql
18   d:\test\functions\trim.sql
```

Usage

If *numeric-expression* is specified, the search starts at that offset into the string.

The first string can be a long string (longer than 255 bytes), but the second is limited to 255 bytes. If a long string is given as the second argument, the function returns a NULL value. If the string is not found, 0 is returned. Searching for a zero-length string returns 1. If any of the arguments are NULL, the result is NULL.

If multibyte characters are used, with the appropriate collation, then the starting position and the return value may be different from the *byte* positions.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

LOG function [Numeric]

Function

Returns the natural logarithm of a number.

Syntax

LOG (*numeric-expression*)

Parameters

numeric-expression The number.

Example

The following statement returns the value 3.912023.

```
SELECT LOG( 50 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"LOG10 function [Numeric]"

LOG10 function [Numeric]

Function
Returns the base 10 logarithm of a number.

Syntax
LOG10 (*numeric-expression*)

Parameters
numeric-expression The number.

Example
The following statement returns the value 1.698970.

```
SELECT LOG10( 50 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"LOG function [Numeric]"

LOWER function [String]

Function
Converts all characters in a string to lower case.

Syntax
LOWER (*string-expression*)

Parameters
string-expression The string to be converted.

Example
The following statement returns the value lower case.

```
SELECT LOWER( 'LOWER CasE' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"LCASE function [String]"

"UCASE function [String]"

"UPPER function [String]"

LTRIM function [String]

Function
Removes leading blanks from a string.

Syntax
LTRIM (*string-expression*)

Parameters
string-expression The string to be trimmed.

Example
The following statement returns the value Test Message with all leading blanks removed.

```
SELECT LTRIM( '     Test Message' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"RTRIM function [String]"

"TRIM function [String]"

MAX function [Aggregate]

Function

Returns the maximum *expression* value found in each group of rows.

Syntax

MAX (*expression*
| **DISTINCT** *column-name*)

Parameters

expression The expression for which the maximum value is to be calculated. This is commonly a column name.

DISTINCT column-name Returns the same as MAX (*expression*), and is included for completeness.

Example

The following statement returns the value 138948.000, representing the maximum salary in the employee table.

```
SELECT MAX ( salary )
FROM employee
```

Usage

Rows where *expression* is NULL are ignored. Returns NULL for a group containing no rows.

Standards and compatibility

- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"MIN function [Aggregate]"

MIN function [Aggregate]

Function

Returns the minimum expression value found in each group of rows.

Syntax

MIN (*expression*
| **DISTINCT** *column-name*)

Parameters

expression The expression for which the minimum value is to be calculated. This is commonly a column name.

DISTINCT column-name Returns the same as MIN (*expression*), and is included for completeness.

Example

The following statement returns the value 24903.000, representing the minimum salary in the employee table.

```
SELECT MIN ( salary )
FROM employee
```

Usage

Rows where *expression* is NULL are ignored. Returns NULL for a group containing no rows.

Standards and compatibility

- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"MAX function [Aggregate]"

MINUTE function [Date and time]

Function

Returns a number from 0 to 59 corresponding to the minute component of the specified date/time value.

Syntax

MINUTE (*datetime-expression*)

Parameters

datetime-expression The date/time value.

Example

The following statement returns the value 22.

```
SELECT MINUTE( '1998-07-13 12:22:34' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

MINUTES function [Date and time]

Function

Returns the number of minutes since an arbitrary date and time, the number of whole minutes between two specified times, or adds the specified integer-expression number of minutes to a time.

Syntax

MINUTES (*datetime-expression*
| *datetime-expression*, *datetime-expression*
| *datetime-expression*, *integer-expression*)

Parameters

datetime-expression A date and time.

integer-expression The number of minutes to be added to the *datetime-expression.* If *integer-expression* is negative, the appropriate number of minutes are subtracted from the date/time. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section "CAST function [Data type conversion]" on page 237.

Examples

The following statement returns the value 1051125487:

```
SELECT MINUTES( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the value 240, to signify the difference between the two times:

```
SELECT MINUTES( '1999-07-13 06:07:12',
    '1999-07-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the datetime value 1999-05-12 21:10:07.000.

```
SELECT MINUTES( CAST( '1999-05-12 21:05:07'
AS DATETIME ), 5) FROM iq_dummy
```

Usage

The second syntax returns the number of whole minutes from the first date/time to the second date/time. The number may be negative.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

MOD function [Numeric]

Function

Returns the remainder when one whole number is divided by another.

Syntax

MOD (*dividend*, *divisor*)

Parameters

dividend The dividend, or numerator of the division.

divisor The divisor, or denominator of the division.

Example

The following statement returns the value 2.

```
SELECT MOD( 5, 3 ) FROM iq_dummy
```

Usage

Division involving a negative *dividend* gives a negative or zero result. The sign of the *divisor* has no effect.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise. The % operator is used as a modulo operator in Adaptive Server Enterprise.

See also "REMAINDER function [Numeric]"

MONTH function [Date and time]

Function Returns a number from 1 to 12 corresponding to the month of the given date.

Syntax **MONTH** (*date-expression*)

Parameters **date-expression** A date/time value.

Example The following statement returns the value 7.

```
SELECT MONTH( '1998-07-13' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

MONTHNAME function [Date and time]

Function Returns the name of the month from the specified date expression.

Syntax **MONTHNAME** (*date-expression*)

Parameters **date-expression** The datetime value.

Example The following statement returns the value September, when the DATE_ORDER option is set to the default value of *ymd*.

```
SELECT MONTHNAME( '1998-09-05' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also "DATE_ORDER option" on page 49

MONTHS function [Date and time]

Function Returns the number of months since an arbitrary starting date/time, the number of months between two specified date/times, or adds the specified integer-expression number of months to a date/time.

Syntax **MONTHS** (*date-expression*
| *date-expression, datetime-expression*
| *date-expression, integer-expression*)

Parameters

date-expression A date and time.

integer-expression The number of months to be added to the *date-expression*. If *integer-expression* is negative, the appropriate number of months are subtracted from the date/time value. If you supply an integer expression, the *date-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section “CAST function [Data type conversion]” on page 237.

Examples

The following statement returns the value 23982:

```
SELECT MONTHS( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the value 2, to signify the difference between the two dates:

```
SELECT MONTHS( '1999-07-13 06:07:12',
    '1999-09-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the datetime value 1999-10-12 21:05:07.000.

```
SELECT MONTHS( CAST( '1999-05-12 21:05:07'
AS DATETIME ), 5) FROM iq_dummy
```

Usage

The first syntax returns the number of months since an arbitrary starting date. This number is often useful for determining if two date/time expressions are in the same month in the same year.

```
MONTHS( invoice_sent ) = MONTHS( payment_received )
```

Note that comparing the MONTH function would incorrectly include a payment made 12 months after the invoice was sent.

The second syntax returns the number of months from the first date to the second date. The number may be negative. It is calculated from the number of the first days of the month between the two dates. Hours, minutes and seconds are ignored.

The third syntax adds *integer-expression* months to the given date. If the new date is past the end of the month (such as MONTHS ('1992-01-31', 1)) the result is set to the last day of the month. If *integer-expression* is negative, the appropriate number of months are subtracted from the date. Hours, minutes and seconds are ignored.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

NEWID function [Miscellaneous]

Function
Generates a UUID (Universally Unique Identifier) value. A UUID is the same as a GUID (Globally Unique Identifier).

Syntax
NEWID ( )

Parameters
There are no parameters associated with NEWID().

Usage
The NEWID() function generates a unique identifier value.

UUIDs can be used to uniquely identify rows in a table. The values are generated such that a value produced on one computer will not match that produced on another. Hence they can also be used as keys in replication and synchronization environments.

You cannot use the NEWID function as a column default for an IQ table.

NEWID is a non-deterministic function. Successive calls to NEWID may return different values. The query optimizer does not cache the results of the NEWID function.

For more information about non-deterministic functions, see CREATE FUNCTION statement on page 405.

Standards and compatibility
- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"STRTOUUID function [String]" on page 318

"UUIDTOSTR function [String]" on page 326

UNIQUEIDENTIFIERSTR in Character data types on page 189

NEXT_CONNECTION function [System]

Function
Returns the next connection number, or the first connection if the parameter is NULL.

Syntax
NEXT_CONNECTION ({**NULL** | *connection-id* })

Parameters
connection-id An integer, usually returned from a previous call to NEXT_CONNECTION. If *connection-id* is NULL, NEXT_CONNECTION returns the first connection ID.

Examples
The following statement returns an identifier for the first connection. The identifier is an integer value like 569851433.

```
SELECT NEXT_CONNECTION( NULL ) FROM iq_dummy
```

The following statement returns a value like 1661140050.

```
SELECT NEXT_CONNECTION( 569851433 ) FROM iq_dummy
```

Usage

NEXT_CONNECTION can be used to enumerate the connections to a database. To get the first connection pass NULL; to get each subsequent connection, pass the previous return value. The function returns NULL when there are no more connections.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

NEXT_DATABASE function [System]

Function

Returns the next database ID number, or the first database if the parameter is NULL.

Syntax

NEXT_DATABASE ({ **NULL** | *database-id* })

Parameters

database-id An integer that specifies the ID number of the database.

Examples

The following statement returns the value 0, the first database value.

```
SELECT NEXT_DATABASE( NULL ) FROM iq_dummy
```

The following statement returns NULL, indicating that there are no more databases on the server.

```
SELECT NEXT_DATABASE( 0 ) FROM iq_dummy
```

Usage

NEXT_DATABASE can be used to enumerate the databases running on a database server. To get the first database pass NULL; to get each subsequent database, pass the previous return value. The function returns NULL when there are no more databases.

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

“OBJECT_ID function [System]”

NEXT_HTTP_HEADER function [HTTP]

Function

Get the next HTTP header name.

Syntax

NEXT_HTTP_HEADER (*header-name*)

Parameters

header-name The name of the previous header. If header-name is null, this function returns the name of the first HTTP header.

Usage

This function iterates over the HTTP headers included within a request. Calling it with NULL causes it to return the name of the first header. Subsequent headers are retrieved by passing the function the name of the previous header. This function returns NULL when called with the name of the last header.

Calling this function repeatedly returns all the header fields exactly once, but not necessarily in the order they appear in the HTTP request.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

NEXT_HTTP_VARIABLE function [HTTP]

Function

Get the next HTTP variable name.

Syntax

NEXT_HTTP_VARIABLE (*var-name*)

Parameters

var-name The name of the previous variable. If var-name is null, this function returns the name of the first HTTP variable.

Usage

This function iterates over the HTTP variables included within a request. Calling it with NULL causes it to return the name of the first variable. Subsequent variables are retrieved by passing the function the name of the previous variable. This function returns NULL when called with the name of the final variable.

Calling this function repeatedly returns all the variables exactly once, but not necessarily in the order they appear in the HTTP request. The variables url or url1, url2, …, url10 are included if URL PATH is set to ON or ELEMENTS, respectively.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"HTML_DECODE function [HTTP]" on page 265

"HTTP_VARIABLE function [HTTP]" on page 268

"NEXT_HTTP_HEADER function [HTTP]" on page 284

NOW function [Date and time]

Function
Returns the current date and time. This is the historical syntax for CURRENT TIMESTAMP.

Syntax
NOW (*****)

Example
The following statement returns the current date and time.

```
SELECT NOW(*) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

NTILE function [Analytical]

Function
Distributes query results into a specified number of "buckets" and assigns the bucket number to each row in the bucket.

Syntax
NTILE (*expression1*)
OVER (**ORDER BY** *expression2* [**ASC** | **DESC**])

Parameters
expression1 A constant integer from 1 to 32767, which specifies the number of buckets.

expression2 A sort specification that can be any valid expression involving a column reference, aggregates, or expressions invoking these items.

Example
The following example uses the NTILE function to determine the sale status of car dealers. The dealers are divided into four groups based on the number of cars each dealer sold. The dealers with ntile = 1 are in the top 25% for car sales.

```
SELECT dealer_name, sales,
NTILE(4) OVER ( ORDER BY sales DESC )
FROM carSales;
```

```
dealer_name        sales       ntile
Boston             1000        1
Worcester          950         1
Providence         950         1
SF                 940         1
Lowell             900         2
Seattle            900         2
Natick             870         2
New Haven          850         2
Portland           800         3
Houston            780         3
```

```
Hartford        780         3
Dublin          750         3
Austin          650         4
Dallas          640         4
Dover           600         4
```

To find the top 10% of car dealers by sales, you specify NTILE(10) in the example SELECT statement. Similarly, to find the top 50% of car dealers by sales, specify NTILE(2).

Usage

NTILE is a rank analytical function that distributes query results into a specified number of buckets and assigns the bucket number to each row in the bucket. You can divide a result set into one-hundredths (percentiles), tenths (deciles), fourths (quartiles), or other numbers of groupings.

NTILE requires an OVER (ORDER BY) clause. The ORDER BY clause specifies the parameter on which ranking is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the OVER clause and is *not* an ORDER BY for the SELECT. No aggregation functions in the rank query are allowed to specify DISTINCT.

The OVER clause indicates that the function operates on a query result set. The result set is the rows that are returned after the FROM, WHERE, GROUP BY, and HAVING clauses have all been evaluated. The OVER clause defines the data set of the rows to include in the computation of the rank analytical function.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

NTILE is only allowed in the select list of a SELECT or INSERT statement or in the ORDER BY clause of the SELECT statement. NTILE can be in a view or a union. The NTILE function cannot be used in a subquery, a HAVING clause, or in the select list of an UPDATE or DELETE statement. Only one NTILE function is allowed per query.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

"Analytical functions"

NULLIF function [Miscellaneous]

Function

Provides an abbreviated CASE expression by comparing expressions.

Syntax

NULLIF (*expression1*, *expression2*)

Parameters

expression1 An expression to be compared.

expression2 An expression to be compared.

Examples

The following statement returns a:

```
SELECT NULLIF( 'a', 'b' ) FROM iq_dummy
```

The following statement returns NULL.

```
SELECT NULLIF( 'a', 'a' ) FROM iq_dummy
```

Usage

NULLIF compares the values of the two expressions.

If the first expression equals the second expression, NULLIF returns NULL.

If the first expression does not equal the second expression, or if the second expression is NULL, NULLIF returns the first expression.

The NULLIF function provides a short way to write some CASE expressions. NULLIF is equivalent to:

CASE WHEN *expression1* = *expression2* **THEN NULL**
ELSE *expression1* **END**

Standards and compatibility

- **SQL/92** Transact-SQL extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"CASE expressions" on page 159

NUMBER function [Miscellaneous]

Function

Generates numbers starting at 1 for each successive row in the results of the query.

Syntax

NUMBER (*****)

Example

The following statement returns the numbered list

number(*)
1
2
3
4
5

```
SELECT NUMBER( * )
```

```
FROM department
WHERE dept_id > 10
```

Usage

Use the NUMBER function only in a select list or a SET clause of an UPDATE statement. A syntax error is generated if you use NUMBER in any other type of statement. For example, the following statement updates each row of the seq_id column with a number 1 greater than the previous row. The number is applied in the order specified by the ORDER BY clause.

```
update empl
set seq_id = number(*)
order by empl_id
```

Note In an UPDATE statement, if the NUMBER(*) function is used in the SET clause and the FROM clause specifies a one-to-many join, NUMBER(*) generates unique numbers that increase, but may not increment sequentially due to row elimination.

NUMBER can also be used to generate primary keys when using the INSERT from SELECT statement, although using IDENTITY/AUTOINCREMENT is a preferred mechanism for generating sequential primary keys.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

OBJECT_ID function [System]

Function

Returns the object ID.

Syntax

OBJECT_ID (*object-name*)

Parameters

object-name The name of the object.

Examples

The following statement returns the object ID 100209 of the customer table.

```
SELECT OBJECT_ID ('CUSTOMER') FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also

“COL_NAME function [System]”

“DB_ID function [System]”

“OBJECT_NAME function [System]”

OBJECT_NAME function [System]

Function — Returns the object name.

Syntax — **OBJECT_NAME** (*object-id* [, *database-id*])

Parameters — **object-id** The object ID.

database-id The database ID.

Examples — The following statement returns the name customer.

```
SELECT OBJECT_NAME ( 100209 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also — "COL_NAME function [System]"

"DB_NAME function [System]"

"OBJECT_ID function [System]"

OCTET_LENGTH function [String]

Function — Returns an unsigned 64 bit value containing the byte length of the column parameter.

Syntax — **OCTET_LENGTH**(*column-name*)

Parameters — **column-name** The name of a column.

Usage — The return value of a NULL argument is NULL.

The OCTET_LENGTH function supports all Sybase IQ data types.

Standards and compatibility — **Sybase** Not supported by Adaptive Server Anywhere or Adaptive Server Enterprise.

See also — "BIT_LENGTH function [String]"

PATINDEX function [String]

Function — Returns the starting position of the first occurrence of a specified pattern.

Syntax — **PATINDEX** (**'%***pattern***%'**, *string-expression*)

Parameters

pattern The pattern to be searched for. This string is limited to 255 bytes. If the leading percent wild card is omitted, PATINDEX returns one (1) if the pattern occurs at the beginning of the string, and zero if not. If *pattern* starts with a percent wild card, then the two leading percent wild cards are treated as one.

The pattern uses the same wild cards as the LIKE comparison. Table 5-16 lists the pattern wild cards.

Table 5-16: PATINDEX pattern wild cards

Wild card	Matches
_ (underscore)	Any one character
% (percent)	Any string of zero or more characters
[]	Any single character in the specified range or set
[^]	Any single character not in the specified range or set

string-expression The string to be searched for the pattern.

Examples

The following statement returns the value 2.

```
SELECT PATINDEX( '%hoco%', 'chocolate' ) FROM iq_dummy
```

The following statement returns the value 11.

```
SELECT PATINDEX ('%4_5_', '0a1A 2a3A 4a5A') FROM
iq_dummy
```

Usage

PATINDEX returns the starting position of the first occurrence of the pattern. If the pattern is not found, it returns zero (0).

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

“LIKE conditions” on page 166

“LOCATE function [String]”

PERCENT_RANK function [Analytical]

Function

Computes the (fractional) position of one row returned from a query with respect to the other rows returned by the query, as defined by the ORDER BY clause. Returns a decimal value between 0 and 1.

Syntax

PERCENT_RANK () **OVER** (**ORDER BY** *expression* [**ASC** | **DESC**])

Parameters

expression A sort specification that can be any valid expression involving a column reference, aggregates, or expressions invoking these items.

Example

The following statement illustrates the use of the PERCENT_RANK function:

```
SELECT s_suppkey, SUM(s_acctBal) AS sum_acctBal,
PERCENT_RANK() OVER ( ORDER BY SUM(s_acctBal) DESC )
AS percent_rank_all FROM supplier GROUP BY s_suppkey;

s_suppkey        sum_acctBal       percent_rank_all
supplier#011     200000            0
supplier#002     200000            0
supplier#013     123000            0.3333
supplier#004     110000            0.5
supplier#035     110000            0.5
supplier#006     50000             0.8333
supplier#021     10000             1
```

Usage

PERCENT_RANK is a rank analytical function. The percent rank of a row R is defined as the rank of a row in the groups specified in the OVER clause minus one divided by the number of total rows in the groups specified in the OVER clause minus one. PERCENT_RANK returns a value between 0 and 1. The first row has a percent rank of zero.

The PERCENT_RANK of a row is calculated as

```
(Rx - 1) / (NtotalRow - 1)
```

where *Rx* is the rank position of a row in the group and *NtotalRow* is the total number of rows in the group specified by the OVER clause.

PERCENT_RANK requires an OVER (ORDER BY) clause. The ORDER BY clause specifies the parameter on which ranking is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the OVER clause and is *not* an ORDER BY for the SELECT. No aggregation functions in the rank query are allowed to specify DISTINCT.

The OVER clause indicates that the function operates on a query result set. The result set is the rows that are returned after the FROM, WHERE, GROUP BY, and HAVING clauses have all been evaluated. The OVER clause defines the data set of the rows to include in the computation of the rank analytical function.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

PERCENT_RANK is only allowed in the select list of a SELECT or INSERT statement or in the ORDER BY clause of the SELECT statement. PERCENT_RANK can be in a view or a union. The PERCENT_RANK function cannot be used in a subquery, a HAVING clause, or in the select list of an UPDATE or DELETE statement. Only one rank analytical function is allowed per query.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

"Analytical functions"

PERCENTILE_CONT function [Analytical]

Function

Given a percentile, returns the value that corresponds to that percentile. Assumes a continuous distribution data model.

Note If you are simply trying to compute a percentile, use the NTILE function instead, with a value of 100.

Syntax

PERCENTILE_CONT (*expression1*)
WITHIN GROUP (**ORDER BY** *expression2* [**ASC** | **DESC**])

Parameters

expression1 A constant of numeric data type and range from 0 to 1 (inclusive). If the argument is NULL, then a "wrong argument for percentile" error is returned. If the argument value is less than 0 or greater than 1, then a "data value out of range" error is returned.

expression2 A sort specification that must be a single expression involving a column reference. Multiple expressions are not allowed and no rank analytical functions, set functions, or subqueries are allowed in this sort expression.

Example

The following example uses the PERCENTILE_CONT function to determine the 10th percentile value for car sales in a region.

The following data set is used in the example:

```
sales       region        dealer_name
900         Northeast     Boston
800         Northeast     Worcester
800         Northeast     Providence
700         Northeast     Lowell
```

```
540         Northeast     Natick
500         Northeast     New Haven
450         Northeast     Hartford
800         Northwest     SF
600         Northwest     Seattle
500         Northwest     Portland
400         Northwest     Dublin
500         South         Houston
400         South         Austin
300         South         Dallas
200         South         Dover
```

The following SELECT statement contains the PERCENTILE_CONT function:

```
SELECT region, PERCENTILE_CONT(0.1)
WITHIN GROUP ( ORDER BY sales DESC )
FROM carSales GROUP BY region;
```

The result of the SELECT statement lists the 10th percentile value for car sales in a region:

```
region          percentile_cont
Northeast       840
Northwest       740
South           470
```

Usage

The inverse distribution analytical functions return a k-th percentile value, which can be used to help establish a threshold acceptance value for a set of data. The function PERCENTILE_CONT takes a percentile value as the function argument and operates on a group of data specified in the WITHIN GROUP clause or operates on the entire data set. The function returns one value per group. If the GROUP BY column from the query is not present, then the result is a single row. The data type of the results is the same as the data type of its ORDER BY item specified in the WITHIN GROUP clause. The data type of the ORDER BY expression for PERCENTILE_CONT must be numeric.

PERCENTILE_CONT requires a WITHIN GROUP (ORDER BY) clause.

The ORDER BY clause, which must be present, specifies the expression on which the percentile function is performed and the order in which the rows are sorted in each group. For the PERCENTILE_CONT function, the data type of this expression must be numeric. Note that this ORDER BY clause is used only within the WITHIN GROUP clause and is *not* an ORDER BY for the SELECT.

The WITHIN GROUP clause distributes the query result into an ordered data set from which the function calculates a result. The WITHIN GROUP clause must contain a single sort item. If the WITHIN GROUP clause contains more or less than one sort item, an error is reported.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

The PERCENTILE_CONT function is allowed in a subquery, a HAVING clause, a view or a union. PERCENTILE_CONT can be used anywhere the simple non-analytical aggregate functions are used. The PERCENTILE_CONT function ignores the NULL value in the data set.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

"PERCENTILE_DISC function [Analytical]"

"NTILE function [Analytical]"

"Analytical functions"

PERCENTILE_DISC function [Analytical]

Function

Given a percentile, returns the value that corresponds to that percentile. Assumes a discrete distribution data model.

Note If you are simply trying to compute a percentile, use the NTILE function instead, with a value of 100.

Syntax

PERCENTILE_DISC (*expression1*)
WITHIN GROUP (**ORDER BY** *expression2* [**ASC** | **DESC**])

Parameters

expression1 A constant of numeric data type and range from 0 to 1 (inclusive). If the argument is NULL, then a "wrong argument for percentile" error is returned. If the argument value is less than 0 or greater than 1, then a "data value out of range" error is returned.

expression2 A sort specification that must be a single expression involving a column reference. Multiple expressions are not allowed and no rank analytical functions, set functions, or subqueries are allowed in this sort expression.

Example

The following example uses the PERCENTILE_DISC function to determine the 10th percentile value for car sales in a region.

The following data set is used in the example:

```
sales       region        dealer_name
900         Northeast     Boston
800         Northeast     Worcester
800         Northeast     Providence
700         Northeast     Lowell
540         Northeast     Natick
500         Northeast     New Haven
450         Northeast     Hartford
800         Northwest     SF
600         Northwest     Seattle
500         Northwest     Portland
400         Northwest     Dublin
500         South         Houston
400         South         Austin
300         South         Dallas
200         South         Dover
```

The following SELECT statement contains the PERCENTILE_DISC function:

```
SELECT region, PERCENTILE_DISC(0.1)
WITHIN GROUP ( ORDER BY sales DESC )
FROM carSales GROUP BY region;
```

The result of the SELECT statement lists the 10th percentile value for car sales in a region:

```
region           percentile_cont
Northeast        900
Northwest        800
South            500
```

Usage

The inverse distribution analytical functions return a k-th percentile value, which can be used to help establish a threshold acceptance value for a set of data. The function PERCENTILE_DISC takes a percentile value as the function argument and operates on a group of data specified in the WITHIN GROUP clause or operates on the entire data set. The function returns one value per group. If the GROUP BY column from the query is not present, then the result is a single row. The data type of the results is the same as the data type of its ORDER BY item specified in the WITHIN GROUP clause. PERCENTILE_DISC supports all data types which can be sorted in Sybase IQ.

PERCENTILE_DISC requires a WITHIN GROUP (ORDER BY) clause.

The ORDER BY clause, which must be present, specifies the expression on which the percentile function is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the WITHIN GROUP clause and is *not* an ORDER BY for the SELECT.

The WITHIN GROUP clause distributes the query result into an ordered data set from which the function calculates a result. The WITHIN GROUP clause must contain a single sort item. If the WITHIN GROUP clause contains more or less than one sort item, an error is reported.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

The PERCENTILE_DISC function is allowed in a subquery, a HAVING clause, a view or a union. PERCENTILE_DISC can be used anywhere the simple non-analytical aggregate functions are used. The PERCENTILE_DISC function ignores the NULL value in the data set.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

“PERCENTILE_CONT function [Analytical]”

“NTILE function [Analytical]”

“Analytical functions”

PI function [Numeric]

Function

Returns the numeric value PI.

Syntax

PI (*****)

Example — The following statement returns the value 3.141592653....

```
SELECT PI( * ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** The PI() function is supported in Adaptive Server Enterprise, but PI(*) is not.

POWER function [Numeric]

Function — Calculates one number raised to the power of another.

Syntax — **POWER** (*numeric-expression1*, *numeric-expression2*)

Parameters

numeric-expression1 The base.

numeric-expression2 The exponent.

Example — The following statement returns the value 64.

```
SELECT Power( 2, 6 ) FROM iq_dummy
```

Usage — Raises *numeric-expression1* to the power *numeric-expresson2*.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

PROPERTY function [System]

Function — Returns the value of the specified server-level property as a string.

Syntax — **PROPERTY** ({ *property-id* | *property-name* })

Parameters

property-id An integer that is the property-number of the server-level property. This number can be determined from the PROPERTY_NUMBER function. The *property-id* is commonly used when looping through a set of properties.

property-name A string giving the name of the property. See the section “Properties available for the server” on page 227 for a list of server property names.

Example — The following statement returns the name of the current database server:

```
SELECT PROPERTY( 'Name' ) FROM iq_dummy
```

Usage
Each property has both a number and a name, but the number is subject to change between releases, and should not be used as a reliable identifier for a given property.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"Properties available for the server" on page 227

PROPERTY_DESCRIPTION function [System]

Function
Returns a description of a property.

Syntax
PROPERTY_DESCRIPTION ({ *property-id* | *property-name* })

Parameters
property-id An integer that is the property-number of the property. This number can be determined from the PROPERTY_NUMBER function. The *property-id* is commonly used when looping through a set of properties.

property-name A string giving the name of the property. For property names, see the lists in the sections "Connection properties" on page 227, "Properties available for the server" on page 227, and "Properties available for each database" on page 228.

Example
The following statement returns the description Number of index insertions.

```
SELECT PROPERTY_DESCRIPTION( 'IndAdd' ) FROM iq_dummy
```

Usage
Each property has both a number and a name, but the number is subject to change between releases, and should not be used as a reliable identifier for a given property.

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"Connection properties" on page 227

"Properties available for the server" on page 227

"Properties available for each database" on page 228

PROPERTY_NAME function [System]

Function
Returns the name of the property with the supplied property number.

Syntax
PROPERTY_NAME (*property-id*)

Parameters **property-id** The property number of the property.

Example The following statement returns the property associated with property number 126. The actual property to which this refers changes from release to release.

```
SELECT PROPERTY_NAME( 126 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"Connection properties" on page 227

"Properties available for the server" on page 227

"Properties available for each database" on page 228

PROPERTY_NUMBER function [System]

Function Returns the property number of the property with the supplied property name.

Syntax **PROPERTY_NUMBER** (*property-name*)

Parameters **property-name** A property name. For property names, see the lists in the sections "Connection properties" on page 227, "Properties available for the server" on page 227, and "Properties available for each database" on page 228.

Example The following statement returns an integer value. The actual value changes from release to release.

```
SELECT PROPERTY_NUMBER( 'PAGESIZE' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"Connection properties" on page 227

"Properties available for the server" on page 227

"Properties available for each database" on page 228

QUARTER function [Date and time]

Function Returns a number indicating the quarter of the year from the supplied date expression.

Syntax **QUARTER**(*date-expression*)

Parameters **date-expression** A date.

Example With the DATE_ORDER option set to the default of *ymd*, the following statement returns the value 2.

```
SELECT QUARTER ( '1987/05/02' ) FROM iq_dummy
```

Usage Table 5-17 lists the dates in the quarters of the year.

Table 5-17: Values of quarter of the year

Quarter	Period (inclusive)
1	January 1 to March 31
2	April 1 to June 30
3	July 1 to September 30
4	October 1 to December 31

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also “DATE_ORDER option” on page 49

RADIANS function [Numeric]

Function Converts a number from degrees to radians.

Syntax **RADIANS** (*numeric-expression*)

Parameters **numeric-expression** A number, in degrees. This angle is converted to radians.

Example The following statement returns a value of approximately 0.5236.

```
SELECT RADIANS( 30 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

RAND function [Numeric]

Function Returns a double precision, random number x, where 0 <= x <1, with an optional seed.

Syntax **RAND** ([*integer-expression*])

Parameters **integer-expression** The optional seed used to create a random number. This argument allows you to create repeatable random number sequences.

Example The following statement returns a value of approximately .941392926249216914.

```
SELECT RAND( 4 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

RANK function [Analytical]

Function Ranks items in a group.

Syntax **RANK** () **OVER** (**ORDER BY** *expression* [**ASC** | **DESC**])

Parameters **expression** A sort specification that can be any valid expression involving a column reference, aggregates, or expressions invoking these items.

Example The following statement illustrates the use of the RANK function:

```
SELECT s_suppkey, SUM(s_acctBal) AS sum_acctBal,
RANK() OVER ( ORDER BY SUM(s_acctBal) DESC )
AS rank_all FROM supplier GROUP BY s_suppkey;

s_suppkey        sum_acctBal       rank_all
supplier#011     200000            1
supplier#002     200000            1
supplier#013     123000            3
supplier#004     110000            4
supplier#035     110000            4
supplier#006     50000             6
supplier#021     10000             7
```

Usage RANK is a rank analytical function. The rank of row R is defined as the number of rows that precede R and are not peers of R. If two or more rows are not distinct within the groups specified in the OVER clause or distinct over the entire result set, then there are one or more gaps in the sequential rank numbering. The difference between RANK and DENSE_RANK is that DENSE_RANK leaves no gap in the ranking sequence when there is a tie. RANK leaves a gap when there is a tie.

RANK requires an OVER (ORDER BY) clause. The ORDER BY clause specifies the parameter on which ranking is performed and the order in which the rows are sorted in each group. Note that this ORDER BY clause is used only within the OVER clause and is *not* an ORDER BY for the SELECT. No aggregation functions in the rank query are allowed to specify DISTINCT.

The OVER clause indicates that the function operates on a query result set. The result set is the rows that are returned after the FROM, WHERE, GROUP BY, and HAVING clauses have all been evaluated. The OVER clause defines the data set of the rows to include in the computation of the rank analytical function.

The ASC or DESC parameter specifies the ordering sequence ascending or descending. Ascending order is the default.

RANK is only allowed in the select list of a SELECT or INSERT statement or in the ORDER BY clause of the SELECT statement. RANK can be in a view or a union. The RANK function cannot be used in a subquery, a HAVING clause, or in the select list of an UPDATE or DELETE statement. Only one rank analytical function is allowed per query.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise or Adaptive Server Anywhere.

See also

"DENSE_RANK function [Analytical]"

"Analytical functions"

REMAINDER function [Numeric]

Function

Returns the remainder when one whole number is divided by another.

Syntax

REMAINDER (*dividend*, *divisor*)

Parameters

dividend The dividend, or numerator of the division.

divisor The divisor, or denominator of the division.

Example

The following statement returns the value 2.

```
SELECT REMAINDER( 5, 3 ) FROM iq_dummy
```

Usage

REMAINDER is the same as the MOD function.

Standards and compatibility

- **SQL/92** Vendor extension.

- **Sybase** Not supported in Adaptive Server Enterprise. The % (modulo) operator and the division operator can be used to produce a remainder.

See also "MOD function [Numeric]"

REPEAT function [String]

Function Concatenates a string a specified number of times.

Syntax **REPEAT** (*string-expression*, *integer-expression*)

Parameters **string-expression** The string to be repeated.

integer-expression The number of times the string is to be repeated. If *integer-expression* is negative, an empty string is returned.

Example The following statement returns the value repeatrepeatrepeat.

```
SELECT REPEAT( 'repeat', 3 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise, but REPLICATE provides the same capabilities.

See also "REPLICATE function [String]"

REPLACE function [String]

Function Replaces all occurrences of a substring with another substring.

Syntax **REPLACE** (*original-string*, *search-string*, *replace-string*)

Parameters If any argument is NULL, the function returns NULL.

original-string The string to be searched. This string can be any length.

search-string The string to be searched for and replaced with *replace-string*. This string is limited to 255 bytes. If *search-string* is an empty string, the original string is returned unchanged.

replace-string The replacement string, which replaces *search-string*. This can be any length. If *replace-string* is an empty string, all occurrences of *search-string* are deleted.

If you need to control the width of the resulting column when *replace-string* is wider than *search-string*, use the CAST function. For example,

```
CREATE TABLE aa(a CHAR(5));
INSERT INTO aa VALUES('CCCCC');
COMMIT;
SELECT a, CAST(REPLACE(a,'C','ZZ') AS CHAR(5)) FROM aa;
```

Examples

The following statement returns the value xx.def.xx.ghi.

```
SELECT REPLACE( 'abc.def.abc.ghi', 'abc', 'xx' ) FROM
iq_dummy
```

The following statement generates a result set containing ALTER PROCEDURE statements which, when executed, repair stored procedures that reference a table that has been renamed. (To be useful, the table name needs to be unique.)

```
SELECT REPLACE(
    replace(proc_defn,'OldTableName','NewTableName'),
    'create procedure',
    'alter procedure')
FROM SYS.SYSPROCEDURE
WHERE proc_defn LIKE '%OldTableName%'
```

Use a separator other than the comma for the LIST function:

```
SELECT REPLACE( list( table_id ), ',', '--')
FROM  SYS.SYSTABLE
WHERE table_id <= 5
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"SUBSTRING function [String]"

REPLICATE function [String]

Function

Concatenates a string a specified number of times.

Syntax

REPLICATE (*string-expression*, *integer-expression*)

Parameters

string-expression The string to be repeated.

integer-expression The number of times the string is to be repeated.

Example

The following statement returns the value repeatrepeatrepeat.

```
SELECT REPLICATE( 'repeat', 3 ) FROM iq_dummy
```

Usage

REPLICATE is the same as the REPEAT function.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "REPEAT function [String]"

RIGHT function [String]

Function Returns the rightmost characters of a string.

Syntax **RIGHT** (*string-expression*, *numeric-expression*)

Parameters **string-expression** The string to be left-truncated.

numeric-expression The number of characters at the end of the string to return.

Example The following statement returns the value olate.

```
SELECT RIGHT( 'chocolate', 5 ) FROM iq_dummy
```

Usage If the string contains multibyte characters, and the proper collation is being used, the number of bytes returned may be greater than the specified number of characters.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "LEFT function [String]"

Chapter 11, "International Languages and Character Sets" in the *Sybase IQ System Administration Guide*

ROUND function [Numeric]

Function Rounds the *numeric-expression* to the specified *integer-expression* number of places after the decimal point.

Syntax **ROUND** (*numeric-expression*, *integer-expression*)

Parameters **numeric-expression** The number, passed to the function, to be rounded.

integer-expression A positive integer specifies the number of significant digits to the right of the decimal point at which to round. A negative expression specifies the number of significant digits to the left of the decimal point at which to round.

Examples The following statement returns the value 123.200.

```
SELECT ROUND( 123.234, 1 ) FROM iq_dummy
```

Additional results of the ROUND function are shown in the following table:

Value	ROUND (Value)
123.4567	round (a.n,4)
123.4570	round (a.n,3)
123.4600	round (a.n,2)
123.5000	round (a.n,1)
123.0000	round (a.n, 0)
120.0000	round (a.n,-1)
100.0000	round (a.n,-2)
0.0000	round(a.n,-3)

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "TRUNCNUM function [Numeric]"

ROWID function [Miscellaneous]

Function Returns the internal row ID value for each row of the table.

Syntax **ROWID** (*table-name*) ... **FROM** *table-name*

Parameters **table-name** The name of the table. Specify the name of the table within the parentheses with either no quotes or with double quotes.

Examples The following statement returns the row ID values 1 through 10.

```
SELECT ROWID( "PRODUCT" ) FROM PRODUCT
```

rowid(product.id)
1
2
3
.
.
.
10

The following statement returns the product ID and row ID value of all rows with a product ID value less than 400.

```
SELECT PRODUCT.ID, ROWID ( PRODUCT )
FROM PRODUCT
WHERE PRODUCT.ID < 400
```

id	rowid(product.id)
300	1
301	2
302	3

The following statement deletes all rows with row ID values greater than 50.

```
DELETE FROM PRODUCT
WHERE ROWID ( PRODUCT ) > 50
```

Usage

The ROWID function can be used in conjunction with other clauses to manipulate specific rows of the table.

The **FROM** *table-name* clause must be specified.

A limitation of the ROWID function is that it cannot use a join index of that table, eliminating any performance benefits that would normally use that join index.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

RTRIM function [String]

Function

Returns a string with trailing blanks removed.

Syntax

RTRIM (*string-expression*)

Parameters

string-expression The string to be trimmed.

Example

The following statement returns the string Test Message, with all trailing blanks removed.

```
SELECT RTRIM( 'Test Message     ' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

“LTRIM function [String]”

SECOND function [Date and time]

Function

Returns a number from 0 to 59 corresponding to the second component of the given date/time value.

Syntax

SECOND (*datetime-expression*)

Parameters

datetime-expression The date/time value.

Example

The following statement returns the value 5.

```
SELECT SECOND( '1998-07-13 08:21:05' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

SECONDS function [Date and time]

Function

Returns the number of seconds since an arbitrary starting date and time, the number of seconds between two times, or adds an integer amount of seconds to a time.

Syntax

SECONDS (*datetime-expression*
| *datetime-expression*, *datetime-expression*
| *datetime-expression*, *integer-expression*)

Parameters

datetime-expression A date and time.

integer-expression The number of seconds to be added to the *datetime-expression.* If *integer-expression* is negative, the appropriate number of minutes are subtracted from the date/time value. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section “CAST function [Data type conversion]” on page 237.

Examples

The following statement returns the value 3600:

```
SELECT ( SECONDS( '1998-07-13 06:07:12' ) -
SECONDS( '1998-07-13 05:07:12' )) FROM iq_dummy
```

The following statement returns the value 14400, to signify the difference between the two times:

```
SELECT SECONDS( '1999-07-13 06:07:12',
    '1999-07-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the datetime value 1999-05-12 21:05:12.000.

```
SELECT SECONDS( CAST( '1999-05-12 21:05:07'
AS TIMESTAMP ), 5) FROM iq_dummy
```

Usage

The second syntax returns the number of whole seconds from the first date/time to the second date/time. The number may be negative.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

SIGN function [Numeric]

Function

Returns the sign of a number.

Syntax

SIGN (*numeric-expression*)

Parameters

numeric-expression The number for which the sign is to be returned.

Example

The following statement returns the value -1.

```
SELECT SIGN( -550 ) FROM iq_dummy
```

Usage

For negative numbers, SIGN returns -1.

For zero, SIGN returns 0.

For positive numbers, SIGN returns 1.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

SIMILAR function [String]

Function

Returns an integer between 0 and 100 representing the similarity between two strings.

Syntax

SIMILAR (*string-expression1*, *string-expression2*)

Parameters

string-expression1 The first string to be compared.

string-expression2 The second string to be compared.

Example

The following statement returns the value 75.

```
SELECT SIMILAR( 'toast', 'coast' ) FROM iq_dummy
```

This signifies that the two values are 75% similar.

Usage

The function returns an integer between 0 and 100 representing the similarity between the two strings. The result can be interpreted as the percentage of characters matched between the two strings. A value of 100 indicates that the two strings are identical.

This function can be used to correct a list of names (such as customers). Some customers may have been added to the list more than once with slightly different names. Join the table to itself and produce a report of all similarities greater than 90 percent but less than 100 percent.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

SIN function [Numeric]

Function

Returns the sine of a number, expressed in radians.

Syntax

SIN (*numeric-expression*)

Parameters

numeric-expression The angle, in radians.

Example

The following statement returns the value 0.496880.

```
SELECT SIN( 0.52 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"ASIN function [Numeric]"

"COS function [Numeric]"

"COT function [Numeric]"

"TAN function [Numeric]"

SORTKEY function [String]

Function

Generates values that can be used to sort character strings based on alternate collation rules.

Syntax

SORTKEY (*string-expression* [, *collation-name*])

Parameters

string-expression The string expression may only contain characters that are encoded in the database's character set. It is usually one of the table fields upon which users want the query results to be ordered.

If *string-expression* is an empty string, SORTKEY returns a zero-length binary value. If *string-expression* is null, SORTKEY returns a null value. An empty string has a different sort order value than a null string from a database column.

The maximum length of the string that SORTKEY can handle is 254 bytes. Any longer part is ignored.

collation-name A string or character variable that specifies the name of the sort order to use.

If you do not specify a collation, the default is 'thaidict'. Although the following are all valid values for collation name, Sybase IQ is only certified with thaidict.

Table 5-18: Collation name for sort order

Sort Order Description	Collation Name
Binary sort	binary
Default Unicode multilingual	default
CP850 Alternative: no accent	altnoacc
CP850 Alternative: lower case first	altdict
CP850 Alternative: no case preference	altnocsp
CP850 Scandinavian dictionary	scandict
CP850 Scandinavian: no case preference	scannocp
Latin-1 English, French, German dictionary	dict
Latin-1 English, French German no case	nocase
Latin-1 English, French German no case preference	nocasep
Latin-1 English, French German no accent	noaccent
Latin-1 Spanish dictionary	espdict
Latin-1 Spanish no case	espnocs
Latin-1 Spanish no accent	espnoac
Thai dictionary	thaidict

Examples

Assume the following table schema:

```
CREATE TABLE T1(id int, c1 varchar(40) shadowc1
varbinary(240))
```

SORTKEY() returns values in the sort order thaidict (Thai dictionary), the Thai character set in UTF8 form. The following statements generate the same result:

```
SELECT c1, SORTKEY(c1) from T1 where rid=3
SELECT c1, SORTKEY(c1, 'thaidict') from T1 where rid=3)
SELECT
'\340\270\201\340\271\207',SORTKEY('\340\279\201\340\2
```

```
71\207') from T1 where rid=3
```

Note Sybase IQ provides a utility to convert data files in CP874 format into UTF8 collation. For details, see The CP874toUTF8 utility in Chapter 3, "Database Administration Utilities" of the *Sybase IQ Utility Guide*.

The following table shows SORTKEY results using thaidict:

c1 in ascii	c1 in binary	SORTKEY()
à, à1	\340\270\201\340\271\207	0x11a3011c

Usage

The following statements generate the same result. SORTKEY() returns values in the sort order default Unicode multilingual:

```
SELECT c1, SORTKEY(c1, 'dict') from T1 where rid=3
SELECT 'coop', SORTKEY('coop', 'dict') from T1 where
rid=3
```

The following table shows SORTKEY results using dict:

c1	SORTKEY()
0x08890997099709b30008000800080008	0x11a3011c

The SORTKEY function generates values that can be used to order results based on predefined sort order behavior. This allows you to work with character sort order behaviors that are beyond the limitation of collations supported by Sybase IQ. The returned value is a binary value that contains coded sort order information for the input string retained from the SORTKEY function.

For example, you can issue the following SELECT statement to retrieve data from table T1 in the sorted order of c1 according to the Thai dictionary:

```
SELECT rid, c1 from T1 ORDER BY SORTKEY(c1)
```

You could instead store the value returned by SORTKEY in a column with the source character string. When you need to retrieve the character data in the desired order, the SELECT statement only needs to include an ORDER BY clause on the column that contains the results of running SORTKEY.

```
UPDATE T1 SET shadowc1=SORTKEY(c1) FROM T1;
SELECT rid, c1 FROM T1 ORDER BY shadowc1
```

The SORTKEY function guarantees that the values it returns for a given set of sort order criteria work for the binary comparisons that are performed on varbinary data types.

The input of SORTKEY can generate up to six bytes of sort order information for each input character. The output of SORTKEY is of type varbinary and has a maximum length of (254 * 6) bytes.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise, except that Adaptive Server Enterprise does not allow the user of self-defined sort orders.

See also

Chapter 11, "International Languages and Character Sets" in *Sybase IQ System Administration Guide*

SOUNDEX function [String]

Function

Returns a number representing the sound of a string.

Syntax

SOUNDEX (*string-expression*)

Parameters

string-expression The string.

Example

The following statement returns two numbers, representing the sound of each name. The SOUNDEX value for each argument is 3827.

```
SELECT SOUNDEX( 'Smith' ), SOUNDEX( 'Smythe' ) FROM
iq_dummy
```

SOUNDEX ('Smith') is equal to SOUNDEX ('Smythe').

Usage

The SOUNDEX function value for a string is based on the first letter and the next three consonants other than H, Y, and W. Doubled letters are counted as one letter. For example,

```
SOUNDEX( 'apples' ) FROM iq_dummy
```

is based on the letters A, P, L and S.

Multibyte characters are ignored by the SOUNDEX function.

Although it is not perfect, soundex normally returns the same number for words that sound similar and that start with the same letter.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise, except that Adaptive Server Enterprise returns a CHAR(4) result and Sybase IQ returns an integer.

SPACE function [String]

Function — Returns a specified number of spaces.

Syntax — **SPACE** (*integer-expression*)

Parameters — **integer-expression** The number of spaces to return.

Example — The following statement returns a string containing 10 spaces.

```
SELECT SPACE( 10 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

SQRT function [Numeric]

Function — Returns the square root of a number.

Syntax — **SQRT** (*numeric-expression*)

Parameters — **numeric-expression** The number for which the square root is to be calculated.

Example — The following statement returns the value 3.

```
SELECT SQRT( 9 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

STDDEV function [Aggregate]

Function — Returns the standard deviation of a set of numbers.

Syntax — **STDDEV** ([ALL] *expression*)

Parameters — **expression** Any numeric data type (float, real, or double precision) expression.

Examples — Given this data:

```
SELECT salary FROM employee WHERE dept_id = 300
```

salary
51432.000
57090.000

salary
42300.000
43700.00
36500.000
138948.000
31200.000
58930.00
75400.00

The following statement returns the value 32617.8446712838471.

```
SELECT STDDEV ( salary ) FROM employee
WHERE dept_id = 300
```

Given this data:

```
SELECT unit_price FROM product WHERE name = 'Tee Shirt'
```

name	unit_price
Tee Shirt	9.00
Tee Shirt	14.00
Tee Shirt	14.00

The following statement returns the value 2.88675134594813049.

```
SELECT STDDEV ( unit_price ) FROM product
WHERE name = 'Tee Shirt'
```

Usage

The formula used to calculate STDDEV is

$$stddev = \sqrt{variance}$$

STDDEV returns a result of data type double precision floating point. If applied to the empty set, the result is NULL.

STDDEV does not support the keyword DISTINCT. A syntax error is returned if DISTINCT is used with STDDEV.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

“VARIANCE function [Aggregate]”

STR function [String]

Function
Returns the string equivalent of a number.

Syntax
STR (*numeric-expression* [, *length* [, *decimal*]])

Parameters
numeric-expression Any approximate numeric (float, real, or double precision) expression.

length The number of characters to be returned (including the decimal point, all digits to the right and left of the decimal point, the sign, if any, and blanks). The default is 10 and the maximum length is 255.

decimal The number of digits to the right of the decimal point to be returned. The default is 0.

Examples
The following statement returns a string of six spaces followed by `1234`, for a total of ten characters:

```
SELECT STR( 1234.56 ) FROM iq_dummy
```

The following statement returns the result `1234.5`:

```
SELECT STR( 1234.56, 6, 1 ) FROM iq_dummy
```

Usage
If the integer portion of the number cannot fit in the length specified, then the result is NULL. For example, the following statement returns (NULL):

```
SELECT STR( 1234.56, 3 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

STRING function [String]

Function
Concatenates one or more strings into one large string.

Syntax
STRING (*string-expression* [, ...])

Parameters
string-expression A string.

If only one argument is supplied, it is converted into a single expression. If more than one argument is supplied, they are concatenated into a single string.

A NULL is treated as an empty string (').

Example
The following statement returns the value testing123.

```
SELECT STRING( 'testing', NULL, 123 )
FROM iq_dummy
```

Usage

Numeric or date parameters are converted to strings before concatenation. The STRING function can also be used to convert any single expression to a string by supplying that expression as the only parameter.

If all parameters are NULL, STRING returns NULL.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

STRTOUUID function [String]

Function

Converts a string value to a unique identifier (UUID or GUID) value.

Syntax

STRTOUUID (*string-expression* **)**

Parameters

string-expression A string in the format *xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx*

Usage

Converts a string in the format *xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx* where *x* is a hexadecimal digit, to a unique identifier value. If the string is not a valid UUID string, NULL is returned.

This function is useful for inserting UUID values into an IQ database.

Standards and compatibility

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"NEWID function [Miscellaneous]" on page 283

"UUIDTOSTR function [String]" on page 326

Example

```
CREATE TABLE T (
  pk uniqueidentifier primary key,
  c1 int);
INSERT INTO T (pk, c1)
  VALUES (STRTOUUID
  ('12345678-1234-5678-9012-123456789012'), 1);
```

STUFF function [String]

Function

Deletes a number of characters from one string and replaces them with another string.

Syntax

STUFF (*string-expression1*, *start*, *length*, *string-expression2*)

Parameters

string-expression1 The string to be modified by the STUFF function.

start The character position at which to begin deleting characters. The first character in the string is position 1.

length The number of characters to delete.

string-expression2 The string to be inserted.

Example

The following statement returns the value chocolate pie.

```
SELECT STUFF( 'chocolate cake', 11, 4, 'pie' )
FROM iq_dummy
```

Usage

To delete a portion of a string using STUFF, use a replacement string of NULL. To insert a string using STUFF, use a length of zero.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

"INSERTSTR function [String]"

SUBSTRING function [String]

Function

Returns a substring of a string.

Syntax

{ **SUBSTRING** | **SUBSTR** } (*string-expression*, *start* [, *length*])

Parameters

string-expression The string from which a substring is to be returned.

start The start position of the substring to return, in characters. A negative starting position specifies a number of characters from the end of the string instead of the beginning. The first character in the string is at position 1.

length The length of the substring to return, in characters. A positive *length* specifies that the substring ends *length* characters to the right of the starting position, while a negative *length* specifies that the substring ends *length* characters to the left of the starting position.

Examples

The following statement returns back:

```
SELECT SUBSTRING ( 'back yard', 1 , 4 )
FROM iq_dummy
```

The following statement returns yard:

```
SELECT SUBSTR ( 'back yard', -1 , -4 )
FROM iq_dummy
```

The following statement returns 0x2233:

```
SELECT SUBSTR ( 0x112233445566, 2, 2 )
FROM iq_dummy
```

Usage

If *length* is specified, the substring is restricted to that length. If no length is specified, the remainder of the string is returned, starting at the *start* position.

Both *start* and *length* can be negative. Using appropriate combinations of negative and positive numbers, you can get a substring from either the beginning or end of the string.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** SUBSTR is not supported by Adaptive Server Enterprise. Use SUBSTRING instead.

SUM function [Aggregate]

Function

Returns the total of the specified expression for each group of rows.

Syntax

SUM (*expression* | **DISTINCT** *column-name*)

Parameters

expression The object to be summed. This is commonly a column name.

DISTINCT column-name Computes the sum of the unique values in *column-name* for each group of rows. This is of limited usefulness, but is included for completeness.

Example

The following statement returns the value 3749146.740.

```
SELECT SUM( salary )
FROM employee
```

Usage

Rows where the specified expression is NULL are not included.

Returns NULL for a group containing no rows.

Standards and compatibility

- **SQL/92** SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also

“COUNT function [Aggregate]”

“AVG function [Aggregate]”

SUSER_ID function [System]

Function

Returns an integer user identification number.

Syntax

SUSER_ID ([*user-name*])

Parameters **user-name** The user name.

Examples The following statement returns the user identification number 1.

```
SELECT SUSER_ID ('DBA') FROM iq_dummy
```

The following statement returns the user identification number 0.

```
SELECT SUSER_ID ('SYS') FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also "SUSER_NAME function [System]"

"USER_ID function [System]"

SUSER_NAME function [System]

Function Returns the user name.

Syntax **SUSER_NAME** ([*user-id*])

Parameters **user-id** The user identification number.

Examples The following statement returns the value DBA.

```
SELECT SUSER_NAME ( 1 ) FROM iq_dummy
```

The following statement returns the value SYS.

```
SELECT SUSER_NAME ( 0 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ. In Adapter Server Enterprise, SUSER_NAME returns the server user name.

See also "SUSER_ID function [System]"

"USER_NAME function [System]"

TAN function [Numeric]

Function Returns the tangent of a number.

Syntax **TAN** (*numeric-expression*)

Parameters **numeric-expression** An angle, in radians.

Example The following statement returns the value 0.572561.

```
SELECT TAN( 0.52 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also "COS function [Numeric]"

"SIN function [Numeric]"

TODAY function [Date and time]

Function Returns the current date. This is the historical syntax for CURRENT DATE.

Syntax **TODAY** (*****)

Example The following statement returns the current day according to the system clock.

```
SELECT TODAY( * ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

TRIM function [String]

Function Removes leading and trailing blanks from a string.

Syntax **TRIM** (*string-expression*)

Parameters **string-expression** The string to be trimmed.

Example The following statement returns the value chocolate with no leading or trailing blanks.

```
SELECT TRIM( '   chocolate   ' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise. Use LTRIM and RTRIM instead.

See also "LTRIM function [String]"

"RTRIM function [String]"

TRUNCATE function [Numeric]

Function

Truncates a number at a specified number of places after the decimal point. Deprecated in favor of TRUNCNUM.

Syntax

"**TRUNCATE**" (*numeric-expression*, *integer-expression*)

Parameters

numeric-expression The number to be truncated.

integer-expression A positive integer specifies the number of significant digits to the right of the decimal point at which to round. A negative expression specifies the number of significant digits to the left of the decimal point at which to round.

Examples

The following statement returns the value 600.

```
SELECT "TRUNCATE"( 655, -2 ) FROM iq_dummy
```

The following statement returns the value 655.340.

```
SELECT "TRUNCATE"( 655.348, 2 ) FROM iq_dummy
```

Usage

This function is the same as TRUNCNUM. Using TRUNCNUM is recommended, as it does not cause keyword conflicts.

The quotation marks are required because of a keyword conflict with the TRUNCATE TABLE statement. You can only use TRUNCATE without the quotation marks if the QUOTED_IDENTIFIER option is set to OFF.

Combinations of ROUND, FLOOR, and CEILING can be used to provide similar functionality.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise.

See also

“QUOTED_IDENTIFIER option [TSQL]” on page 118

“TRUNCNUM function [Numeric]”

TRUNCNUM function [Numeric]

Function

Truncates a number at a specified number of places after the decimal point.

Syntax

TRUNCNUM (*numeric-expression*, *integer-expression*)

Parameters

numeric-expression The number to be truncated.

integer-expression A positive integer specifies the number of significant digits to the right of the decimal point at which to round. A negative expression specifies the number of significant digits to the left of the decimal point at which to round.

Examples

The following statement returns the value 600.

```
SELECT TRUNCNUM( 655, -2 ) FROM iq_dummy
```

The following statement: returns the value 655.340.

```
SELECT TRUNCNUM( 655.348, 2 ) FROM iq_dummy
```

Usage

This function is the same as "TRUNCATE," but does not cause keyword conflicts.

Combinations of ROUND, FLOOR, and CEILING can be used to provide similar functionality.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise.

See also

"ROUND function [Numeric]"

"TRUNCATE function [Numeric]"

UCASE function [String]

Function

Converts all characters in a string to upper case.

Syntax

UCASE (*string-expression*)

Parameters

string-expression The string to be converted to upper case.

Example

The following statement returns the value CHOCOLATE.

```
SELECT UCASE( 'ChocoLate' ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** UCASE is not supported by Adaptive Server Enterprise, but UPPER provides the same feature in a compatible manner.

See also

"UPPER function [String]"

"LCASE function [String]"

UPPER function [String]

Function
Converts all characters in a string to upper case.

Syntax
UPPER (*string-expression*)

Parameters
string-expression The string to be converted to upper case.

Example
The following statement returns the value CHOCOLATE.

```
SELECT UPPER( 'ChocoLate' ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** This function is SQL/92 compatible.
- **Sybase** Compatible with Adaptive Server Enterprise.

See also
"UCASE function [String]"

"LCASE function [String]"

"LOWER function [String]"

USER_ID function [System]

Function
Returns an integer user identification number.

Syntax
USER_ID ([*user-name*])

Parameters
user-name The user name.

Examples
The following statement returns the user identification number 1.

```
SELECT USER_ID ('DBA') FROM iq_dummy
```

The following statement returns the user identification number 0.

```
SELECT USER_ID ('SYS') FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ.

See also
"SUSER_ID function [System]"

"USER_NAME function [System]"

USER_NAME function [System]

Function
Returns the user name.

Syntax
USER_NAME ([*user-id*])

Parameters
user-id The user identification number.

Examples
The following statement returns the value DBA.

```
SELECT USER_NAME ( 1 ) FROM iq_dummy
```

The following statement returns the value SYS.

```
SELECT USER_NAME ( 0 ) FROM iq_dummy
```

Standards and compatibility
- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise function implemented for Sybase IQ. In Adapter Server Enterprise, USER_NAME returns the user name, not the server user name.

See also
"SUSER_NAME function [System]"

"USER_ID function [System]"

UUIDTOSTR function [String]

Function
Converts a unique identifier value (UUID, also known as GUID) to a string value.

Syntax
UUIDTOSTR (*uuid-expression* **)**

Parameters
uuid-expression A unique identifier value.

Usage
Converts a unique identifier to a string value in the format *xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx*, where x is a hexadecimal digit. If the binary value is not a valid uniqueidentifier, NULL is returned.

This function is useful if you want to view a UUID value.

Standards and compatibility
- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also
"NEWID function [Miscellaneous]" on page 283

"STRTOUUID function [String]" on page 318

VARIANCE function [Aggregate]

Function
Returns the variance of a set of numbers.

Syntax

VARIANCE ([**ALL**] *expression*)

Parameters

expression Any numeric data type (float, real, or double precision) expression.

Examples

Given this data:

```
SELECT salary FROM employee WHERE dept_id = 300
```

salary
51432.000
57090.000
42300.000
43700.00
36500.000
138948.000
31200.000
58930.00
75400.00

The following statement returns the value 1063923790.99999994.

```
SELECT VARIANCE ( salary ) FROM employee
WHERE dept_id = 300
```

Given this data:

```
SELECT unit_price FROM product WHERE name = 'Tee Shirt'
```

name	unit_price
Tee Shirt	9.00
Tee Shirt	14.00
Tee Shirt	14.00

The following statement returns the value 8.33333333333334327.

```
SELECT VARIANCE ( unit_price ) FROM product
WHERE name = 'Tee Shirt'
```

Usage

The formula used to calculate VARIANCE is

$$var = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)}$$

VARIANCE returns a result of data type double precision floating point. If applied to the empty set, the result is NULL.

VARIANCE does not support the keyword DISTINCT. A syntax error is returned if DISTINCT is used with VARIANCE.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"STDDEV function [Aggregate]"

WEEKS function [Date and time]

Function

Returns the number of weeks since an arbitrary starting date/time, returns the number of weeks between two specified date/times, or adds the specified integer-expression number of weeks to a date/time.

Syntax

WEEKS (*datetime-expression*
| *datetime-expression, datetime-expression*
| *datetime-expression, integer-expression*)

Parameters

datetime-expression A date and time.

integer-expression The number of weeks to be added to the *datetime-expression.* If *integer-expression* is negative, the appropriate number of weeks are subtracted from the date/time value. Hours, minutes, and seconds are ignored. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section "CAST function [Data type conversion]" on page 237.

Examples

The following statement returns the value 104278:

```
SELECT WEEKS( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the value 9, to signify the difference between the two dates:

```
SELECT WEEKS( '1999-07-13 06:07:12',
    '1999-09-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the timestamp value 1999-06-16 21:05:07.000.

```
SELECT WEEKS( CAST( '1999-05-12 21:05:07'
AS TIMESTAMP ), 5) FROM iq_dummy
```

Usage

Weeks are defined as going from Sunday to Saturday, as they do in a North American calendar. The number returned by the first syntax is often useful for determining if two dates are in the same week.

```
WEEKS ( invoice_sent ) = WEEKS ( payment_received ) FROM
iq_dummy
```

In the second syntax, the value of WEEKS is calculated from the number of Sundays between the two dates. Hours, minutes, and seconds are ignored. This function is not affected by the DATE_FIRST_DAY_OF_WEEK option.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

YEAR function [Date and time]

Function

Returns a four digit number corresponding to the year of the given date/time.

Syntax

YEAR (*datetime-expression*)

Parameters

datetime-expression A date and time.

Example

The following statement returns the value 1998:

```
SELECT YEAR( '1998-07-13 06:07:12' ) FROM iq_dummy
```

Usage

The YEAR function is the same as the first syntax of the YEARS function.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also

"YEARS function [Date and time]"

YEARS function [Date and time]

Function

Returns a four digit number corresponding to the year of a given date/time, returns the number of years between two specified date/times, or adds the specified integer-expression number of years to a date/time.

Syntax

YEARS (*datetime-expression*
| *datetime-expression, datetime-expression*
| *datetime-expression, integer-expression*)

Parameters

datetime-expression A date and time.

integer-expression The number of years to be added to the *datetime-expression.* If *integer-expression* is negative, the appropriate number of years are subtracted from the datetime value. If you supply an integer expression, the *datetime-expression* must be explicitly cast as a datetime data type.

For information on casting data types, see the section "CAST function [Data type conversion]" on page 237.

Examples

The following statement returns the value 1998.

```
SELECT YEARS( '1998-07-13 06:07:12' ) FROM iq_dummy
```

The following statement returns the value 2, to signify the difference between the two dates.

```
SELECT YEARS( '1997-07-13 06:07:12',
    '1999-09-13 10:07:12' ) FROM iq_dummy
```

The following statement returns the timestamp value 2004-05-12 21:05:07.000.

```
SELECT YEARS( CAST( '1999-05-12 21:05:07'
AS TIMESTAMP ), 5) FROM iq_dummy
```

Usage

The first syntax of the YEARS function is the same as the YEAR function.

The second syntax returns the number of years from the first date to the second date, calculated from the number of first days of the year between the two dates. The number may be negative. Hours, minutes, and seconds are ignored. For example, the following statement returns 2, which is the number of first days of the year between the specified dates:

```
SELECT YEARS ( '2000-02-24', '2002-02-24' ) FROM
iq_dummy
```

The next statement also returns 2, even though the difference between the specified dates is not two full calendar years. The value 2 is the number of first days of the year (in this case January 01, 2001 and January 01, 2002) between the two dates.

```
SELECT YEARS ( '2000-02-24', '2002-02-20' ) FROM
iq_dummy
```

The third syntax adds an *integer-expression* number of years to the given date. If the new date is past the end of the month (such as SELECT YEARS (CAST ('1992-02-29' AS TIMESTAMP), 1)), the result is set to the last day of the month. If *integer-expression* is negative, the appropriate number of years is subtracted from the date. Hours, minutes, and seconds are ignored.

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

See also "YEAR function [Date and time]"

YMD function [Date and time]

Function Returns a date value corresponding to the given year, month, and day of the month.

Syntax **YMD** (*integer-expression1*, *integer-expression2*, *integer-expression3*)

Parameters **integer-expression1** The year.

integer-expression2 The number of the month. If the month is outside the range 1-12, the year is adjusted accordingly.

integer-expression3 The day number. The day is allowed to be any integer, the date is adjusted accordingly.

Examples The following statement returns the value 1998-06-12.

```
SELECT YMD( 1998, 06, 12 ) FROM iq_dummy
```

If the values are outside their normal range, the date adjusts accordingly. For example, the following statement returns the value 1993-03-01.

```
SELECT YMD( 1992, 15, 1 ) FROM iq_dummy
```

The following statement returns the value 1993-02-28.

```
SELECT YMD ( 1992, 15, 1-1 ) FROM iq_dummy
```

The following statement returns the value 1992-02-29.

```
SELECT YMD ( 1992, 3, 1-1 ) FROM iq_dummy
```

Standards and compatibility

- **SQL/92** Vendor extension.
- **Sybase** Compatible with Adaptive Server Enterprise

CHAPTER 6

SQL Statements

About this chapter

This chapter presents detailed descriptions of the SQL statements available to users of Sybase IQ.

This chapter contains an alphabetical listing of SQL statements, including some that can only be used from Embedded SQL or DBISQL.

Using the SQL statement reference

This section describes some conventions used in documenting the SQL statements.

Common elements in SQL syntax

This section lists language elements that are found in the syntax of many SQL statements.

For more information on the elements described here, see “Identifiers” on page 150, Chapter 4, “SQL Data Types,” “Search conditions” on page 162, “Expressions” on page 153, or “Strings” on page 152.

- **column-name** An identifier that represents the name of a column.
- **condition** An expression that evaluates to TRUE, FALSE, or UNKNOWN.
- **connection-name** A string representing the name of an active connection.
- **data-type** A storage data type.
- **expression** An expression.
- **filename** A string containing a filename.

- **host-variable** A C language variable, declared as a host variable preceded by a colon.
- **indicator-variable** A second host variable of type short int immediately following a normal host variable. It must also be preceded by a colon. Indicator variables are used to pass NULL values to and from the database.
- **number** Any sequence of digits followed by an optional decimal part and preceded by an optional negative sign. Optionally, the number can be followed by an E and then an exponent. For example,

  ```
  42
  -4.038
  .001
  3.4e10
  1e-10
  ```

- **owner** An identifier representing the user ID who owns a database object.
- **role-name** An identifier representing the role name of a foreign key.
- **savepoint-name** An identifier that represents the name of a savepoint.
- **search-condition** A condition that evaluates to TRUE, FALSE, or UNKNOWN.
- **special-value** One of the special values described in “Special values” on page 173.
- **statement-label** An identifier that represents the label of a loop or compound statement.
- **table-list** A list of table names, which may include correlation names.

  For more information, see FROM clause on page 486.
- **table-name** An identifier that represents the name of a table.
- **userid** An identifier representing a user name. The user ID is not case sensitive and is unaffected by the setting of the CASE RESPECT property of the database.
- **variable-name** An identifier that represents a variable name.

Syntax conventions

The following conventions are used in the SQL syntax descriptions:

- **Keywords** All SQL keywords are shown in UPPER CASE. However, SQL keywords are case insensitive, so you can enter keywords in any case you wish; SELECT is the same as Select which is the same as select.
- **Placeholders** Items that must be replaced with appropriate identifiers or expressions are shown in *italics*.
- **Continuation** Lines beginning with an ellipsis (...) are a continuation from the previous line.
- **Optional portions** Optional portions of a statement are enclosed by square brackets. For example,

  ```
  RELEASE SAVEPOINT [ savepoint-name ]
  ```

  indicates that the *savepoint-name* is optional. The square brackets should not be typed.
- **Repeating items** Lists of repeating items are shown with an element of the list followed by an ellipsis (three dots). One or more list elements are allowed. When more than one is specified, they must be separated by commas if indicated as such. For example,

  ```
  UNIQUE (column-name [, ...])
  ```

  indicates that you can specify *column-name* more than once separated by commas. The square brackets should not be typed.
- **Alternatives** When one option must be chosen, the alternatives are enclosed in curly braces. For example,

  ```
  [ QUOTES { ON | OFF } ]
  ```

  indicates that if the QUOTES option is chosen, one of ON or OFF must be provided. The braces should not be typed.
- **One or more options** If you choose more than one, separate your choices with commas. For example

  { **CONNECT**, **DBA**, **RESOURCE** }

Statement applicability indicators

Some statement titles are followed by an indicator in square brackets that indicate where the statement can be used. These indicators are as follows:

- **[ESQL]** The statement is for use in Embedded SQL.
- **[DBISQL]** The statement can be used only in DBISQL.
- **[SP]** The statement is for use in stored procedures or batches.
- **[TSQL]** The statement is implemented for compatibility with Adaptive Server Enterprise. In some cases, the statement cannot be used in stored procedures that are not Transact-SQL format. In other cases, there is an alternative statement that is closer to the SQL/92 standard that is recommended unless Transact-SQL compatibility is an issue.

If two sets of brackets are used, the statement can be used in both environments. For example, [ESQL] [SP] means a statement can be used either in Embedded SQL or in stored procedures.

ALLOCATE DESCRIPTOR statement [ESQL]

Description

Allocates space for a SQL descriptor area (SQLDA).

Syntax

ALLOCATE DESCRIPTOR *descriptor-name*
... [WITH MAX { *integer* | *host-variable* }]

Parameters

descriptor-name:
string

For more information, see Chapter 3, “SQL Language Elements.”

Examples

The following sample program includes an example of ALLOCATE DESCRIPTOR statement usage.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>


EXEC SQL INCLUDE SQLCA;


#include <sqldef.h>


EXEC SQL BEGIN DECLARE SECTION;
int       x;
short     type;
int       numcols;
```

```
char      string[100];
a_sql_statement_number  stmt = 0;
EXEC SQL END DECLARE SECTION;

int main(int argc, char * argv[])
{
    struct sqlda *      sqlda1;

    if( !db_init( &sqlca ) ) {
       return 1;
    }
    db_string_connect(&sqlca,
"UID=dba;PWD=sql;DBF=d:\\ASIQ-12_5\\sample.db");

    EXEC SQL ALLOCATE DESCRIPTOR sqlda1 WITH MAX 25;

    EXEC SQL PREPARE :stmt FROM 'select * from
employee';
    EXEC SQL DECLARE curs CURSOR FOR :stmt;
    EXEC SQL OPEN curs;

    EXEC SQL DESCRIBE :stmt into sqlda1;
    EXEC SQL GET DESCRIPTOR sqlda1 :numcols=COUNT;
       // how many columns?
    if( numcols > 25 ) {
       // reallocate if necessary
       EXEC SQL DEALLOCATE DESCRIPTOR sqlda1;
       EXEC SQL ALLOCATE DESCRIPTOR sqlda1
          WITH MAX :numcols;
    }
    type = DT_STRING;   // change the type to string
    EXEC SQL SET DESCRIPTOR sqlda1 VALUE 2 TYPE = :type;
    fill_sqlda( sqlda1 );  // allocate space for the
variables

    EXEC SQL FETCH ABSOLUTE 1 curs USING DESCRIPTOR
sqlda1;
    EXEC SQL GET DESCRIPTOR sqlda1 VALUE 2 :string =
DATA;

    printf("name = %s", string );

    EXEC SQL DEALLOCATE DESCRIPTOR sqlda1;
    EXEC SQL CLOSE curs;
    EXEC SQL DROP STATEMENT :stmt;
```

```
    db_string_disconnect( &sqlca, "" );
    db_fini( &sqlca );

    return 0;
}
```

Usage

Allocates space for a descriptor area (SQLDA). You must declare the following in your C code prior to using this statement:

```
struct sqlda * descriptor_name
```

The WITH MAX clause allows you to specify the number of variables within the descriptor area. The default size is one.

You must still call fill_sqlda to allocate space for the actual data items before doing a fetch or any statement that accesses the data within a descriptor area.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

See also

- DEALLOCATE DESCRIPTOR statement [ESQL]
- The SQL descriptor area (SQLDA) in the *Adaptive Server Anywhere Programming Guide*

ALTER DBSPACE statement

Description

Changes the readwrite mode, changes the size, or extends an existing dbspace.

Syntax

ALTER DBSPACE *dbspace-name*
{ **READWRITE** | **READONLY** | **RELOCATE**
| **SIZE** *dbspace-size* [KB | MB | GB | TB | PAGES]
| **ADD** *dbspace-size* [KB | MB | GB | TB | PAGES] }

Examples

Example 1 Change the mode of a dbspace called *mydb_tmp_2* to relocate.

```
ALTER DBSPACE mydb_tmp_2 RELOCATE;
```

Example 2 Specify the new size of 10MB for the dbspace IQ_SYSTEM_MAIN.

```
ALTER DBSPACE IQ_SYSTEM_MAIN SIZE 10MB
```

Example 3 Increase the size of the dbspace IQ_SYSTEM_TEMP by 2GB.

```
ALTER DBSPACE IQ_SYSTEM_TEMP ADD 2 GB
```

Example 4 Specify the new size of 4MB for the dbspace IQ_SYSTEM_TEMP. (SIZE defaults to megabytes.)

```
ALTER DBSPACE IQ_SYSTEM_TEMP SIZE 4
```

Example 5 Increase the size of the dbspace IQ_SYSTEM_MAIN by 1000 pages. (ADD defaults to pages.)

```
ALTER DBSPACE IQ_SYSTEM_MAIN ADD 1000
```

Usage

The ALTER DBSPACE statement changes the readwrite mode, changes the size, or extends an existing dbspace. The sp_iqdbspace system stored procedure displays the mode and size of the dbspace. Dbspace names are case sensitive for databases created with CASE RESPECT.

READWRITE clause Specifies that allocations can be made from the dbspace. The mode of a newly created dbspace is readwrite.

READONLY clause Specifies that the server will no longer write to the dbspace. You can still modify objects on the dbspace, but new versions are placed on the remaining readwrite dbspaces.

RELOCATE clause Specifies that space will not be allocated from the dbspace and that the objects on the dbspace are subject to relocation. The server does not write to an IQ Main dbspace in relocate mode.

SIZE clause Specifies the new size of the dbspace in units of pages, kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB). The default is megabytes. The size of the dbspace can be increased only if the free list has sufficient room or if the dbspace has sufficient reserved space. The size of the dbspace can be decreased only if the truncated portion is not in use.

ADD clause ALTER DBSPACE ADD extends the dbspace by the specified *dbspace-size* in units of pages, kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB). The default is PAGES. The page size of a database is fixed when the database is created.

You can also view and change the dbspace mode and size through the Sybase Central Dbspaces window.

Side effects

- Automatic commit
- Automatic checkpoint
- A mode change to readonly or relocate causes immediate relocation of the internal database structures on the dbspace to one of the readwrite dbspaces.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have DBA authority.

See also

- DROP statement
- CREATE DBSPACE statement
- CREATE DATABASE statement
- “sp_iqdbspace procedure” in Chapter 9, “System Procedures”
- “Working with dbspaces” in Chapter 5, “Working with Database Objects” of the *Sybase IQ System Administration Guide*

ALTER EVENT statement

Description

Changes the definition of an event or its associated handler for automating predefined actions. Also alters the definition of scheduled actions.

Syntax

ALTER EVENT *event-name*
[**DELETE TYPE** | **TYPE** *event-type*]
{ **WHERE** { *trigger-condition* | **NULL** }
| { **ADD** | [**MODIFY**] | **DELETE** } **SCHEDULE** *schedule-spec*
}
[**ENABLE** | **DISABLE**]
[[**MODIFY**] **HANDLER** *compound-statement* | **DELETE HANDLER** }

Parameters

event-type:
BackupEnd| "Connect"
| ConnectFailed| DatabaseStart
| DBDiskSpace| "Disconnect"
| GlobalAutoincrement | GrowDB
| GrowLog| GrowTemp
| LogDiskSpace| "RAISERROR"
| ServerIdle| TempDiskSpace

trigger-condition:
[event_condition(*condition-name*) { = | < | > | != | <= | >= } *value*]

schedule-spec:
[*schedule-name*]
{ START TIME *start-time* | BETWEEN *start-time* AND *end-time* }
[EVERY *period* { HOURS | MINUTES | SECONDS }]
[ON { (*day-of-week, ...*) | (*day-of-month, ...*) }]
[START DATE *start-date*]

event-name | *schedule-name*:
identifier

day-of-week :
string

value | *period* | *day-of-month* :
integer

start-time | *end-time* :
time

start-date :
date

Usage

This statement allows you to alter an event definition created with CREATE EVENT. Possible uses include the following:

- You can use ALTER EVENT to change an event handler during development.
- You may want to define and test an event handler without a trigger condition or schedule during a development phase, and then add the conditions for execution using ALTER EVENT once the event handler is completed.
- You may want to disable an event handler temporarily by disabling the event.

When you alter an event using the ALTER EVENT statement, you specify the event name and, optionally, the schedule name. You can list event names by querying the system table SYSEVENT. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

You can list schedule names by querying the system table SYSSCHEDULE. For example:

```
SELECT event_id, sched_name FROM SYS.SYSSCHEDULE
```

Each event has a unique event id. Use the event_id columns of SYSEVENT and SYSSCHEDULE to match the event to the associated schedule.

DELETE TYPE clause Removes an association of the event with an event type.

ADD | *MODIFY* | *DELETE SCHEDULE clause* Changes the definition of a schedule. Only one schedule can be altered in any one ALTER EVENT statement.

WHERE clause The WHERE NULL option deletes a condition.

For descriptions of most of the parameters, see the CREATE EVENT statement.

Side effects

Automatic commit.

Permissions — Must have DBA authority.

See also — BEGIN... END statement

CREATE EVENT statement

Chapter 18, "Automating Tasks Using Schedules and Events" in the *Sybase IQ System Administration Guide*

ALTER INDEX statement

Description — Renames indexes and foreign key role names of indexes and foreign keys explicitly created by a user.

Syntax

Syntax 1

ALTER INDEX *index-name rename-spec*

Syntax 2

ALTER [INDEX] FOREIGN KEY *role-name rename-spec*

Parameters

rename-spec:
ON [*owner*.]*table-name* RENAME [AS | TO] *new-name*

Examples

Example 1 The following statement renames an index COL1_HG_OLD in the table jak.mytable to COL1_HG_NEW.

```
ALTER INDEX COL1_HG_OLD ON jak.mytable
RENAME AS COL1_HG_NEW
```

Example 2 The following statement renames a foreign key role name ky_dept_id in table dba.employee to emp_dept_id.

```
ALTER INDEX FOREIGN KEY ky_dept_id
ON dba.employee
RENAME TO emp_dept_id
```

Usage — The ALTER INDEX statement renames indexes and foreign key role names of indexes and foreign keys that were explicitly created by a user. Note that indexes created to enforce key constraints cannot be renamed.

ON clause The ON clause specifies the name of the table which contains the index or foreign key to rename.

RENAME [AS | TO] clause The RENAME clause specifies the new name of the index or foreign key role.

Side Effects

Automatic commit. Clears the Results tab in the Results pane in Interactive SQL. Closes all cursors for the current connection.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must own the table, or have REFERENCES permissions on the table, or have DBA authority.

See also

- CREATE INDEX statement on page 410
- CREATE TABLE statement on page 435
- ALTER TABLE statement on page 348

ALTER PROCEDURE statement

Description

Replaces a procedure with a modified version. You must include the entire new procedure in the ALTER PROCEDURE statement, and reassign user permissions on the procedure.

Syntax

ALTER PROCEDURE [*owner*.]*procedure-name procedure-definition*

Parameters

procedure-definition:
CREATE PROCEDURE syntax following the name

Usage

The ALTER PROCEDURE statement is identical in syntax to the CREATE PROCEDURE statement except for the first word.

Existing permissions on the procedure are maintained, and do not have to be reassigned. If a DROP procedure and CREATE PROCEDURE were carried out, execute permissions would have to be reassigned.

Side effects

Automatic commit is a side effect of this statement.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions — Must be the owner of the procedure or be DBA. Automatic commit.

See also — CREATE PROCEDURE statement

ALTER SERVER statement

Description — Modifies the attributes of a remote server.

Syntax

ALTER SERVER *server-name*
[**CLASS** '*server-class*']
[**USING** '*connection-info*']
[**CAPABILITY** '*cap-name*' { **ON** | **OFF** }]

Parameters

server-class:
{*ASAJDBC* | *ASEJDBC*
| *ASAODBC* | *ASEODBC*
| *DB2ODBC* | *MSSODBC*
| *ORAODBC* | *ODBC* }

connection-info:
{ *machine-name:port-number* [/*dbname*] | *data-source-name* }

cap-name:
the name of a server capability

Examples

- Change the server class of the Adaptive Server named ase_prod so its connection to Sybase IQ is ODBC-based. Its Data Source Name is ase_prod.

```
ALTER SERVER ase_prod
CLASS 'ASEODBC'
USING 'ase_prod'
```

- Change a capability of server infodc:

```
ALTER SERVER infodc
CAPABILITY 'insert select' OFF
```

Usage — The ALTER SERVER statement modifies the attributes of a server. These changes do not take effect until the next connection to the remote server.

CLASS clause The CLASS clause is specified to change the server class. For more information on server classes, see Chapter 17, “Server Classes for Remote Data Access” and Chapter 16, “Accessing Remote Data” in the *Sybase IQ System Administration Guide*.

USING clause The USING clause is specified to change the server's connection information. For more information about connection information, see CREATE SERVER statement on page 430.

CAPABILITY clause The CAPABILITY clause turns a server capability ON or OFF. Server capabilities are stored in the system table SYSCAPABILITY. The names of these capabilities are stored in the system table SYSCAPABILITYNAME. The SYSCAPABILITY table contains no entries for a remote server until the first connection is made to that server. At the first connection, Sybase IQ interrogates the server about its capabilities and then populates the SYSCAPABILITY table. For subsequent connections, the server's capabilities are obtained from this table.

In general, you do not need to alter a server's capabilities. It may be necessary to alter capabilities of a generic server of class ODBC.

Side Effects

Automatic commit is a side effect of this statement.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

Must have RESOURCE authority.

See also

- CREATE SERVER statement on page 430
- DROP SERVER statement on page 471
- Chapter 17, “Server Classes for Remote Data Access” and Chapter 16, “Accessing Remote Data” in the *Sybase IQ System Administration Guide*

ALTER SERVICE statement

Description

Alters a web service.

Syntax

ALTER SERVICE *service-name*
[**TYPE** '*service-type-string*']
[*attributes*]
[**AS** *statement*']

Parameters

attributes:[AUTHORIZATION { ON | OFF }] [SECURE { ON | OFF }] [USER *user-name* | NULL }] [URL [PATH] { PATH] {ON | OFF | ELEMENTS }] [USING (*SOAP-prefix* | NULL }]

service-type-string: {‘RAW’ | ‘HTML’ | ‘XML’ | ‘SOAP’ | ’DISH’}

Examples

To set up a web server quickly, start a database server with the -xs switch, then execute the following statements:

```
CREATE SERVICE tables TYPE 'HTML'

ALTER SERVICE tables
AUTHORIZATION OFF
USER DBA
AS SELECT * FROM SYS.SYSTABLE
```

After executing these statements, use any web browser to open the URL http://localhost/tables.

Usage

The alter service statement causes the database server to act as a web server.

service-name You cannot rename web services.

service-type-string Identifies the type of the service. The type must be one of the listed service types. There is no default value.

AUTHORIZATION clause Determines whether users must specify a user name and password when connecting to the service. If authorization is OFF, the AS clause is required and a single user must be identified by the USER clause. All requests are run using that user's account and permissions.

If authorization is ON, all users must provide a user name and password. Optionally, you may limit the users that are permitted to use the service by providing a user or group name using the USER clause. If the user name is NULL, all known users can access the service.

The default value is ON. It is recommended that production systems be run with authorization turned on and that you grant permission to use the service by adding users to a group.

SECURE clause Indicates whether unsecure connections are accepted. ON indicates that only HTTPS connections are to be accepted. Service requests received on the HTTP port are automatically redirected to the HTTPS port. If set to OFF, both HTTP and HTTPS connections are accepted. The default value is OFF.

USER clause If authorization is disabled, this parameter becomes mandatory and specifies the user id used to execute all service requests. If authorization is enabled (the default), this optional clause identified the user or group permitted access to the service. The default value is NULL, which grants access to all users.

URL clause Determines whether URI paths are accepted and, if so, how they are processed. OFF indicates that nothing must follow the service name in a URI request. ON indicates that the remainder of the URI is interpreted as the value of a variable named url. ELEMENTS indicates that the remainder of the URI path is to be split at the slash characters into a list of up to 10 elements. The values are assigned to variables named url plus a numeric suffix of between 1 and 10; for example, the first three variable names are url1, url2, and url3. If fewer than 10 values are supplied, the remaining variables are set to NULL. If the service name ends with the character /, then URL must be set to OFF. The default value is OFF.

USING clause This clause applies only to DISH services. The parameter specifies a name prefix. Only SOAP services whose names begin with this prefix are handled.

statement If the statement is NULL, the URI must specify the statement to be executed. Otherwise, the specified SQL statement is the only one that can be executed through the service. SOAP services must have statements; DISH services must have none. The default value is NULL.

It is strongly recommended that all services run in production systems define a statement. The statement can be NULL only if authorization is enabled.

RAW The result set is sent to the client without any further formatting. You can produce formatted documents by generating the required tags explicitly within your procedure.

HTML The result set of a statement or procedure are automatically formatted into an HTML document that contains a table.

XML The result set is assumed to be in XML format. If it is not already so, it is automatically converted to XML RAW format.

SOAP The request must be a valid Simple Object Access Protocol, or SOAP, request. The result set is automatically formatted as a SOAP response. For more information about the SOAP standards, see www.w3.org/TR/SOAP at http://www.w3.org/TR/SOAP.

DISH A Determine SOAP Handler, or DISH, service acts as a proxy for one or more SOAP services. In use, it acts as a container that holds and provides access to a number of soap services. A Web Services Description Language (WSDL) file is automatically generated for each of the included SOAP services. The included SOAP services are identified by a common prefix, which must be specified in the USING clause.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions — Must have DBA authority.

See also
- CREATE SERVICE statement
- DROP SERVICE statement
- Using the Built-in Web Server in *Adaptive Server Anywhere Database Administration Guide*

ALTER TABLE statement

Description — Modifies a table definition.

Syntax

ALTER TABLE [*owner*.]*table-name*
{ **ADD** *column-definition* [*column-constraint*]...
| **ADD** *table-constraint*
| **MODIFY** *column-definition*
| **MODIFY** *column-name*[**IDENTITY**] [**DEFAULT AUTOINCREMENT**] [**NOT**] **NULL**
| **MODIFY** *column-name* [**CONSTRAINT** *constraint-name*] **CHECK NULL**
| **MODIFY** *column-name* **CHECK (** *new-condition* **)**
| **ALTER** *column-name column-modification*
| **ALTER** *constraint-name* **CHECK (** *new-condition* **)**
| { **DELETE** | **DROP** } *column-name*
| { **DELETE** | **DROP** } **CHECK**
| { **DELETE** | **DROP** } **CONSTRAINT** *constraint-name*
| { **DELETE** | **DROP** } **UNIQUE (** *column-name* [, ...] **)**
| { **DELETE** | **DROP** } **PRIMARY KEY**
| { **DELETE** | **DROP** } **FOREIGN KEY** *role-name*
| **RENAME** *new-table-name*
| **RENAME** *column-name* **TO** *new-column-name*
| **RENAME** *constraint-name* **TO** *new-constraint-name*}

Parameters

column-definition:
column-name data-type [NOT NULL] [IDENTITY] [DEFAULT AUTOINCREMENT]

column-constraint:
[CONSTRAINT *constraint-name*] { UNIQUE
| PRIMARY KEY
| REFERENCES *table-name* [(*column-name*)] [*actions*]
| CHECK (*condition*)
| IQ UNIQUE (*integer*) }

table-constraint:
{ UNIQUE (*column-name* [, ...])
| PRIMARY KEY (*column-name* [, ...])
| *foreign-key-constraint*
| CHECK (*condition*)}

foreign-key-constraint:
FOREIGN KEY [*role-name*] [(*column-name* [, ...])]
... REFERENCES *table-name* [(*column-name* [, ...])]
... [*actions*] [

actions:
[ON {UPDATE | DELETE} *action*]

action:
{ RESTRICT }

Examples

- Add a new column to the employees table showing which office they work in.

```
ALTER TABLE employee
ADD office CHAR(20)
```

- Drop the office column from the employees table.

```
ALTER TABLE employee
DELETE office
```

- Add a column to the customer table assigning each customer a sales contact.

```
ALTER TABLE customer
ADD sales_contact INTEGER
REFERENCES employee (emp_id)
```

Usage

The ALTER TABLE statement changes table attributes (column definitions, constraints) in a table that was previously created. Note that the syntax allows a list of alter clauses; however, only one table-constraint or column-constraint can be added, modified or deleted in one ALTER TABLE statement.

Note You cannot alter local temporary tables, but you can alter global temporary tables when they are in use by only one connection.

Sybase IQ enforces REFERENCES and CHECK constraints. Table and/or column check constraints added in an ALTER TABLE statement are not evaluated as part of that alter table operation. For details about CHECK constraints, see CREATE TABLE statement on page 435.

Note If SELECT * is used in a view definition and you alter a table referenced by the SELECT *, then you must run ALTER VIEW <viewname> RECOMPILE to ensure that the view definition is correct and to prevent unexpected results when querying the view.

ADD column-definition [column-constraint] Add a new column to the table. The table must be empty to specify NOT NULL. The table may contain data when you add an IDENTITY or DEFAULT AUTOINCREMENT column. If the column has a default IDENTITY value, all rows of the new column are populated with sequential values. Can also add a foreign key constraint as a column constraint for a single column key. The value of the IDENTITY/DEFAULT AUTOINCREMENT column uniquely identifies every row in a table. The IDENTITY/DEFAULT AUTOINCREMENT column stores sequential numbers that are automatically generated during inserts and updates. DEFAULT AUTOINCREMENT columns are also known as IDENTITY columns. When using IDENTITY/DEFAULT AUTOINCREMENT, the column must be one of the integer data types, or an exact numeric type, with scale 0. See CREATE TABLE statement for more about column constraints and IDENTITY/DEFAULT AUTOINCREMENT columns.

Note You cannot add foreign key constraints to an unenforced primary key created with Sybase IQ 12.4.3 or earlier versions.

ADD table-constraint Add a constraint to the table. Can also add a foreign key constraint as a table constraint for a single or multicolumn key. See CREATE TABLE statement for a full explanation of table constraints.

If PRIMARY KEY is specified, the table must not already have a primary key created by the CREATE TABLE statement or another ALTER TABLE statement.

Note You cannot MODIFY a table or column constraint. To change a constraint, you must DELETE the old constraint and ADD the new constraint.

MODIFY column-name [NOT] NULL Change the NOT NULL constraint on the column to allow or disallow NULL values in the column.

MODIFY column-name [IDENTITY] [DEFAULT AUTOINCREMENT] The value of the IDENTITY or DEFAULT AUTOINCREMENT column uniquely identifies every row in a table. The IDENTITY/DEFAULT AUTOINCREMENT column stores sequential numbers that are automatically generated during inserts and updates. DEFAULT AUTOINCREMENT columns are also known as IDENTITY columns. When using IDENTITY/DEFAULT AUTOINCREMENT, the column must be one of the integer data types, or an exact numeric type, with scale 0. See CREATE TABLE statement for a full explanation of column constraints and IDENTITY/DEFAULT AUTOINCREMENT columns.

MODIFY column-name CHECK NULL Delete the check constraint for the column.

MODIFY column-name CHECK (new-condition) Replace the existing CHECK condition for the column with the one specified.

DELETE column-name Delete the column from the table. If the column is contained in any multicolumn index, uniqueness constraint, foreign key, or primary key then the index, constraint or key must be deleted before the column can be deleted. This does not delete CHECK constraints that refer to the column. An IDENTITY/DEFAULT AUTOINCREMENT column can only be deleted if IDENTITY_INSERT is set OFF for the table and the table is not a local temporary table.

DELETE CHECK Delete all check constraints for the table. This includes both table check constraints and column check constraints.

DELETE UNIQUE (column-name,...) Delete a uniqueness constraint for this table. Any foreign keys referencing this uniqueness constraint (rather than the primary key) will also be deleted. Reports an error if there are associated foreign key constraints. You must use ALTER TABLE to delete all foreign keys that reference the primary key before you can delete the primary key constraint.

DELETE PRIMARY KEY Delete the primary key constraint for this table. All foreign keys referencing the primary key for this table will also be deleted. Reports an error if there are associated foreign key constraints. If the primary key is unenforced, DELETE returns an error if associated unenforced foreign key constraints exist.

DELETE FOREIGN KEY role-name Delete the foreign key constraint for this table with the given role name. Retains the implicitly-created non-unique HG index for the foreign key constraint. Users can explicitly remove the HG index with the DROP INDEX statement.

RENAME new-table-name Change the name of the table to the *new-table-name*. Note that any applications using the old table name will need to be modified. Also, any foreign keys which were automatically assigned the same name as the old table name will not change names.

RENAME column-name TO new-column-name Change the name of the column to the *new-column-name*. Note that any applications using the old column name will need to be modified.

RENAME constraint-name TO new-constraint-name Change the name of the constraint to the *new-constraint-name*. Note that any applications using the old constraint name will need to be modified.

ALTER TABLE will be prevented whenever the statement affects a table that is currently being used by another connection. ALTER TABLE can be time consuming and the server will not process requests referencing the same table while the statement is being processed.

Side effects

- Automatic commit. The MODIFY and DELETE options close all cursors for the current connection. The DBISQL data window is also cleared.
- A checkpoint is carried out at the beginning of the ALTER TABLE operation.
- Once you alter a column or table, any stored procedures, views or other items that refer to the altered column no longer work.

Standards

- **SQL/92** Intermediate level feature. MODIFY clauses are not SQL/92 compliant.
- **Sybase** Some clauses are supported by Adaptive Server Enterprise.

Permissions

Must be the owner of the table or have DBA authority or ALTER permission on the table. Requires exclusive access to the table.

See also

- CREATE TABLE statement on page 435
- DROP statement on page 466
- Chapter 4, “SQL Data Types”

ALTER VIEW statement

Description

Replaces a view definition with a modified version. You must include the entire new view definition in the ALTER VIEW statement.

Syntax

ALTER VIEW
... [*owner*.]*view-name* [(*column-name* [, ...])]
... **AS** *select-without-order-by*
... [**WITH CHECK OPTION**]

Usage

The ALTER VIEW statement is identical in syntax to the CREATE VIEW statement except for the first word. The ALTER VIEW statement replaces the entire contents of the CREATE VIEW statement with the contents of the ALTER VIEW statement. Existing permissions on the view are maintained, and do not have to be reassigned. If a DROP VIEW followed by CREATE VIEW is used, instead of ALTER VIEW, permissions on the view would have to be reassigned.

Note If SELECT * is used in a view definition and a table referenced by the SELECT * is altered, then you must run ALTER VIEW <viewname> RECOMPILE to ensure that the view definition is correct and to prevent unexpected results when querying the view.

Side Effects

Automatic commit.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must be owner of the view or have DBA authority.

See also

- CREATE VIEW statement on page 446
- DROP statement on page 466

BACKUP statement

Description

Backs up an Sybase IQ database on one or more archive devices.

Syntax

BACKUP DATABASE
... [**CRC** { **ON** | **OFF** }]
... [**ATTENDED** { **ON** | **OFF** }]
... [**BLOCK FACTOR** *integer*]

... [{ **FULL** | **INCREMENTAL** | **INCREMENTAL SINCE FULL** }]
... [{ **VIRTUAL DECOUPLED** |
VIRTUAL ENCAPSULATED *'shell_command'* }]
...**TO** *archive_device* [**SIZE** *integer*] [**STACKER** *integer*] ...
... [**WITH COMMENT** *string*]

Examples

- The following UNIX example backs up the asiqdemo database onto tape devices */dev/rmt/0* and */dev/rmt/2* on a Sun Solaris platform. On Solaris, the letter *n* after the device name specifies the "no rewind on close" feature. Always specify this feature with BACKUP, using the naming convention appropriate for your UNIX platform (Windows does not support this feature). This example backs up all changes to the database since the last full backup.

  ```
  BACKUP DATABASE
  INCREMENTAL SINCE FULL
  TO '/dev/rmt/0n' SIZE 10000000
  TO '/dev/rmt/2n' SIZE 15000000
  ```

Note SIZE units are kilobytes (KB). In this example, the specified sizes are 10GB and 15GB.

Usage

The IQ database may be open for use by many readers and writers when you execute a BACKUP command. It will act as a read-only user and will rely on the Table Level Versioning feature of Sybase IQ to achieve a consistent set of data. BACKUP implicitly issues a CHECKPOINT prior to commencing, and then it backs up the catalog tables that describe the database (and any other tables you have added to the Catalog Store). During this first phase, Sybase IQ does not allow any metadata changes to the database (such as adding or dropping columns and tables). Correspondingly, a later RESTORE of the backup will only restore up to that initial CHECKPOINT.

The BACKUP command allows you to specify full or incremental backups. You can choose two kinds of incremental backups. INCREMENTAL will only backup those blocks that have changed and committed since the last BACKUP of any type (incremental or full). INCREMENTAL SINCE FULL will backup all of the blocks that have changed since the last full backup. The first type of incremental backup can be smaller and faster to do for BACKUP commands, but slower and more complicated for RESTORE commands. The opposite is true for the other type of incremental backup. The reason is that the first type generally results in *N* sets of incremental backup archives for each full backup archive. If a restore is required, the DBA will first RESTORE the full backup archive and then each incremental archive in the proper order. (Sybase IQ keeps track of which ones are needed.) The second type will require the DBA to restore only the full backup archive and the last incremental archive.

Incremental virtual backup is supported using the VIRTUAL DECOUPLED and VIRTUAL ENCAPSULATED parameters of the BACKUP statement.

CRC clause Activates 32–bit cyclical redundancy checking on a per block basis (in addition to whatever error detection is available in the hardware). When you specify this clause, the numbers computed on backup are verified during any subsequent RESTORE operation, affecting performance of both commands. The default is ON.

ATTENDED clause This clause applies only when backing up to a tape device. If ATTENDED ON (the default) is used, a message is sent to the application that issued the BACKUP statement if the tape drive requires intervention. This may happen, for example, when a new tape is required. If you specify OFF, BACKUP does not prompt for new tapes. If additional tapes are needed and OFF has been specified, Sybase IQ gives an error and aborts the BACKUP command. However, a short delay is included to account for the time an automatic stacker drive will require to switch tapes.

BLOCK FACTOR clause Specifies the number of blocks to write at one time. Its value must be greater than 0 or Sybase IQ generates an error message. Its default is 25 for UNIX systems and 15 for Windows systems (to accommodate the smaller fixed tape block sizes). This clause effectively controls the amount of memory used for buffers. The actual amount of memory is this value times the block size times the number of threads used to extract data from the database. Sybase recommends setting BLOCK FACTOR to at least 25.

FULL clause Specifies a full backup; all blocks in use in the database are saved to the archive device(s). This is the default action.

INCREMENTAL clause Specifies an incremental backup; all blocks changed since the last backup of any kind are saved to the archive device(s).

INCREMENTAL SINCE FULL clause Specifies an incremental backup; all blocks changed since the last FULL backup are saved to the archive device(s).

VIRTUAL DECOUPLED clause Specifies a decoupled virtual backup. For the backup to be complete, you must copy the IQ dbspaces after the decoupled virtual backup finishes and then perform a non-virtual incremental backup.

VIRTUAL ENCAPSULATED clause Specifies an encapsulated virtual backup. The *'shell-command'* argument can be a string or variable containing a string that is executed as part of the encapsulated virtual backup. The shell commands execute a system-level backup of the IQ Store as part of the backup operation.

TO clause Specifies the name of the *archive_device* to be used for backup, delimited with single quotation marks. The *archive_device* is a file name or tape drive device name for the archive file. If you are using multiple archive devices, specify them using separate TO clauses. (A comma-separated list is not allowed.) Archive devices must be distinct. The number of TO clauses determines the amount of parallelism Sybase IQ attempts with regard to output devices.

BACKUP overwrites existing archive files unless you move the old files or use a different *archive_device* name or path.

The backup API DLL implementation allows you to specify arguments to pass to the DLL when opening an archive device. For third party implementations, the *archive_device* string has the following format:

```
'DLLidentifier::vendor_specific_information'
```

A specific example is:

```
'spsc::workorder=12;volname=ASD002'
```

The *archive_device* string length can be up to 1023 bytes. The *DLLidentifier* portion must be 1 to 30 bytes in length and can only contain alphanumeric and underscore characters. The *vendor_specific_information* portion of the string is passed to the third party implementation without checking its contents. Do not specify the SIZE or STACKER clauses of the BACKUP command when using third party implementations, as that information should be encoded in the *vendor_specific_information* portion of the string.

Note Only certain third party products are certified with Sybase IQ using this syntax. See the *Sybase IQ Release Bulletin* for additional usage instructions or restrictions. Before using any third party product to back up your IQ database in this way, make sure it is certified. See the *Sybase IQ Release Bulletin*, or see the Sybase Certification Reports for the Sybase IQ product in Technical Documents at http://www.sybase.com/support/techdocs/.

For the Sybase implementation of the backup API, you do not have to specify this other information, just the tape device name or filename. For disk devices, you should also specify the SIZE value or Sybase IQ assumes that each created disk file will be no larger than 2GB on UNIX, or 1.5 GB on Windows. An example of an archive device for the Sybase API DLL that specifies a tape device for certain UNIX systems is:

```
'/dev/rmt/0'
```

SIZE clause Specifies maximum tape or file capacity per output device (some platforms do not reliably detect end-of-tape markers). No volume used on the corresponding device should be shorter than this value. This value applies to both tape and disk files but not third party devices. Units are kilobytes (KB) so, for example, for a 3.5GB tape you specify 3500000. Defaults are by platform and medium.

The SIZE parameter is per output device. SIZE does not limit the number of bytes per device; SIZE limits the file size. Each output device can have a different SIZE parameter. During backup, when the amount of information written to a given device reaches the value specified by the SIZE parameter, BACKUP does one of the following:

- If the device is a file system device, then BACKUP closes the current file and creates another file of the same name, with the next ascending number appended to the filename, for example, *bkup1.dat1.1*, *bkup1.dat1.2*, *bkup1.dat1.3*.
- If the device is a tape unit, then BACKUP closes the current tape and you need to mount another tape.

It is your responsibility to mount additional tapes if needed, or to ensure that the disk has enough space to accommodate the backup.

When multiple devices are specified, BACKUP distributes the information across all devices.

Table 6-1: BACKUP default sizes

Platform	Default SIZE for tape	Default SIZE for disk
UNIX	none	2GB
Windows	1.5GB **Note** SIZE must be a multiple of 64. Other values are rounded down to a multiple of 64.	1.5GB

STACKER clause Specifies that the device is automatically loaded, and specifies the number of tapes it is loaded with. This value is not the tape position in the stacker, which could be zero. When ATTENDED is OFF and STACKER is ON, Sybase IQ waits for a pre-determined amount of time to allow the next tape to be autoloaded. The number of tapes supplied along with the SIZE clause will be used to determine whether there is enough space to store the backed up data. Do not use this clause with third party media management devices.

WITH COMMENT clause Specifies an optional comment recorded in the archive file and in the backup history file. Maximum length is up to 32KB. If you do not specify a value, a NULL string is stored.

Other issues for BACKUP are these:

- BACKUP does not support raw devices as archival devices.

- Windows systems only support fixed-length I/O operations to tape devices (for more information about this limitation, see your *Sybase IQ Installation and Configuration Guide*). While Windows supports tape partitioning, Sybase IQ does not use it, so do not use another application to format tapes for BACKUP. Windows has a simpler naming strategy for its tape devices, where the first tape device is \\.*tape0*, the second is \\.*tape1*, and so on.

  Warning! For backup (and for most other situations) Sybase IQ treats the leading backslash in a string as an escape character, when the backslash precedes an n, an x, or another backslash. For this reason, when you specify backup tape devices you must double each backslash required by the Windows naming convention. For example, indicate the first Windows tape device you are backing up to as '\\\\.*tape0*', the second as '\\\\.*tape1*', and so on. If you omit the extra backslashes, or otherwise misspell a tape device name, and write a name that is not a valid tape device on your system, Sybase IQ interprets this name as a disk file name.

- Sybase IQ does not rewind tapes before using them. You must ensure the tapes used for BACKUP or RESTORE are at the correct starting point before putting them in the tape device. It does rewind tapes after using them on rewinding devices.
- During BACKUP and RESTORE operations, if Sybase IQ cannot open the archive device (for example, when it needs the media loaded) and the ATTENDED parameter is ON, it waits for ten seconds and tries again. It will continue these attempts indefinitely until either it is successful or the operation is terminated with a Ctrl-C.
- If you enter a Ctrl-C, BACKUP will fail and return the database to the state it was in before the backup started.
- If disk striping is used, such as on a RAID device, the striped disks are treated as a single device.
- If you are recovering an Adaptive Server Anywhere database, see Backup and Data Recovery in *Adaptive Server Anywhere Database Administration Guide* for additional options.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions — Must be the owner of the database or have DBA authority.

See also — RESTORE statement

Chapter 14, “Backup and Data Recovery” in *Sybase IQ System Administration Guide*

BEGIN... END statement

Description — Groups SQL statements together.

Syntax

[*statement-label* :]
... **BEGIN** [[**NOT**] **ATOMIC**]
... [*local-declaration* ; ...]
... *statement-list*
... [**EXCEPTION** [*exception-case* ...]]
... **END** [*statement-label*]

Parameters

local-declaration:
{ *variable-declaration*
| *cursor-declaration*
| *exception-declaration*
| *temporary-table-declaration* }

variable-declaration:
DECLARE *variable-name data-type*

exception-declaration:
DECLARE *exception-name* EXCEPTION
FOR
SQLSTATE [VALUE] *string*

exception-case:
WHEN *exception-name* [, ...] THEN *statement-list*
| WHEN OTHERS THEN *statement-list*

Examples

- The body of a procedure is a compound statement.

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35),
OUT TopValue INT)
BEGIN
    DECLARE err_notfound EXCEPTION FOR
       SQLSTATE '02000' ;
    DECLARE curThisCust CURSOR FOR
       SELECT company_name, CAST(
              sum(sales_order_items.quantity *
```

```
            product.unit_price) AS INTEGER) VALUE
      FROM customer
            LEFT OUTER JOIN sales_order
            LEFT OUTER JOIN sales_order_items
            LEFT OUTER JOIN product
      GROUP BY company_name ;
   DECLARE ThisValue INT ;
   DECLARE ThisCompany CHAR(35) ;
   SET TopValue = 0 ;
   OPEN curThisCust ;


   CustomerLoop:
   LOOP
      FETCH NEXT curThisCust
         INTO ThisCompany, ThisValue ;
      IF SQLSTATE = err_notfound THEN
         LEAVE CustomerLoop ;
      END IF ;
      IF ThisValue > TopValue THEN
         SET TopValue = ThisValue ;
         SET TopCompany = ThisCompany ;
      END IF ;
   END LOOP CustomerLoop ;


CLOSE curThisCust ;
END
```

Usage

The body of a procedure or trigger is a **compound statement**. Compound statements can also be used in control statements within a procedure or trigger.

A compound statement allows one or more SQL statements to be grouped together and treated as a unit. A compound statement starts with the keyword BEGIN and ends with the keyword END. Immediately following the BEGIN, a compound statement can have local declarations that only exist within the compound statement. A compound statement can have a local declaration for a variable, a cursor, a temporary table, or an exception. Local declarations can be referenced by any statement in that compound statement, or in any compound statement nested within it. Local declarations are not visible to other procedures that are called from within a compound statement.

If the ending *statement-label* is specified, it must match the beginning *statement-label*. The LEAVE statement can be used to resume execution at the first statement after the compound statement. The compound statement that is the body of a procedure has an implicit label that is the same as the name of the procedure or trigger.

For a complete description of compound statements and exception handling, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Supported by Adaptive Server Enterprise. This does not mean that all statements inside a compound statement are supported.

  The BEGIN and END keywords are not required in Transact-SQL.

  BEGIN and END are used in Transact-SQL to group a set of statements into a single compound statement, so that control statements such as IF ... ELSE, which only affect the performance of a single SQL statement, can affect the performance of the whole group. The ATOMIC keyword is not supported by Adaptive Server Enterprise.

  In Transact-SQL. DECLARE statements need not immediately follow a BEGIN keyword, and the cursor or variable that is declared exists for the duration of the compound statement. You should declare variables at the beginning of the compound statement for compatibility.

Permissions

None.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- DECLARE LOCAL TEMPORARY TABLE statement
- LEAVE statement
- SIGNAL statement
- RESIGNAL statement

BEGIN PARALLEL IQ ... END PARALLEL IQ statement

Description

Groups CREATE INDEX statements together for execution at the same time.

Syntax
... **BEGIN PARALLEL IQ**
statement-list
... **END PARALLEL IQ**

Parameters
statement-list
a list of CREATE INDEX statements

Examples
- The following statement executes atomically. If one command fails, the entire statement rolls back.

```
BEGIN PARALLEL IQ
       CREATE HG INDEX c1_HG on table1 (col1);
       CREATE HNG INDEX c12_HNG on table1 (col12);
       CREATE LF INDEX c1_LF on table1 (col1);
       CREATE HNG INDEX c2_HNG on table1 (col2);
END PARALLEL IQ
```

Usage
This statement allows you to execute a group of CREATE INDEX statements as though they are a single DDL statement, creating indexes on multiple IQ tables at the same time. While this statement is executing, you and other users cannot issue other DDL statements.

You can specify multiple tables within the statement list. Granularity is at the column level. In other words, multiple indexes on the same column are executed serially.

Side effects

None.

Standards
- **SQL/92** Not supported.
- **Sybase** Not supported by Adaptive Server Enterprise. For support of statements inside the statement, see CREATE INDEX statement.

Permissions
None.

See also
CREATE INDEX statement

BEGIN TRANSACTION statement

Description
Starts a user-defined transaction.

Syntax
BEGIN TRAN[**SACTION**] [*transaction-name*]

Examples
Example 1 This example illustrates the effect of a BEGIN TRANSACTION statement on the snapshot version of a table.

In the first case, assume that table t1 contains no data. Two connections, Conn1 and Conn2, are made at the same time. The following is a timeline of the commands executed within the two connections:

Table 6-2: Example 1a: first case command timeline

Conn1	Conn2
`CONNECT`	`CONNECT`
`INSERT t1 VALUES(1)` (an implicit begin transaction)	…
`COMMIT`	…
…	`SELECT * FROM t1` (an implicit begin transaction)
	Data returned from table t1: 1

In the first case, user Conn2 issues a SELECT statement after user Conn1 issues a COMMIT. Since the SELECT of Conn2 is the first command executed following the connect, a transaction begins at this time and a snapshot is taken of table t1 after t1 contains data. User Conn2 can see the updated table.

In the second case, assume again that table t1 contains no data. Two connections, Conn1 and Conn2, are made at the same time. The commands executed by the two users are in the following timeline:

Table 6-3: Example 1b: second case command timeline

Conn1	Conn2
`CONNECT`	`CONNECT`
…	`BEGIN TRANSACTION`
`INSERT t1 VALUES(1)` (an implicit begin transaction)	…
`COMMIT`	…
…	`SELECT * FROM t1`
	No data returned from table t1

In the second case, user Conn2 issues a BEGIN TRANSACTION statement after connecting and IQ takes a snapshot of table t1 before user Conn1 inserts any data. Even though Conn2 issues a SELECT after Conn1 has committed the inserted data, Conn2 still has a snapshot of t1*before* the data was inserted. In this case, Conn2 cannot see the updated table and the SELECT returns no data. Until the current transaction of user Conn2 ends, the image of table t1 remains unchanged to user Conn2.

Example 2 The following batch reports successive values of @@trancount as 0, 1, 2, 1, 0. The values are printed on the server window.

```
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
```

See the “Usage” section for more information on the @@trancount global variable.

Usage

The optional parameter *transaction-name* is the name assigned to this transaction. It must be a valid identifier. Use transaction names only on the outermost pair of nested BEGIN/COMMIT or BEGIN/ROLLBACK statements.

BEGIN TRANSACTION creates a transaction for the current connection, if the connection does not currently have a transaction. When a transaction starts, it selects the snapshot version that is used until the next commit or rollback.

Note that a transaction automatically starts at the start of the first command following a connect, commit, or rollback, if there is no explicit BEGIN TRANSACTION.

When executed inside a transaction, the BEGIN TRANSACTION statement increases the nesting level of transactions by one. The nesting level is decreased by a COMMIT statement. When transactions are nested, only the outermost COMMIT makes the changes to the database permanent.

Chained and unchained modes

Adaptive Server Enterprise and Sybase IQ have two transaction modes.

The default Adaptive Server Enterprise transaction mode, called **unchained mode**, commits each statement individually, unless an explicit BEGIN TRANSACTION statement is executed to start a transaction. In contrast, the ISO SQL/92 compatible **chained mode** only commits a transaction when an explicit COMMIT is executed or when a statement that carries out an autocommit (such as data definition statements) is executed.

You can control the mode by setting the CHAINED database option. The default setting for ODBC and Embedded SQL connections in Sybase IQ is ON, in which case IQ runs in chained mode. (ODBC users should also check the AutoCommit ODBC setting.) The default for TDS connections is OFF.

You cannot alter the CHAINED option within a transaction.

Warning! When calling a stored procedure, you should ensure that it operates correctly under the required transaction mode.

For more information about the CHAINED option and the chained mode, see “CHAINED option [TSQL]” on page 41.

The current nesting level is held in the global variable @@trancount. The @@trancount variable has a value of zero before a BEGIN TRANSACTION statement is executed, and only a COMMIT executed when @@trancount is equal to one makes changes to the database permanent.

A ROLLBACK statement without a transaction or savepoint name always rolls back statements to the outermost BEGIN TRANSACTION (explicit or implicit) statement, and cancels the entire transaction.

@@trancount values in Adaptive Server Enterprise and IQ

You should not rely on the value of @@trancount for more than keeping track of the number of explicit BEGIN TRANSACTION statements that have been issued.

When Adaptive Server Enterprise starts a transaction implicitly, the @@trancount variable is set to 1. Sybase IQ does not set the @@trancount value to 1 when a transaction is started implicitly. Consequently, the IQ @@trancount variable has a value of zero before any BEGIN TRANSACTION statement (even though there is a current transaction), while in Adaptive Server Enterprise (in chained mode) @@trancount has a value of 1.

For transactions starting with a BEGIN TRANSACTION statement, @@trancount has a value of 1 in both Sybase IQ and Adaptive Server Enterprise after the BEGIN TRANSACTION statement. If a transaction is started implicitly with a different statement, and a BEGIN TRANSACTION statement is then executed, @@trancount has a value of 2 in both Sybase IQ and Adaptive Server Enterprise after the BEGIN TRANSACTION statement.

Side effects

None.

Standards

- **SQL/92** Vendor extension
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

None.

See also

- COMMIT statement on page 374
- "ISOLATION_LEVEL option" on page 73
- ROLLBACK statement
- SAVEPOINT statement

CALL statement

Description

Invokes a procedure.

Syntax

Syntax 1

[*variable* =] **CALL** *procedure-name* ([*expression*] [, ...])

Syntax 2

[*variable* =] **CALL** *procedure-name* ([*parameter-name* = *expression*] [, ...])

Examples

- Call the sp_customer_list procedure. This procedure has no parameters, and returns a result set.

```
CALL sp_customer_list()
```

- The following DBISQL example creates a procedure to return the number of orders placed by the customer whose ID is supplied, creates a variable to hold the result, calls the procedure, and displays the result.

```
CREATE PROCEDURE OrderCount (IN customer_ID INT, OUT
Orders INT)
BEGIN
SELECT COUNT("DBA".sales_order.id)
INTO Orders
FROM "DBA".customer
KEY LEFT OUTER JOIN "DBA".sales_order
WHERE "DBA".customer.id = customer_ID ;
END
go
-- Create a variable to hold the result
CREATE VARIABLE Orders INT
go

-- Call the procedure, FOR customer 101
-- ----------------------------
CALL OrderCount ( 101, Orders)
go
-------------------------------
--  Display the result
SELECT Orders FROM DUMMY
go
```

Usage

The CALL statement invokes a procedure that has been previously created with a CREATE PROCEDURE statement. When the procedure completes, any INOUT or OUT parameter values will be copied back.

The argument list can be specified by position or by using keyword format. By position, the arguments will match up with the corresponding parameter in the parameter list for the procedure. By keyword, the arguments are matched up with the named parameters.

Procedure arguments can be assigned default values in the CREATE PROCEDURE statement, and missing parameters are assigned the default value, or, if no default is set, NULL.

Inside a procedure, a CALL statement can be used in a DECLARE statement when the procedure returns result sets (see Chapter 8, “Using Procedures and Batches” in the *Sybase IQ System Administration Guide*).

Procedures can return an integer value (as a status indicator, say) using the RETURN statement. You can save this return value in a variable using the equality sign as an assignment operator:

```
CREATE VARIABLE returnval INT ;
returnval = CALL proc_integer ( arg1 = val1, ... )
```

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported by Adaptive Server Enterprise. For an alternative that is supported, see the EXECUTE statement [ESQL].

Permissions

Must be the owner of the procedure, have EXECUTE permission for the procedure, or have DBA authority.

See also

- CREATE PROCEDURE statement
- GRANT statement

CASE statement

Description

Selects execution path based on multiple cases.

Syntax

CASE *value-expression*
... **WHEN** [*constant* | **NULL**] **THEN** *statement-list* ...
... [**WHEN** [*constant* | **NULL**] **THEN** *statement-list*] ...
... **ELSE** *statement-list*
... **END CASE**

Examples

The following procedure using a CASE statement classifies the products listed in the product table of the sample database into one of shirt, hat, shorts, or unknown.

```
CREATE PROCEDURE ProductType (IN product_id INT, OUT
type CHAR(10))
    BEGIN
    DECLARE prod_name CHAR(20) ;
    SELECT name INTO prod_name FROM "DBA"."product"
    WHERE id = product_id;
    CASE prod_name
    WHEN 'Tee Shirt' THEN
       SET type = 'Shirt'
    WHEN 'Sweatshirt' THEN
       SET type = 'Shirt'
    WHEN 'Baseball Cap' THEN
       SET type = 'Hat'
    WHEN 'Visor' THEN
```

```
        SET type = 'Hat'
    WHEN 'Shorts' THEN
        SET type = 'Shorts'
    ELSE
        SET type = 'UNKNOWN'
    END CASE ;
    END
```

Usage

The CASE statement is a control statement that allows you to choose a list of SQL statements to execute based on the value of an expression. If a WHEN clause exists for the value of *value-expression*, the *statement-list* in the WHEN clause is executed. If no appropriate WHEN clause exists, and an ELSE clause exists, the *statement-list* in the ELSE clause is executed. Execution resumes at the first statement after the END CASE.

Note The ANSI standard allows two forms of CASE statements. While Sybase IQ allows both forms, when CASE is in the predicate, for best performance you must use the form shown here.

If you require the other form (also called ANSI syntax) for compatibility with Adaptive Server Anywhere, see CASE statement Syntax 2 in *Adaptive Server Anywhere SQL Reference*.

CASE statement is different from CASE expression
Do not confuse the syntax of the CASE statement with that of the CASE expression.

For information on the CASE expression, see “Expressions” on page 153.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

None.

See also

BEGIN... END statement

CHECKPOINT statement

Description: Checkpoints the database.

Syntax: **CHECKPOINT**

Usage: The CHECKPOINT statement forces the database server to execute a checkpoint. Checkpoints are also performed automatically by the database server according to an internal algorithm. Applications do not normally need to issue the CHECKPOINT statement. For a full description of checkpoints, see Chapter 14, "Backup and Data Recovery" in the *Sybase IQ System Administration Guide*.

Side effects

None.

Standards:
- **SQL/92** Vendor extension
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions: Must have DBA authority to checkpoint the network database server. No permissions are required to checkpoint the personal database server.

CLEAR statement [DBISQL]

Description: Clears the Interactive SQL (DBISQL) data window.

Syntax: **CLEAR**

Usage: The CLEAR statement is used to clear the DBISQL main window.

Side effects

Closes the cursor associated with the data being cleared.

Standards:
- **SQL/92** Vendor extension
- **Sybase** Not applicable

Permissions: None.

See also: EXIT statement [DBISQL]

CLOSE statement [ESQL] [SP]

Description

Closes a cursor.

Syntax

CLOSE *cursor-name*

Parameters

cursor-name:
{ *identifier* | *host-variable* }

Examples

- The following examples close cursors in Embedded SQL.

```
EXEC SQL CLOSE employee_cursor;
EXEC SQL CLOSE :cursor_var;
```

- The following procedure uses a cursor.

```
CREATE PROCEDURE TopCustomer (OUT TopCompany
CHAR(35), OUT TopValue INT)
BEGIN
DECLARE err_notfound EXCEPTION
   FOR SQLSTATE '02000' ;
DECLARE curThisCust CURSOR FOR
SELECT company_name, CAST(
sum(sales_order_items.quantity *
product.unit_price) AS INTEGER) VALUE
FROM customer
LEFT OUTER JOIN sales_order
LEFT OUTER JOIN sales_order_items
LEFT OUTER JOIN product
GROUP BY company_name ;


DECLARE ThisValue INT ;
DECLARE ThisCompany CHAR(35) ;
SET TopValue = 0 ;
OPEN curThisCust ;
CustomerLoop:
LOOP
   FETCH NEXT curThisCust
   INTO ThisCompany, ThisValue ;
      IF SQLSTATE = err_notfound THEN
         LEAVE CustomerLoop ;
      END IF ;
      IF ThisValue > TopValue THEN
         SET TopValue = ThisValue ;
         SET TopCompany = ThisCompany ;
      END IF ;
```

```
        END LOOP CustomerLoop ;
    CLOSE curThisCust ;
    END
```

Usage

This statement closes the named cursor.

Side effects

None.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

The cursor must have been previously opened.

See also

- OPEN statement [ESQL] [SP]
- DECLARE CURSOR statement [ESQL] [SP]
- PREPARE statement [ESQL]

COMMENT statement

Description

Stores a comment in the system tables for a database object.

Syntax

COMMENT ON
{ **COLUMN** [*owner*.]*table-name*.*column-name*
| **EVENT** *event-name*
| **FOREIGN KEY** [*owner*.]*table-name*.*role-name*
| **INDEX** [[*owner*.]*table*.]*index-name*
| **JAVA CLASS** *java-class-name*
|**JAVA JAR** *java-jar-name*
| **LOGIN** *integrated_login_id*
| **PROCEDURE** [*owner*.]*procedure-name*
| **SERVICE** *web-service-name*
| **TABLE** [*owner*.]*table-name*
| **USER** *userid*
| **VIEW** [*owner*.]*view-name* }
IS *comment*

Parameters

comment:
{ *string* | NULL }

Examples

The following examples show how to add and remove a comment.

- Add a comment to the employee table.

```
COMMENT
ON TABLE employee
```

```
IS "Employee information"
```

- Remove the comment from the employee table.

```
COMMENT
ON TABLE employee
IS NULL
```

Usage

Several system tables have a column named Remarks that allows you to associate a comment with a database item:

Table 6-4: System tables with Remarks column

SYSCOLUMN	SYSLOGIN
SYSEVENT	SYSPROCEDURE
SYSFOREIGNKEY	SYSPROCPARM
SYSINDEX	SYSPUBLICATION
SYSIQJOININDEX	SYSREMOTETYPE
SYSJAR	SYSTABLE
SYSJARCOMPONENT	SYSUSERPERM
SYSJAVACLASS	

The COMMENT ON statement allows you to set the Remarks column in these system tables. A comment can be removed by setting it to NULL.

Side effects

Automatic commit.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must either be the owner of the database object being commented, or have DBA authority.

COMMIT statement

Description

Makes changes to the database permanent, or terminates a user-defined transaction.

Syntax

Syntax 1

COMMIT [**WORK**]

Syntax 2

COMMIT TRAN[**SACTION**] [*transaction-name*]

Examples

- The following statement commits the current transaction:

```
COMMIT
```

- The following Transact-SQL batch reports successive values of @@trancount as 0, 1, 2, 1, 0.

```
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
go
```

Usage

Syntax 1 The COMMIT statement ends a transaction and makes all changes made during this transaction permanent in the database.

Data definition statements all carry out a commit automatically. For information, see the Side effects listing for each SQL statement.

The COMMIT statement fails if the database server detects any invalid foreign keys. This makes it impossible to end a transaction with any invalid foreign keys. Usually, foreign key integrity is checked on each data manipulation operation. However, if the database option WAIT_FOR_COMMIT is set ON or a particular foreign key was defined with a CHECK ON COMMIT clause, the database server delays integrity checking until the COMMIT statement is executed.

Syntax 2 You can use BEGIN TRANSACTION and COMMIT TRANSACTION statements in pairs to construct **nested transactions**. Nested transactions are similar to **savepoints**. When executed as the outermost of a set of nested transactions, the statement makes changes to the database permanent. When executed inside a transaction, the COMMIT TRANSACTION statement decreases the nesting level of transactions by one. When transactions are nested, only the outermost COMMIT makes the changes to the database permanent.

The optional parameter *transaction-name* is the name assigned to this transaction. It must be a valid identifier. You should use transaction names only on the outermost pair of nested BEGIN/COMMIT or BEGIN/ROLLBACK statements.

You can use a set of options to control the detailed behavior of the COMMIT statement. For information, see “COOPERATIVE_COMMIT_TIMEOUT option” on page 45, “COOPERATIVE_COMMITS option” on page 45, “DELAYED_COMMITS option” on page 55, and “DELAYED_COMMIT_TIMEOUT option” on page 55. You can use the Commit connection property to return the number of Commits on the current connection.

Side effects

Closes all cursors except those opened WITH HOLD.

Deletes all rows of declared temporary tables on this connection, unless they were declared using ON COMMIT PRESERVE ROWS.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Adaptive Server Enterprise. Syntax 2 is a T-SQL extension.

Permissions

Must be connected to the database.

See also

- BEGIN TRANSACTION statement
- ROLLBACK statement
- CONNECT statement [ESQL] [DBISQL]
- SAVEPOINT statement
- SET CONNECTION statement [DBISQL] [ESQL]
- DISCONNECT statement [DBISQL]

CONFIGURE statement [DBISQL]

Description

Activates the DBISQL configuration window.

Syntax

CONFIGURE

Usage

The CONFIGURE statement activates the DBISQL configuration window. This window displays the current settings of all DBISQL options. It does not display or allow you to modify database options.

If you select Permanent, the options are written to the SYSOPTION table in the database and the database server performs an automatic COMMIT. If you do not choose Permanent, and instead click OK, the options are set temporarily and remain in effect for the current database connection only.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

None.

See also

SET OPTION statement

CONNECT statement [ESQL] [DBISQL]

Description

Establishes a connection to a database.

Syntax

Syntax 1

CONNECT
... [**TO** *engine-name*]
... [**DATABASE** *database-name*]
... [**AS** *connection-name*]
... [**USER**] *userid* [**IDENTIFIED BY** *password*]

Syntax 2

CONNECT USING *connect-string*

Parameters

engine-name:
identifier, string or host-variable

database-name:
identifier, string or host-variable

connection-name:
identifier, string or host-variable

userid:
identifier, string or host-variable

password:
identifier, string or host-variable

connect-string:
a valid connection string or host-variable

Examples

- The following are examples of CONNECT usage within Embedded SQL.

```
EXEC SQL CONNECT AS :conn_name
USER :userid IDENTIFIED BY :password;
EXEC SQL CONNECT USER "dba" IDENTIFIED BY "SQL";
```

- The following are examples of CONNECT usage from DBISQL.
  - Connect to a database from DBISQL. It prompts for a user ID and a password.

```
CONNECT
```

- Connect to the default database as DBA, from DBISQL. It will prompt for a password.

```
CONNECT USER "DBA"
```

- Connect to the sample database as the DBA, from DBISQL.

```
CONNECT
TO asiqdemo
USER "DBA"
IDENTIFIED BY SQL
```

- Connect to the sample database using a connect string, from DBISQL.

```
CONNECT
USING 'UID=DBA;PWD=SQL;DBN=asiqdemo'
```

Usage

The CONNECT statement establishes a connection to the database identified by *database-name* running on the server identified by *engine-name*.

Embedded SQL behavior In Embedded SQL, if no *engine-name* is specified, the default local database server will be assumed (the first database server started). If a local database server is not running and the Anywhere Client (DBCLIENT) is running, the default server will be assumed (the server name specified when the client was started). If no *database-name* is specified, the first database on the given server will be assumed.

The WHENEVER statement, SET SQLCA and some DECLARE statements do not generate code and thus may appear before the CONNECT statement in the source file. Otherwise, no statements are allowed until a successful CONNECT statement has been executed.

The user ID and password are used for permission checks on all dynamic SQL statements. By default, the password is case sensitive; the user ID is not.

For a detailed description of the connection algorithm, see "How Sybase IQ makes connections" in Chapter 3, "Sybase IQ Connections" of the *Sybase IQ System Administration Guide*.

DBISQL behavior If no database or server is specified in the CONNECT statement, DBISQL remains connected to the current database, rather than to the default server and database. If a database name is specified without a server name, DBISQL attempts to connect to the specified database on the current server. (Note that you must specify the database name defined in the -n database switch, not the database file name.) If a server name is specified without a database name, DBISQL connects to the default database on the specified server. For example, if the following batch is executed while connected to a database, the two tables are created in the same database.

```
CREATE TABLE t1( c1 int );
CONNECT DBA IDENTIFIED BY SQL;
CREATE TABLE t2 (c1 int );
```

No other database statements are allowed until a successful CONNECT statement has been executed.

The user ID and password are used for checking the permissions on SQL statements. If the password or the user ID and password are not specified, the user will be prompted to type the missing information. By default, the password is case sensitive; the user ID is not.

Multiple connections are managed through the concept of a current connection. After a successful connect statement, the new connection becomes the current one. To switch to a different connection, use the SET CONNECTION statement. Executing a CONNECT statement does not close the existing connection (if any). The DISCONNECT statement is used to drop connections.

Static SQL statements use the user ID and password specified with the *-l* option on the SQLPP statement line. If no *-l* option is given, then the user ID and password of the CONNECT statement are used for static SQL statements also.

Connecting with no password If you are connected to a user ID with DBA authority, you can connect to another user ID without specifying a password. (The output of dbtran requires this capability.) For example, if you are connected to a database from Interactive SQL as DBA, you can connect without a password with the statement:

```
CONNECT other_user_id
```

In Embedded SQL, you can connect without a password by using a host variable for the password and setting the value of the host variable to be the null pointer.

AS clause A connection can optionally be named by specifying the AS clause. This allows multiple connections to the same database, or multiple connections to the same or different database servers, all simultaneously. Each connection has its own associated transaction. You may even get locking conflicts between your transactions if, for example, you try to modify the same record in the same database from two different connections.

Syntax 2 A *connect-string* is a list of parameter settings of the form keyword=*value*, and must be enclosed in single quotes.

Side effects

None.

Standards

- **SQL/92** Syntax 1 is a full SQL feature; syntax 2 is a vendor extension.
- **Sybase** Open Client Embedded SQL supports a different syntax for the CONNECT statement.

Permissions

None.

See also

- GRANT statement
- DISCONNECT statement [DBISQL]
- SET CONNECTION statement [DBISQL] [ESQL]

CREATE DATABASE statement

Description

Creates a database. The database consists of several operating system files.

Syntax

CREATE DATABASE *db-name*
... [[**TRANSACTION**] { **LOG ON** [*log-file-name*]
[**MIRROR** *mirror-file-name*] }]
... [**CASE** { **RESPECT** | **IGNORE** }]
... [**PAGE SIZE** *page-size*]
... [**COLLATION** *collation-label*] [**ENCRYPTED**
ON | **OFF** | *key-spec*}] {... [**BLANK PADDING ON**]
]
... [**JAVA** { **ON** | **OFF** }]
... [**JCONNECT** { **ON** | **OFF** }]
... [**PASSWORD CASE** { **RESPECT** | **IGNORE** }]
... [**IQ PATH** *iq-file-name*]
... [**IQ SIZE** *iq-file-size*]
... [**IQ PAGE SIZE** *iq-page-size*]
... [**BLOCK SIZE** *block-size*]
... [**IQ RESERVE** *sizeMB*]
... [**TEMPORARY RESERVE** *sizeMB*]

... [**MESSAGE PATH** *message-file-name*]
... [**TEMPORARY PATH** *temp-file-name*]
.... [**TEMPORARY SIZE** *temp-db-size*]

Parameters

db-name | *log-file-name* | *mirror-file-name* | *iq-file-name* | *message-file-name* | *temp-file-name*:
'*file-name*'

page-size:
{ 4096 | 8192 | 16384 | 32768 }

iq-page-size:
{ 65536 | 131072 | 262144 | 524288 }

block-size:
{ 4096 | 8192 | 16384 | 32768 }

collation-label:
string

key-spec: [ON] KEY *key* [ALGORITHM 'AES']

Examples

- The following Windows example creates an IQ database named *mydb* with its corresponding *mydb.db*, *mydb.iq*, *mydb.iqtmp*, and *mydb.iqmsg* files in the *C:\s1\data* directory:

```
CREATE DATABASE 'C:\\s1\\data\\mydb'
BLANK PADDING ON
IQ PATH 'C:\\s1\\data'
IQ SIZE 2000
IQ PAGE SIZE 65536
```

- The following UNIX command creates an IQ database with raw devices for IQ PATH and TEMPORARY PATH. The default IQ page size of 128KB applies.

```
CREATE DATABASE '/s1/data/bigdb'
IQ PATH '/dev/md/rdsk/bigdb'
MESSAGE PATH '/s1/data'
TEMPORARY PATH '/dev/md/rdsk/bigtmp'
```

- The following UNIX example creates a strongly encrypted IQ database using the AES encryption algorithm with the key “is!seCret.”

```
CREATE DATABASE 'marvin.db'
JAVA OFF
BLANK PADDING ON
CASE RESPECT
COLLATION 'ISO_BINENG'
```

```
IQ PATH '/filesystem/marvin.main1'
IQ SIZE 6400
IQ PAGE SIZE 262144
TEMPORARY PATH '/filesystem/marvin.temp1'
TEMPORARY SIZE 3200
MESSAGE PATH '/filesystem/marvin.mess1'
ENCRYPTED ON KEY 'is!seCret' ALGORITHM 'AES'
```

Usage

Creates an IQ database with the supplied name and attributes. The IQ PATH clause is required for creating the IQ database. Otherwise, you will create a standard Adaptive Server Anywhere database. If you omit the IQ PATH option, specifying any of the following options will generate an error: IQ SIZE, IQ PAGE SIZE, BLOCK SIZE, MESSAGE PATH, TEMPORARY PATH, and TEMPORARY SIZE.

When Sybase IQ creates an IQ database, it automatically generates four database files to store different types of data that constitute an IQ database. Each file corresponds to a dbspace, the logical name by which Sybase IQ identifies database files. The files are:

- *db-name.db* is the file that holds the catalog dbspace, SYSTEM. It contains the system tables and stored procedures describing the database and any standard Anywhere database objects you add. If you do not include the *.db* extension, Sybase IQ will add it. This initial dbspace contains the Catalog Store, and you can later add dbspaces to increase its size. It cannot be created on a raw partition.
- *db-name.iq* is the default name of the file that holds the main data dbspace, IQ_SYSTEM_MAIN, containing the IQ tables and indexes. You can specify a different file name with the IQ PATH clause. This initial dbspace contains the IQ Store, and you can later add dbspaces to increase its size.
- *db-name.iqtmp* is the default name of the file that holds the initial temporary dbspace, IQ_SYSTEM_TEMP. It contains the temporary tables generated by certain queries. The required size of this file can vary depending on the type of query and amount of data. You can specify a different name using the TEMPORARY PATH clause. This initial dbspace contains the Temporary Store, and you can later add dbspaces to increase its size.
- *db-name.iqmsg* is the default name of the file that contains the messages trace dbspace, IQ_SYSTEM_MSG. You can specify a different file name using the MESSAGE PATH clause.

In addition to these files, an IQ database has a transaction log file (*db-name.log*) and may have a transaction log mirror file.

File names

The file names (*db-name*, *log-file-name*, *mirror-file-name*, *iq-file-name*, *message-file-name*, *temp-file-name*) are strings containing operating system file names. As literal strings, they must be enclosed in single quotes.

- In Windows, if you specify a path, any backslash characters (\) must be doubled if they are followed by an n or an x. This prevents them being interpreted as a newline character (\n) or as a hexadecimal number (\x), according to the rules for strings in SQL. It is safer to always double the backslash. For example:

```
CREATE DATABASE 'c:\\sybase\\mydb.db'
LOG ON 'e:\\logdrive\\mydb.log'
JCONNECT OFF
IQ PATH 'c:\\sybase\\mydb'
IQ SIZE 40
```

- If you specify no path, or a relative path:
  - The Catalog Store file (*db-name.db*) is created relative to the working directory of the server.
  - The IQ Store, Temporary Store, and message log files are created in the same directory as, or relative to, the Catalog Store.

Relative pathnames are recommended.

Warning! The database file, temporary dbspace, and transaction log file *must* be located on the same physical machine as the database server. Do not place database files and transaction log files on a network drive. The transaction log should be on a separate device from its mirror, however.

On UNIX systems you can create symbolic links, which are indirect pointers that contain the pathname of the file to which they point. You can use symbolic links as relative pathnames. There are several advantages to creating a symbolic link for the database filename:

- Symbolic links to raw devices can have meaningful names, while the actual device name syntax can be obscure.
- A symbolic name may eliminate problems restoring a database file that was moved to a new directory since it was backed up.
- In multiplex databases, symbolic links can be used to avoid device name conflicts among multiple servers when you use raw devices for IQ Temporary storage.

To create a symbolic link, use the ln -s command. For example:

```
ln -s /disk1/company/iqdata/company.iq company_iq_store
```

Once you create this link, you can specify the symbolic link in commands like CREATE DATABASE or RESTORE instead of the fully qualified pathname.

When you create a database or a dbspace, the path for every dbspace file must be unique. If your CREATE DATABASE command specifies the identical path and filename for these two stores, you receive an error.

Note Multiplex databases have a shared IQ Store, where they share all dbspaces, and a local IQ Store. The local IQ Store consists of dbspaces that are managed by only one query server and are not visible to any other query server. To create multiplex databases, use the Create Database and Create Query Server wizards in Sybase Central. See Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide* for more information.

You can cause a unique path in any of these ways:

- Specify a different extension for each file (for example, *mydb.iq* and *mydb.iqtmp*)
- Specify a different file name (for example, *mydb.iq* and *mytmp.iq*)
- Specify a different pathname (for example, */iqfiles/main/iq* and */iqfiles/temp/iq*) or different raw partitions
- Omit TEMPORARY PATH when you create the database. In this case, the temporary store is created in the same path as the Catalog Store, with the default name and extension *dbname.iqtmp* where *dbname* is the database name.

Warning! On UNIX platforms, to maintain database consistency you must be careful to specify filenames that are links to different files. IQ cannot detect the target where linked files point. Even if the filenames in the command differ, it is your responsibility to make sure they do not point to the same file.

Clauses and options of CREATE DATABASE:

TRANSACTION LOG clause The transaction log is a file where the database server logs all changes made to the database. The transaction log plays a key role in system recovery. If you do not specify any TRANSACTION LOG clause, or if you omit a path for the filename, it is placed in the same directory as the *.db* file. However, you should place it on a different physical device from the *.db* and *.iq*. It cannot be created on a raw partition.

MIRROR clause A transaction log mirror is an identical copy of a transaction log, usually maintained on a separate device, for greater protection of your data. By default, Sybase IQ does not use a mirrored transaction log. If you do wish to use a transaction log mirror, you must provide a filename. If you use a relative path, the transaction log mirror is created relative to the directory of the Catalog Store (*db-name.db*). Sybase recommends that you always create a mirror copy of the transaction log.

CASE clause For databases created with CASE RESPECT, all affected values are case sensitive in comparisons and string operations. Database object names such as columns, procedures, or user IDs, are unaffected. Dbspace names are case sensitive for databases created with CASE RESPECT. Password case sensitivity follows data sensitivity unless you specify the PASSWORD CASE clause of CREATE DATABASE.

Note When a database is created with CASE IGNORE, queries may return data in either upper or lower case, depending on the type of index the optimizer chose to use. You can return all upper case data in such a situation by using this command:

```
SET TEMPORARY OPTION AGGREGATION_PREFERENCE=-2
```

Alternatively, you can use the LOWER or UPPER functions on columns to display the column values in lower or upper case.

This option is provided for compatibility with the ISO/ANSI SQL standard. The default (RESPECT) is that all comparisons are case sensitive. CASE RESPECT provides better performance than CASE IGNORE.

Note All databases are created with at least one user ID:

```
DBA
```

and password:

SQL

If you create a database requiring case-sensitive comparisons, the password must be entered in uppercase, unless you specify PASSWORD CASE IGNORE. The user ID is unaffected by the CASE RESPECT setting.

PAGE SIZE clause The page size for the Anywhere segment of the database (containing the catalog tables) can be 4096, 8192, 16384, or 32768 bytes, with 4096 being the default. Other values for the size will be changed to the next larger size. Normally you should use the default, 4096 (4KB). Large databases may see performance benefits from a page size larger than this default. Smaller values may limit the number of columns your database can support. If you specify a page size smaller than 4096, IQ uses a page size of 4096.

When you start a database, its page size cannot be larger than the page size of the current server. The server page size is taken from the first set of databases started or is set on the server command line using the -gp command-line option.

Command line length for any statement is limited to the Catalog page size. The 4KB default is large enough in most cases; however, in a few cases a larger PAGE SIZE value is needed to accommodate very long commands, such as RESTORE commands that reference numerous dbspaces.

COLLATION clause The collation sequence used for all string comparisons in the database.The default collation sequence is ISO_BINENG, which provides the best performance. In ISO_BINENG, the collation order is the same as the order of characters in the ASCII character set. All uppercase letters precede all lowercase letters (for example, both 'A' and 'B' precede 'a').

For a list of available collation sequences, see “The CP874toUTF8 utility” in Chapter 3, “Database Administration Utilities” of the *Sybase IQ Utility Guide*.

Before creating a database with a non-default collation, or a custom collating sequence, be sure to see Chapter 11, “International Languages and Character Sets” in the *Sybase IQ System Administration Guide*.

ENCRYPTED clause Encryption makes the data stored in your physical database file unreadable. There are two levels of encryption:

- Simple encryption is equivalent to obfuscation. The data is unreadable, but someone with cryptographic expertise could decipher the data. Simple encryption is achieved by specifying the ENCRYPTED clause with no KEY clause.

- Strong encryption is achieved through the use of a 128-bit algorithm and a security key. The data is unreadable and virtually undecipherable without the key.

Encryption can only be specified during database creation. (To introduce encryption to an existing database requires a complete unload, database recreation, and reloading of all data.) To create a strongly encrypted database, specify the ENCRYPTED clause with the KEY clause. As with most passwords, it is best to choose a KEY value that cannot be easily guessed. We recommend that you choose a value for your KEY that is at least 16 characters long, contains a mix of upper and lower case, and includes numbers, letters and special characters.

You will require this key each time you start the database.

Using the ALGORITHM clause in conjunction with the ENCRYPTED and KEY clauses lets you specify the encryption algorithm. Currently, the only supported algorithm is AES. If the ENCRYPTED clause is used but no algorithm is specified, the default is AES. Encryption is OFF by default.

Warning! Protect your KEY! Be sure to store a copy of your key in a safe location. A lost KEY will result in a completely inaccessible database, from which there is no recovery.

BLANK PADDING clause By default, trailing blanks are ignored for comparison purposes (BLANK PADDING ON), and Embedded SQL programs pad strings fetched into character arrays. This option is provided for compatibility with the ISO/ANSI SQL standard.

For example, the two strings

```
'Smith'
'Smith   '
```

would be treated as equal in a database created with BLANK PADDING ON.

Note CREATE DATABASE no longer supports BLANK PADDING OFF for new databases. This change has no effect on existing databases. You can test the state of existing databases using the BlankPadding database property:

```
select db_property ( 'BlankPadding' )
```

Sybase recommends that you change any existing columns affected by BLANK PADDING OFF, to ensure correct join results. Recreate join columns as CHAR data type, rather than VARCHAR. CHAR columns are always blank padded.

JAVA clause If you wish to use Java in your database, you must install entries for the Sybase runtime Java classes into the catalog system tables. By default, these entries are installed. You can specify JAVA OFF if you are sure you will not be using Java to avoid installing these entries. Platforms that support JAVA ON will have the file "libdbjava7", with a platform-specific suffix, in the */lib* directory.

JCONNECT clause If you wish to use the Sybase jConnect JDBC driver to access system catalog information, you need to install jConnect support. Use this option if you wish to exclude the jConnect system objects (the default is ON). You can still use JDBC, as long as you do not access system information.

PASSWORD CASE clause You can specify whether passwords are case sensitive in the database. The case sensitivity of passwords does not have to be the same as the database's case sensitivity setting for string comparisons. If you do not specify the case sensitivity of passwords, passwords follow the case sensitivity of the database, which defaults to CASE RESPECT. Extended characters used in passwords (that is, characters above the first 128 in the code page) are case sensitive, regardless of the password case sensitivity setting.

IQ PATH clause The pathname of the main segment file containing the IQ data. You can specify an operating system file or a raw partition of an I/O device. (The *Sybase IQ Installation and Configuration Guide* for your platform describes the format for specifying a raw partition.) IQ automatically detects which type based on the pathname you specify. If you use a relative path, the file is created relative to the directory of the Catalog Store (the *.db* file).

IQ SIZE clause The size in MB of either the raw partition or the operating system file you specify with the IQ PATH clause. For raw partitions, you should always take the default, which allows IQ to use the entire raw partition; if you specify a value for IQ SIZE it must match the size of the I/O device or IQ returns an error. For operating system files, you can specify a value based on the size of your data, from the minimum in the table below up to a maximum of 128GB. The default for operating system files depends on IQ PAGE SIZE:

Table 6-5: Default and minimum sizes of IQ and Temporary Store files

IQ PAGE SIZE	*IQ SIZE default*	*TEMPORARY SIZE default*	*Minimum explicit IQ SIZE*	*Minimum explicit TEMPORARY SIZE*
65536	4096000	2048000	4MB	2MB
131072	8192000	4096000	8MB	4MB
262144	16384000	8192000	16MB	8MB
524288	32768000	16384000	32MB	16MB

IQ PAGE SIZE clause The page size in bytes for the IQ segment of the database (containing the IQ tables and indexes). The value must be a power of 2, from 65536 to 524288 bytes. The default is 131072 (128KB). Other values for the size will be changed to the next larger size. The IQ page size determines the default I/O transfer block size and maximum data compression for your database.

For the best performance, Sybase recommends the following minimum IQ page sizes:

- 64KB (IQ PAGE SIZE 65536) for databases whose largest table contains up to 1 billion rows, or a total size less than 8TB. This is the absolute minimum for a new database. On 32-bit platforms, a 64KB IQ page size gives the best performance.
- 128KB (IQ PAGE SIZE 131072) for databases on a 64-bit platform whose largest table contains more than 1 billion rows and fewer than 4 billion rows, or may grow to a total size of 8TB or greater. 128KB is the default IQ page size.
- 256KB (IQ PAGE SIZE 262144) for databases on a 64-bit platform whose largest table contains more than 4 billion rows, or may grow to a total size of 8TB or greater.

Very wide tables, such as tables with multiple columns of wide VARCHAR data (columns from 255 to 32,767 bytes) may need the next larger IQ PAGE SIZE.

BLOCK SIZE clause The I/O transfer block size in bytes for the IQ segment of the database. The value must be less than IQ PAGE SIZE, and must be a power of two between 4096 and 32768. Other values for the size will be changed to the next larger size. The default value depends on the value of the IQ PAGE SIZE clause. For most applications, this default value is optimum. Before specifying a different value, see Chapter 4, “Managing System Resources” in the *Sybase IQ Performance and Tuning Guide*.

IQ RESERVE clause Specifies the size in megabytes of free list space to reserve for the Main IQ Store (IQ_SYSTEM_MAIN dbspace), so that the dbspace can be increased in size in the future. The *sizeMB* parameter can be any number greater than 0. The reserve cannot be changed after the dbspace is created.

When IQ RESERVE is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

TEMPORARY RESERVE clause Specifies the size in megabytes of free list space to reserve for the Temporary IQ Store (IQ_SYSTEM_TEMP dbspace), so that the dbspace can be increased in size in the future. The *sizeMB* parameter can be any number greater than 0. The reserve cannot be changed after the dbspace is created.

When TEMPORARY RESERVE is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

Note Reserve and mode for temporary dbspaces are lost, if the database is restored from a backup.

MESSAGE PATH clause The pathname of the segment containing the IQ messages trace file. You must specify an operating system file; the message file cannot be on a raw partition. If you use a relative path or omit the path, the message file is created relative to the directory of the *.db* file.

TEMPORARY PATH clause The pathname of the temporary segment file containing the temporary tables generated by certain queries. You can specify an operating system file or a raw partition of an I/O device. (The *Sybase IQ Installation and Configuration Guide* for your platform describes the format for specifying a raw partition.) IQ automatically detects which type based on the pathname you specify. If you use a relative path or omit the path, the temporary file is created relative to the directory of the *.db* file.

TEMPORARY SIZE clause The size in MB of either the raw partition or the operating system file you specify with the TEMPORARY PATH clause. For raw partitions, you should always take the default, which allows IQ to use the entire raw partition. The default for operating system files is always one-half the value of IQ SIZE. If the IQ Store is on a raw partition and the Temporary Store is an operating system file, the default TEMPORARY SIZE is half the size of the IQ Store raw partition.

Side effects

Several operating system files are created.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise provides a CREATE DATABASE statement, but with different options.

Permissions

The permissions required to execute this statement are set on the server command line, using the -gu command-line option. The default setting is to require DBA authority.

The account under which the server is running must have write permissions on the directories where files are created.

See also

- CREATE DBSPACE statement
- DROP DATABASE statement

CREATE DBSPACE statement

Description

Creates a new dbspace and the associated database file. This file can be on a different device than the initial dbspace.

Syntax

CREATE DBSPACE *dbspace-name* **AS** *filename*
... [{ **IQ STORE** | **IQ TEMPORARY STORE**
| **IQ LOCAL STORE** | **CATALOG STORE** }]
... [[**SIZE**] *file-size*]
... [**RESERVE** *sizeMB*]

Examples

On Windows, create a dbspace called *mydb_tmp_2* to add 200 MB to the IQ Temporary Store of the current IQ database (mydb).

```
CREATE DBSPACE mydb_tmp_2
AS 'e:\\s2\\data\\mydb_2.iqtmp'
IQ TEMPORARY STORE
SIZE 200 ;
```

Usage

The CREATE DBSPACE statement creates a new database file called a dbspace. When a database is first initialized using CREATE DATABASE, it creates several database files by default, including:

- *db-name.db* is the catalog dbspace containing the system tables and stored procedures describing the database and any standard Adaptive Server Anywhere database objects you add. It is known as the Catalog Store, and has the dbspace name SYSTEM.
- *db-name.iq* is the main data dbspace containing the IQ tables and indexes. It is known as the IQ Store, and has the dbspace name IQ_SYSTEM_MAIN.
- *db-name.iqtmp* is the initial temporary dbspace containing the temporary tables generated by certain queries. It is known as the IQ Temporary Store, and has the dbspace name IQ_SYSTEM_TEMP.

CREATE DBSPACE adds a new dbspace to one of these stores. The default is the IQ Store. The dbspace you add can be on a different disk device than the initial dbspace allowing the creation of stores larger than one physical device.

Note Multiplex databases have a shared IQ Store, where they share all dbspaces, and a local IQ Store. The local IQ Store consists of dbspaces that are managed by only one query server and are not visible to any other query server. To create dbspaces for a multiplex database, Sybase recommends using Sybase Central rather than the CREATE DBSPACE statement. See Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide* for details.

When you create a database or a dbspace, the path for the Temporary Store must be unique. If your CREATE DBSPACE command specifies the identical path and filename for these two stores, you receive an error.

You can cause a unique path in any of these ways:

- Specify a different extension for each file (for example, *mydb.iq* and *mydb.iqtmp*)
- Specify a different file name (for example, *mydb.iq* and *mytmp.iq*)

- Specify a different pathname (for example, */iqfiles/main/iq* and */iqfiles/temp/iq*) or different raw partitions

Warning! On UNIX platforms, to maintain database consistency you must be careful to specify filenames that are links to different files. IQ cannot detect the target where linked files point. Even if the filenames in the command differ, it is your responsibility to make sure they do not point to the same file.

The *dbspace-name* is an internal name for the dbspace. The *filename* is the actual filename of the dbspace, with a path where necessary. A *filename* without an explicit directory is created in the same directory as the initial dbspace of that store. Any relative directory is relative to that initial dbspace. Each *dbspace-name* must be unique in a database. Dbspace names are case sensitive for databases created with CASE RESPECT.

SIZE clause For operating system files, specifies the size in MB, from 0 to 4194304 (0 to 4 terabytes), of the file you specify in *filename*. See Chapter 8, “Physical Limitations” for platform-specific limits. The default depends on the store type and block size. For the IQ Main Store, the default number of bytes equals 1000 * the block size. For the IQ Temporary Store the default number of bytes equals 100 * the block size. You cannot specify the SIZE clause for the Catalog Store.

A SIZE value of 0 creates a dbspace of minimum size, which is 1000 blocks for IQ Main Store and 100 blocks for IQ Temporary Store.

For raw partitions, do not specify SIZE explicitly. Sybase IQ sets this parameter to the maximum raw partition size automatically, and returns an error if you attempt to specify another size.

RESERVE clause Specifies the size in megabytes of free list space to reserve, so that the dbspace can be increased in size in the future. The *sizeMB* parameter can be any number greater than 0. The reserve cannot be changed after the dbspace is created.

When RESERVE is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

Note Reserve and mode for temporary dbspaces are lost if the database is restored from a backup.

A database can have up to 2047 dbspaces, including the initial dbspaces created when you create the database. However, your operating system may limit the number of files per database.

Side effects

Automatic commit. Automatic checkpoint.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have DBA authority.

See also

- DROP statement
- "Working with database objects" and "Working with dbspaces" in Chapter 5, "Working with Database Objects" of the *Sybase IQ System Administration Guide*

CREATE DOMAIN statement

Description

Creates a user-defined data type in the database.

Syntax

CREATE { **DOMAIN** | **DATATYPE** } *domain-name data-type* ... [[**NOT**] **NULL**]

Parameters

domain-name:
identifier

data-type:
built-in data type, with precision and scale

Examples

The following statement creates a data type named address, which holds a 35-character string, and which may be NULL.

```
CREATE DOMAIN address CHAR( 35 ) NULL
```

Usage

User-defined data types are aliases for built-in data types, including precision and scale values where applicable. They improve convenience and encourage consistency in the database.

It is recommended that you use CREATE DOMAIN, rather than CREATE DATATYPE, as CREATE DOMAIN is the ANSI/ISO SQL3 term.

The user who creates a data type is automatically made the owner of that data type. No owner can be specified in the CREATE DATATYPE statement. The user-defined data type name must be unique, and all users can access the data type without using the owner as prefix.

User-defined data types are objects within the database. Their names must conform to the rules for identifiers. User-defined data type names are always case insensitive, as are built-in data type names.

By default, user-defined data types allow NULLs unless the allow_nulls_by_default option is set to OFF. In this case, new user-defined data types by default do not allow NULLs. The nullability of a column created on a user-defined data type depends on the setting of the definition of the user-defined data type, not on the setting of the allow_nulls_by_default option when the column is referenced. Any explicit setting of NULL or NOT NULL in the column definition overrides the user-defined data type setting.

The CREATE DOMAIN statement allows you to incorporate a rule, called a CHECK condition, into the definition of a user-defined data type.

Sybase IQ enforces CHECK constraints for base, global temporary. local temporary tables, and user-defined data types.

To drop the data type from the database, use the DROP statement. You must be either the owner of the data type or have DBA authority in order to drop a user-defined data type.

Side effects

Automatic commit.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Not supported by Adaptive Server Enterprise. Transact-SQL provides similar functionality using the *sp_addtype* system procedure and the CREATE DEFAULT and CREATE RULE statements.

Permissions

Must have RESOURCE authority.

See also

- DROP statement
- Chapter 4, “SQL Data Types”

CREATE EVENT statement

Description

Defines an event and its associated handler for automating predefined actions. Also defines scheduled actions.

Syntax

CREATE EVENT *event-name*
... [**TYPE** *event-type*
[**WHERE** *trigger-condition* [**AND** *trigger-condition*], ...]
| **SCHEDULE** *schedule-spec*, ...]
... [**ENABLE** | **DISABLE**]
... [**AT** { **CONSOLIDATED** | **REMOTE** | **ALL** }]
...[**HANDLER**
BEGIN
...
END]

Parameters

event-type:
BackupEnd| "Connect"
| ConnectFailed| DatabaseStart
| DBDiskSpace| "Disconnect"
| GlobalAutoincrement | GrowDB
| GrowLog| GrowTemp
| LogDiskSpace| "RAISERROR"
| ServerIdle| TempDiskSpace

trigger-condition:
event_condition(*condition-name*) { = | < | > | != | <= | >= } *value*

schedule-spec:
[*schedule-name*]
{ START TIME *start-time* | BETWEEN *start-time* AND *end-time* }
[EVERY *period* { HOURS | MINUTES | SECONDS }]
[ON { (*day-of-week, ...*) | (*day-of-month, ...*) }]
[START DATE *start-date*]

event-name | *schedule-name*:
identifier

day-of-week :
string

day-of-month | *value* | *period* :
integer

start-time | *end-time* :
time

start-date :
date

Examples

- Instruct the database server to carry out an automatic incremental backup, every day at 1 am.

```
CREATE EVENT IncrementalBackup
SCHEDULE
START TIME '1:00AM' EVERY 24 HOURS
HANDLER
BEGIN
   BACKUP DATABASE INCREMENTAL
   TO 'backups/daily.incr'
END
```

- Instruct the database server to call the system stored procedure sp_iqspaceused every 10 minutes, then store in a table the returned current data and time, the current number of connections to the database, and current information about the use of Main and Temporary IQ Store.

```
CREATE TABLE mysummary(dt DATETIME,
   users INT, mainKB UNSIGNED BIGINT,
   mainPC UNSIGNED INT,
   tempKB UNSIGNED BIGINT,
   tempPC UNSIGNED INT) ;

CREATE EVENT mysummary
   SCHEDULE sched_mysummary
      START TIME '00:01 AM' EVERY 10 MINUTES
   HANDLER
   BEGIN
      DECLARE mt UNSIGNED BIGINT;
      DECLARE mu UNSIGNED BIGINT;
      DECLARE tt UNSIGNED BIGINT;
      DECLARE tu UNSIGNED BIGINT;
      DECLARE conncount UNSIGNED INT;

      SET conncount = DB_PROPERTY('ConnCount');
      CALL SP_IQSPACEUSED(mt,mu,tt,tu);

      INSERT INTO mysummary VALUES( NOW(),
      conncount, mu, (mu*100)/mt, tu,
      (tu*100)/tt );

   END ;
```

For more examples see “Defining trigger conditions for events” in Chapter 18, “Automating Tasks Using Schedules and Events” in the *Sybase IQ System Administration Guide*.

Usage

Events can be used in two main ways:

- **Scheduling actions** The database server carries out a set of actions on a schedule of times. You could use this capability to schedule backups, validity checks, queries to fill up reporting tables, and so on.
- **Event handling actions** The database server carries out a set of actions when a predefined event occurs. The events that can be handled include disk space restrictions (when a disk fills beyond a specified percentage), when the server is idle, and so on.

An event definition includes two distinct pieces. The **trigger condition** can be an occurrence, such as a disk filling up beyond a defined threshold. A **schedule** is a set of times, each of which acts as a trigger condition. When a trigger condition is satisfied, the **event handler** executes. The event handler includes one or more actions specified inside a compound statement (BEGIN... END).

If no trigger condition or schedule specification is supplied, only an explicit TRIGGER EVENT statement can trigger the event. During development, you may wish to develop and test event handlers using TRIGGER EVENT, and add the schedule or WHERE clause once testing is complete.

Event errors are logged to the database server console.

When event handlers are triggered, the server makes context information, such as the connection ID that caused the event to be triggered, available to the event handler using the EVENT_PARAMETER function.

CREATE EVENT clause The event name is an identifier. An event has a creator, which is the user creating the event, and the event handler executes with the permissions of that creator. This is the same as stored procedure execution. You cannot create events owned by other users.

You can list event names by querying the system table SYSEVENT. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

TYPE clause The *event-type* is one of the listed set of system-defined event types. The event types are case insensitive. To specify the conditions under which this *event-type* triggers the event, use the WHERE clause.

- **DiskSpace event types** If the database contains an event handler for one of the DiskSpace types, the database server checks the available space on each device associated with the relevant file every 30 seconds.

  In the event the database has more than one dbspace, on separate drives, DBDiskSpace checks each drive and acts depending on the lowest available space.

The LogDiskSpace event type checks the location of the transaction log and any mirrored transaction log, and reports based on the least available space.

The disk space event types require Windows and are not available on UNIX platforms.

- **Globalautoincrement event type** This event fires when the GLOBAL AUTOINCREMENT default value for a table is within one percent of the end of its range. A typical action for the handler could be to request a new value for the GLOBAL_DATABASE_ID option.

  You can use the EVENT_CONDITION function with RemainingValues as an argument for this event type.

- **ServerIdle event type** If the database contains an event handler for the ServerIdle type, the server checks for server activity every 30 seconds.

WHERE clause The trigger condition determines the condition under which an event is fired. For example, to take an action when the disk containing the transaction log becomes more than 80% full, use the following triggering condition:

```
...
WHERE event_condition( 'LogDiskSpacePercentFree' ) < 20
...
```

The argument to the EVENT_CONDITION function must be valid for the event type.

You can use multiple AND conditions to make up the WHERE clause, but you cannot use OR conditions or other conditions.

For information on valid arguments, see “EVENT_CONDITION function [System]” on page 259.

SCHEDULE clause This clause specifies when scheduled actions are to take place. The sequence of times acts as a set of triggering conditions for the associated actions defined in the event handler.

You can create more than one schedule for a given event and its associated handler. This permits complex schedules to be implemented. While it is compulsory to provide a schedule-name when there is more than one schedule, it is optional if you provide only a single schedule.

You can list schedule names by querying the system table SYSSCHEDULE. For example:

```
SELECT event_id, sched_name FROM SYS.SYSSCHEDULE
```

Each event has a unique event id. Use the event_id columns of SYSEVENT and SYSSCHEDULE to match the event to the associated schedule.

When a non-recurring scheduled event has passed, its schedule is deleted, but the event handler is not deleted.

Scheduled event times are calculated when the schedules are created, and again when the event handler completes execution. The next event time is computed by inspecting the schedule or schedules for the event, and finding the next schedule time that is in the future. If an event handler is instructed to run every hour between 9:00 and 5:00, and it takes 65 minutes to execute, it runs at 9:00, 11:00, 1:00, 3:00, and 5:00. If you want execution to overlap, you must create more than one event.

The subclauses of a schedule definition are as follows:

- **START TIME** The first scheduled time for each day on which the event is scheduled. If a START DATE is specified, the START TIME refers to that date. If no START DATE is specified, the START TIME is on the current day (unless the time has passed) and each subsequent day.
- **BETWEEN ... AND** A range of times during the day outside of which no scheduled times occur. If a START DATE is specified, the scheduled times do not occur until that date.
- **EVERY** An interval between successive scheduled events. Scheduled events occur only after the START TIME for the day, or in the range specified by BETWEEN ... AND.
- **ON** A list of days on which the scheduled events occur. The default is every day. These can be specified as days of the week or days of the month.

  Days of the week are Monday, Tuesday, and so on. The abbreviated forms of the day, such as Mon, Tue, and so on, may also be used. The database server recognizes both full-length and abbreviated day names in any of the languages supported by Sybase IQ.

  Days of the month are integers from 0 to 31. A value of 0 represents the last day of any month.
- **START DATE** The date on which scheduled events are to start occurring. The default is the current date.

Each time a scheduled event handler is completed, the next scheduled time and date is calculated.

1 If the EVERY clause is used, find whether the next scheduled time falls on the current day, and is before the end of the BETWEEN ... AND range. If so, that is the next scheduled time.

2 If the next scheduled time does not fall on the current day, find the next date on which the event is to be executed.

3 Find the START TIME for that date, or the beginning of the BETWEEN ... AND range.

ENABLE | DISABLE By default, event handlers are enabled. When DISABLE is specified, the event handler does not execute even when the scheduled time or triggering condition occurs. A TRIGGER EVENT statement does *not* cause a disabled event handler to be executed.

AT clause If you wish to execute events at remote or consolidated databases in a SQL Remote setup, you can use this clause to restrict the databases at which the event is handled. By default, all databases execute the event.

HANDLER clause Each event has one handler. Like the body of a stored procedure, the handler is a compound statement. There are some differences, though: you can use an EXCEPTION clause within the compound statement to handle errors, but not the ON EXCEPTION RESUME clause provided within stored procedures.

Side effects

Automatic commit.

The actions of an event handler are committed if no error is detected during execution, and rolled back if errors are detected.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have DBA authority.

Event handlers execute on a separate connection, with the permissions of the event owner. To execute with permissions other than DBA, you can call a procedure from within the event handler: the procedure executes with the permissions of its owner. The separate connection does not count towards the ten-connection limit of the personal database server.

See also

BEGIN... END statement

ALTER EVENT statement

COMMENT statement

DROP statement

TRIGGER EVENT statement

Chapter 18, "Automating Tasks Using Schedules and Events" in the *Sybase IQ System Administration Guide*

CREATE EXISTING TABLE statement

Description

Creates a new proxy table representing an existing object on a remote server.

Syntax

CREATE EXISTING TABLE [*owner*.]*table_name*
[(*column-definition*, ...)]
AT *'location-string'*

Parameters

column-definition:
column-name data-type [NOT NULL]

location-string:
remote-server-name.[*db-name*].[*owner*].*object-name*
| *remote-server-name*;[*db-name*];[*owner*];*object-name*

Examples

- Create a proxy table named blurbs for the blurbs table at the remote server server_a.

```
CREATE EXISTING TABLE blurbs
( author_id id not null,
copy text not null)
AT 'server_a.db1.joe.blurbs'
```

- Create a proxy table named blurbs for the blurbs table at the remote server server_a. Sybase IQ derives the column list from the metadata it obtains from the remote table.

```
CREATE EXISTING TABLE blurbs
AT 'server_a.db1.joe.blurbs'
```

- Create a proxy table named rda_employee for the employee table at the Sybase IQ remote server asiqdemo.

```
CREATE EXISTING TABLE rda_employee
AT 'asiqdemo..dba.employee'
```

Usage

The CREATE EXISTING TABLE statement creates a new local, proxy table that maps to a table at an external location. The CREATE EXISTING TABLE statement is a variant of the CREATE TABLE statement. The EXISTING keyword is used with CREATE TABLE to specify that a table already exists remotely and that its metadata is to be imported into Sybase IQ. This establishes the remote table as a visible entity to its users. Sybase IQ verifies that the table exists at the external location before it creates the table.

Tables used as proxy tables cannot have names longer than 30 characters.

If the object does not exist (either host data file or remote server object), the statement is rejected with an error message.

Index information from the host data file or remote server table is extracted and used to create rows for the system table sysindexes. This defines indexes and keys in server terms and enables the query optimizer to consider any indexes that may exist on this table.

Referential constraints are passed to the remote location when appropriate.

If column-definitions are not specified, Sybase IQ derives the column list from the metadata it obtains from the remote table. If column-definitions are specified, Sybase IQ verifies the column-definitions. Column names, data types, lengths, and null properties are checked for the following:

- Column names must match identically (although case is ignored).
- Data types in the CREATE EXISTING TABLE statement must match or be convertible to the data types of the column on the remote location. For example, a local column data type is defined as numeric, while the remote column data type is money.
- Each column's NULL property is checked. If the local column's NULL property is not identical to the remote column's NULL property, a warning message is issued, but the statement is not aborted.
- Each column's length is checked. If the length of char, varchar, binary, decimal and numeric columns do not match, a warning message is issued, but the command is not aborted. You may choose to include only a subset of the actual remote column list in your CREATE EXISTING statement.
- AT clause The AT clause specifies the location of the remote object. The AT clause supports the semicolon (;) as a delimiter. If a semicolon is present anywhere in the location string, the semicolon is the field delimiter. If no semicolon is present, a period is the field delimiter. This allows filenames and extensions to be used in the database and owner fields. Semicolon field delimiters are used primarily with server classes not currently supported; however, you can also use them in situations where a period would also work as a field delimiter. For example, the following statement maps the table proxy_a to the Adaptive Server Anywhere database mydb on the remote server myasa:

```
CREATE EXISTING TABLE
proxy_a1
AT 'myasa;mydb;;a1'
```

Side effects

Automatic commit.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

Must have RESOURCE authority. To create a table for another user, you must have DBA authority.

See also

CREATE TABLE statement

Chapter 17, "Server Classes for Remote Data Access" and Chapter 16, "Accessing Remote Data" in the *Sybase IQ System Administration Guide*.

CREATE EXTERNLOGIN statement

Description

Assigns an alternate login name and password to be used when communicating with a remote server.

Syntax

CREATE EXTERNLOGIN *login-name*
TO *remote-server*
REMOTE LOGIN *remote-user*
[**IDENTIFIED BY** *remote-password*]

Examples

- Map the local user named DBA to the user sa with password 4TKNOX when connecting to the server sybase1.

```
CREATE EXTERNLOGIN dba
TO sybase1
REMOTE LOGIN sa
IDENTIFIED BY 4TKNOX
```

Usage

By default, Sybase IQ uses the names and passwords of its clients whenever it connects to a remote server on behalf of those clients. CREATE EXTERNLOGIN assigns an alternate login name and password to be used when communicating with a remote server. It stores the password internally in encrypted form. The *remote_server* must be known to the local server by an entry in the sysservers table. For more information, see CREATE SERVER statement.

Sites with automatic password expiration should plan for periodic updates of passwords for external logins.

CREATE EXTERNLOGIN cannot be used from within a transaction.

login-name specifies the local user login name. When using integrated logins, the *login-name* is the database user to which the Windows user ID is mapped.

TO clause The TO clause specifies the name of the remote server.

REMOTE LOGIN clause The REMOTE LOGIN clause specifies the user account on *remote-server* for the local user *login-name*.

IDENTIFIED BY clause The IDENTIFIED BY clause specifies *remote-password* is the password for *remote-user*

The *remote-user* and *remote-password* combination must be valid on *remote-server*.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

Only the login-name and the DBA account can add or modify an external login for login-name.

See also

DROP EXTERNLOGIN statement

CREATE FUNCTION statement

Description

Creates a new function in the database.

Syntax

CREATE FUNCTION [*owner*.]*function-name* **(** [*parameter*, …] **)**
RETURNS *data-type routine-characteristics*
{ *compound-statement*
| **AS** *tsql-compound-statement*
| *external-name* }

Parameters

parameter:
IN *parameter-name data-type*

routine-characteristics:
ON EXCEPTION RESUME | [NOT] DETERMINISTIC

tsql-compound-statement:
sql-statement
sql-statement ...

external-name:
EXTERNAL NAME *library-call*
| EXTERNAL NAME *java-call* LANGUAGE JAVA

library-call:
'[*operating-system*:]*function-name@library.dll*; ...'

operating-system:
WindowsNT | UNIX

java-call:
'[*package-name*.]*class-name.method-name method-signature*'

method-signature:
([*field-descriptor*, ...]) *return-descriptor*

field-descriptor | *return-descriptor*:
Z | B | S | I | J | F | D | C | V | [*descriptor* | L*class-name*;

Examples

Example 1 The following function concatenates a firstname string and a lastname string.

```
CREATE FUNCTION fullname (
    firstname CHAR(30),
    lastname CHAR(30) )
RETURNS CHAR(61)
BEGIN
    DECLARE name CHAR(61);
    SET name = firstname || ' ' || lastname;
    RETURN (name);
END
```

The following examples illustrate the use of the fullname function.

- Return a full name from two supplied strings:

```
SELECT fullname ('joe','smith')
```

fullname('joe', 'smith')
joe smith

- List the names of all employees:

```
SELECT fullname (emp_fname, emp_lname)
FROM employee
```

fullname (emp_fname, emp_lname)
Fran Whitney
Matthew Cobb

fullname (emp_fname, emp_lname)
Philip Chin
Julie Jordan
Robert Breault
...

Example 2 The following function uses Transact-SQL syntax:

```
CREATE FUNCTION DoubleIt ( @Input INT )
RETURNS INT
AS
DECLARE @Result INT
SELECT @Result = @Input * 2
RETURN @Result
```

The statement `SELECT DoubleIt( 5 )` returns a value of `10`.

Example 3 The following statement creates an external function written in Java:

```
CREATE FUNCTION dba.encrypt( IN name char(254) )
RETURNS VARCHAR
EXTERNAL NAME
'Scramble.encrypt
(Ljava/lang/String;)Ljava/lang/String;'
LANGUAGE JAVA
```

Usage

The CREATE FUNCTION statement creates a user-defined function in the database. A function can be created for another user by specifying an owner name. Subject to permissions, a user-defined function can be used in exactly the same way as other non-aggregate functions.

The following describes each of the clauses of the CREATE FUNCTION statement.

CREATE FUNCTION clause Parameter names must conform to the rules for database identifiers. They must have a valid SQL data type, and must be prefixed by the keyword IN, signifying that the argument is an expression that provides a value to the function.

compound-statement A set of SQL statements bracketed by BEGIN and END, and separated by semicolons. See BEGIN... END statement on page 360

tsql-compound-statement A batch of Transact-SQL statements. See “Transact-SQL batch overview” on page 816, and CREATE PROCEDURE statement [T-SQL] on page 427.

EXTERNAL NAME clause A function using the EXTERNAL NAME clause is a wrapper around a call to a function in an external library. A function using EXTERNAL NAME can have no other clauses following the RETURNS clause. The *library* name may include the file extension, which is typically *.dll* on Windows, and *.so* on UNIX. In the absence of the extension, the software appends the platform-specific default file extension for libraries.

For information about external library calls, see "Calling external libraries from procedures" in Chapter 8, "Using Procedures and Batches" of the *Sybase IQ System Administration Guide*.

EXTERNAL NAME LANGUAGE JAVA clause A function that uses EXTERNAL NAME with a LANGUAGE JAVA clause is a wrapper around a Java method.

For information on calling Java procedures, see CREATE PROCEDURE statement on page 420.

ON EXCEPTION RESUME clause Use Transact-SQL -like error handling. For more information, see CREATE PROCEDURE statement on page 420.

NOT DETERMINISTIC clause A function specified as NOT DETERMINISTIC is re-evaluated each time it is called in a query. The results of functions not specified in this manner may be cached for better performance, and re-used each time the function is called with the same parameters during query evaluation.

Functions that have side effects such as modifying the underlying data should be declared as NOT DETERMINISTIC. For example, a function that generates primary key values and is used in an INSERT … SELECT statement should be declared NOT DETERMINISTIC:

```
CREATE FUNCTION keygen( increment INTEGER )
RETURNS INTEGER
NOT DETERMINISTIC
BEGIN
  DECLARE keyval INTEGER;
  UPDATE counter SET x = x + increment;
  SELECT counter.x INTO keyval FROM counter;
  RETURN keyval
END
INSERT INTO new_table
SELECT keygen(1), ...
FROM old_table
```

Functions may be declared as DETERMINISTIC if they always return the same value for given input parameters.

Unless they are declared NOT DETERMINISTIC, all user-defined functions return a consistent result for the same parameters and are free of side effects. That is, the server assumes that two successive calls to the same function with the same parameters will return the same result, and will not have any unwanted side effects on the query's semantics.

Note User-defined functions are processed by the Adaptive Server Anywhere portion of the product. They do not take advantage of the performance features of Sybase IQ. Queries that include user-defined functions will run at least 10 times slower than queries without them.

In certain cases, differences in semantics between ASA and Sybase IQ can produce different results for a query if it is issued in a user-defined function. For example, IQ treats the CHAR and VARCHAR data types as distinct and different, while Anywhere treats CHAR data as if it were VARCHAR.

To modify a user-defined function, or to hide the contents of a function by scrambling its definition, use the ALTER FUNCTION statement. For more information, see the *Adaptive Server Anywhere SQL Reference*.

Side effects

Automatic commit.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have RESOURCE authority.

External functions, including Java functions, must have DBA authority.

See also

DROP statement

BEGIN... END statement

CREATE PROCEDURE statement

RETURN statement

Chapter 8, “Using Procedures and Batches” in the *Sybase IQ System Administration Guide*

ALTER FUNCTION statement in the *Adaptive Server Anywhere SQL Reference*.

CREATE INDEX statement

Description

Creates an index on a specified table, or pair of tables.

Syntax

CREATE [**UNIQUE**] [*index-type*] **INDEX** *index-name*
... **ON** [*owner*.]*table-name*
... (*column-name* [, *column-name*] ...)
... [{ **IN** | **ON** } *dbspace-name*]
... [**NOTIFY** *integer*]
... [**DELIMITED BY** '*separators-string* ']
... [**LIMIT** *maxwordsize-integer*]

Parameters

index-type:
{ CMP | HG | HNG | LF | WD | DATE | TIME | DTTM }

Examples

- Create a Compare index on the projected_earnings and current_earnings columns. These columns are decimal columns with identical precision and scale.

```
CREATE
CMP INDEX proj_curr_cmp
ON sales_data
( projected_earnings, current_earnings )
```

- Create a High_Group index on the sales_order_items table for the product ID column.

```
CREATE HG INDEX item_prod_hg
ON sales_order_items
( prod_id )
```

- Create a Low_Fast index on the sales_order_items table for the same product ID column without any notification messages.

```
CREATE LF INDEX item_prod
ON sales_order_items
( prod_id )
 NOTIFY 0
```

- Create a WD index on the earnings_report table. Specify that the delimiters of strings are space, colon, semicolon, and period. Limit the length of the strings to 25.

```
CREATE WD INDEX earnings_wd
ON earnings_report_table(varchar)
DELIMITED BY ' :;.'
LIMIT 25
```

- Create a DTTM index on the sales_order table for the order_date column.

```
CREATE DTTM INDEX order_dttm
ON sales_order
( order_date )
```

Usage

The CREATE INDEX statement creates an index on the specified column of the named table. Once an index is created, it is never referenced in a SQL statement again except to delete it using the DROP INDEX statement.

For columns in IQ tables, you can specify an *index-type* of HG (High_Group), HNG (High_Non_Group), LF (Low_Fast), WD (Word), DATE, TIME, or DTTM (Datetime). If you do not specify an *index-type*, an HG index is created by default.

To create an index on the relationship between two columns in an IQ table, you can specify an *index-type* of CMP (Compare). Columns must be of identical data type, precision and scale. For a CHAR, VARCHAR, BINARY or VARBINARY column, "precision" means that both columns have the same width.

For maximum query speed, the correct type of index for a column depends on:

- The number of unique values in the column
- How that column is going to be used in queries
- The amount of disk space available

The *Sybase IQ System Administration Guide* describes the index types in detail and tells how to determine the appropriate index types for your data.

You can specify multiple indexes on a column of an IQ table, but these must be of different index types. The CREATE INDEX command does not allow you to add a duplicate index type. Sybase IQ will choose the fastest index available for the current query or portion of the query. However, each additional index type may significantly add to the space requirements of that table.

column-name Specifies the name of the column to be indexed. A column name is an identifier preceded by an optional correlation name. (A correlation name is usually a table name. For more information on correlation names, see FROM clause on page 486.) If a column name has characters other than letters, digits, and underscore, enclose it in quotation marks ("").

When you omit the UNIQUE keyword, you can only specify an HG index. Foreign keys require non-unique HG indexes and composite foreign keys require non-unique composite HG indexes. The multicolumn composite key for both unique and non-unique HG indexes has a maximum width of 5300 bytes. CHAR or VARCHAR data cannot be more than 255 bytes when it is part of a composite key or single-column HG, LF, HNG, DATE, TIME, or DTTM indexes.

UNIQUE attribute The UNIQUE attribute ensures that there will not be two rows in the table with identical values in all the columns in the index. Each index key must be unique or contain a NULL in at least one column. You can create unique HG indexes with more than one column, but you cannot create multicolumn indexes using other index types. You cannot specify the UNIQUE attribute with the CMP, HNG, WD, DATE, TIME, or DTTM index types.

Index placement An index is always placed in the same type of dbspace (IQ Store or Temporary Store) as its table. When you load the index, the data is spread across any database files of that type with room available. While the CREATE INDEX command lets you specify the *dbspace-name* IQ_SYSTEM_TEMP or IQ_SYSTEM_MAIN, this option has no real effect for IQ indexes. IQ ensures that any *dbspace-name* you specify is appropriate for the index. If you try to specify IQ_SYSTEM_MAIN for indexes on temporary tables, or vice versa, you receive an error. Dbspace names are case sensitive for databases created with CASE RESPECT.

DELIMITED BY clause Specifies separators to use in parsing a column string into the words to be stored in that column's WD index. If this clause is omitted or the value specified is the empty string, then Sybase IQ uses the default set of separators. The default set of separators is designed for the default collation order (ISO-BINENG). It includes all 7-bit ASCII characters that are not 7-bit ASCII alphanumeric characters, except for the hyphen and the single quotation mark. The hyphen and the single quotation mark are part of words by default. There are 64 separators in the default separator set. For example, if the column value is the string

```
The cat is on the mat
```

and the database was created with the CASE IGNORE setting using default separators, the following words are stored in the WD index from this string:

```
cat is mat on the
```

If multiple DELIMITED BY and LIMIT clauses are specified, no error is returned, but only the last clause of each type is used.

separators-string The separators-string must be a sequence of 0 or more characters in the collation order used when the database was created. Each character in the separators-string is treated as a separator. If there are no characters in the separators-string, the default set of separators is used. (Each separator must be a single character in the collation sequence being used.) There may not be more than 256 characters (separators) in the separators-string.

To specify tab as a delimiter, you can either type a <TAB> character within the separator string, or use the hexadecimal ASCII code of the tab character, \x09. Note that \t specifies two separators, \ and the letter t. To specify newline as a delimiter, you can type a <RETURN> character or the hexadecimal ASCII code \x0a.

For example, the clause `DELIMITED BY ' :;.\/t'` specifies these seven separators: space : ; . \ / t

Table 6-6: Tab and newline as delimiters

For these delimiters...	Use this separators-string in the DELIMITED BY clause
tab	`'  '` (type <TAB>) or `'\x09'`
newline	`'  '` (type <RETURN>) or `'\x0a'`

LIMIT clause May be used for the creation of the WD index only. Specifies the maximum word length that will be permitted in the WD index. Longer words found during parsing will cause an error. The default is 255 bytes. The minimum permitted value is 1 and the maximum permitted value is 255. If the maximum word length specified in the CREATE INDEX statement or determined by default exceeds the column width, the used maximum word length is silently reduced to the column width. Using a lower maximum permitted word length allows insertions, deletions, and updates to use less space and time. Note that the empty word (two adjacent separators) is silently ignored. After a WD index is created, any insertions into its column will be parsed using the separators and maximum word size determined at create time. These separators and maximum word size cannot be changed after the index is created.

NOTIFY clause Gives notification messages after *n* records are successfully added for the index. The messages are sent to the standard output device. A message contains information about memory usage, database space, and how many buffers are in use. The default is 100,000 records. To turn off NOTIFY, set it to 0.

Notes

- **Index ownership** There is no way of specifying the index owner in the CREATE INDEX statement. Indexes are automatically owned by the owner of the table on which they are defined. The index name must be unique for each owner.

- **No indexes on views** Indexes cannot be created for views.
- **Index name** The name of each index must be unique for a given table.
- **Exclusive table use** CREATE INDEX is prevented whenever the statement affects a table currently being modified by another connection. However, queries are allowed on a table that is also adding an index.
- **CHAR columns** After a WD index is created, any insertions into its column will be parsed using the separators and maximum word size cannot be changed after the index is created.

  For CHAR columns, Sybase recommends that you specify a space as at least one of the separators or use the default separator set. Sybase IQ automatically pads CHAR columns to the maximum column width. If your column contains blanks in addition to the character data, queries on WD indexed data may return misleading results. For example, column company_name contains two words delimited by a separator, but the second word is blank padded:

  ```
  'Concord' 'Farms                '
  ```

  Suppose that a user entered the following query:

  ```
  SELECT COUNT(*)FROM customers WHERE company_name
  contains ('Farms')
  ```

  The parser determines that the string contains

  ```
  'Farms                          '
  ```

  instead of

  ```
  'Farms'
  ```

  and returns 0 instead of 1. You can avoid this problem by using VARCHAR instead of CHAR columns.
- **Data types** You cannot use CREATE INDEX to create an index on a column with BIT data. Only the default index, CMP index, or WD index can be created on CHAR and VARCHAR data with more than 255 bytes. Only the default index and CMP index can be created on VARBINARY data with more than 255 bytes. In addition, you cannot create an HNG index or a CMP index on a column with FLOAT, REAL, or DOUBLE data. A TIME index can only be created on a column having the data type TIME. A DATE index can only be created on a column having the data type DATE. A DTTM index can only be created on a column having the data type DATETIME or TIMESTAMP.

- **Multicolumn indexes** You can create a unique or non-unique HG index with more than one column. (Sybase IQ implicitly creates a non-unique HG index on a set of columns that make up a foreign key.) HG and CMP are the only types of indexes that can have multiple columns. You cannot create a unique HNG or LF index with more than one column. You cannot create a DATE, TIME, or DTTM index with more than one column.

  The maximum width of a multicolumn concatenated key is 5KB (5300 bytes). The number of columns allowed depends on how many columns can fit into 1KB. CHAR or VARCHAR data greater than 255 bytes is not allowed as part of a composite key in single-column HG, LF, HNG, DATE, TIME, or DTTM indexes.

  Multicolumn indexes on base tables are *not* replicated in join indexes created using those base tables.

  An INSERT on a multicolumn index must include all columns of the index.

- **Parallel index creation** You can use the BEGIN PARALLEL IQ ... END PARALLEL IQ statement to group CREATE INDEX statements on multiple IQ tables, so that they execute as though they are a single DDL statement. See the BEGIN PARALLEL IQ ... END PARALLEL IQ statement for more information.

Warning! Using the CREATE INDEX command on a local temporary table containing uncommitted data will fail and generate the following error message: "Local temporary table, <*tablename*>, must be committed in order to create an index." Be sure to commit the data in the local temporary table before creating an index.

Side effects

Automatic commit.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Adaptive Server Enterprise has a more complex CREATE INDEX statement than Sybase IQ. While the Adaptive Server Enterprise syntax is permitted in Sybase IQ, some clauses and keywords are ignored. For the full syntax of the Adaptive Server Enterprise CREATE INDEX statement, refer to the Adaptive Server Enterprise *Reference Manual, Volume 2: Commands*.

Adaptive Server Enterprise indexes can be either **clustered** or **nonclustered**. A clustered index almost always retrieves data faster than a nonclustered index. Only one clustered index is permitted per table.

Sybase IQ does not support clustered indexes. The CLUSTERED and NONCLUSTERED keywords are allowed by SQL Anywhere, but no action is taken.

Sybase IQ does not permit the DESC keyword.

Sybase IQ also allows, by ignoring, the following keywords:

- FILLFACTOR
- IGNORE_DUP_KEY
- SORTED_DATA
- IGNORE_DUP_ROW
- ALLOW_DUP_ROW
- ON

Index names must be unique on a given table for both Sybase IQ and Adaptive Server Enterprise.

Permissions

Must be the owner of the table or have DBA authority.

See also

- DROP statement
- CREATE JOIN INDEX statement
- "INDEX_PREFERENCE option"
- Chapter 6, "Using Sybase IQ Indexes" in the *Sybase IQ System Administration Guide*

CREATE JOIN INDEX statement

Description

Creates a join index, which defines a group of tables that are pre-joined through specific columns, to improve performance of queries using the tables in a join operation.

Syntax

CREATE JOIN INDEX *join-index-name* **FOR** *join-clause*

Parameters

join-clause:
[( ] *join-expression join-type join-expression*
[ON *search-condition*] [ )]

join-expression:
{ *table-name* | *join-clause* }

join-type:
[NATURAL] FULL [OUTER] JOIN

search-condition:
[( ] *search-expression* [AND *search-expression*] [ )]

search-expression:
[( ] [*table-name.*] *column-name* = [*table-name.*] *column-name* [ )]

Examples

Create a join index between the department and employee tables using the dept_id column, which is the primary key for department and foreign key for employee.

```
CREATE JOIN INDEX emp_dept_join
FOR department FULL OUTER JOIN employee
ON department.dept_id = employee.dept_id
```

Usage

The CREATE JOIN INDEX statement creates a join index on the specified columns of the named tables. Once a join index is created, it is never referenced again except to delete it using the DROP JOIN INDEX statement or to synchronize it using the SYNCHRONIZE JOIN INDEX statement. This statement only supports joins of type FULL OUTER; the OUTER keyword is optional.

ON clause References only columns from two tables. One set of columns must be from a single table in the left sub-tree and the other set of columns must be from a table in the right sub-tree. The only predicates supported are equijoin predicates. Sybase IQ does not allow single-variable predicates, intra-column comparisons, or non-equality joins.

Join index columns must have identical data type, precision, and scale.

To specify a multipart key, you need to include more than one predicate linking the two tables connected by a logical AND. A disjunct ON clause is not supported (i.e., IQ does not permit a logical OR of join predicates). Also, the ON clause does not accept a standard WHERE clause, so it is not possible to specify an alias.

You can use the NATURAL keyword instead of an ON clause. A NATURAL join is one that pairs columns up by name and implies an equijoin. If the NATURAL join generates predicates involving more than one pair of tables, CREATE JOIN INDEX will return an error. You can specify NATURAL or ON, but not both.

The CREATE JOIN INDEX statement looks for a primary key to foreign key relationship in the tables to determine the direction of the one-to-many relationship (the direction of a one-to-one relationship is not important). The primary key is always the “one” and the foreign key is always the “many”. If such information is not defined, Sybase IQ assumes the sub-tree on the left is the “one” while the sub-tree on the right is the “many”. If the opposite is true, CREATE JOIN INDEX will return an error.

Note Query optimizations for all joins rely heavily on underlying primary keys. They do not require foreign keys. However, you can benefit from using foreign keys. Sybase IQ enforces foreign keys if you set up your loads to check for primary key-foreign key relationships.

Join index tables must be IQ base tables. They must not be temporary tables, remote tables, or proxy tables.

Note that multicolumn indexes on base tables are *not* replicated in join indexes created using those base tables.

A star-join index is one in which a single table at the center of the star is joined to multiple tables in a one-to-many relationship. In order to define a star-join index you must define single-column key and primary keys, and then use the key join syntax in the CREATE JOIN INDEX statement. IQ does not support star-join indexes that use multiple join key columns for any join.

Note The FLOAT_AS_DOUBLE option, which defaults to OFF, must be set ON for JDBC and client connections in order for CREATE JOIN INDEX statements to succeed.

Note You must explicitly grant permissions on the underlying “join virtual table” to other users in your group, before they can manipulate tables in the join. For information on granting privileges on the join virtual table, see the section “Inserting or deleting from tables in a join index” in Chapter 6, “Using Sybase IQ Indexes” in the *Sybase IQ System Administration Guide*.

Side effects

Automatic commit.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions — Must have DBA authority or have RESOURCE authority and be the owner of all tables involved in the join.

See also — CREATE INDEX statement

CREATE TABLE statement

Chapter 6, "Using Sybase IQ Indexes" in *Sybase IQ System Administration Guide*

CREATE MESSAGE statement [T-SQL]

Description — Adds a user-defined message to the SYSUSERMESSAGES system table for use by PRINT and RAISERROR statements.

Syntax — **CREATE MESSAGE** *message-number*
... **AS** *'message-text'*

Usage — CREATE MESSAGE associates a message number with a message string. The message number can be used in PRINT and RAISERROR statements.

The replaceable text in the syntax is as follows:

- **message_number** The message number of the message to add. The message number for a user-defined message must be 20000 or greater.
- **message_text** The text of the message to add. The maximum length is 255 bytes. PRINT and RAISERROR recognize placeholders in the message text to print out. A single message can contain up to 20 unique placeholders in any order. These placeholders are replaced with the formatted contents of any arguments that follow the message when the text of the message is sent to the client.

  The placeholders are numbered to allow reordering of the arguments when translating a message to a language with a different grammatical structure. A placeholder for an argument appears as "%nn!"— a percent sign (%), followed by an integer from 1 to 20, followed by an exclamation mark (!) — where the integer represents the position of the argument in the argument list, "%1!" is the first argument, "%2!" is the second argument, and so on.

There is no parameter corresponding to the *language* argument for sp_addmessage.

Side effects

Automatic commit.

Standards

- **SQL/92** Vendor extension.
- **Sybase** The functionality of CREATE MESSAGE is provided by the sp_addmessage procedure in Adaptive Server Enterprise.

Permissions

Must have RESOURCE authority

See also

- PRINT statement [T-SQL]
- RAISERROR statement [T-SQL]

CREATE PROCEDURE statement

Description

Creates a new procedure in the database.

Syntax

```
CREATE PROCEDURE [ owner.]procedure-name ( [ parameter , ... ] )
{ EXTERNAL NAME library-call
  | [ DYNAMIC RESULT SETS integer-expression ]
...    EXTERNAL NAME java-call LANGUAGE JAVA
  | [ RESULT ( result-column , ... ) ]
... [ ON EXCEPTION RESUME ]
...   compound-statement
  | AT location-string
  }
```

Parameters

parameter:

parameter_mode parameter-name data-type [DEFAULT *expression*]
| SQLCODE
| SQLSTATE

parameter_mode:

IN | OUT | INOUT

result-column:

column-name data-type

library-call:

'*function-name@library.dll*; ...'

java-call:

'[*package-name*.]*class-name.method-name method-signature*'

method-signature:

([*field-descriptor*,...]) *return-descriptor*

field-descriptor | *return-descriptor*:
Z | B | S | I | J | F | D | C | V | [*descriptor* | L*class-name*;

Examples

- The following procedure uses a case statement to classify the results of a query.

```
CREATE PROCEDURE ProductType (IN product_id INT, OUT
type CHAR(10))
BEGIN
    DECLARE prod_name CHAR(20) ;
    SELECT name INTO prod_name FROM "DBA"."product"
    WHERE id = product_id;
    CASE prod_name
    WHEN 'Tee Shirt' THEN
       SET type = 'Shirt'
    WHEN 'Sweatshirt' THEN
       SET type = 'Shirt'
    WHEN 'Baseball Cap' THEN
       SET type = 'Hat'
    WHEN 'Visor' THEN
       SET type = 'Hat'
    WHEN 'Shorts' THEN
       SET type = 'Shorts'
    ELSE
       SET type = 'UNKNOWN'
    END CASE ;
END
```

- The following procedure uses a cursor and loops over the rows of the cursor to return a single value.

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35),
OUT TopValue INT)
BEGIN
    DECLARE err_notfound EXCEPTION
    FOR SQLSTATE '02000' ;
    DECLARE curThisCust CURSOR FOR
    SELECT company_name, CAST(
sum(sales_order_items.quantity *
    product.unit_price) AS INTEGER) VALUE
    FROM customer
    LEFT OUTER JOIN sales_order
    LEFT OUTER JOIN sales_order_items
    LEFT OUTER JOIN product
    GROUP BY company_name ;


    DECLARE ThisValue INT ;
```

```
    DECLARE ThisCompany CHAR(35) ;
    SET TopValue = 0 ;
    OPEN curThisCust ;
    CustomerLoop:
    LOOP
       FETCH NEXT curThisCust
       INTO ThisCompany, ThisValue ;
       IF SQLSTATE = err_notfound THEN
          LEAVE CustomerLoop ;
       END IF ;
       IF ThisValue > TopValue THEN
          SET TopValue = ThisValue ;
          SET TopCompany = ThisCompany ;
          END IF ;
    END LOOP CustomerLoop ;
    CLOSE curThisCust ;
END
```

Usage

The CREATE PROCEDURE statement creates a procedure in the database. Users with DBA authority can create procedures for other users by specifying an owner. A procedure is invoked with a CALL statement.

The body of a procedure consists of a compound statement. For information on compound statements, see BEGIN... END statement.

CREATE PROCEDURE clause

Parameter names must conform to the rules for other database identifiers such as column names. They must be a valid SQL data type (see Chapter 4, “SQL Data Types”), and must be prefixed by one of the keywords IN, OUT or INOUT. The keywords have the following meanings:

- **IN** The parameter is an expression that provides a value to the procedure.
- **OUT** The parameter is a variable that could be given a value by the procedure.
- **INOUT** The parameter is a variable that provides a value to the procedure, and could be given a new value by the procedure.

When procedures are executed using the CALL statement, not all parameters need to be specified. If a default value is provided in the CREATE PROCEDURE statement, missing parameters are assigned the default values. If an argument is not provided in the CALL statement, and no default is set, an error is given.

SQLSTATE and SQLCODE are special parameters that output the SQLSTATE or SQLCODE value when the procedure ends (they are OUT parameters). Whether or not a SQLSTATE and SQLCODE parameter is specified, the SQLSTATE and SQLCODE special values can always be checked immediately after a procedure call to test the return status of the procedure.

The SQLSTATE and SQLCODE special values are modified by the next SQL statement. Providing SQLSTATE or SQLCODE as procedure arguments allows the return code to be stored in a variable.

RESULT clause

The RESULT clause declares the number and type of columns in the result set. The parenthesized list following the RESULT keyword defines the result column names and types. This information is returned by the Embedded SQL DESCRIBE or by ODBC SQLDescribeCol when a CALL statement is being described. Allowable data types are listed in Chapter 4, "SQL Data Types".

For more information on returning result sets from procedures, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*.

Some procedures can return more than one result set, with different numbers of columns, depending on how they are executed. For example, the following procedure returns two columns under some circumstances, and one in others.

```
CREATE PROCEDURE names( IN formal char(1))
BEGIN
    IF formal = 'n' THEN
       SELECT emp_fname
       FROM employee
    ELSE
       SELECT emp_lname,emp_fname
       FROM employee
    END IF
END
```

Procedures with variable result sets must be written without a RESULT clause, or in Transact-SQL. Their use is subject to the following limitations:

- **Embedded SQL** You must DESCRIBE the procedure call after the cursor for the result set is opened, but before any rows are returned, in order to get the proper shape of result set. The CURSOR *cursor-name* clause on the DESCRIBE statement is required.
- **ODBC** Variable result-set procedures can be used by ODBC applications. The proper description of the result sets is carried out by the ODBC driver.

- **Open Client applications** Variable result-set procedures can be used by Open Client applications.

If your procedure returns only one result set, you should use a RESULT clause. The presence of this clause prevents ODBC and Open Client applications from describing the result set again after a cursor is open.

In order to handle multiple result sets, ODBC must describe the currently executing cursor, not the procedure's defined result set. Therefore, ODBC does not always describe column names as defined in the RESULT clause of the procedure definition. To avoid this problem, use column aliases in the SELECT statement that generates the result set.

ON EXCEPTION RESUME clause

This clause enables Transact-SQL -like error handling to be used within a Watcom-SQL syntax procedure.

If you use ON EXCEPTION RESUME, the procedure takes an action that depends on the setting of the ON_TSQL_ERROR option. If ON_TSQL_ERROR is set to CONDITIONAL (which is the default) the execution continues if the next statement handles the error; otherwise, it exits.

Error-handling statements include the following:

- IF
- SELECT @variable =
- CASE
- LOOP
- LEAVE
- CONTINUE
- CALL
- EXECUTE
- SIGNAL
- RESIGNAL
- DECLARE
- SET VARIABLE

You should not use explicit error handling code with an ON EXCEPTION RESUME clause.

For more information, see “ON_TSQL_ERROR option [TSQL]” on page 103.

EXTERNAL NAME clause

A procedure using the EXTERNAL NAME clause is a wrapper around a call to an external dynamic link library, and is called an **external stored procedure**. An external stored procedure can have no clauses other than the EXTERNAL NAME clause following the parameter list.

For information about external procedures, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*.

AT location-string clause

Create a **proxy stored procedure** on the current database for a remote procedure specified by *location-string*. The AT clause supports the semicolon (;) as a field delimiter in *location-string*. If no semicolon is present, a period is the field delimiter. This allows file names and extensions to be used in the database and owner fields.

For example, the following statement creates the proxy procedure remotewho that calls the dbo.sp_who procedure on the master database of the bostonase server:

```
CREATE PROCEDURE remotewho ()
AT 'bostonase.master.dbo.sp_who'
```

Remote procedures can return only up to 254 characters in output variables.

For information on remote servers, see the CREATE SERVER statement. For information on using remote procedures, see the section "Using remote procedure calls (RPCs)" in Chapter 16, "Accessing Remote Data" of the *Sybase IQ System Administration Guide*.

DYNAMIC RESULT SETS clause

This clause is for use with procedures that are wrappers around Java methods. If the DYNAMIC RESULT SETS clause is not provided, it is assumed that the method returns no result set.

EXTERNAL NAME LANGUAGE JAVA clause

A procedure that uses EXTERNAL NAME with a LANGUAGE JAVA clause is a wrapper around a Java method.

If the number of parameters is less than the number indicated in the method-signature then the difference must equal the number specified in DYNAMIC RESULT SETS, and each parameter in the method signature in excess of those in the procedure parameter list must have a method signature of [Ljava/sql/ResultSet;.

Java method signatures A Java method signature is a compact character representation of the types of the parameters and the type of the return value.

The meanings of *field-descriptor* and *return-descriptor* are listed in Table 6-7.

Table 6-7: Java method signatures

Field type	Java data type
B	byte
C	char
D	double
F	float
I	int
J	long
L*class-name*;	an instance of the class *class-name*. The class name must be fully qualified, and any dot in the name must be replaced by a /. For example, java/lang/String
S	short
V	void
Z	boolean
[	use one for each dimension of an array

For example,

```
double some_method(
  boolean a,
  int b,
  java.math.BigDecimal c,
  byte [][] d,
  java.sql.ResultSet[] d ) {
}
```

would have the following signature:

```
'(ZILjava/math/BigDecimal;[[B[Ljava/sql/ResultSet;)D'
```

Side effects

Automatic commit.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** The Transact-SQL CREATE PROCEDURE statement is different.
- **SQLJ** The syntax extensions for Java result sets are as specified in the proposed SQLJ1 standard.

Permissions

Must have RESOURCE authority. For external procedures, must have DBA authority.

See also

- DROP statement

- CALL statement
- BEGIN... END statement
- GRANT statement
- EXECUTE IMMEDIATE statement [ESQL] [SP]

CREATE PROCEDURE statement [T-SQL]

Description

Creates a new procedure in the database in a manner compatible with Adaptive Server Enterprise.

Syntax

The following subset of the Transact-SQL CREATE PROCEDURE statement is supported in Sybase IQ.

CREATE PROCEDURE [*owner*.]*procedure_name*
... [[( ] *@parameter_name data-type* [= *default*] [**OUTPUT**] [, ..] [ )]]
...[**WITH RECOMPILE**]
...**AS**
...*statement-list*

Usage

The following differences between Transact-SQL and Sybase IQ statements are listed to help those writing in both dialects.

- **Variable names prefixed by @** The "@" sign denotes a Transact-SQL variable name, while Sybase IQ variables can be any valid identifier, and the @ prefix is optional.
- **Input and output parameters** Sybase IQ procedure parameters are specified as IN, OUT, or INOUT, while Transact-SQL procedure parameters are INPUT parameters by default or can be specified as OUTPUT. Those parameters that would be declared as INOUT or as OUT in Sybase IQ should be declared with OUTPUT in Transact-SQL.
- **Parameter default values** Sybase IQ procedure parameters are given a default value using the keyword DEFAULT, while Transact-SQL uses an equality sign (=) to provide the default value.
- **Returning result sets** Sybase IQ uses a RESULT clause to specify returned result sets. In Transact-SQL procedures, the column names or alias names of the first query are returned to the calling environment.

```
CREATE PROCEDURE showdept @deptname varchar(30)
AS
    SELECT employee.emp_lname, employee.emp_fname
    FROM department, employee
```

```
    WHERE department.dept_name = @deptname
    AND department.dept_id = employee.dept_id
```

The following is the corresponding Sybase IQ procedure:

```
CREATE PROCEDURE showdept(in deptname
          varchar(30) )
RESULT ( lastname char(20), firstname char(20))
ON EXCEPTION RESUME
BEGIN
    SELECT employee.emp_lname, employee.emp_fname
    FROM department, employee
    WHERE department.dept_name = deptname
    AND department.dept_id = employee.dept_id
END
```

- **Procedure body** The body of a Transact-SQL procedure is a list of Transact-SQL statements prefixed by the AS keyword. The body of a Sybase IQ procedure is a compound statement, bracketed by BEGIN and END keywords.

Side effects

Automatic commit.

Standards

- **SQL/92** Transact-SQL extension.
- **Sybase** Sybase IQ supports a subset of the Adaptive Server Enterprise CREATE PROCEDURE statement syntax.

  If the Transact-SQL WITH RECOMPILE optional clause is supplied, it is ignored. Adaptive Server Anywhere always recompiles procedures the first time they are executed after a database is started, and stores the compiled procedure until the database is stopped.

  Groups of procedures are not supported.

Permissions

Must have RESOURCE authority.

See also

CREATE PROCEDURE statement

CREATE SCHEMA statement

Description

Creates a collection of tables, views, and permissions for a database user.

Syntax

CREATE SCHEMA AUTHORIZATION *userid*
... [{ *create-table-statement*

| *create-view-statement*
| *grant-statement* }]...

Usage

The CREATE SCHEMA statement creates a schema. A schema is a collection of tables, views, and their associated permissions.

The *userid* must be the user ID of the current connection. You cannot create a schema for another user. The user ID is not case sensitive.

If any of the statements contained in the CREATE SCHEMA statement fails, then the entire CREATE SCHEMA statement is rolled back.

The CREATE SCHEMA statement is simply a way of collecting together individual CREATE and GRANT statements into one operation. There is no SCHEMA database object created in the database, and to drop the objects you must use individual DROP TABLE or DROP VIEW statements. To revoke permissions, you must use a REVOKE statement for each permission granted.

The individual CREATE or GRANT statements are not separated by statement delimiters. The statement delimiter marks the end of the CREATE SCHEMA statement itself.

The individual CREATE or GRANT statements must be ordered such that the objects are created before permissions are granted on them.

Although you can currently create more than one schema for a user, this is not recommended, and may not be supported in future releases.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Sybase IQ does not support the use of REVOKE statements within the CREATE SCHEMA statement, and does not allow its use within Transact-SQL batches or procedures.

Permissions

Must have RESOURCE authority.

See also

- CREATE TABLE statement
- CREATE VIEW statement
- GRANT statement

CREATE SERVER statement

Description

Adds a server to the sysservers table.

Syntax

CREATE SERVER *server-name*
CLASS '*server-class*'
USING '*connection-info*'
[**READ ONLY**]

Parameters

server-class:
{ ASAJDBC| ASEJDBC
| ASAODBC | ASEODBC
| DB2ODBC | MSSODBC
| ORAODBC | ODBC}

connection-info:
{ *machine-name:port-number* [*/dbname*] | *data-source-name* }

Examples

- Create a remote server for the JDBC-based Adaptive Server named ase_prod. Its machine name is banana and port number is 3025.

```
CREATE SERVER ase_prod
CLASS 'asejdbc'
USING 'banana:3025'
```

- Create an Adaptive Server Anywhere remote server named testasa, located on the machine apple, and listening on port number 2638. Use:

```
CREATE SERVER testasa
CLASS 'asajdbc'
USING 'apple:2638'
```

- Create a remote server for the Oracle server named oracle723. Its ODBC Data Source Name is oracle723.

```
CREATE SERVER oracle723
CLASS 'oraodbc'
USING 'oracle723'
```

Usage

The CREATE SERVER statement defines a remote server from the Sybase IQ catalogs.

For more information on server classes and how to configure a server, see Chapter 17, “Server Classes for Remote Data Access” in the *Sybase IQ System Administration Guide*.

USING clause If a JDBC-based server class is used, the USING clause is the *hostname:port-number [/dbname]* where:

- **hostname** is the machine the remote server runs on

- **portnumber** is the TCP/IP port number the remote server listens on. The default port number for Sybase IQ and Adaptive Server Anywhere is 2638.
- **dbname** For Adaptive Server Anywhere remote servers, if you do not specify a *dbname*, then the default database is used. For Adaptive Server Enterprise, the default is the master database, and an alternative to using *dbname* is to another database by some other means (for example, in the FORWARD TO statement).

For more information see "JDBC-based server classes" in the *Sybase IQ System Administration Guide*.

If an ODBC-based server class is used, the USING clause is the *data-source-name*. The data-source-name is the ODBC Data Source Name.

READ ONLY The READ ONLY clause specifies that the remote server is a read-only data source. Any update request is rejected by Sybase IQ.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

Must have RESOURCE authority.

See also

- ALTER SERVER statement
- DROP SERVER statement

CREATE SERVICE statement

Description

Permits a database server to act as a web server.

Syntax

CREATE SERVICE *service-name*
TYPE *service-type-string*
[*attributes*] [
AS *statement*]

Parameters

attributes:
[AUTHORIZATION { ON
| OFF }] [SECURE
{ ON | OFF }] [USER { *user-name* | NULL } [ ] URL [PATH] { ON | OFF |
ELEMENTS }] [USING { *SOAP-prefix* | NULL }]

service-type-string:
{ 'RAW ' | 'HTML ' |
'XML ' |
'SOAP ' |
' DISH ' }

service-name Web service names may be any sequence of alpha-numeric characters or "/", "-", "_", ".", "!", "~", "*", "'", "(", or ")", except that the first character must not begin with a slash (/) and the name must not contain two or more consecutive slash characters.

service-type-string Identifies the type of the service. The type must be one of the listed service types. There is no default value.

AUTHORIZATION clause Determines whether users must specify a user name and password when connecting to the service. If authorization is OFF, the AS clause is required and a single user must be identified by the USER clause. All requests are run using that user's account and permissions.

If authorization is ON, all users must provide a user name and password. Optionally, you may limit the users that are permitted to use the service by providing a user or group name using the USER clause. If the user name is NULL, all known users can access the service.

The default value is ON. It is recommended that production systems be run with authorization turned on and that you grant permission to use the service by adding users to a group.

SECURE clause Indicates whether unsecure connections are accepted. ON indicates that only HTTPS connections are to be accepted. Service requests received on the HTTP port are automatically redirected to the HTTPS port. If set to OFF, both HTTP and HTTPS connections are accepted. The default value is OFF.

USER clause If authorization is disabled, this parameter becomes mandatory and specifies the user id used to execute all service requests. If authorization is enabled (the default), this optional clause identified the user or group permitted access to the service. The default value is NULL, which grants access to all users.

URL clause Determines whether URI paths are accepted and, if so, how they are processed. OFF indicates that nothing must follow the service name in a URI request. ON indicates that the remainder of the URI is interpreted as the value of a variable named url. ELEMENTS indicates that the remainder of the URI path is to be split at the slash characters into a list of up to 10 elements. The values are assigned to variables named url plus a numeric suffix of between 1 and 10; for example, the first three variable names are url1, url2, and url3. If fewer than 10 values are supplied, the remaining variables are set to NULL. If the service name ends with the character /, then URL must be set to OFF. The default value is OFF.

USING clause This clause applies only to DISH services. The parameter specifies a name prefix. Only SOAP services whose names begin with this prefix are handled.

statement If the statement is NULL, the URI must specify the statement to be executed. Otherwise, the specified SQL statement is the only one that can be executed through the service. The statement is mandatory for SOAP services, and ignored for DISH services. The default value is NULL.

> It is strongly recommended that all services run in production systems define a statement. The statement can be NULL only if authorization is enabled.

RAW The result set is sent to the client without any further formatting. You can produce formatted documents by generating the required tags explicitly within your procedure, as demonstrated in an example, below.

HTML The result set of a statement or procedure are automatically formatted into an HTML document that contains a table.

XML The result set is assumed to be in XML format. If it is not already so, it is automatically converted to XML RAW format.

SOAP The request must be a valid Simple Object Access Protocol, or SOAP, request. The result set is automatically formatted as a SOAP response. For more information about the SOAP standards, see www.w3.org/TR/SOAP at http://www.w3.org/TR/SOAP.

DISH A Determine SOAP Handler, or DISH, service acts as a proxy for one or more SOAP services. In use, it acts as a container that holds and provides access to a number of soap services. A Web Services Description Language (WSDL) file is automatically generated for each of the included SOAP services. The included SOAP services are identified by a common prefix, which must be specified in the USING clause.

The create service statement causes the database server to act as a web server. A new entry is created in the SYSWEBSERVICE system table.

Examples

Example 1 To set up a web server quickly, start a database server with the `-xs` switch, then execute the following statement:

```
CREATE SERVICE tables TYPE 'HTML'
AUTHORIZATION OFF    USER DBA
AS SELECT * FROM SYS.SYSTABLE
```

After executing this statement, use any web browser to open the URL *http://localhost/tables*.

Example 2 The following example demonstrates how to write a Hello World program.

```
CREATE PROCEDURE hello_world_proc RESULT (html_doc long
varchar) BEGIN   CALL dbo.sa_set_http_header( 'Content-
Type', 'text/html' );    SELECT '<html>\n'        ||
'<head><title>Hello World</title></head>\n'        ||
'<body>\n'       || '<h1>Hello World!</h1>\n'       ||
'</body>\n'        || '</html>\n'; END;

CREATE SERVICE hello_world TYPE 'RAW' AUTHORIZATION OFF
USER DBA AS CALL hello_world_proc;
```

Usage

The create service statement causes the database server to act as a web server. A new entry is created in the SYSWEBSERVICE system table.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have DBA authority.

See also

- ALTER SERVICE statement
- DROP SERVICE statement
- Using the Built-in Web Server in *Adaptive Server Anywhere Database Administration Guide*

CREATE TABLE statement

Description

Creates a new table in the database or on a remote server.

Syntax

CREATE [**GLOBAL TEMPORARY**] **TABLE** [*owner*.]*table-name*
... (*column-definition* [*column-constraint*]...
[, *column-definition* [*column-constraint*]...]
[, *table-constraint*]...)
... [{ **IN** | **ON** } *dbspace-name*]
... [**ON COMMIT** { **DELETE** | **PRESERVE** } **ROWS**
| **NOT TRANSACTIONAL**]
[**AT** *location-string*]

Parameters

column-definition:

column-name data-type [[NOT] NULL] [*default-value*]

default-value:
[DEFAULT AUTOINCREMENT | IDENTITY]

column-constraint:
{ UNIQUE
| PRIMARY KEY
| REFERENCES *table-name* [(*column-name*)] [*actions*]
| CHECK (*condition*)
| IQ UNIQUE (*integer*) }

table-constraint:
{ UNIQUE (*column-name* [, *column-name*]...)
| PRIMARY KEY (*column-name* [, *column-name*]...)
| CHECK (*condition*)
| *foreign-key-constraint* }

foreign-key-constraint:
FOREIGN KEY [*role-name*]
[(*column-name* [, *column-name*]...)]
... REFERENCES *table-name* [(*column-name* [, *column-name*]...)]
... [*action*] [

action:
ON { UPDATE | DELETE { RESTRICT }

location-string:
{ *remote-server-name*.[*db-name*].[*owner*].*object-name*
| *remote-server-name*;[*db-name*];[*owner*];*object-name* }

Examples

- Create a table for a library database to hold book information.

```
CREATE TABLE library_books (
```

```
isbn CHAR(20)      PRIMARY KEY IQ UNIQUE (150000),
copyright_date     DATE,
title              CHAR(100),
author             CHAR(50)
)
```

- Create a table for a library database to hold information on borrowed books.

```
CREATE TABLE borrowed_book (
date_borrowed DATE NOT NULL,
date_returned DATE,
book       CHAR(20)
           REFERENCES library_books (isbn),
CHECK( date_returned >= date_borrowed )
)
```

- Creates a table named t1 at the remote server SERVER_A and creates a proxy table named t1 that is mapped to the remote table.

```
CREATE TABLE t1
( a  INT,
  b  CHAR(10))
AT 'SERVER_A.db1.joe.t1'
```

Usage

The CREATE TABLE statement creates a new table. A table can be created for another user by specifying an owner name. If GLOBAL TEMPORARY is not specified, the table is referred to as a base table. Otherwise, the table is a temporary table.

A created global temporary table is a table that exists in the database like a base table and remains in the database until it is explicitly removed by a DROP TABLE statement. The rows in a temporary table are only visible to the connection that inserted the rows. Multiple connections from the same or different applications can use the same temporary table at the same time and each connection will only see its own rows. A given connection inherits the schema of a global temporary table as it exists when the connection first refers to the table. The rows of a temporary table are deleted when the connection ends.

When you create a local temporary table, omit the owner specification. If you specify an owner when creating a temporary table, for example, `CREATE TABLE dbo.#temp(col1 int)`, a base table is incorrectly created.

You cannot use a temporary table to create a join index.

IN clause The IN clause specifies in which database file (dbspace) the table is to be created. You can specify SYSTEM with this clause to put either a permanent or temporary table in the Catalog Store. All other use of the IN clause is ignored. You *cannot* use this clause to place an IQ table in a particular dbspace. By default all permanent tables are placed in the main IQ Store, and all temporary tables are placed in the Temporary IQ Store. Global temporary tables can never be in the IQ Store.

For more information about dbspaces, see CREATE DBSPACE statement.

ON COMMIT clause The ON COMMIT clause is only allowed for temporary tables. By default, the rows of a temporary table are deleted on COMMIT.

NOT TRANSACTIONAL The NOT TRANSACTIONAL clause is allowed only for temporary tables. A table created using NOT TRANSACTIONAL is not affected by either COMMIT or ROLLBACK.

The NOT TRANSACTIONAL clause provides performance improvements in some circumstances because operations on non-transactional temporary tables do not cause entries to be made in the rollback log. For example, NOT TRANSACTIONAL may be useful if procedures that use the temporary table are called repeatedly with no intervening COMMITs or ROLLBACKs.

The parenthesized list following the CREATE TABLE statement can contain the following clauses in any order:

AT clause The AT clause is used to create a table at the remote location specified by *location-string*. The local table that is created is a proxy table that maps to the remote location. Tables used as proxy tables must have names of 30 characters or less. The AT clause supports the semicolon (;) as a delimiter. If a semicolon is present anywhere in the *location-string*, the semicolon is the field delimiter. If no semicolon is present, a period is the field delimiter. This allows filenames and extensions to be used in the database and owner fields.

Semicolon field delimiters are used primarily with server classes not currently supported; however, you can also use them in situations where a period would also work as a field delimiter. For example, the following statement maps the table proxy_a to the Adaptive Server Anywhere database mydb on the remote server myasa:

```
CREATE TABLE proxy_a1
AT 'myasa;mydb;;a1'
```

Foreign key definitions are ignored on remote tables. Foreign key definitions on local tables that refer to remote tables are also ignored. Primary key definitions are sent to the remote server if the server supports primary keys.

column-definition Define a column in the table. Allowable data types are described in Chapter 4, “SQL Data Types”. Two columns in the same table cannot have the same name. If NOT NULL is specified, or if the column is in a UNIQUE or PRIMARY KEY constraint, the column cannot contain any NULL values. You can create up to 45,000 columns; however, there may be performance penalties with more than 10,000 columns in a table.

- **DEFAULT AUTOINCREMENT** The value of the DEFAULT AUTOINCREMENT column uniquely identifies every row in a table. Columns of this type are also known as IDENTITY columns, for compatibility with Adaptive Server Enterprise. The IDENTITY/DEFAUL AUTOINCREMENT column stores sequential numbers that are automatically generated during inserts and updates. When using IDENTITY or DEFAULT AUTOINCREMENT, the column must be one of the integer data types, or an exact numeric type, with scale 0. The column value may also be NULL. You must qualify the specified tablename with the owner name.

  ON inserts into the table. If a value is not specified for the IDENTITY/DEFAULT AUTOINCREMENT column, a unique value larger than any other value in the column is generated. If an INSERT specifies a value for the column, it is used; if the specified value is not larger than the current maximum value for the column, that value will be used as a starting point for subsequent inserts.

  Deleting rows does not decrement the IDENTITY/AUTOINCREMENT counter. Gaps created by deleting rows can only be filled by explicit assignment when using an insert. The database option IDENTITY_INSERT must be set ON to perform an insert into an IDENTITY/AUTOINCREMENT column.

  For example, the following creates a table with an IDENTITY column and explicitly adds some data to it:

  ```
  CREATE TABLE mytable(c1 INT IDENTITY);
  SET TEMPORARY OPTION IDENTITY_INSERT "DBA".mytable
  ON;
  INSERT INTO mytable VALUES(5);
  ```

  After an explicit insert of a row number less then the maximum, subsequent rows without explicit assignment are still automatically incremented with a value of one greater than the previous maximum.

  You can find the most recently inserted value of the column by inspecting the @@identity global variable.

- **IDENTITY** The identity column is a Transact-SQL-compatible alternative to using the AUTOINCREMENT default. In Sybase IQ, the identity column may be created using either the IDENTITY or the DEFAULT AUTOINCREMENT clause.

table-constraint Table constraints help ensure the integrity of data in the database. There are four types of integrity constraints:

- **UNIQUE constraint** Identifies one or more columns that uniquely identify each row in the table. No two rows in the table can have the same values in all the named column(s). A table may have more than one unique constraint.
- **PRIMARY KEY constraint** Is the same as a UNIQUE constraint except that a table can have only one primary key constraint. *You cannot specify the PRIMARY KEY and UNIQUE constraints for the same column*. The primary key usually identifies the best identifier for a row. For example, the customer number might be the primary key for the customer table.
- **FOREIGN KEY constraint** Restricts the values for a set of columns to match the values in a primary key or uniqueness constraint of another table. For example, a foreign key constraint could be used to ensure that a customer number in an invoice table corresponds to a customer number in the customer table.

Note You cannot create foreign key constraints on local temporary tables. Global temporary tables must be created with ON COMMIT PRESERVE ROWS.

- **CHECK constraint** Allows arbitrary conditions to be verified. For example, a check constraint could be used to ensure that a column called Gender only contains the values male or female. No row in a table is allowed to violate a constraint. If an INSERT or UPDATE statement would cause a row to violate a constraint, the operation is not permitted and the effects of the statement are undone.

  Column identifiers in column check constraints that start with the symbol '@' are placeholders for the actual column name. Thus a statement of the form:

  ```
  CREATE TABLE t1(c1 INTEGER CHECK (@foo < 5))
  ```

  is exactly the same as the following statement:

  ```
  CREATE TABLE t1(c1 INTEGER CHECK (c1 < 5))
  ```

Column identifiers appearing in table check constraints that start with the symbol '@'are *not* placeholders.

If a statement would cause changes to the database that would violate an integrity constraint, the statement is effectively not executed and an error is reported. (*Effectively* means that any changes made by the statement before the error was detected are undone.)

Sybase IQ enforces single-column UNIQUE constraints by creating an HG index for that column.

Note You cannot define a column with a BIT data type as a UNIQUE or PRIMARY KEY constraint. Also, the default for columns of BIT data type is to not allow NULL values; you can change this by explicitly defining the column as allowing NULL values.

---

column-constraint A column constraint restricts the values the column can hold. Column and table constraints help ensure the integrity of data in the database. If a statement would cause a violation of a constraint, execution of the statement does not complete, any changes made by the statement before error detection are undone, and an error is reported. Column constraints are abbreviations for the corresponding table constraints. For example, the following are equivalent:

```
CREATE TABLE Product (
    product_num integer UNIQUE
)
CREATE TABLE Product (
    product_num integer,
    UNIQUE ( product_num )
)
```

Column constraints are normally used unless the constraint references more than one column in the table. In these cases, a table constraint must be used.

IQ UNIQUE constraint This constraint can be specified for columns only. IQ UNIQUE defines the cardinality of the column, and it is used to optimize the indexes internally. The default value is 0, which gives IQ no information for optimizing the default index. The IQ UNIQUE constraint should be applied if the expected distinct count (the number of unique values) for the column is less than or equal to 65536. This allows Sybase IQ to optimize storage of this column's data.

When the MINIMIZE_STORAGE option is ON (the default for new databases is OFF), it is equivalent to specifying IQ UNIQUE 255 for every newly created column, and there is no need to specify IQ UNIQUE except for columns with more than 65536 unique values.

Integrity constraints

UNIQUE or UNIQUE (column-name, ...) No two rows in the table can have the same values in all the named column(s). A table may have more than one unique constraint.

There is a difference between a **unique constraint** and a **unique index**. Columns of a unique index are allowed to be NULL, while columns in a unique constraint are not. A foreign key can reference either a primary key or a column with a unique constraint, but not a unique index, because it can include multiple instances of NULL.

PRIMARY KEY or PRIMARY KEY (column-name, ...) The primary key for the table will consist of the listed column(s), and none of the named column(s) can contain any NULL values. Sybase IQ ensures that each row in the table will have a unique primary key value. A table can have only one PRIMARY KEY.

When the second form is used (PRIMARY KEY followed by a list of columns), the primary key is created including the columns in the order in which they are defined, not the order in which they are listed.

When a column is designated as PRIMARY KEY, FOREIGN KEY, or UNIQUE, Sybase IQ creates a High_Group index for it automatically. For multicolumn primary keys, this index is on the primary key, not the individual columns. For best performance, you should also index each column with a HG or LF index separately.

REFERENCES primary-table-name [(primary-column-name)] This clause defines the column as a foreign key for a primary key or a unique constraint of a primary table. Normally, a foreign key would be for a primary key rather than an unique constraint. If a primary column name is specified, it must match a column in the primary table which is subject to a unique constraint or primary key constraint, and that constraint must consist of only that one column. Otherwise the foreign key references the primary key of the second table. Primary key and foreign key must have the same data type and the same precision, scale and sign. Only a non-unique single-column HG index is created for a single-column foreign key. For a multicolumn foreign key, Sybase IQ creates a non-unique composite HG index. The maximum width of a multicolumn composite key for a unique or non-unique HG index is 1KB.

A temporary table cannot have a foreign key that references a base table and a base table cannot have a foreign key that references a temporary table. Local temporary tables cannot have or be referenced by a foreign key.

FOREIGN KEY [role-name] [(...)] REFERENCES primary-table-name [(...)] This clause defines foreign key references to a primary key or a unique constraint in another table. Normally, a foreign key would be for a primary key rather than an unique constraint. (In this description, this other table will be called the primary table.)

If the primary table column names are not specified, then the primary table columns will be the columns in the table's primary key. If foreign key column names are not specified then the foreign key columns will have the same names as the columns in the primary table. If foreign key column names are specified, then the primary key column names must be specified, and the column names are paired according to position in the lists.

If the primary table is not the same as the foreign key table, either the unique or primary key constraint must have been defined on the referenced key. Both referenced key and foreign key must have the same number of columns, of identical data type with the same sign, precision, and scale.

The value of the row's foreign key must appear as a candidate key value in one of the primary table's rows unless one or more of the columns in the foreign key contains null(s) in a null allows foreign key column.

Any foreign key column not explicitly defined will automatically be created with the same data type as the corresponding column in the primary table. These automatically created columns cannot be part of the primary key of the foreign table. Thus, a column used in both a primary key and foreign key must be explicitly created.

The *role-name* is the name of the foreign key. The main function of the *role-name* is to distinguish two foreign keys to the same table. If no *role-name* is specified, the role-name is assigned as follows:

1 If there is no foreign key with a *role-name* the same as the table name, then the table name is assigned as the *role-name*.

2 If the table name is already taken, the *role-name* is the table name concatenated with a zero-padded three-digit number unique to the table.

The referential integrity action defines the action to be taken to maintain foreign key relationships in the database. Whenever a primary key value is changed or deleted from a database table, there may be corresponding foreign key values in other tables that should be modified in some way. You can specify an ON DELETE clause, followed by the RESTRICT clause:

RESTRICT Generates an error if you try to update or delete a primary key value while there are corresponding foreign keys elsewhere in the database. Generates an error if you try to update a foreign key so that you create new values unmatched by a candidate key. This is the default action, unless you specify that LOAD optionally reject rows that violate referential integrity.This enforces referential integrity at the statement level.

If you use CHECK ON COMMIT without specifying any actions, then RESTRICT is implied as an action for DELETE. Sybase IQ does not support CHECK ON COMMIT.

A global temporary table cannot have a foreign key that references a base table and a base table cannot have a foreign key that references a global temporary table. Local temporary tables cannot have or be referenced by a foreign key.

CHECK (condition) No row is allowed to fail the condition. If an INSERT statement would cause a row to fail the condition, the operation is not permitted and the effects of the statement are undone.

The change is rejected only if the condition is FALSE; in particular, the change is allowed if the condition is UNKNOWN. (See “NULL value” and “Search conditions” in Chapter 3, “SQL Language Elements” for more information about TRUE, FALSE, and UNKNOWN conditions.) CHECK condition is *not* enforced by Sybase IQ.

Note Sybase recommends that you do not define referential integrity (i.e., foreign key-primary key relationships) in IQ unless you are certain there are no orphan foreign keys.

Remote tables

Foreign key definitions are ignored on remote tables. Foreign key definitions on local tables that refer to remote tables are also ignored. Primary key definitions will be sent to the remote server if the server supports it.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry level feature.

  The following are vendor extensions:

  - The { IN | ON } *dbspace-name* clause.
  - The ON COMMIT clause
  - Some of the default values.

- **Sybase** Supported by Adaptive Server Enterprise, with some differences.
  - **Temporary tables** You can create a temporary table by preceding the table name in a CREATE TABLE statement with a pound sign (#). These temporary tables are Sybase IQ declared temporary tables, which are available only in the current connection. For information about declared temporary tables, see DECLARE LOCAL TEMPORARY TABLE statement.
  - **Physical placement** Physical placement of a table is carried out differently in Sybase IQ and in Adaptive Server Enterprise. The *ON segment-name* clause supported by Adaptive Server Enterprise is supported in Sybase IQ, but *segment-name* refers to an IQ dbspace.
  - **Constraints** Sybase IQ does not support named constraints or named defaults, but does support user-defined data types which allow constraint and default definitions to be encapsulated in the data type definition. It also supports explicit defaults and CHECK conditions in the CREATE TABLE statement.
  - **NULL default** By default, columns in Adaptive Server Enterprise default to NOT NULL, whereas in Sybase IQ the default setting is NULL, to allow NULL values. This setting can be controlled using the allow_nulls_by_default option. For information on this option, see "ALLOW_NULLS_BY_DEFAULT option [TSQL]" on page 31. You should explicitly specify NULL or NOT NULL to make your data definition statements transferable.

Permissions

Must have RESOURCE authority. To create a table for another user, you must have DBA authority.

See also

- DROP statement
- ALTER TABLE statement
- CREATE DBSPACE statement
- CREATE INDEX statement
- DECLARE LOCAL TEMPORARY TABLE statement
- "MINIMIZE_STORAGE option" on page 95
- Chapter 5, "Working with Database Objects" in *Sybase IQ System Administration Guide*

CREATE VARIABLE statement

Description

Creates a SQL variable.

Syntax

CREATE VARIABLE *identifier data-type*

Examples

- The following code fragment could be used to insert a large text value into the database.

```
EXEC SQL BEGIN DECLARE SECTION;
char buffer[5000];
EXEC SQL END DECLARE SECTION;
EXEC SQL CREATE VARIABLE hold_blob VARCHAR;
EXEC SQL SET hold_blob = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( buffer, 1, 5000, fp );
    if( size <= 0 ) break;
    /* add data to blob using concatenation
    Note that concatenation works for binary
    data too! */
    EXEC SQL SET hold_blob = hold_blob || :buffer;
}
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_blob );
EXEC SQL DROP VARIABLE hold_blob;
```

Usage

The CREATE VARIABLE statement creates a new variable of the specified data type. The variable contains the NULL value until it is assigned a different value by the SET VARIABLE statement.

A variable can be used in a SQL expression anywhere a column name is allowed. If a column name exists with the same name as the variable, the variable value is used.

Variables belong to the current connection, and disappear when you disconnect from the database or when you use the DROP VARIABLE statement. Variables are not visible to other connections. Variables are not affected by COMMIT or ROLLBACK statements.

In Version 12.5 and above, variables created with the CREATE VARIABLE statement persist for a connection even when the statement is issued within a (BEGIN...END) statement. You must use DECLARE to create variables that only persist within a (BEGIN...END) statement, for example, within stored procedures.

Variables are useful for creating large text or binary objects for INSERT or UPDATE statements from Embedded SQL programs.

Local variables in procedures and triggers are declared within a compound statement (see "Using compound statements" in Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*).

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

None.

See also

- BEGIN... END statement
- DECLARE statement
- Chapter 4, "SQL Data Types"
- DROP VARIABLE statement
- SET statement

CREATE VIEW statement

Description

Creates a view on the database. Views are used to give a different perspective on the data even though it is not stored that way.

Syntax

CREATE VIEW
... [*owner*.]*view-name* [(*column-name* [, ...])]
... **AS** *select-without-order-by*
... [**WITH CHECK OPTION**]

Examples

- Create a view showing all information for male employees only. This view has the same column names as the base table.

```
CREATE VIEW male_employee
AS SELECT *
FROM Employee
WHERE Sex = 'M'
```

- Create a view showing employees and the departments they belong to.

```
CREATE VIEW emp_dept
AS SELECT emp_lname, emp_fname, dept_name
FROM Employee JOIN Department
ON Employee.dept_id = Department.dept_id
```

Usage

The CREATE VIEW statement creates a view with the given name. A view can be created for another user by specifying the owner. You must have DBA authority to create a view for another user.

A view name can be used in place of a table name in SELECT, DELETE, UPDATE, and INSERT statements. Views, however, do not physically exist in the database as tables. They are derived each time they are used. The view is derived as the result of the SELECT statement specified in the CREATE VIEW statement. Table names used in a view should be qualified by the user ID of the table owner. Otherwise, a different user ID might not be able to find the table or might get the wrong table.

The columns in the view are given the names specified in the column name list. If the column name list is not specified, then the view columns are given names from the select list items. In order to use the names from the select list items, the items must be a simple column name or they must have an alias-name specified (see SELECT statement). You cannot add or drop IDENTIY/AUTOINCREMENT columns from a view.

Views can be updated unless the SELECT statement defining the view contains a GROUP BY clause, an aggregate function, or involves a UNION operation. An update to the view causes the underlying table(s) to be updated

view-name The *view-name* is an identifier. The default owner is the current user ID.

column-name The columns in the view are given the names specified in the *column-name* list. If the column name list is not specified, the view columns are given names from the select list items. In order to use the names from the select list items, each item must be a simple column name or have an alias-name specified (see SELECT statement).

AS clause The SELECT statement on which the view is based must not have an ORDER BY clause on it. It may have a GROUP BY clause and may be a UNION.

WITH CHECK OPTION clause The WITH CHECK OPTION clause rejects any updates and inserts to the view that do not meet the criteria of the views as defined by its SELECT statement. However, Sybase IQ currently ignores this option (it supports the syntax for compatibility reasons).

Side effects

Automatic commit.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions — Must have RESOURCE authority and SELECT permission on the tables in the view definition.

See also
- DROP statement
- CREATE TABLE statement

DEALLOCATE DESCRIPTOR statement [ESQL]

Description — Frees memory associated with a SQL descriptor area.

Syntax — **DEALLOCATE DESCRIPTOR** *descriptor-name*:
string

Examples — For an example, see ALLOCATE DESCRIPTOR statement [ESQL].

Usage — Frees all memory associated with a descriptor area, including the data items, indicator variables, and the structure itself.

Side effects

None.

Standards
- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions — None.

See also — The chapter "The Embedded SQL Interface" of the Adaptive Server Anywhere *Programming Interface Guide*.

SET DESCRIPTOR statement [ESQL] on page 579

Declaration section [ESQL]

Description — Declares host variables in an Embedded SQL program. Host variables are used to exchange data with the database.

Syntax — **EXEC SQL BEGIN DECLARE SECTION**;
... C declarations
EXEC SQL END DECLARE SECTION;

Examples

```
EXEC SQL BEGIN DECLARE SECTION;
```

```
char *emp_lname, initials[5];
int dept;
EXEC SQL END DECLARE SECTION;
```

Usage

A declaration section is simply a section of C variable declarations surrounded by the BEGIN DECLARE SECTION and END DECLARE SECTION statements. A declaration section makes the SQL preprocessor aware of C variables that will be used as host variables. Not all C declarations are valid inside a declaration section. See the chapter “Embedded SQL Programming” of the *Adaptive Server Anywhere Programming Guide* for more information.

Standards

- **SQL/92**
- **Sybase**

Permissions

None.

See also

BEGIN... END statement

DECLARE statement

Description

Declares a SQL variable within a compound statement (BEGIN... END).

Syntax

DECLARE *variable_name data-type*

Examples

The following batch illustrates the use of the DECLARE statement and prints a message on the server window:

```
BEGIN
  DECLARE varname CHAR(61) ;
  SET varname = 'Test name';
  MESSAGE name;
END
```

Usage

Variables used in the body of a procedure can be declared using the DECLARE statement. The variable persists for the duration of the compound statement in which it is declared.

The body of a procedure is a compound statement, and variables must be declared immediately following BEGIN. In a Transact-SQL procedure or trigger, there is no such restriction.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Supported by Adaptive Server Enterprise.

- To be compatible with Adaptive Server Enterprise, the variable name must be preceded by an @.
- In Adaptive Server Enterprise, a variable that is declared in a procedure or trigger exists for the duration of the procedure or trigger. In Sybase IQ, if a variable is declared inside a compound statement, it exists only for the duration of that compound statement (whether it is declared in an IQ SQL or Transact-SQL compound statement).

Permissions

None.

DECLARE CURSOR statement [ESQL] [SP]

Description

Declares a cursor. Cursors are the primary means for manipulating the results of queries.

Syntax

DECLARE *cursor-name*
[**SCROLL**
| **NO SCROLL**
| **DYNAMIC SCROLL**
]
CURSOR FOR
{ *select-statement*
| *statement-name*
[**FOR** {**READ ONLY** | **UPDATE** [**OF** *column-name-list*] }]
| **USING** *variable-name* }

Parameters

cursor-name:
identifier

statement-name:
identifier | host-variable

column-name-list:
identifiers

variable-name:
identifier

Examples

- The following example illustrates how to declare a scroll cursor in Embedded SQL:

```
EXEC SQL DECLARE cur_employee SCROLL CURSOR
FOR SELECT * FROM employee ;
```

- The following example illustrates how to declare a cursor for a prepared statement in Embedded SQL:

```
EXEC SQL PREPARE employee_statement
FROM 'SELECT emp_lname FROM employee' ;
EXEC SQL DECLARE cur_employee CURSOR
FOR employee_statement ;
```

- The following example illustrates the use of cursors in a stored procedure:

```
BEGIN
  DECLARE cur_employee CURSOR FOR
      SELECT emp_lname
      FROM employee ;
  DECLARE name CHAR(40) ;
  OPEN cur_employee;
  LOOP
    FETCH NEXT cur_employee INTO name ;
    ...
  END LOOP
  CLOSE cur_employee;
END
```

Usage

The DECLARE CURSOR statement declares a cursor with the specified name for a SELECT statement or a CALL statement.

SCROLL A cursor declared as SCROLL supports the NEXT, PRIOR, FIRST, LAST, ABSOLUTE, and RELATIVE options of the FETCH statement. A SCROLL cursor allows you to fetch an arbitrary row in the result set while the cursor is open.

NO SCROLL A cursor declared as NO SCROLL is restricted to moving forward through the result set using only the FETCH NEXT and FETCH ABSOLUTE (0) seek operations.

Since rows cannot be returned to once the cursor leaves the row, there are no sensitivity restrictions on the cursor. Consequently, when a NO SCROLL cursor is requested, Sybase IQ supplies the most efficient kind of cursor, which is an asensitive cursor.

DYNAMIC SCROLL A cursor declared as DYNAMIC SCROLL supports the NEXT, PRIOR, FIRST, LAST, ABSOLUTE, and RELATIVE options of the FETCH statement. A DYNAMIC SCROLL cursor allows you to fetch an arbitrary row in the result set while the cursor is open.

FOR statement-name Statements are named using the PREPARE statement. Cursors can be declared only for a prepared SELECT or CALL.

FOR READ ONLY A cursor declared FOR READ ONLY may not be used in a positioned UPDATE or a positioned DELETE operation.

FOR UPDATE You can update the cursor result set of a cursor declared FOR UPDATE. Only asensitive behavior is supported for updatable cursors; any other sensitivity is ignored.

When the cursor is opened, exclusive table locks are taken on all tables that are opened for update. Stand-alone LOAD TABLE, UPDATE, INSERT, DELETE, and TRUNCATE statements are not allowed on tables that are opened for update in the same transaction, since Sybase IQ permits only one statement to modify a table at a time. You can open only one updatable cursor on a specific table at a time.

Updatable cursors are allowed to scroll, except over Open Client.

READ ONLY is the default value of the FOR clause.

OF column-name-list The list of columns from the cursor result set (specified by the *select-statement*) defined as updatable.

USING variable-name You can declare a cursor on a variable in stored procedures and user-defined functions. The variable is a string containing a SELECT statement for the cursor. The variable must be available when the DECLARE is processed, and so must be one of the following:

- A parameter to the procedure. For example:

```
create function get_row_count(in qry varchar)
returns int
begin
    declare crsr cursor using qry;
    declare rowcnt int;

    set rowcnt = 0;
    open crsr;
    lp: loop
        fetch crsr;
        if SQLCODE <> 0 then leave lp end if;
        set rowcnt = rowcnt + 1;
    end loop;
    return rowcnt;
end
```

- Nested inside another BEGIN…END after the variable has been assigned a value. For example:

```
create procedure get_table_name(
in id_value int, out tabname char(128)
)
begin
declare qry varchar;
```

```
set qry = 'select table_name from SYS.SYSTABLE ' ||
          'where table_id=' || string(id_value);
begin
   declare crsr cursor using qry;

   open crsr;
   fetch crsr into tabname;
   close crsr;
end
end
```

Embedded SQL

Statements are named using the PREPARE statement. Cursors can be declared only for a prepared SELECT or CALL.

Updatable cursor support

Sybase IQ support of updatable cursors is similar to Adaptive Server Anywhere support of updatable cursors. For a full discussion of cursor types and working with cursors, see the *Adaptive Server Anywhere Programming Guide*. This section contains information important to the use of updatable cursors in Sybase IQ.

Sybase IQ supports one type of cursor sensitivity, which is defined in terms of which changes to underlying data are visible. All Sybase IQ cursors are asensitive, which means that changes may be reflected in the membership, order, or values of the result set seen through the cursor, or may not be reflected at all.

With an asensitive cursor, changes effected by positioned UPDATE and positioned DELETE statements are visible in the cursor result set, except where client side caching prevents seeing these changes. Inserted rows are not visible.

Rows that are updated so that they no longer meet the requirements of the WHERE clause of the open cursor are still visible.

When using cursors there is always a trade-off between efficiency and consistency. Asensitive cursors provide efficient performance at the expense of consistency.

Sybase IQ supports updatable cursors on single tables.

Supported query specifications for updatable cursors in Sybase IQ are as follows:

- Expressions in the select list against columns that are not functionally dependent on columns being updated
- Arbitrary subqueries with asensitive behavior, that is, changes to data referenced by subqueries are not visible in the cursor result set
- ORDER BY clause; the ORDER BY columns may be updated, but the result set does not re-order
- Columns that meet these requirements:
  - No CAST on a column
  - Base columns of a base table in the SELECT clause
  - There are no expressions or functions on that column in the SELECT clause and it is not duplicated in the select list (for example, SELECT c1, c1).
  - Base columns of a base table restricted to those listed in the FOR UPDATE OF *column-name-list* clause, if the clause is specified.

Sybase IQ does *not* permit updatable cursors on queries that contain any operator that precludes a one-to-one mapping of result set rows to rows in a base table, specifically:

- SELECT DISTINCT
- an operator that has a UNION
- an operator that has a GROUP BY
- an operator that has a SET function (single group or extended GROUP BY)
- an operator that has an OLAP function, with the exception of RANK()

See the description of the UPDATE (positioned) statement [ESQL] [SP] on page 597 for information on the columns and expressions allowed in the SET clause for the update of a row in the result set of a cursor.

Sybase IQ supports inserts only on updatable cursors where all nonnullable, nonidentity columns are both selected and updatable.

In Sybase IQ, COMMIT and ROLLBACK are not allowed inside an open updatable cursor, even if the cursor is opened as a hold cursor. IQ does support ROLLBACK TO SAVEPOINT inside an updatable cursor.

Any failure that occurs after the cursor is open results in a rollback of all operations that have been performed through this open cursor.

Updatable cursor limitations

A declared cursor is read-only and not updatable in cases where:

- The data extraction facility is enabled with the TEMP_EXTRACT_NAME1 option set to a pathname
- As a join index, or within a join index
- ANSI_CLOSE_CURSORS_ON_ROLLBACK is set OFF
- CHAINED is set OFF
- The statement is INSERT SELECT or SELECT INTO
- More than one table is included
- No updatable columns exist

If IQ fails to set an updatable cursor when requested, see the *.iqmsg* file for an related information.

Updatable cursor differences

Sybase IQ updatable cursors differ from ANSI SQL/3 standard behavior as follows:

- Hold cursor update close on commit.
- Sybase IQ locks tables when the cursor is open.
- All updates, deletes, and insert operations are applied when the cursor is closed, in the following order: deletes first, then updates, then inserts.

Side effects

None.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

- PREPARE statement [ESQL]
- OPEN statement [ESQL] [SP]
- SELECT statement
- CALL statement
- UPDATE (positioned) statement [ESQL] [SP]
- DELETE (positioned) statement [ESQL] [SP]

DECLARE CURSOR statement [T-SQL]

Description
Declares a cursor in a manner compatible with Adaptive Server Enterprise.

Syntax
DECLARE *cursor-name*
... **CURSOR FOR** *select-statement*
... [**FOR** { **READ ONLY** | **UPDATE** }]

Usage
Sybase IQ supports a DECLARE CURSOR syntax that is not supported in Enterprise. For information on the full DECLARE CURSOR syntax, see DECLARE CURSOR statement [ESQL] [SP].

This section describes the overlap between the IQ and Adaptive Server Enterprise flavors of DECLARE CURSOR.

Side effects

None.

Standards
- **SQL/92** Entry-level compliant. The FOR UPDATE and FOR READ ONLY options are Transact-SQL extensions.
- **Sybase** There are some features of the Adaptive Server Enterprise DECLARE CURSOR statement that are not supported in Sybase IQ.
  - In the Sybase IQ dialect, a DECLARE CURSOR statement in a procedure or batch must immediately follow the BEGIN keyword. In the Transact-SQL dialect, there is no such restriction.
  - In Enterprise, when a cursor is declared in a procedure or batch, it exists for the duration of the procedure or batch. In Sybase IQ, if a cursor is declared inside a compound statement, it exists only for the duration of that compound statement (whether it is declared in a Sybase IQ or Transact-SQL compound statement).

Permissions
None.

See also
DECLARE CURSOR statement [ESQL] [SP]

DECLARE LOCAL TEMPORARY TABLE statement

Description
Declares a local temporary table.

Syntax
DECLARE LOCAL TEMPORARY TABLE *table-name*
... (*column-definition* [*column-constraint*]...
[, *column-definition* [*column-constraint*]...]
[, *table-constraint*]...)

... [**ON COMMIT** { **DELETE** | **PRESERVE** } **ROWS**
NOT TRANSACTIONAL]

Examples

- The following example illustrates how to declare a local temporary table in Embedded SQL:

```
EXEC SQL DECLARE LOCAL TEMPORARY TABLE MyTable (
  number INT
    );
```

- The following example illustrates how to declare a local temporary table in a stored procedure:

```
BEGIN
  DECLARE LOCAL TEMPORARY TABLE TempTab (
    number INT
  );
  ...
END
```

Usage

The DECLARE LOCAL TEMPORARY TABLE statement declares a temporary table.

A local temporary table and the rows in it are only visible to the connection that created the table and inserted the rows. By default, the rows of a temporary table are deleted on COMMIT.

Declared local temporary tables within compound statements exist within the compound statement. Otherwise, the declared local temporary table exists until the end of the connection.

See CREATE TABLE statement for definitions of *column-definition*, *column-constraint*, and *table-constraint*, and the NOT TRANSACTIONAL clause. See SELECT statement for an example of how to select data into a temporary table.

Once you create a local temporary table, either implicitly or explicitly, you cannot create another temporary table of that name for as long as the temporary table exists. For example, you could create a local temporary table implicitly by entering:

```
select * into #tmp from table1
```

Or, you could create a local temporary table explicitly by declaring it:

```
declare local temporary table foo
```

If you then try to select into #tmp or foo, or declare #tmp or foo again, you get an error indicating that #tmp or foo already exists.

When you declare a local temporary table, omit the owner specification. If you specify the same owner.table in more than one DECLARE LOCAL TEMPORARY TABLE statement in the same session, a syntax error is reported. For example, an error is reported when the following statements are executed in the same session:

```
DECLARE LOCAL TEMPORARY TABLE user1.temp(col1 int);
DECLARE LOCAL TEMPORARY TABLE user1.temp(col1 int);
```

If the owner name is omitted, then the error “Item temp already exists” is reported:

```
DECLARE LOCAL TEMPORARY TABLE temp(col1 int);
DECLARE LOCAL TEMPORARY TABLE temp(col1 int);
```

You cannot use the ALTER TABLE and DROP INDEX statements on local temporary tables.

You cannot use the sp_iqindex, sp_iqtablesize, and sp_iqindexsize stored procedures on local temporary tables.

Side effects

None.

Standards

- **SQL/92** Conforms to SQL/92 standard
- **Sybase** Adaptive Server Enterprise does not support DECLARE TEMPORARY TABLE.

Permissions

None.

See also

CREATE TABLE statement

DELETE statement

Description

Deletes rows from the database.

Syntax

DELETE [**FROM**] [*owner*.]*table-name*
... [**FROM** *table-list*]
... [**WHERE** *search-condition*]

Examples

- Remove employee 105 from the database.

  ```
  DELETE
  FROM employee
  WHERE emp_id = 105
  ```

- Remove all data prior to 1993 from the fin_data table.

```
DELETE
FROM fin_data
WHERE year < 1993
```

- Remove all names from the contact table if they are already present in the customer table.

```
DELETE
FROM contact
FROM contact, customer
WHERE contact.last_name = customer.lname
AND contact.first_name = customer.fname
```

Usage

The DELETE statement deletes all the rows from the named table that satisfy the search condition. If no WHERE clause is specified, all rows from the named table are deleted.

The DELETE statement can be used on views provided the SELECT statement defining the view has only one table in the FROM clause and does not contain a GROUP BY clause, an aggregate function, or involve a UNION operation.

The optional second FROM clause in the DELETE statement allows rows to be deleted based on joins. If the second FROM clause is present, the WHERE clause qualifies the rows of this second FROM clause. Rows are deleted from the table name given in the first FROM clause.

The effects of a DELETE on a table can be passed on to any of the join indexes that reference that table through the SYNCHRONIZE JOIN INDEX command. For performance reasons, you should do as many deletes as possible before synchronizing the join indexes.

Note You cannot use the DELETE statement on a join virtual table. If you attempt to delete from a join virtual table, an error is reported.

Correlation name resolution

The following statement illustrates a potential ambiguity in table names in DELETE statements with two FROM clauses that use correlation names:

```
DELETE
FROM table_1
FROM table_1 AS alias_1, table_2 AS alias_2
WHERE ...
```

The table table_1 is identified without a correlation name in the first FROM clause, but with a correlation name in the second FROM clause. In this case, *table_1* in the first clause is identified with alias_1 in the second clause—there is only one instance of table_1 in this statement.

This is an exception to the general rule that where a table is identified with a correlation name and without a correlation name in the same statement, two instances of the table are considered.

Consider the following example:

```
DELETE
FROM table_1
FROM table_1 AS alias_1, table_1 AS alias_2
WHERE ...
```

In this case, there are two instances of table_1 in the second FROM clause. In this case, there is no way of identifying which instance the first FROM clause should be identified with. The usual rules of correlation names apply, and table_1 in the first FROM clause is identified with neither instance in the second clause: there are three instances of table_1 in the statement.

Side effects

None.

Standards

- **SQL/92** Entry level compliant. The use of more than one table in the FROM clause is a vendor extension.
- **Sybase** Supported by Adaptive Server Enterprise, including the vendor extension.

  The Transact-SQL ROWCOUNT option has no effect on DELETE operations in Sybase IQ.

Permissions

Must have DELETE permission on the table.

See also

- FROM clause
- INSERT statement
- SYNCHRONIZE JOIN INDEX statement
- TRUNCATE TABLE statement

DELETE (positioned) statement [ESQL] [SP]

Description
Deletes the data at the current location of a cursor.

Syntax
DELETE
WHERE CURRENT OF *cursor-name*

Parameters
cursor-name:
identifier | hostvar

Examples
The following statement removes the current row from the database.

```
DELETE WHERE CURRENT OF cur_employee
```

Usage
This form of the DELETE statement deletes the current row of the specified cursor. The current row is defined to be the last row fetched from the cursor.

The positioned DELETE statement can be used on a cursor open on a view as long as the view is updatable.

Changes effected by positioned DELETE statements are visible in the cursor result set, except where client side caching prevents seeing these changes.

Standards
- **SQL/92** Entry-level feature. The range of cursors that can be updated may contain vendor extensions if the ANSI_UPDATE_CONSTRAINTS option is set to OFF.
- **SQL/99** Core feature. The range of cursors that can be updated may contain vendor extensions if the ANSI_UPDATE_CONSTRAINTS option is set to OFF.
- **Sybase** Embedded SQL use is supported by Open Client/Open Server. Procedure and trigger use is supported in Adaptive Server Anywhere.

Permissions
Must have DELETE permission on tables used in the cursor.

See also
- UPDATE statement
- UPDATE (positioned) statement [ESQL] [SP]
- INSERT statement
- DECLARE CURSOR statement [ESQL] [SP]

DESCRIBE statement [ESQL]

Description
Gets information about the host variables required to store data retrieved from the database or host variables used to pass data to the database.

Syntax

DESCRIBE
... [**USER TYPES**]
... [{ **ALL** | **BIND VARIABLES FOR** | **INPUT**
| **OUTPUT** | **SELECT LIST FOR** }]
... [{ **LONG NAMES** [*long-name-spec*] | **WITH VARIABLE RESULT** }]
... [**FOR**] { *statement-name* | **CURSOR** *cursor-name* }
... **INTO** *sqlda-name*

Parameters

long-name-spec:
{ OWNER.TABLE.COLUMN | TABLE.COLUMN | COLUMN }

statement-name:
identifier | host-variable

cursor-name:
declared cursor

sqlda-name:
identifier

Examples

The following example shows how to use the DESCRIBE statement:

```
sqlda = alloc_sqlda( 3 );
EXEC SQL DESCRIBE OUTPUT
  FOR employee_statement
  INTO sqlda;
if( sqlda->sqld  >  sqlda->sqln ) {
  actual_size = sqlda->sqld;
  free_sqlda( sqlda );
  sqlda = alloc_sqlda( actual_size );
  EXEC SQL DESCRIBE OUTPUT
    FOR employee_statement
    INTO sqlda;
}
```

Usage

The DESCRIBE statement sets up the named SQLDA to describe either the OUTPUT (equivalently SELECT LIST) or the INPUT (BIND VARIABLES) for the named statement.

In the INPUT case, DESCRIBE BIND VARIABLES does not set up the data types in the SQLDA: this needs to be done by the application. The ALL keyword allows you to describe INPUT and OUTPUT in one SQLDA.

If you specify a statement name, the statement must have been previously prepared using the PREPARE statement with the same statement name and the SQLDA must have been previously allocated (see the ALLOCATE DESCRIPTOR statement [ESQL]).

If you specify a cursor name, the cursor must have been previously declared and opened. The default action is to describe the OUTPUT. Only SELECT statements and CALL statements have OUTPUT. A DESCRIBE OUTPUT on any other statement will indicate no output by setting the sqld field of the SQLDA to zero.

USER TYPES A DESCRIBE statement with the USER TYPES clause returns information about user-defined data types of a column. Typically, such a DESCRIBE will be done when a previous DESCRIBE returns an indicator of DT_HAS_USERTYPE_INFO.

The information returned is the same as for a DESCRIBE without the USER TYPES keywords, except that the sqlname field holds the name of the user-defined data type, instead of the name of the column.

If the DESCRIBE uses the LONG NAMES clause, the sqldata field holds this information.

SELECT The DESCRIBE OUTPUT statement fills in the data type and length in the SQLDA for each select list item. The name field is also filled in with a name for the select list item. If an alias is specified for a select list item, the name will be that alias. Otherwise, the name will be derived from the select list item: if the item is a simple column name, it will be used, otherwise, a substring of the expression will be used. DESCRIBE will also put the number of select list items in the sqld field of the SQLDA.

If the statement being described is a UNION of two or more SELECT statements, the column names returned for DESCRIBE OUTPUT are the same column names which would be returned for the first SELECT statement.

CALL The DESCRIBE OUTPUT statement fills in the data type, length, and name in the SQLDA for each INOUT or OUT parameter in the procedure. DESCRIBE OUTPUT will also put the number of INOUT or OUT parameters in the sqld field of the SQLDA.

CALL (result set) The DESCRIBE OUTPUT statement fills in the data type, length, and name in the SQLDA for each RESULT column in the procedure definition. DESCRIBE OUTPUT will also put the number of result columns in the sqld field of the SQLDA.

A bind variable is a value supplied by the application when the database executes the statements. Bind variables can be considered parameters to the statement. DESCRIBE INPUT will fill in the name fields in the SQLDA with the bind variable names. DESCRIBE INPUT will also put the number of bind variables in the sqld field of the SQLDA.

DESCRIBE uses the indicator variables in the SQLDA to provide additional information. DT_PROCEDURE_IN and DT_PROCEDURE_OUT are bits that are set in the indicator variable when a CALL statement is described. DT_PROCEDURE_IN indicates an IN or INOUT parameter and DT_PROCEDURE_OUT indicates an INOUT or OUT parameter. Procedure RESULT columns will have both bits clear. After a describe OUTPUT, these bits can be used to distinguish between statements that have result sets (need to use OPEN, FETCH, RESUME, CLOSE) and statements that do not (need to use EXECUTE). DESCRIBE INPUT only sets DT_PROCEDURE_IN and DT_PROCEDURE_OUT appropriately when a bind variable is an argument to a CALL statement; bind variables within an expression that is an argument in a CALL statement will not set the bits.

DESCRIBE ALL allows you to describe INPUT and OUTPUT with one request to the database server. This has a performance benefit in a multiuser environment. The INPUT information will be filled in the SQLDA first, followed by the OUTPUT information. The sqld field contains the total number of INPUT and OUTPUT variables. The DT_DESCRIBE_INPUT bit in the indicator variable is set for INPUT variables and clear for OUTPUT variables.

Retrieving long column names

The LONG NAMES clause is provided to retrieve column names for a statement or cursor. Without this clause, there is a 29-character limit on the length of column names: with the clause, names of an arbitrary length are supported.

If LONG NAMES is used, the long names are placed into the SQLDATA field of the SQLDA, as if you were fetching from a cursor. None of the other fields (SQLLEN, SQLTYPE, and so on) are filled in. The SQLDA must be set up like a FETCH SQLDA: it must contain one entry for each column, and the entry must be a string type.

The default specification for the long names is TABLE.COLUMN.

Describing variable result sets

The WITH VARIABLE RESULT statement is used to describe procedures that may have more than one result set, with different numbers or types of columns.

If WITH VARIABLE RESULT is used, the database server sets the SQLCOUNT value after the describe to one of the following values:

- **0** The result set may change: the procedure call should be described again following each OPEN statement.
- **1** The result set is fixed. No re-describing is required.

For more information on the use of the SQLDA structure, see the chapter "Embedded SQL Programming" of the *Adaptive Server Anywhere Programming Guide*.

Side effects

None.

Standards

- **SQL/92** Part of the SQL/92 standard. Some clauses are vendor extensions.
- **Sybase** Some clauses supported by Open Client/Open Server.

Permissions

None.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- OPEN statement [ESQL] [SP]
- PREPARE statement [ESQL]

DISCONNECT statement [DBISQL]

Description

Drops a connection with the database.

Syntax

DISCONNECT [{ *connection-name* | **CURRENT** | **ALL** }]

Parameters

connection-name:
identifier, string, or host-variable

Examples

- The following statement shows how to use DISCONNECT in Embedded SQL:

```
EXEC SQL DISCONNECT :conn_name
```

- The following statement shows how to use DISCONNECT from DBISQL to disconnect all connections:

```
DISCONNECT ALL
```

Usage

The DISCONNECT statement drops a connection with the database server and releases all resources used by it. If the connection to be dropped was named on the CONNECT statement, then the name can be specified. Specifying ALL will drop all of the application's connections to all database environments. CURRENT is the default and will drop the current connection.

An implicit ROLLBACK is executed on connections that are dropped.

Side effects

None.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

- CONNECT statement [ESQL] [DBISQL]
- SET CONNECTION statement [DBISQL] [ESQL]

DROP statement

Description

Removes objects from the database.

Syntax

DROP
{ **DBSPACE** *dbspace-name*
| { **DATATYPE** | **DOMAIN** } *datatype-name*
| **EVENT** *event-name*
| **INDEX** [[*owner*].*table-name*.]*index-name*
| **JOIN INDEX** [*owner*.]*join-index-name*
| **MESSAGE** *message-number*
| **TABLE** [*owner*.]*table-name*
| **VIEW** [*owner*.]*view-name*
| **PROCEDURE** [*owner*.]*procedure-name*
| **FUNCTION** [*owner*.]*function-name* }

Examples

- Drop the department table from the database.

  ```
  DROP TABLE department
  ```

- Drop the emp_dept view from the database.

  ```
  DROP VIEW emp_dept
  ```

Usage

The DROP statement removes the definition of the indicated database structure. If the structure is a dbspace, then all tables with any data in that dbspace must be dropped or relocated prior to dropping the dbspace; other structures are automatically relocated. If the structure is a table, all data in the table is automatically deleted as part of the dropping process. Also, all indexes and keys for the table are dropped by the DROP TABLE statement. However, you cannot drop the table if any join indexes exist that use that table. You must first use DROP JOIN INDEX to remove the join indexes.

DROP INDEX deletes any explicitly created index. It only deletes an implicitly created index if there is no associated primary key, unique, or foreign key constraint(s).

DROP INDEX for a non-unique HG index fails if an associated unenforced foreign key exists.

Warning! Do not delete views owned by the DBO user. Deleting such views or changing them into tables may cause problems.

DROP TABLE, DROP INDEX, DROP JOIN INDEX, and DROP DBSPACE are prevented whenever the statement affects a table that is currently being used by another connection.

DROP TABLE is prevented if the primary table has foreign key constraints associated with it, including unenforced foreign key constraints.

A foreign key can have either a non-unique single or a multicolumn HG index. A primary key may have unique single or multicolumn HG indexes. You cannot drop the HG index implicitly created for an existing foreign key, primary key and unique constraint. If a DBA is dropping a join index belonging to another user, the join index name must be qualified with an owner name.

The four initial dbspaces are SYSTEM, IQ_SYSTEM_MAIN, IQ_SYSTEM_TEMP, and IQ_SYSTEM_MSG. Any dbspace, except SYSTEM and IQ_SYSTEM_MSG, can be dropped using DROP DBSPACE, as long as there is at least one remaining dbspace with readwrite mode. You must relocate or drop tables in the dbspace, before you can drop the dbspace. An error is returned if the dbspace still contains user data; other structures are automatically relocated when the dbspace is dropped. Dbspace names are case sensitive for databases created with CASE RESPECT.

Note A dbspace may contain data at any point after it is used by a command, thereby preventing a DROP DBSPACE on it.

See the section “Working with dbspaces” in Chapter 5, “Working with Database Objects” of the *Sybase IQ System Administration Guide* for more information on modifying dbspaces.

DROP PROCEDURE is prevented when the procedure is in use by another connection.

DROP DATATYPE is prevented if the data type is used in a table. You must change data types on all columns defined on the user-defined data type in order to drop the data type. It is recommended that you use DROP DOMAIN rather than DROP DATATYPE, as DROP DOMAIN is the syntax used in the ANSI/ISO SQL3 draft.

Note Do not use DROP DOMAIN on a multiplex query server without a local IQ Main Store. Synchronizing the multiplex removes domains from query servers without local stores. If the Query Server has a local store, then both CREATE DOMAIN and DROP DOMAIN are permitted.

Side effects

Automatic commit. Clears the Data window in DBISQL. DROP TABLE and DROP INDEX close all cursors for the current connection.

Local temporary tables are an exception; no commit is performed when one is dropped.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

For DROP DBSPACE, must have DBA authority and must be the only connection to the database.

For others, must be the owner of the object, or have DBA authority.

Global temporary tables cannot be dropped unless all users that have referenced the temporary table have disconnected.

See also

- CREATE DOMAIN statement
- CREATE DBSPACE statement
- CREATE TABLE statement
- CREATE INDEX statement
- CREATE VIEW statement
- CREATE PROCEDURE statement
- CREATE EVENT statement
- CREATE MESSAGE statement [T-SQL]
- ALTER TABLE statement
- ALTER DBSPACE statement

- "sp_iqdbspace procedure" in Chapter 9, "System Procedures"
- Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*

DROP CONNECTION statement

Description — Drops a connection to the database, belonging to any user.

Syntax — **DROP CONNECTION** *connection-id*

Examples

- The following statement drops connection with ID number 4.

```
DROP CONNECTION 4
```

Usage — The DROP CONNECTION statement disconnects a user from the database by dropping the connection to the database.

The *connection-id* for the connection is obtained using the connection_property function to request the connection number. The following statement returns the connection ID of the current connection:

```
SELECT connection_property( 'number' )
```

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions — Must have DBA authority.

See also — CONNECT statement [ESQL] [DBISQL]

DROP DATABASE statement

Description — Drops a database and its associated dbspace segment files.

Syntax — **DROP DATABASE** *db-filename* [**KEY** *key-spec*]

Parameters

key-spec:
A string, including mixed cases, numbers, letters, and special characters. It may be necessary to protect the key from interpretation or alteration by the command shell.

Examples

- The following statement drops database mydb.

```
DROP DATABASE mydb.db
```

- The following statement drops the encrypted database *marvin.db*, which was created with the key *is!seCret*:

```
DROP DATABASE 'marvin.db' KEY 'is!seCret'
```

- The following UNIX example drops the database *temp.db* from the */s1/temp* directory.

```
DROP DATABASE '/s1/temp/temp.db'
```

Usage

The DROP DATABASE statement drops all the database segment files associated with the IQ STORE and TEMPORARY STORE before it drops the CATALOG store files.

The database must be stopped before you can drop it. If the connection parameter AUTOSTOP=no is used, you may need to issue a STOP DATABASE statement.

The *db-filename* you specify corresponds to the database filename you defined for the database using the CREATE DATABASE command. If you specified a directory path for this value in the CREATE DATABASE command, *you must also specify the directory path* for DROP DATABASE. Otherwise, Sybase IQ looks for the database files in the default directory where the server files reside.

You cannot execute a DROP DATABASE statement to drop an IQ database that has a DatabaseStart event defined for it.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Required permissions are set using the database server -gu command-line option. The default setting is to require DBA authority.

See also

CREATE DATABASE statement

DROP EXTERNLOGIN statement

Description — Drops an external login from the IQ system tables.

Syntax — **DROP EXTERNLOGIN** *login-name*
TO *remote-server*

Examples

```
DROP EXTERNLOGIN dba TO sybase1
```

Usage — DROP EXTERNLOGIN deletes an external login from the IQ system tables.

login-name specifies the local user login name

TO clause The TO clause specifies the name of the remote server. The local user's alternate login name and password for that server is the external login that is deleted.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions — Only the login-name and the DBA account can delete an external login for login-name.

See also — CREATE EXTERNLOGIN statement

DROP SERVER statement

Description — Drops a remote server from the IQ system tables.

Syntax — **DROP SERVER** *server-name*

Examples

```
DROP SERVER ase_prod
```

Usage — DROP SERVER deletes a remote server from the IQ system tables. You must drop all the proxy tables that have been defined for the remote server before this statement will succeed.

Side effects

Automatic commit.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions — Only the DBA account can delete a remote server.

See also CREATE SERVER statement

DROP SERVICE statement

Description Deletes a web service.

Syntax **DROP SERVICE** *service-name*

Examples To drop a web service named tables, execute the following statement:

```
DROP SERVICE tables
```

Usage DROP SERVICE deletes a web service.

Side effects

None.

Standards
- **SQL/92** Vendor extension
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions Must have DBA authority.

See also
- ALTER SERVICE statement
- CREATE SERVICE statement
- Using the Built-in Web Server in *Adaptive Server Anywhere Database Administration Guide*

DROP STATEMENT statement [ESQL]

Description Frees statement resources.

Syntax **DROP STATEMENT** [*owner*.]*statement-name*

Parameters *statement-name*:
identifier or host-variable

Examples
- The following are examples of DROP STATEMENT use:

```
EXEC SQL DROP STATEMENT S1;
EXEC SQL DROP STATEMENT :stmt;
```

Usage

The DROP STATEMENT statement frees resources used by the named prepared statement. These resources are allocated by a successful PREPARE statement, and are normally not freed until the database connection is released.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Open Client/Open Server

Permissions

Must have prepared the statement.

See also

PREPARE statement [ESQL]

DROP VARIABLE statement

Description

Eliminates a SQL variable.

Syntax

DROP VARIABLE *identifier*

Usage

The DROP VARIABLE statement eliminates a SQL variable previously created using the CREATE VARIABLE statement. Variables will be automatically eliminated when the database connection is released. However, variables are often used for large objects. Thus, eliminating them after use may free up significant resources (primarily disk space).

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise.

Permissions

None.

See also

- CREATE VARIABLE statement
- SET statement

EXECUTE statement [ESQL]

Description

Executes a SQL statement.

Syntax

Syntax 1

EXECUTE *statement-name*
... [{ **USING DESCRIPTOR** *sqlda-name* | **USING** *host-variable-list* }]
... [{ **INTO DESCRIPTOR** *into-sqlda-name* | **INTO** *into-host-variable-list*]
... [**ARRAY** :*nnn* }]

Syntax 2

EXECUTE IMMEDIATE *statement*

Parameters

statement-name:
identifier or host-variable

sqlda-name:
identifier

into-sqlda-name:
identifier

statement:
string or host-variable

Examples

- Execute a DELETE.

```
EXEC SQL EXECUTE IMMEDIATE
'DELETE FROM employee WHERE emp_id = 105';
```

- Execute a prepared DELETE statement.

```
EXEC SQL PREPARE del_stmt FROM
'DELETE FROM employee WHERE emp_id = :a';
EXEC SQL EXECUTE del_stmt USING :employee_number;
```

- Execute a prepared query.

```
EXEC SQL PREPARE sel1 FROM
'SELECT emp_lname FROM employee WHERE emp_id = :a';
EXEC SQL EXECUTE sel1 USING :employee_number INTO
:emp_lname;
```

Usage

Format 1 executes the named dynamic statement which was previously prepared. If the dynamic statement contains host variable place holders which supply information for the request (bind variables), then either the sqlda-name must specify a C variable which is a pointer to an SQLDA containing enough descriptors for all bind variables occurring in the statement, or the bind variables must be supplied in the host-variable-list.

The optional ARRAY clause can be used with prepared INSERT statements, to allow wide inserts, which insert more than one row at a time and which may improve performance. The value nnn is the number of rows to be inserted. The SQLDA must contain nnn * (columns per row) variables. The first row is placed in SQLDA variables 0 to (columns per row)-1, and so on.

OUTPUT from a SELECT statement or a CALL statement is put either into the variables in the variable list or into the program data areas described by the named SQLDA. The correspondence is one to one from the OUTPUT (selection list or parameters) to either the host variable list or the SQLDA descriptor array.

If EXECUTE is used with an INSERT statement, the inserted row is returned in the second descriptor. For example, when using auto-increment primary keys that generate primary key values, the EXECUTE statement provides a mechanism to re-fetch the row immediately and determine the primary key value assigned to the row.

Format 2 is a short form to PREPARE and EXECUTE a statement that does not contain bind variables or output. The SQL statement contained in the string or host-variable is immediately executed.

The EXECUTE statement can be used for any SQL statement that can be prepared. Cursors are used for SELECT statements or CALL statements that return many rows from the database.

After successful execution of an INSERT, UPDATE, or DELETE statement, the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) is filled in with the number of rows affected by the operation.

Side effects

None.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Supported in Open Client/Open Server.

Permissions

Permissions are checked on the statement being executed.

See also

- PREPARE statement [ESQL]
- DECLARE CURSOR statement [ESQL] [SP]

EXECUTE statement [T-SQL]

Description

Invokes a procedure, as an Adaptive Server Enterprise-compatible alternative to the CALL statement.

Syntax

EXECUTE [*@return_status* =] [*owner*.]*procedure_name*
... { [*@parameter-name* =] *expression*
| [*@parameter-name* =] *@variable* [*output*] } ,...

Examples

- The following demonstration procedure is used to illustrate the EXECUTE statement.

```
CREATE PROCEDURE p1( @var INTEGER = 54 )
AS
PRINT 'on input @var = %1! ', @var
DECLARE @internal_var integer
SELECT @intvar=123
SELECT @var=@intvar
PRINT 'on exit @var = %1!', @var
```

- The following statement executes the procedure, supplying the input value of 23 for the parameter. If you are connected from an Open Client application, the PRINT messages are displayed on the client window. If you are connected from an ODBC or Embedded SQL application, the messages are displayed on the database server window.

```
EXECUTE p1 23
```

- The following is an alternative way of executing the procedure, which is useful if there are several parameters.

```
EXECUTE p1 @var = 23
```

- The following statement executes the procedure, using the default value for the parameter

```
EXECUTE p1
```

- The following statement executes the procedure, and stores the return value in a variable for checking return status.

```
EXECUTE @status = p1 23
```

Usage

The EXECUTE statement executes a stored procedure, optionally supplying procedure parameters and retrieving output values and return status information.

The EXECUTE statement is implemented for Transact-SQL compatibility, but can be used in either Transact-SQL or Sybase IQ batches and procedures.

Side effects

None.

Permissions — Must be the owner of the procedure, have EXECUTE permission for the procedure, or have DBA authority.

See also — CALL statement

EXECUTE IMMEDIATE statement [ESQL] [SP]

Description — Enables dynamically constructed statements to be executed from within a procedure.

Syntax

Syntax 1

EXECUTE IMMEDIATE [*execute-option*] *string-expression*

execute-option:
WITH QUOTES [**ON** | **OFF**]
| **WITH ESCAPES** { **ON** | **OFF** }
| **WITH RESULT SET** { **ON** | **OFF** }

Syntax 2

EXECUTE (*string-expression*)

Examples — The following procedure creates a table, where the table name is supplied as a parameter to the procedure. The EXECUTE IMMEDIATE statement must all be on a single line.

```
CREATE PROCEDURE CreateTableProc(
                    IN tablename char(30)
                    )
BEGIN
    EXECUTE IMMEDIATE 'CREATE TABLE ' || tablename ||
' ( column1 INT PRIMARY KEY)'
END
```

To call the procedure and create a table mytable:

```
CALL CreateTableProc( 'mytable' )
```

Usage — The EXECUTE IMMEDIATE statement extends the range of statements that can be executed from within procedures. It lets you execute dynamically prepared statements, such as statements that are constructed using the parameters passed in to a procedure.

Literal strings in the statement must be enclosed in single quotes, and must differ from any existing statement name in a PREPARE or EXECUTE IMMEDIATE statement. The statement must be on a single line.

Only global variables can be referenced in a statement executed by EXECUTE IMMEDIATE.

Only syntax 2 can be used inside Transact-SQL stored procedures.

WITH QUOTES When you specify WITH QUOTES or WITH QUOTES ON, any double quotes in the string expression are assumed to delimit an identifier. When you do not specify WITH QUOTES, or specify WITH QUOTES OFF, the treatment of double quotes in the string expression depends on the current setting of the QUOTED_IDENTIFIER option.

WITH QUOTES is useful when an object name that is passed into the stored procedure is used to construct the statement that is to be executed, but the name might require double quotes and the procedure might be called when QUOTED_IDENTIFIER is set to OFF.

For more information, see "QUOTED_IDENTIFIER option [TSQL]."

WITH ESCAPES WITH ESCAPES OFF causes any escape sequences (such as \n, \x, or \\) in the string expression to be ignored. For example, two consecutive backslashes remain as two backslashes, rather than being converted to a single backslash. The default setting is equivalent to WITH ESCAPES ON.

One use of WITH ESCAPES OFF is for easier execution of dynamically-constructed statements referencing filenames that contain backslashes.

In some contexts, escape sequences in the *string-expression* are transformed before the EXECUTE IMMEDIATE statement is executed. For example, compound statements are parsed before being executed, and escape sequences are transformed during this parsing, regardless of the WITH ESCAPES setting. In these contexts, WITH ESCAPES OFF prevents further translations from occurring. For example:

```
BEGIN
DECLARE String1 LONG VARCHAR;
DECLARE String2 LONG VARCHAR;
EXECUTE IMMEDIATE
  'SET String1 = ''One backslash: \\\\ ''';
 EXECUTE IMMEDIATE WITH ESCAPES OFF
  'SET String2 = ''Two backslashes: \\\\ ''';
 SELECT String1, String2
END
```

WITH RESULT SET You can have an EXECUTE IMMEDIATE statement return a result set by specifying WITH RESULT SET ON. With this clause, the containing procedure is marked as returning a result set. If you do not include this clause, an error is reported when the procedure is called if the statement does not produce a result set.

Note
The default option is WITH RESULT SET OFF, meaning that no result set is produced when the statement is executed.

Side effects

None. However, if the statement is a data definition statement with an automatic commit as a side effect, then that commit does take place.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Supported in Open Client/Open Server.

Permissions

None. The statement is executed with the permissions of the owner of the procedure, not with the permissions of the user who calls the procedure.

See also

- CREATE PROCEDURE statement
- BEGIN... END statement

EXIT statement [DBISQL]

Description

Leaves DBISQL.

Syntax

{ **EXIT** | **QUIT** | **BYE** }

Usage

Leave the DBISQL environment and return to the operating system. This will close your connection with the database. Before doing so, DBISQL will perform a COMMIT operation if the COMMIT_ON_EXIT option is ON. If the option is OFF, DBISQL will perform a ROLLBACK. The default action is to COMMIT any changes you have made to the database.

Side effects

Will do a commit if option COMMIT_ON_EXIT is ON (default); otherwise will do a rollback.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not applicable in Adaptive Server Enterprise.

Permissions None.

See also SET OPTION statement

FETCH statement [ESQL] [SP]

Description Repositions a cursor and then get data from it.

Syntax
FETCH
{ **NEXT** | **PRIOR** | **FIRST** | **LAST**
| **ABSOLUTE** *row-count* | **RELATIVE** *row-count* }
... *cursor-name*
... { [**INTO** *host-variable-list*]
| **USING DESCRIPTOR** *sqlda-name*
| **INTO** *variable-list* }
... [**PURGE**] [**BLOCK** *n*] [**ARRAY** *fetch-count*]
... **INTO** *variable-list*
... **IQ CACHE** *row-count*

Parameters
cursor-name:
identifier or host-variable

sqlda-name:
identifier

host-variable-list:
may contain indicator variables

row-count:
number or host variable

fetch-count:
integer or host variable

Examples
- The following is an Embedded SQL example.

```
EXEC SQL DECLARE cur_employee CURSOR FOR
SELECT emp_id, emp_lname FROM employee ;
EXEC SQL OPEN cur_employee;
EXEC SQL FETCH cur_employee
INTO :emp_number, :emp_name:indicator;
```

- The following is a procedure example:

```
BEGIN
    DECLARE cur_employee CURSOR FOR
       SELECT emp_lname
       FROM employee ;
```

```
        DECLARE name CHAR(40) ;
        OPEN cur_employee;
        LOOP
           FETCH NEXT cur_employee into name ;
            ...
        END LOOP
        CLOSE cur_employee;
    END
```

Usage

The FETCH statement retrieves one row from the named cursor.

The ARRAY clause allows so-called *wide fetches*, which retrieve more than one row at a time, and which may improve performance.

The cursor must have been previously opened.

One row from the result of the SELECT statement is put into the variables in the variable list. The correspondence is one to one from the select list to the host variable list.

One or more rows from the result of the SELECT statement is put either into the variables in the variable list or into the program data areas described by the named SQLDA. In either case, the correspondence is one to one from the select list to either the host variable list or the SQLDA descriptor array.

The INTO clause is optional. If it is not specified, then the FETCH statement positions the cursor only (see the following paragraphs).

An optional positional parameter can be specified that allows the cursor to be moved before a row is fetched. The default is NEXT which causes the cursor to be advanced one row before the row is fetched. PRIOR causes the cursor to be backed up one row before fetching.

RELATIVE positioning is used to move the cursor by a specified number of rows in either direction before fetching. A positive number indicates moving forward and a negative number indicates moving backwards. Thus, a NEXT is equivalent to RELATIVE 1 and PRIOR is equivalent to RELATIVE -1. RELATIVE 0 retrieves the same row as the last fetch statement on this cursor.

The ABSOLUTE positioning parameter is used to go to a particular row. A zero indicates the position before the first row (see Chapter 8, “Using Procedures and Batches” in the *Sybase IQ System Administration Guide*).

A one (1) indicates the first row, and so on. Negative numbers are used to specify an absolute position from the end of the cursor. A negative one (-1) indicates the last row of the cursor. FIRST is a short form for ABSOLUTE 1. LAST is a short form for ABSOLUTE -1.

Note Sybase IQ does not handle the FIRST, LAST, ABSOLUTE, and negative RELATIVE options very efficiently, so there is a performance impact when using them.

The OPEN statement initially positions the cursor before the first row.

If the fetch includes a positioning parameter and the position is outside the allowable cursor positions, then the SQLE_NOTFOUND warning is issued.

The IQ CACHE clause specifies the maximum number of rows buffered in the FIFO queue. If you do not specify a value for it, the value of the CURSOR_WINDOW_ROWS database option is used. The default setting of CURSOR_WINDOW_ROWS is 200.

Using the FETCH statement in Embedded SQL

The following clauses are for use in Embedded SQL only:

- USING DESCRIPTOR *sqlda-name*
- INTO *host-variable-list*
- PURGE
- BLOCK n
- ARRAY fetch-count
- Use of *host-variable* in cursor-name and row-count.

The DECLARE CURSOR statement must appear before the FETCH statement in the C source code, and the OPEN statement must be executed before the FETCH statement. If a host variable is being used for the cursor name, then the DECLARE statement actually generates code and thus must be executed before the FETCH statement.

In the multiuser environment, rows may be fetched by the client more than one at a time. This is referred to as block fetching or multirow fetching. The first fetch causes several rows to be sent back from the server. The client buffers these rows and subsequent fetches are retrieved from these buffers without a new request to the server.

The BLOCK clause gives the client and server a hint as to how many rows may be fetched by the application. The special value of 0 means the request will be sent to the server and a single row will be returned (no row blocking).

The PURGE clause causes the client to flush its buffers of all rows and then send the fetch request to the server. Note that this fetch request may return a block of rows.

If the SQLSTATE_NOTFOUND warning is returned on the fetch, then the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) will contain the number of rows that the attempted fetch exceeded the allowable cursor positions. (A cursor can be on a row, before the first row or after the last row.) The value is 0 if the row was not found but the position is valid, for example, executing FETCH RELATIVE 1 when positioned on the last row of a cursor. The value will be positive if the attempted fetch was further beyond the end of the cursor, and negative if the attempted fetch was further before the beginning of the cursor.

After successful execution of the fetch statement, the *sqlerrd[1]* field of the SQLCA (SQLIOCOUNT) will be incremented by the number of input/output operations required to perform the fetch. This field is actually incremented on every database statement.

To use wide fetches in Embedded SQL, include the fetch statement in your code as follows:

```
EXEC SQL FETCH . . . ARRAY nnn
```

where *ARRAY nnn* is the last item of the FETCH statement. The fetch count *nnn* can be a host variable. The SQLDA must contain nnn * (columns per row) variables. The first row is placed in SQLDA variables 0 to (columns per row)-1, and so on.

The server returns in SQLCOUNT the number of records fetched and always returns a SQLCOUNT greater than zero unless there is an error. Older versions of the server only return a single row and the SQLCOUNT is set to zero. Thus a SQLCOUNT of zero with no error condition indicates one valid row has been fetched.

Side effects

None.

Standards

- **SQL/92** Entry level feature. Use in procedures is a Persistent Stored Module feature.
- **Sybase** Supported in Adaptive Server Enterprise.

Permissions

The cursor must be opened and the user must have SELECT permission on the tables referenced in the declaration of the cursor.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- PREPARE statement [ESQL]
- OPEN statement [ESQL] [SP]
- “CURSOR_WINDOW_ROWS option” on page 46

FOR statement

Description

Repeats the execution of a statement list once for each row in a cursor.

Syntax

[*statement-label*:]
... **FOR** *for-loop-name* **AS** *cursor-name*
... **CURSOR FOR** *statement*
... [{ **FOR UPDATE** | **FOR READ ONLY** }]
... **DO** *statement-list*
... **END FOR** [*statement-label*]

Examples

- The following fragment illustrates the use of the FOR loop.

```
FOR names AS curs CURSOR FOR
SELECT emp_lname
FROM employee
DO
    CALL search_for_name( emp_lname );
END FOR;
```

Usage

The FOR statement is a control statement that allows you to execute a list of SQL statements once for each row in a cursor. The FOR statement is equivalent to a compound statement with a DECLARE for the cursor and a DECLARE of a variable for each column in the result set of the cursor followed by a loop that fetches one row from the cursor into the local variables and executes *statement-list* once for each row in the cursor.

The name and data type of the local variables that are declared are derived from the *statement* used in the cursor. With a SELECT statement, the data type will be the data type of the expressions in the select list. The names will be the select list item aliases where they exist; otherwise, they will be the name of the columns. Any select list item that is not a simple column reference must have an alias. With a CALL statement, the names and data types will be taken from the RESULT clause in the procedure definition.

The LEAVE statement can be used to resume execution at the first statement after the END FOR. If the ending *statement-label* is specified, it must match the beginning *statement-label*.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

None.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- FETCH statement [ESQL] [SP]
- LEAVE statement
- LOOP statement

FORWARD TO statement

Description

Sends native syntax to a remote server.

Syntax

Syntax 1

FORWARD TO *server-name* { *sql-statement* }

Syntax 2

FORWARD TO [*server-name*]

Examples

The following example shows a passthrough session with the remote server ase_prod:

```
FORWARD TO aseprod
SELECT * from titles
SELECT * from authors
FORWARD TO
```

Usage

The FORWARD TO statement enables users to specify the server to which a passthrough connection is required. The statement can be used in two ways:

- To send a statement to a remote server (syntax 1)
- To place Sybase IQ into passthrough mode for sending a series of statements to a remote server (syntax 2)

When establishing a connection to *server-name* on behalf of the user, the server uses:

- A remote login alias set using CREATE EXTERNLOGIN, or

- If a remote login alias is not set up, the name and password used to communicate with Sybase IQ.

If the connection cannot be made to the server specified, the reason is contained in a message returned to the user.

After statements are passed to the requested server, any results are converted into a form that can be recognized by the client program.

server-name is the name of the remote server.

sql-statement is a command in the remote server's native syntax. The command or group of commands is enclosed in curly brackets ({}).

When you specify a *server_name*, but do not specify a statement in the FORWARD TO query, your session enters passthrough mode, and all subsequent queries are passed directly to the remote server. To turn passthrough mode off, issue FORWARD TO without a *server_name* specification.

Side effects

The remote connection is set to AUTOCOMMIT (unchained) mode for the duration of the FORWARD TO session. Any work that was pending prior to the FORWARD TO statement is automatically committed.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

CREATE SERVER statement

FROM clause

Description

Specifies the database tables or views involved in a SELECT statement.

Syntax

... **FROM** *table-expression* [, ...]

Parameters

table-expression:
{ *table-spec*
| *table-expression join-type table-spec* [ON *condition*]
| (*table-expression* [, ...]) }

table-spec:
{ [*userid*.] *table-name* [[AS] *correlation-name*]
| *select-statement* [AS *correlation-name* (*column-name* [, ...])] }

join-type:
{ CROSS JOIN
| [NATURAL | KEY] JOIN
| [NATURAL | KEY] INNER JOIN
| [NATURAL | KEY] LEFT OUTER JOIN
| [NATURAL | KEY] RIGHT OUTER JOIN
| [NATURAL | KEY] FULL OUTER JOIN }

Examples

- The following are valid FROM clauses:

```
...
FROM employee
...
...
FROM employee NATURAL JOIN department
...
...
FROM customer
KEY JOIN sales_order
KEY JOIN sales_order_items
KEY JOIN product
...
```

- The following query illustrates how to use derived tables in a query:

```
SELECT lname, fname, number_of_orders
FROM customer JOIN
     ( SELECT cust_id, count(*)
       FROM sales_order
        GROUP BY cust_id )
     AS sales_order_counts ( cust_id,
                             number_of_orders )
ON ( customer.id = sales_order_counts.cust_id )
WHERE number_of_orders > 3
```

Usage

The SELECT statement requires a table list to specify which tables will be used by the statement.

Note Although this description refers to tables, it also applies to views unless otherwise noted.

The FROM table list creates a result set consisting of all the columns from all the tables specified. Initially, all combinations of rows in the component tables are in the result set, and the number of combinations is usually reduced by join conditions and/or WHERE conditions.

The *join-type* keywords are described in Table 6-8.

Table 6-8: FROM clause join-type keywords

***join-type* keyword**	**Description**
CROSS JOIN	Returns the Cartesian product (cross product) of the two source tables
NATURAL JOIN	Compares for equality all corresponding columns with the same names in two tables (a special case equi-join; columns are of same length and data type)
KEY JOIN	Restricts foreign key values in the first table to be equal to the primary key values in the second table
INNER JOIN	Discards all rows from the result table that do not have corresponding rows in both tables
LEFT OUTER JOIN	Preserves unmatched rows from the left table, but discards unmatched rows from the right table
RIGHT OUTER JOIN	Preserves unmatched rows from the right table, but discards unmatched rows from the left table
FULL OUTER JOIN	Retains unmatched rows from both the left and the right tables

Do not mix comma style joins and keyword style joins in the FROM clause. The same query can be written two ways, each using *one* of the join styles. The ANSI syntax keyword style join is preferable.

The following query uses a comma style join:

```
SELECT *
  FROM product pr, sales_order so, sales_order_items si
  WHERE pr.prod_id = so.prod_id
    AND pr.prod_id = si.prod_id;
```

The same query can use the preferable keyword style join:

```
SELECT *
  FROM product pr INNER JOIN sales_order so
    ON (pr.prod_id = so.prod_id)
  INNER JOIN sales_order_items si
    ON (pr.prod_id = si.prod_id);
```

The ON clause filters the data of inner, left, right, and full joins. Cross joins do not have an ON clause. In an inner join, the ON clause is equivalent to a WHERE clause. In outer joins, however, the ON and WHERE clauses are different. The ON clause in an outer join filters the rows of a cross product and then includes in the result the unmatched rows extended with nulls. The WHERE clause will then eliminate rows from both the matched and unmatched rows produced by the outer join. You must take care to ensure that unmatched rows you want are not eliminated by the predicates in the WHERE clause.

Subqueries cannot be used inside an outer join ON clause.

For information on writing Transact-SQL compatible joins, see Appendix A, “Compatibility with Other Sybase Databases”.

Tables owned by a different user can be qualified by specifying the *userid*. Tables owned by groups to which the current user belongs are found by default without specifying the user ID.

The correlation name is used to give a temporary name to the table for this SQL statement only. This is useful when referencing columns that must be qualified by a table name but the table name is long and cumbersome to type. The correlation name is also necessary to distinguish between table instances when referencing the same table more than once in the same query. If no correlation name is specified, then the table name is used as the correlation name for the current statement.

If the same correlation name is used twice for the same table in a table expression, that table is treated as if it were only listed once. For example, in:

```
SELECT *
FROM sales_order
KEY JOIN sales_order_items,
sales_order
KEY JOIN employee
```

The two instances of the sales_order table are treated as one instance, and is equivalent to:

```
SELECT *
FROM sales_order_items
KEY JOIN sales_order
KEY JOIN employee
```

By contrast, the following is treated as two instances of the Person table, with different correlation names HUSBAND and WIFE.

```
SELECT *
```

```
FROM Person HUSBAND, Person WIFE
```

You can supply a SELECT statement instead of one or more tables or views in the FROM clause. This allows you to use groups on groups, or joins with groups, without creating a view. This use of SELECT statements is called derived tables.

Join columns require like data types for optimal performance.

Depending on the query, Sybase IQ allows a maximum of between 16 and 64 tables in the FROM clause with the optimizer turned on; however, performance may suffer if you have more than 16 to 18 tables in the FROM clause in very complex queries.

Note If you omit the FROM clause, or if all tables in the query are in the SYSTEM dbspace, the query is processed by Adaptive Server Anywhere instead of Sybase IQ and may behave differently, especially with respect to syntactic and semantic restrictions and the effects of option settings. See the Adaptive Server Anywhere documentation for rules that may apply to processing.

If you have a query that does not require a FROM clause, you can force the query to be processed by Sybase IQ by adding the clause "FROM iq_dummy," where iq_dummy is a one-row, one-column table that you create in your database.

Side effects

None.

Standards

- **SQL/92** Entry level feature.
- **Sybase** The JOIN clause is not supported in some versions of Adaptive Server Enterprise. Instead you must use the WHERE clause to build joins.

Permissions

Must be connected to the database.

See also

- SELECT statement
- DELETE statement
- "Search conditions" on page 162

GET DESCRIPTOR statement [ESQL]

Description

Retrieves information about variables within a descriptor area or retrieves actual data from a variable in a descriptor area

Syntax

GET DESCRIPTOR *descriptor-name*
... { *hostvar* = **COUNT** } | **VALUE** *n assignment* [, ...] }

Parameters

assignment:
hostvar = { TYPE | LENGTH | PRECISION | SCALE | DATA
| INDICATOR | NAME | NULLABLE | RETURNED_LENGTH }

Examples

For an example, see ALLOCATE DESCRIPTOR statement [ESQL].

Usage

The GET DESCRIPTOR statement is used to retrieve information about variables within a descriptor area, or to retrieve actual data from a variable in a descriptor area.

The value *n* specifies the variable in the descriptor area about which the information will be retrieved. Type checking is performed when doing GET ... DATA to ensure that the host variable and the descriptor variable have the same data type.

If an error occurs, it is returned in the SQLCA.

Side effects

None.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

- DEALLOCATE DESCRIPTOR statement [ESQL]
- SET DESCRIPTOR statement [ESQL]

GOTO statement [T-SQL]

Description

Branches to a labeled statement.

Syntax

label:
GOTO *label*

Examples

The following Transact-SQL batch prints the message "yes" on the server window four times:

```
declare @count smallint
select @count = 1
restart:
    print 'yes'
    select @count = @count + 1
    while @count <=4
     goto restart
```

Usage

Any statement in a Transact-SQL procedure or batch can be labeled. The label name is a valid identifier followed by a colon. In the GOTO statement the colon is not used.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Adaptive Server Enterprise supports the GOTO statement.

Permissions

None.

GRANT statement

Description

Gives permissions to specific users and to create new user IDs.

Syntax

Syntax 1

GRANT CONNECT TO *userid* [, ...] **IDENTIFIED BY** *password* [, ...]

Syntax 2

GRANT
{ **DBA**
| **GROUP**
| **MEMBERSHIP IN GROUP** *userid* [, ...]
| **RESOURCE** | **ALL** }
... **TO** *userid* [, ...]

Syntax 3

GRANT
{ **ALL** [**PRIVILEGES**]
| **ALTER**
| **DELETE**
| **INSERT**
| **REFERENCES** [(*column-name* [, ...])]
| **SELECT** [(*column-name* [, ...])]
| **UPDATE** [(*column-name*,...)]
... **ON** [*owner*.]*table-name* **TO** *userid* [, ...] [**WITH GRANT OPTION**]

Syntax 4

GRANT EXECUTE ON [*owner*.]*procedure-name* **TO** *userid* [, ...]

Syntax 5

GRANT INTEGRATED LOGIN TO *user_profile_name* [, ...] **AS USER** *userid*

Examples

- Make two new users for the database.

```
GRANT
CONNECT TO Laurel, Hardy
IDENTIFIED BY Stan, Ollie
```

- Grant permissions on the employee table to user Laurel.

```
GRANT
SELECT, INSERT, DELETE
ON employee
TO Laurel
```

- Allow the user Hardy to execute the Calculate_Report procedure.

```
GRANT
EXECUTE ON Calculate_Report
TO Hardy
```

Usage

The GRANT statement is used to grant database permissions to individual user IDs and groups. It is also used to create and delete users and groups.

Syntax 1 and 2 of the GRANT statement are used for granting special privileges to users as follows:

CONNECT TO userid,... Creates a new user. GRANT CONNECT can also be used by any user to change their own password. To create a user with the empty string as the password, type:

```
GRANT CONNECT TO userid IDENTIFIED BY ""
```

If you have DBA authority, you can change the password of any existing user with the following command:

```
GRANT CONNECT TO userid IDENTIFIED BY password
```

The same command can also be used to add a new user. For this reason, if you inadvertently enter the user ID of an existing user when you mean to add a new user, you are actually changing the password of the existing user. You do not receive a warning because this behavior is considered normal. This behavior differs from pre-Version 12 IQ.

To avoid this situation, use the system procedures sp_addlogin and sp_adduser to add users. These procedures give you an error if you try to add an existing user ID, as in Adaptive Server Enterprise, and pre-Version 12 IQ.

To create a user with no password, type:

```
GRANT CONNECT TO userid
```

Note that the user ID is not case sensitive.

A user with no password cannot connect to the database. This is useful when creating groups when you do not want anyone to connect to the group user ID. The password must be a valid identifier, as described in "Identifiers" on page 150.

DBA Database Administrator authority gives a user permission to do anything. This is usually reserved for the person in the organization who is looking after the database.

GROUP Allows the user(s) to have members. See Chapter 12, "Managing User IDs and Permissions" in the *Sybase IQ System Administration Guide* for a complete description.

MEMBERSHIP IN GROUP userid,... This allows the user(s) to inherit table permissions from a group and to reference tables created by the group without qualifying the table name.

Syntax 3 of the GRANT statement is used to grant permission on individual tables or views. The table permissions can be listed together, or specifying ALL grants all six permissions at once. The permissions have the following meaning:

RESOURCE Allows the user to create tables and views. In syntax 2, ALL is a synonym for RESOURCE that is compatible with Adaptive Server Enterprise.

ALL In syntax 3, this grants all of the permissions outlined below.

ALTER The users will be allowed to alter this table with the ALTER TABLE statement. This permission is not allowed for views.

DELETE The users will be allowed to delete rows from this table or view.

INSERT The users will be allowed to insert rows into the named table or view.

REFERENCES [(column-name,...)] The users will be allowed to create indexes on the named tables, and foreign keys which reference the named tables. If column names are specified, then the users will be allowed to reference only those columns. REFERENCES permissions on columns cannot be granted for views, only for tables.

SELECT [(column-name,...)] The users will be allowed to look at information in this view or table. If column names are specified, then the users will be allowed to look at only those columns. SELECT permissions on columns cannot be granted for views, only for tables.

UPDATE [(column-name,...)] The users will be allowed to update rows in this view or table. If column names are specified, the users will be allowed to update only those columns. UPDATE permissions on columns cannot be granted for views, only for tables. In order to update a table, users must have both SELECT and UPDATE permission on the table.

For example, to grant SELECT and UPDATE permissions on the employee table to user Laurel, enter:

```
GRANT
SELECT, UPDATE ( street )
ON employee
TO Laurel
```

If WITH GRANT OPTION is specified, then the named user ID is also given permission to GRANT the same permissions to other user IDs.

Format 4 of the GRANT statement is used to grant permission to execute a procedure.

Format 5 of the GRANT statement creates an explicit integrated login mapping between one or more Windows user profiles and an existing database user ID, allowing users who successfully log in to their local machine to connect to a database without having to provide a user ID or password.

Side effects

Automatic commit.

Standards

- **SQL/92** Syntax 3 is an entry-level feature. Syntax 4 is a Persistent Stored Module feature. Other syntaxes are vendor extensions.
- **Sybase** Syntax 2 and 3 are supported in Adaptive Server Enterprise. The security model is different in Adaptive Server Enterprise and Sybase IQ, so other syntaxes differ.

Permissions

For Syntax 1 or 2 one of the three following conditions must be met:

- You are changing your own password using GRANT CONNECT

- You are adding members to your own user ID, or
- You have DBA authority.

If you are changing another user's password, the other user must not be connected to the database.

For Syntax 3, one of the following conditions must be met:

- You created the table
- You have been granted permissions on the table with GRANT OPTION, OR
- You have DBA authority

For Syntax 4, one of the following conditions must be met:

- You created the procedure
- You have DBA authority

For Syntax 5, the following condition must be met:

- You have DBA authority

See also

REVOKE statement

HELP statement [DBISQL]

Description

Receives help in the DBISQL environment.

Syntax

HELP [*topic*]

Usage

The HELP statement is used to enter the DBISQL interactive help facility. The *topic* for help can be optionally specified. If *topic* is not specified, then the help system is entered at the index.

Side effects

None.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not applicable

Permissions

None.

IF statement

Description

Provides conditional execution of SQL statements.

Syntax

IF *search-condition* **THEN** *statement-list*
... [**ELSE IF** *search-condition* **THEN** *statement-list*]...
... [**ELSE** *statement-list*]
... **END IF**

Examples

The following procedure illustrates the use of the IF statement:

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35),
OUT TopValue INT)
BEGIN
    DECLARE err_notfound EXCEPTION
    FOR SQLSTATE '02000' ;
    DECLARE curThisCust CURSOR FOR
    SELECT company_name, CAST(
sum(sales_order_items.quantity *
    product.unit_price) AS INTEGER) VALUE
    FROM customer
    LEFT OUTER JOIN sales_order
    LEFT OUTER JOIN sales_order_items
    LEFT OUTER JOIN product
    GROUP BY company_name ;


    DECLARE ThisValue INT ;
    DECLARE ThisCompany CHAR(35) ;
    SET TopValue = 0 ;
    OPEN curThisCust ;
    CustomerLoop:
    LOOP
        FETCH NEXT curThisCust
        INTO ThisCompany, ThisValue ;
        IF SQLSTATE = err_notfound THEN
            LEAVE CustomerLoop ;
        END IF ;
        IF ThisValue > TopValue THEN
            SET TopValue = ThisValue ;
            SET TopCompany = ThisCompany ;
        END IF ;
    END LOOP CustomerLoop ;
    CLOSE curThisCust ;
END
```

Usage

The IF statement is a control statement that allows you to conditionally execute the first list of SQL statements whose *search-condition* evaluates to TRUE. If no *search-condition* evaluates to TRUE, and an ELSE clause exists, the *statement-list* in the ELSE clause is executed. If no *search-condition* evaluates to TRUE, and there is no ELSE clause, the expression returns a NULL value.

Execution resumes at the first statement after the END IF.

When comparing variables to the single value returned by a SELECT statement inside an IF statement, you must first assign the result of the SELECT to another variable.

IF statement is different from IF expression
Do not confuse the syntax of the IF statement with that of the IF expression.

For information on the IF expression, see "Expressions" on page 153.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** The Transact-SQL IF statement has a slightly different syntax.

Permissions

None.

See also

BEGIN... END statement

IF statement [T-SQL]

Description

Provides conditional execution of a Transact-SQL statement, as an alternative to the Sybase IQ IF statement.

Syntax

IF *expression*
... *statement*
... [**ELSE** [**IF** *expression*] *statement*]...

Examples

- The following example illustrates the use of the Transact-SQL IF statement:

```
IF (SELECT max(id) FROM sysobjects) < 100
    RETURN
ELSE
    BEGIN
```

```
        PRINT "These are the user-created objects"
        SELECT name, type, id
        FROM sysobjects
        WHERE id < 100
END
```

- The following two statement blocks illustrate Transact-SQL and Sybase IQ compatibility:

```
/* Transact-SQL IF statement */
IF @v1 = 0
    PRINT '0'
ELSE IF @v1 = 1
    PRINT '1'
ELSE
    PRINT 'other'
/* IQ IF statement */
IF v1 = 0 THEN
    PRINT '0'
ELSEIF v1 = 1 THEN
    PRINT '1'
ELSE
    PRINT 'other'
END IF
```

Usage

The Transact-SQL IF conditional and the ELSE conditional each control the performance of only a single SQL statement or compound statement (between the keywords BEGIN and END).

In contrast to the Sybase IQ IF statement, the Transact-SQL IF statement has no THEN. The Transact-SQL version also has no ELSE IF or END IF keywords.

When comparing variables to the single value returned by a SELECT statement inside an IF statement, you must first assign the result of the SELECT to another variable.

Side effects

None.

Standards

- **SQL/92** Transact-SQL extension.
- **Sybase** Adaptive Server Enterprise supports the Transact-SQL IF statement.

Permissions

None.

INCLUDE statement [ESQL]

Description

Includes a file into a source program to be scanned by the SQL source language preprocessor.

Syntax

INCLUDE *filename*

Parameters

filename:
identifier

Usage

The INCLUDE statement is very much like the C preprocessor #include directive. However, the SQL preprocessor will read the given file inserting its contents into the output C file. Thus, if an include file contains information that the SQL preprocessor requires, it should be included with the Embedded SQL INCLUDE statement.

Two file names are specially recognized: SQLCA and SQLDA. Any C program using Embedded SQL must contain an

```
EXEC SQL INCLUDE SQLCA;
```

statement before any Embedded SQL statements. This statement must appear at a position in the C program where static variable declarations are allowed. Many Embedded SQL statements require variables (invisible to the programmer) which are declared by the SQL preprocessor at the position of the SQLCA include statement. The SQLDA file must be included if any SQLDAs are used.

Side effects

None.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

INSERT statement

Description

Inserts into a table either a single row (Syntax 1) or a selection of rows (Syntax 2) from elsewhere in the current database, or a selection of rows from another database (Syntax 3).

Syntax

Syntax 1

INSERT [**INTO**] [*owner*.]*table-name* [(*column-name* [, ...])]
... **VALUES** (*expression* ...)

Syntax 2

INSERT [**INTO**] [*owner*.]*table-name* [(*column-name* [, ...])]
... *insert-load-options*
... *select-statement*

Syntax 3

INSERT [**INTO**] [*owner*.]*table-name* [(*column-name* [, ...])]
... *insert-load-options*
[**LOCATION** *'servername.dbname* '
[**ENCRYPTED PASSWORD**][**PACKETSIZE** *packet-size*]]
... {*select-statement*}

Parameters

insert-load-options:
[LIMIT *number-of-rows*]
[NOTIFY *number-of-rows*]
[SKIP *number-of-rows*]
[START ROW ID *number*]

Examples

- Add an Eastern Sales department to the database.

```
INSERT
INTO department ( dept_id, dept_name )
VALUES ( 230, 'Eastern Sales' )
```

- Fill the table dept_head with the names of department heads and their departments.

```
INSERT
INTO dept_head (name, dept)
NOTIFY 20
SELECT emp_fname || ' ' || emp_fname
       AS name,
   dept_name
FROM employee JOIN department
ON emp_id = dept_head_id
```

- Insert data from the l_shipdate and l_orderkey columns of the lineitem table from the Sybase IQ 11.5 database asiq11db.dba on the server detroit, into the corresponding columns of the lineitem table in the current database.

```
INSERT INTO lineitem
    (l_shipdate, l_orderkey)
    LOCATION 'detroit.asiqdb'
PACKETSIZE 512
{ SELECT l_shipdate, l_orderkey
    FROM lineitem }
```

Usage

The INSERT statement is used to add new rows to a database table.

Syntax 1 allows the insertion of a single row with the specified expression values. If the list of column names is not specified, the values are inserted into the table columns in the order they were created (the same order as retrieved with SELECT *). The row is inserted into the table at an arbitrary position. (In relational databases, tables are not ordered.)

Syntax 2 allows the user to do mass insertion into a table with the results of a fully general SELECT statement. Insertions are done in an arbitrary order unless the SELECT statement contains an ORDER BY clause. The columns from the select list are matched ordinally with the columns specified in the column list, or sequentially in the order in which the columns were created.

Note The NUMBER(*) function is useful for generating primary keys with Syntax 2 of the INSERT statement (see Chapter 5, “SQL Functions”).

Syntax 3 is a variation of Syntax 2 that allows you to insert data from an Adaptive Server Enterprise or pre-Version 12 IQ database. The *servername.dbname* identifies the server and database for the table in the FROM clause. In order to use Syntax 3, the Adaptive Server Enterprise server to which you are connecting must exist in the *interfaces* file on the local machine. The following Open Client restrictions apply to queries using this syntax:

- You can insert a maximum of 2147483647 rows.
- You cannot use unsigned integer data.

Sybase IQ connects to the server and database you specify and returns the results from the queries in those tables to insert in the current database. If you omit the *server-name*, IQ ignores any *database-name* you might specify since the only choice is the current database on the local server.

The ENCRYPTED PASSWORD parameter allows you to specify the use of Open Client Library default password encryption when connecting to a remote server. If ENCRYPTED PASSWORD is specified and the remote server does not support Open Client Library default password encryption, an error is reported indicating that an invalid user ID or password was used. When used as a remote server, Sybase IQ does not support this password encryption.

The PACKETSIZE parameter specifies the TDS packet size in bytes. The default TDS packet size on most platforms is 512 bytes. If your application is receiving large amounts of text or bulk data across a network, then a larger packet size may significantly improve performance.

The value of *packet-size* must be a multiple of 512 either equal to the default network packet size or between the default network packet size and the maximum network packet size. The maximum network packet size and the default network packet size are a multiple of 512 in the range 512 - 524288 bytes. The maximum network packet size is always greater than or equal to the default network packet size. See the Adaptive Server Enterprise *System Administration Guide, Volume 1* for more information on network packet size.

If INSERT...LOCATION PACKETSIZE *packet-size* is not specified or is specified as zero, then the default packet size value for the platform is used.

Note If you specify an incorrect packet size (for example 933, which is not a multiple of 512), the connection attempt fails with an Open Client ct_connect "Connection failed" error. Any unsuccessful connection attempt returns a generic "Connection failed" message. The Adaptive Server Enterprise error log may contain more specific information about the cause of the connection failure.

While you are connected by INSERT...LOCATION, the IQ hostname and the program_name Sybase IQ appear in sysprocesses in the Adaptive Server Enterprise master database.

Sybase IQ does not support the Adaptive Server Enterprise data type TEXT, but you can execute INSERT...LOCATION (Syntax 3) from both an IQ CHAR or VARCHAR column whose length is greater than 255 bytes, and from an ASE database column of data type TEXT. ASE TEXT and IMAGE columns can be inserted into columns of other IQ data types, if IQ supports the internal conversion. All data inserted is silently right truncated at 32767 bytes.

Note If you use INSERT...LOCATION to insert data selected from a VARBINARY column, set the LOAD_MEMORY_MB option on the *local* database to limit memory used by the insert, and set ASE_BINARY_DISPLAY to OFF on the *remote* database.

INSERT...LOCATION (Syntax 3) does not support the use of variables in the SELECT statement.

Inserts can be done into views provided the SELECT statement defining the view has only one table in the FROM clause and does not contain a GROUP BY clause, an aggregate function, or involve a UNION operation.

Character strings inserted into tables are always stored in the case they are entered, regardless of whether the database is case sensitive or not. Thus a string *Value* inserted into a table is always held in the database with an upper-case V and the remainder of the letters lower case. SELECT statements return the string as *Value*. If the database is not case-sensitive, however, all comparisons make *Value* the same as *value*, *VALUE*, and so on. Further, if a single-column primary key already contains an entry *Value*, an INSERT of *value* is rejected, as it would make the primary key not unique.

Whenever you execute an INSERT ... LOCATION statement, Sybase IQ loads the localization information needed to determine language, collation sequence, character set, and date/time format. If your database uses a non-default locale for your platform, you must set an environment variable on your local client to ensure that Sybase IQ loads the correct information.

If you set the LC_ALL environment variable, Sybase IQ uses its value as the locale name. If LC_ALL is not set, Sybase IQ uses the value of the LANG environment variable. If neither variable is set, Sybase IQ uses the "default" entry in the locales file. For an example, see "Setting locales" in Chapter 11, "International Languages and Character Sets" of the *Sybase IQ System Administration Guide*.

The LIMIT option specifies the maximum number of rows you want to insert into the table from a query. The default is 0 for no limit.

The NOTIFY option specifies that you be notified with a message each time the number of rows are successfully inserted into the table. The default is every 100,000 rows.

The SKIP option lets you define a number of rows to skip at the beginning of the input table(s) for this insert. The default is 0.

The START ROW ID option specifies the record identification number of a row in the IQ table where it should start inserting. This option is used for *partial-width* inserts, which are inserts into a subset of the columns in the table. By default, new rows are inserted wherever there is space in the table, and each insert starts a new row. Partial-width inserts need to start at an existing row. They also need to insert data from the source table into the destination table positionally by column, so you must specify the destination columns in the same order as their corresponding source columns. The default is 0. For more information about partial-width inserts see Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide*.

Note Use the START ROW ID option for partial-width inserts only! If the columns being loaded already contain data, the insert will fail.

An INSERT on a multicolumn index must include all columns of the index.

Side effects

None.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Adaptive Server Enterprise (excluding the *insert-load-options*).

Permissions

Must have INSERT permission on the table.

See also

- DELETE statement
- LOAD TABLE statement
- SYNCHRONIZE JOIN INDEX statement
- "Using the INSERT statement" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide*

INSTALL statement

Description

Makes Java classes available for use within a database.

Syntax

INSTALL JAVA [*install-mode*] [**JAR** *jar-name*] **FROM** *source*

Parameters

install-mode:
{ NEW | UPDATE }

source:
{ FILE *filename* | URL *url-value* }

Examples

- The following statement installs the user-created Java class named Demo by providing the filename and location of the class.

```
INSTALL JAVA NEW
FROM FILE 'D:\JavaClass\Demo.class'
```

After installation, the class is referenced using its name. It's original file path location is no longer used. For example, the following statement uses the class installed in the previous statement.

```
CREATE VARIABLE d Demo
```

If the Demo class was a member of the package sybase.work, the fully qualified name of the class must be used, for example:

```
CREATE VARIABLE d sybase.work.Demo
```

- The following statement installs all the classes contained in a zip file, and associates them within the database with a JAR file name.

```
INSTALL JAVA
JAR 'Widgets'
FROM FILE 'C:\Jars\Widget.zip'
```

Again, the location of the zip file is not retained and classes must be reference using the fully qualified class name (package name and class name). The zip file must be an uncompressed Jar file.

Usage

Install mode Specifying an install mode of NEW requires that the referenced Java classes are new classes, rather than updates of currently installed classes. An error occurs if a class with the same name exists in the database and the NEW install mode is used.

Specifying UPDATE specifies that the referenced Java classes may include replacements for Java classes already installed in the given database.

Connection must be dropped for update to take effect
Updating a Java class installed in a database takes effect immediately. However, the connection used to execute the INSTALL JAVA UPDATE statement has access only to the older version of the Java class until the connection is dropped.

Note A client application executing this statement should drop the database connection used to execute the statement and reconnect in order to get access to the latest version.

This applies to the DBISQL utility also. If you update a Java class by executing the INSTALL statement from DBISQL, the new version is not available until you disconnect from the database engine or server and reconnect.

If install mode is omitted, then the default is NEW.

JAR If this is specified, then the *file-name* or *text-pointer* must designate a jar file or a column containing a jar. Jar files typically have extensions of *.jar* or *.zip*.

Installed jar and zip files can be compressed or uncompressed. However, jar files produced by the Sun JDK *jar* utility are not supported. Files produced by other zip utilities are supported.

If the JAR option is specified, then the jar is retained as a jar after the classes that it contains have been installed. That jar is the associated jar of each of those classes. The set of jars installed in a database with the JAR option are called the retained jars of the database.

Retained jars are referenced in INSTALL and REMOVE statements. Retained jars have no effect on other uses of Java-SQL classes. Retained jars are used by the SQL system for requests by other systems for the class associated with given data. If a requested class has an associated jar, then the SQL system can supply that jar, rather than the individual class.

The *jar-name* is a character string value of length up to 255 bytes. The *jar-name* is used to identify the retained jar in subsequent INSTALL UPDATE and REMOVE statements.

source Specifies the location of the Java class(es) to be installed.

The formats supported for *file-name* include fully qualified file names, such as '*c:\libs\jarname.jar'* and '*/usr/u/libs/jarname.jar*', and relative file names, which are relative to the current working directory of the database server.

The *filename* must identify either a class file, or a jar file.

Class availability

The class definition for each class is loaded by each connection's VM the first time that class is used. When you INSTALL a class, the VM on your connection is implicitly restarted. Therefore, you have immediate access to the new class, whether the INSTALL has an *install-mode* of NEW or UPDATE.

For other connections, the new class is loaded the next time a VM accesses the class for the first time. If the class is already loaded by a VM, that connection does not see the new class until the VM is restarted for that connection (for example, with a STOP JAVA and START JAVA).

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

- DBA permissions are required to execute the INSTALL statement.
- All installed classes can be referenced in any way by any user.

See also

REMOVE statement

IQ UTILITIES statement

Description

Collects statistics on the buffer caches for an IQ database.

Syntax

IQ UTILITIES { **MAIN** | **PRIVATE** }
[**INTO**] *table-name*
{ **START MONITOR** ['*monitor-options*']
| **STOP MONITOR** }

Parameters

monitor-options:
{ -summary |
{ -append | -truncate }
-bufalloc |
-cache |
-cache_by_type |
-contention |
-debug |
-file_suffix *suffix*|
-io |
-interval *seconds* |
-threads }...

Examples

The following command starts the buffer cache monitor and records activity for the IQ temp buffer cache.

```
IQ UTILITIES PRIVATE INTO monitor START MONITOR '-cache
-interval 20'
```

Usage

START MONITOR starts the IQ buffer cache monitor. For START and STOP MONITOR, the *table_name* is a dummy table. You can specify any IQ base or temporary table, although it is best to have a table that you use only for monitoring. Results go to a text file, *dbname.connection#-main-iqmon* for MAIN buffer cache results, or *dbname.connection#-temp-iqmon* for PRIVATE (Temp) buffer cache results. Running the monitor again from the same database and connection number overwrites previous results. To set the directory location of the monitor output file, set the MONITOR_OUTPUT_DIRECTORY option.

The *monitor-options* define the content and frequency of results. You can specify more than one, and they must be enclosed with quotation marks.

- -summary displays summary information for both the main and temp (private) buffer caches. This option is the default.
- -append | -truncate appends to the existing output file or truncates the existing output file, respectively. Truncate is the default.
- -bufalloc displays information on the main or temp buffer allocator, which reserves space in the buffer cache for objects like sorts, hashes, and bitmaps.
- -cache displays main or temp buffer cache activity in detail.
- -cache_by_type produces the same results as -cache, but broken down by IQ page type. This format is used mainly to supply information to Sybase Technical Support.
- -contention displays many key buffer cache and memory manager locks
- -debug displays all the information that is available to the performance monitor, whether or not there is a standard display mode that covers the same information. This option is used mainly to supply information to Sybase Technical Support
- -file_suffix *suffix* creates a monitor output file named `<dbname>.<connid>-<main_or_temp>-<suffix>`. If you do not specify a suffix, it defaults to *iqmon*.
- -io displays main or temp buffer cache I/O rates and data compression ratios.

- -interval specifies the reporting interval in seconds. The default is every 60 seconds. The minimum is every 2 seconds.
- -threads displays information about processing threads

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise.

Permissions

None.

See also

"MONITOR_OUTPUT_DIRECTORY option" on page 98

Chapter 5, "Monitoring and Tuning Performance" in the *Sybase IQ Performance and Tuning Guide*, for examples of monitor results

Chapter 8, "Using Procedures and Batches" in *Sybase IQ System Administration Guide* for advanced use of IQ UTILITIES to create procedures that extend the functionality of Sybase IQ system stored procedures

LEAVE statement

Description

Continues execution by leaving a compound statement or LOOP.

Syntax

LEAVE *statement-label*

Examples

- The following fragment shows how the LEAVE statement is used to leave a loop.

```
SET i = 1;
lbl:
LOOP
    INSERT
    INTO Counters ( number )
    VALUES ( i ) ;
    IF i >= 10 THEN
       LEAVE lbl ;
    END IF ;
    SET i = i + 1
END LOOP lbl
```

- The following example fragment uses LEAVE in a nested loop.

```
outer_loop:
```

```
LOOP
    SET i = 1;
    inner_loop:
    LOOP
        ...
        SET i = i + 1;
        IF i >= 10 THEN
            LEAVE outer_loop
        END IF
    END LOOP inner_loop
END LOOP outer_loop
```

Usage

The LEAVE statement is a control statement that allows you to leave a labeled compound statement or a labeled loop. Execution resumes at the first statement after the compound statement or loop.

The compound statement that is the body of a procedure has an implicit label that is the same as the name of the procedure.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported in Adaptive Server Enterprise. The break statement provides a similar feature for Transact-SQL compatible procedures.

Permissions

None.

See also

- LOOP statement
- FOR statement
- BEGIN... END statement

LOAD TABLE statement

Description

Imports data into a database table from an external ASCII-format file.

Syntax

LOAD [**INTO**] **TABLE** [*owner*].*table-name*
... (*load-specification* [, ...])
... **FROM** { '*filename-string*' | *filename-variable* } [, ...]
... [**CHECK CONSTRAINTS** { **ON** | **OFF** } **IGNORE CONSTRAINT***constrainttype*[, ...]]
... **QUOTES OFF**
... **ESCAPES OFF**

... [**FORMAT** { **'ascii'** | **'binary'** }]
... [**DELIMITED BY** '*string*']
... [**STRIP** { **ON** | **OFF** }]
... [**WITH CHECKPOINT** { **ON** | **OFF** }]
... [{ **BLOCK FACTOR** *number* | **BLOCK SIZE** *number* }]
... [**BYTE ORDER** { **NATIVE** | **HIGH** | **LOW** }]
... [**LIMIT** *number-of-rows*]
... [**NOTIFY** *number-of-rows*]
... [**ON FILE ERROR** { **ROLLBACK** | **FINISH** | **CONTINUE**}]
... [**PREVIEW** { **ON** | **OFF** }]
... [**ROW DELIMITED BY** '*delimiter-string*']
... [**SKIP** *number-of-rows*]
... [**START ROW ID** *number*]
... [**UNLOAD FORMAT**]
... [**IGNORE CONSTRAINT** *constrainttype* [, ...]]
... [**MESSAGE LOG** '*string*' **ROW LOG** '*string*' [**ONLY LOG** *logwhat* [, ...]]
... [**LOG DELIMITED BY** '*string*']

Parameters

load-specification:
{ *column-name* [*column-spec*]
| FILLER (*filler-type*) }

column-spec:
{ ASCII (*input-width*)
| BINARY [WITH NULL BYTE]
| PREFIX { 1 | 2 | 4 }
| '*delimiter-string*'
| DATE (*input-date-format*)
| DATETIME (*input-datetime-format*) }
[NULL ({ BLANKS | ZEROS | '*literal*', ... })]

filler-type:
{ *input-width*
| PREFIX { 1 | 2 | 4 }
| '*delimiter-string*' }

constrainttype:
{ CHECK *integer* | UNIQUE *integer*
| NULL *integer*
| FOREIGN KEY *integer*
| DATA VALUE *integer*
| ALL *integer* }

logwhat:
{ CHECK | ALL | NULL | UNIQUE | DATA VALUE | FOREIGN KEY }

Examples

- Loads data from one file into the product table on a Windows system. A tab is used as the column delimiter following the description and color columns.

```
LOAD TABLE product
( id   ASCII(6),
FILLER(1),
name   ASCII(15),
FILLER(1),
description   '\x09',
size   ASCII(2),
FILLER(1),
color   '\x09',
quantity   PREFIX 2,
unit_price   PREFIX 2,
FILLER(2) )
FROM 'C:\\mydata\\source1.dmp'
QUOTES OFF
ESCAPES OFF
BYTE ORDER LOW
NOTIFY 1000
```

- Loads data from two files into the product_new table (which allows NULL values) on a UNIX system. The tab character is the default column delimiter, and the newline character is the row delimiter.

```
LOAD TABLE product_new
( id,
name,
description,
size,
color   '\x09'   NULL( 'null', 'none', 'na' ),
quantity   PREFIX 2,
unit_price   PREFIX 2 )
FROM '/s1/mydata/source2.dump',
'/s1/mydata/source3.dump'
QUOTES OFF
ESCAPES OFF
BLOCKSIZE 100000
FORMAT ascii
DELIMITED BY '\x09'
ON FILE ERROR CONTINUE
ROW DELIMITED BY '\n'
```

Usage

The LOAD TABLE statement allows efficient mass insertion into a database table from a file with ASCII or binary data.

The LOAD TABLE options also allow you to control load behavior when integrity constraints are violated and to log information about the violations.

If the WITH CHECKPOINT ON clause is not specified, the file used for loading must be retained in case recovery is required. If WITH CHECKPOINT ON is specified, a checkpoint is carried out after loading, and recovery is guaranteed even if the data file is then removed from the system.

You can use LOAD TABLE on a temporary table, but the temporary table must have been declared with the ON COMMIT PRESERVE ROWS clause or the next COMMIT will remove the rows you've loaded.

You can also specify more than one file to load data. In the FROM clause, you specify each *filename-string* separated by commas. However, Sybase IQ cannot guarantee that all the data can be loaded because of memory constraints. If memory allocation fails, the entire load transaction is rolled back. The files are read one at a time, and they are processed in a left-to-right order as specified in the FROM clause. Any SKIP or LIMIT value only applies in the beginning of the load, not for each file.

Note When loading a multiplex database, *use absolute (fully-qualified) paths in all filenames*. Do not use relative pathnames.

Sybase IQ supports loading from both ASCII and binary data, and it supports both fixed and variable length formats. To handle all of these formats, you must supply a *load-specification* to tell Sybase IQ what kind of data to expect from each "column" or field in the source file. The *column-spec* allows you to define these formats:

- ASCII with a fixed length of bytes. The *input-width* value is an integer value indicating the fixed width in bytes of the input field in every record.
- Binary fields that use a number of PREFIX bytes (1, 2, or 4) to specify the length of the binary input.

  Note that if the data is unloaded using the extraction facility with the TEMP_EXTRACT_BINARY option set ON, then you *must* use the BINARY WITH NULL BYTE parameter for each column when you load the binary data.
- Variable-length characters delimited by a separator. You specify the terminator as hexadecimal ASCII characters. The *delimiter-string* can be any string of up to 4 characters, including any combination of printable characters, and/or any 8–bit hexadecimal ASCII code that represents a non-printing character. For example, you specify:

- '\x09' to represent a tab as the terminator.
- '\x00' for a null terminator (no visible terminator as in "C" strings).
- '\x0a' for a newline character as the terminator. You can also use the special character combination of '\n' for newline.

Note The delimiter-string can be from 1 to 4 characters long, but you can only specify a single character in the DELIMITED BY clause.

- DATE or DATETIME string as ASCII characters. You must define the *input-date-format* or *input-datetime-format* of the string using one of the corresponding formats for the date and datetime data types supported by Sybase IQ. Use DATE for date values and DATETIME for datetime and time values.

Table 6-9: Formatting dates and times

Option	Meaning
yyyy or YYYY yy or YY	Represents number of year. Default is current year.
mm or MM	Represents number of month. Always use leading zero or blank for number of the month where appropriate, for example '05' for May. DATE value must include a month. For example, if the DATE value you enter is '1998', you receive an error. If you enter '03', IQ applies the default year and day and converts it to '1998-03-01'.
dd or DD jjj or JJJ	Represents number of day. Default day is 01. Always use leading zeros for number of day where appropriate, for example '01' for first day. J or j indicates a Julian day (1 to 366) of the year.
hh HH	Represents hour. Hour is based on 24-hour clock. Always use leading zeros or blanks for hour where appropriate, for example '01' for 1 am. '00' is also valid value for hour of 12 am.
nn	Represents minute. Always use leading zeros for minute where appropriate, for example '08' for 8 minutes.
ss[.ssssss]	Represents seconds and fraction of a second.
aa	Represents the a.m. or p.m. designation.
pp	Represents the p.m designation only if needed. (This is an incompatibility with IQ releases prior to 12.0; previously, pp was synonymous with aa.)
hh	Sybase IQ assumes zero for minutes and seconds. For example, if the DATETIME value you enter is '03', IQ converts it to '03:00:00.0000'.
hh:nn or hh:mm	Sybase IQ assumes zero for seconds. For example, if the time value you enter is '03:25', IQ converts it to '03:25:00.0000'.

Table 6-10: Sample DATE and DATETIME format options

Input Data	Format Specification
12/31/98	DATE ('MM/DD/YY')
19981231	DATE ('YYYYMMDD')
123198140150	DATETIME ('MMDDYYhhnnss')
14:01:50 12-31-98	DATETIME ('hh:mm:ss MM-DD-YY')
18:27:53	DATETIME ('hh:mm:ss')
12/31/98 02:01:50AM	DATETIME ('MM/DD/YY hh:mm:ssaa')

Sybase IQ has built-in load optimizations for common date, time and datetime formats. If your data to be loaded matches one of these formats, you can significantly decrease load time by using the appropriate format. For a list of these formats, and details about optimizing performance when loading date and datetime data, see Chapter 7, “Moving Data In and Out of Databases” in the *Sybase IQ System Administration Guide*.

You can also specify the date/time field as an ASCII fixed width field (as described above) and use the FILLER(1) option to skip the column delimiter. For more information about specifying date and time data, see Date and time data types on page 199 or Chapter 7, “Moving Data In and Out of Databases” in the *Sybase IQ System Administration Guide*.

The NULL portion of the *column-spec* indicates how to treat certain input values as NULL values when loading into the table column. These characters can include BLANKS, ZEROS, or any other list of literals you define. When specifying a NULL value or reading a NULL value from the source file, the destination column must be able to contain NULLs.

ZEROS are interpreted as follows: the cell is set to NULL if (and only if) the input data (before conversion, if ASCII) is all binary zeros (and not character zeros).

- If the input data is character zero, then:

  a) NULL(ZEROS) never causes the cell to be NULL

  b) NULL('0') causes the cell to be NULL

- If the input data is binary zero (all bits clear), then:

  a) NULL(ZEROS) causes the cell to be NULL

  b) NULL('0') never causes the cell to be NULL

For example, if your LOAD statement includes `col1 date('yymmdd') null(zeros)` and the date is 000000, you will receive an error indicating that 000000 cannot be converted to a DATE(4). To get the load statement to insert a NULL value in col1 when the data is 000000, you must write the NULL clause as `null('000000')`, or modify the data to equal binary zeros and use NULL(ZEROS).

If the length of a VARCHAR cell is zero and the cell is not NULL, you get a zero-length cell. For all other data types, if the length of the cell is zero, Sybase IQ inserts a NULL. This is ANSI behavior. For non-ANSI treatment of zero-length character data, set the Non_Ansi_Null_Varchar database option.

Another important part of the *load-specification* is the FILLER option. It indicates you want to skip over a specified field in the source input file. For example, there may be characters at the end of rows or even entire fields in the input files that you do not want to add to the table. As with the *column-spec* definition, FILLER allows you to specify ASCII fixed length of bytes, variable length characters delimited by a separator, and binary fields using PREFIX bytes.

filename-string The filename-string is passed to the server as a string. The string is therefore subject to the same formatting requirements as other SQL strings. In particular:

- To indicate directory paths in Windows systems, the backslash character \ must be represented by two backslashes. Therefore, the statement to load data from the file *c:\temp\input.dat* into the employee table is:

  ```
  LOAD TABLE employee
  FROM 'c:\\temp\\input.dat' ...
  ```

- The pathname is relative to the database server, not to the client application. If you are running the statement on a database server on some other computer, the directory names refers to directories on the server machine, not on the client machine.

The following describes each of the clauses of the statement.

QUOTES option If you omit a *column-spec* definition for an input field and QUOTES is on (the default), the LOAD statement looks for a quote character. The quote character is either an apostrophe (single quote) or a quotation mark (double quote). The first such character encountered in the input file is treated as the quote character for the input file. For Sybase IQ, *you must set this option as OFF*.

CHECK CONSTRAINTS option This option defaults to ON. When you specify CHECK CONSTRAINTS ON, check constraints are evaluated and you are free to ignore or log them.

Setting CHECK CONSTRAINTS OFF means that IQ ignores all check constraint violations. This can be useful, for example, during database rebuilding. If a table has check constraints that call user-defined functions that are not yet created, the rebuild fails unless this option is set to OFF.

This option is mutually exclusive to the following options. If any of these options are specified in the same load, an error results:

- IGNORE CONSTRAINT ALL
- IGNORE CONSTRAINT CHECK
- LOG ALL
- LOG CHECK

ESCAPES option If you omit a *column-spec* definition for an input field and ESCAPES is on (the default), characters following the backslash character are recognized and interpreted as special characters by the database server. Newline characters can be included as the combination \n, other characters can be included in data as hexadecimal ASCII codes, such as \x09 for the tab character. A sequence of two backslash characters (\\ ) is interpreted as a single backslash. For Sybase IQ, *you must set this option as OFF*.

FORMAT option Sybase IQ supports ASCII and binary input fields. The format is usually defined by the *column-spec* described above. If you omit that definition for a column, by default Sybase IQ uses the format defined by this option. Input lines are assumed to have ascii (the default) or binary fields, one row per line, with values separated by the column delimiter character.

DELIMITED BY option If you omit a column delimiter in the *column-spec* definition, the default column delimiter character is a comma. You can specify an alternative column delimiter by providing a single ASCII character or the hexadecimal character representation. The DELIMITED BY clause is as follows:

```
... DELIMITED BY '\x09' ...
```

To use the newline character as a delimiter, you can specify either the special combination '\n' or its ASCII value '\x0a'. Note that, while you can specify up to four characters in the column-spec *delimiter-string*, you can only specify a single character in the DELIMITED BY clause

STRIP option With STRIP turned on (the default), trailing blanks are stripped from values before they are inserted. This is effective only for VARCHAR data; it does not apply to ASCII fix-width inserts. To turn the STRIP option off, the clause is as follows:

```
... STRIP OFF ...
```

Trailing blanks are stripped only for non-quoted strings. Quoted strings retain their trailing blanks. As an alternative, the FILLER option allows you to be more specific in the number of bytes to strip instead of just all the trailing spaces. It is more efficient for Sybase IQ to have this option off, and it adheres to the ANSI standard when dealing with trailing blanks. (char data is always padded, so this option only affects varchar data.)

WITH CHECKPOINT option The default setting is OFF. If set to ON, a checkpoint is issued after successfully completing and logging the statement.

If WITH CHECKPOINT ON is not specified, and recovery is subsequently required, the data file used to load the table is needed for the recovery to complete successfully. If WITH CHECKPOINT ON is specified, and recovery is subsequently required, it will begin after the checkpoint, and the data file need not be present.

BLOCK FACTOR option Specifies blocking factor, or number of records per block, used when a tape was created. This option is not valid for inserts from variable length input fields; use the BLOCKSIZE option instead. However, it does affect all file inserts (including from disk) with fixed length input fields, and it can dramatically affect performance. You cannot specify this option along with the BLOCK SIZE option. The default is 10,000.

BLOCK SIZE option Specifies the default size in bytes in which input should be read. This option only affects variable length input data read from files; it is not valid for fixed length input fields. It is similar to BLOCK FACTOR, but there are no restrictions on the relationship of record size to block size. You cannot specify this option along with the BLOCK FACTOR option. The default is 500,000.

BYTE ORDER option Specifies the byte ordering during reads. This option applies to all binary input fields. If none are defined, this option is ignored. Sybase IQ always reads binary data in the format native to the machine it is running on (default is NATIVE). You can also specify:

- HIGH when multibyte quantities have the high order byte first (for big endian platforms like Sun, IBM AIX, and HP).
- LOW when multibyte quantities have the low order byte first (for little endian platforms like Windows).

LIMIT option Specifies the maximum number of rows you want to insert into the table. The default is 0 for no limit.

NOTIFY option Specifies that you be notified with a message each time the specified number of rows is successfully inserted into the table. The default is every 100,000 rows. The value of this option overrides the value of the NOTIFY_MODULUS database option.

ON FILE ERROR option Specifies the action Sybase IQ takes when an input file cannot be opened because it does not exist or you have incorrect permissions to read the file. You can specify one of the following:

- ROLLBACK aborts the entire transaction (the default).
- FINISH finishes the insertions already completed and ends the load operation.
- CONTINUE returns an error but only skips the file to continue the load operation. You cannot use this option with partial-width inserts.

Only one ON FILE ERROR clause is permitted.

PREVIEW option Displays the layout of input into the destination table including starting position, name, and data type of each column. Sybase IQ displays this information at the start of the load process. If you are writing to a log file, this information is also included in the log. This option is especially useful with partial-width inserts.

ROW DELIMITED BY option Specifies a string up to 4 bytes in length that indicates the end of an input record. You can use this option only if all fields within the row are any of the following:

- Delimited with column terminators
- Data defined by the DATE or DATETIME *column-spec* options
- ASCII fixed length fields

You cannot use this option if any input fields contain binary data. With this option, a row terminator causes any missing fields to be set to NULL. All rows must have the same row delimiters, and it must be distinct from all column delimiters. The row and field delimiter strings cannot be an initial subset of each other. For example, you cannot specify “*” as a field delimiter and “*#” as the row delimiter, but you could specify “#” as the field delimiter with that row delimiter.

If a row is missing its delimiters, Sybase IQ returns an error and rolls back the entire load transaction. The only exception is the final record of a file where it rolls back that row and returns a warning message. On Windows, a row delimiter is usually indicated by the newline character followed by the carriage return character. You may need to specify this as the *delimiter-string* (see above for description) for either this option or FILLER.

SKIP option Lets you define a number of rows to skip at the beginning of the input table(s) for this load. The default is 0.

START ROW ID option Specifies the record identification number of a row in the IQ table where it should start inserting. This option is used for *partial-width* inserts, which are inserts into a subset of the columns in the table. By default, new rows are inserted wherever there is space in the table, and each insert starts a new row. Partial-width inserts need to start at an existing row. They also need to insert data from the source file into the destination table positionally by column, so you must specify the destination columns in the same order as their corresponding source columns. Define the format of each input column with a *column-spec*. The default is 0. For more information about partial-width inserts see Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide*.

Note Use the START ROW ID option for partial-width inserts only! If the columns being loaded already contain data, the insert will fail. For example:

UNLOAD FORMAT option Specifies that the file has IQ internal unload formats for each column created by an earlier version of IQ (before Version 12.0). This load option has the following restrictions:

- You cannot specify any *column-spec* (such as ASCII or PREFIX) for a column other than BINARY. This includes the NULL specifications.
- If you need to load null values for a column using the BINARY *column-spec*, you must specify the WITH NULL BYTE keyword or IQ will return an error.
- You cannot use the DELIMITED BY or ROW DELIMITED BY options with UNLOAD FORMAT.

IGNORE CONSTRAINT option Specifies whether to ignore CHECK, UNIQUE, NULL, DATA VALUE, and/or FOREIGN KEY integrity constraint violations that occur during a load and the maximum number of violations to ignore before initiating a rollback. Specifying each *constrainttype* has the following result:

- **CHECK *limit*** If *limit* specifies zero, then the number of UNIQUE constraint violations to ignore is infinite. If CHECK is not specified, the first occurrence of any CHECK constraint violation causes the LOAD statement to roll back. If *limit* is non-zero, then the *limit* +1 occurrence of a CHECK constraint violation causes the load to roll back.
- **UNIQUE *limit*** If *limit* specifies zero, then the number of UNIQUE constraint violations to ignore is infinite. If *limit* is non-zero, then the *limit* +1 occurrence of a UNIQUE constraint violation causes the load to rollback.
- **NULL *limit*** If *limit* specifies zero, then the number of NULL constraint violations to ignore is infinite. If *limit* is non-zero, then the *limit* +1 occurrence of a NULL constraint violation causes the load to rollback.
- **FOREIGN KEY *limit*** If *limit* specifies zero, then the number of FOREIGN KEY constraint violations to ignore is infinite. If *limit* is non-zero, then the *limit* +1 occurrence of a FOREIGN KEY constraint violation causes the load to rollback.
- **DATA VALUE *limit*** If the database option CONVERSION_ERROR = ON, then an error is reported and the statement rolls back. If *limit* specifies zero, then the number of DATA VALUE constraint violations (data type conversion errors) to ignore is infinite. If *limit* is non-zero, then the *limit* +1 occurrence of a DATA VALUE constraint violation causes the load to rollback.
- **ALL *limit*** If the database option CONVERSION_ERROR = ON, then an error is reported and the statement rolls back. If *limit* specifies zero, then the cumulative total of all integrity constraint violations to ignore is infinite. If *limit* is non-zero, then load rolls back when the cumulative total of all ignored UNIQUE, NULL, DATA VALUE, and FOREIGN KEY integrity constraint violations exceeds the value of *limit*. For example, you specify the following IGNORE CONSTRAINT option:

```
IGNORE CONSTRAINT NULL 50, UNIQUE 100, ALL 200
```

The total number of integrity constraint violations cannot exceed 200, while the total number of NULL and UNIQUE constraint violations cannot exceed 50 and 100, respectively. Whenever any of these limits is exceeded, the LOAD TABLE statement rolls back.

Note A single row can have more than one integrity constraint violation. Every occurrence of an integrity constraint violation counts towards the limit of that type of violation.

Sybase strongly recommends setting the IGNORE CONSTRAINT option limit to a non-zero value, if you are logging the ignored integrity constraint violations. Logging an excessive number of violations affects the performance of the load.

If CHECK, UNIQUE, NULL, or FOREIGN KEY is not specified in the IGNORE CONSTRAINT clause, then the load rolls back on the first occurrence of each of these types of integrity constraint violation.

If DATA VALUE is not specified in the IGNORE CONSTRAINT clause, then the load rolls back on the first occurrence of this type of integrity constraint violation, unless the database option CONVERSION_ERROR = OFF. If CONVERSION_ERROR = OFF, then a warning is reported for any DATA VALUE constraint violation and the load continues.

When the load completes, an informational message regarding integrity constraint violations is logged in the *.iqmsg* file. This message contains the number of integrity constraint violations that occurred during the load and the number of rows that were skipped.

MESSAGE LOG option Specifies the names of files in which to log information about integrity constraint violations and the types of violations to log. Timestamps indicating the start and completion of the load are logged in both the MESSAGE LOG and the ROW LOG files. Both MESSAGE LOG and ROW LOG must be specified, or no information about integrity violations is logged.

- If the ONLY LOG clause is not specified, then no information on integrity constraint violations is logged. Only the timestamps indicating the start and completion of the load are logged.
- Information is logged on all integrity constraint type violations specified in the ONLY LOG clause.
- If constraint violations are being logged, then every occurrence of an integrity constraint violation generates exactly one row of information in the MESSAGE LOG file.

The number of rows (errors reported) in the MESSAGE LOG file can exceed the IGNORE CONSTRAINT option limit, because the load is performed by multiple threads running in parallel. More than one thread may report that the number of constraint violations has exceeded the specified limit.

- If constraint violations are being logged, then exactly one row of information is logged in the ROW LOG file for a given row, regardless of the number of integrity constraint violations that occur on that row.

  Note that the number of distinct errors in the MESSAGE LOG file may not exactly match the number of rows in the ROW LOG file. The difference in the number of rows is due to the parallel processing of the load described above for the MESSAGE LOG.

- The MESSAGE LOG and ROW LOG files cannot be raw partitions.
- If the MESSAGE LOG or ROW LOG file already exists, then new information is appended to the file.
- Specifying an invalid filename for the MESSAGE LOG or ROW LOG file generates an error.
- Specifying the same filename for the MESSAGE LOG and ROW LOG files generates an error.

Various combinations of the IGNORE CONSTRAINT and MESSAGE LOG options result in different logging actions, as indicated in Table 6-11.

Table 6-11: LOAD TABLE logging actions

IGNORE CONSTRAINT specified?	MESSAGE LOG specified?	Action
yes	yes	All ignored integrity constraint violations are logged, including the user specified limit, before the rollback.
no	yes	The first integrity constraint violation is logged before the rollback.
yes	no	Nothing is logged.
no	no	Nothing is logged. The first integrity constraint violation causes a rollback.

Note Sybase strongly recommends setting the IGNORE CONSTRAINT option limit to a non-zero value, if you are logging the ignored integrity constraint violations. If a single row has more than one integrity constraint violation, a row for *each* violation is written to the MESSAGE LOG file. Logging an excessive number of violations affects the performance of the load.

LOG DELIMITED BY option Specifies the separator between data values in the ROW LOG file. The default separator is a comma.

For more details on the contents and format of the MESSAGE LOG and ROW LOG files, see "Bulk loading data using the LOAD TABLE statement" in Chapter 7, "Moving Data In and Out of Databases"of the *Sybase IQ System Administration Guide*.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions

The permissions required to execute a LOAD TABLE statement depend on the database server -gl command line option, as follows:

- If the -gl option is set to ALL, you must be the owner of the table, have DBA authority, or have ALTER permission.
- If the -gl option is set to DBA, you must have DBA authority.
- If the -gl option is set to NONE, LOAD TABLE is not permitted.

For more information, see the -gl command line option in "Server command-line options" on page 7 in Chapter 1, "Running the Database Server" of the *Sybase IQ Utility Guide*.

LOAD TABLE also requires an exclusive lock on the table.

See also

INSERT statement on page 500

"NON_ANSI_NULL_VARCHAR option" on page 99

"Bulk loading data using the LOAD TABLE statement" in Chapter 7, "Moving Data In and Out of Databases" of the *Sybase IQ System Administration Guide*

"Monitoring disk space usage" in Chapter 1, "Troubleshooting Hints" of the *Sybase IQ Troubleshooting and Error Messages Guide*

LOOP statement

Description

Repeats the execution of a statement list.

Syntax

[*statement-label*:]
... [**WHILE** *search-condition*] **LOOP**
... *statement-list*
... **END LOOP** [*statement-label*]

Examples

- A While loop in a procedure.

```
...
SET i = 1 ;
WHILE i <= 10 LOOP
    INSERT INTO Counters( number ) VALUES ( i ) ;
    SET i = i + 1 ;
END LOOP ;
...
```

- A labeled loop in a procedure.

```
SET i = 1;
lbl:
LOOP
    INSERT
    INTO Counters( number )
    VALUES ( i ) ;
    IF i >= 10 THEN
       LEAVE lbl ;
    END IF ;
```

```
        SET i = i + 1 ;
    END LOOP lbl
```

Usage

The WHILE and LOOP statements are control statements that allow you to repeatedly execute a list of SQL statements while a *search-condition* evaluates to TRUE. The LEAVE statement can be used to resume execution at the first statement after the END LOOP.

If the ending *statement-label* is specified, it must match the beginning *statement-label*.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** Not supported in Adaptive Server Enterprise. The WHILE statement provides looping in Transact-SQL stored procedures.

Permissions

None.

See also

- FOR statement
- LEAVE statement

MESSAGE statement

Description

Displays a message.

Syntax

MESSAGE *expression*, ...
[**TYPE** { **INFO** | **ACTION** | **WARNING** | **STATUS** }]
[**TO** {**CONSOLE** | **CLIENT** [**FOR** { **CONNECTION** *conn_id* | **ALL** }] | **LOG** }
[**DEBUG ONLY**]]

conn_id : integer

Parameters

TYPE clause The TYPE clause only has an effect if the message is sent to the client. The client application must decide how to handle the message. Interactive SQL displays messages in the following locations:

- **INFO** The Message window (default).
- **ACTION** A Message box with an OK button.
- **WARNING** A Message box with an OK button.
- **STATUS** The Messages pane.

TO clause This clause specifies the destination of a message:

- **CONSOLE** Send messages to the database server window. CONSOLE is the default.
- **CLIENT** Send messages to the client application. Your application must decide how to handle the message, and you can use the TYPE as information on which to base that decision.
- **LOG** Send messages to the server log file specified by the -o option.

FOR clause For messages TO CLIENT, this clause specifies which connections receive notification about the message:

- **CONNECTION conn_id** Specify the recipient's connection ID for the message.
- **ALL** Specify that all open connections receive the message.

DEBUG ONLY This clause allows you to control whether debugging messages added to stored procedures are enabled or disabled by changing the setting of the DEBUG_MESSAGES option. When DEBUG ONLY is specified, the MESSAGE statement is executed only when the DEBUG_MESSAGES option is set to ON.

Note
DEBUG ONLY messages are inexpensive when the DEBUG_MESSAGES option is set to OFF, so these statements can usually be left in stored procedures on a production system. However, they should be used sparingly in locations where they would be executed frequently; otherwise, they may result in a small performance penalty.

Examples

- The following procedure displays a message on the server message window:

```
CREATE PROCEDURE message_test ()
BEGIN
MESSAGE 'The current date and time: ', Now();
END
```

- The following statement displays the string `The current date and time,` and the current date and time, on the database server message window:

```
CALL message_test()
```

- To register a callback in ODBC, first declare the message handler:

```
void SQL_CALLBACK my_msgproc(
```

```
    void *    sqlca,
    unsigned char     msg_type,
    long              code,
    unsigned short    len,
    char*              msg )
{ … }
```

Install the declared message handler by calling the SQLSetConnectAttr function.

```
rc = SQLSetConnectAttr(
   dbc,
   ASA_REGISTER_MESSAGE_CALLBACK,
   (SQLPOINTER) &my_msgproc, SQL_IS_POINTER );
```

Usage

The MESSAGE statement displays a message, which can be any expression. Clauses can specify where the message is displayed.

The procedure issuing a MESSAGE … TO CLIENT statement must be associated with a connection.

For example, the message box is not displayed in the following example because the event occurs outside of a connection.

```
CREATE EVENT CheckIdleTime TYPE ServerIdle
WHERE event_condition( 'IdleTime' ) > 100
HANDLER
BEGIN
   MESSAGE 'Idle engine' type warning to client;
END;
```

However, in the following example, the message is written to the server console.

```
CREATE EVENT CheckIdleTime TYPE ServerIdle
WHERE event_condition( 'IdleTime' ) > 100
HANDLER
BEGIN
   MESSAGE 'Idle engine' type warning to console;
END;
```

Valid expressions can include a quoted string or other constant, variable, or function. However, queries are not permitted in the output of a MESSAGE statement even though the definition of an expression includes queries.

The FOR clause can be used to notify another application of an event detected on the server without the need for the application to explicitly check for the event. When the FOR clause is used, recipients receive the message the next time that they execute a SQL statement. If the recipient is currently executing a SQL statement, the message is received when the statement completes. If the statement being executed is a stored procedure call, the message is received before the call is completed.

If an application requires notification within a short time after the message is sent and when the connection is not executing SQL statements, you can use a second connection. This connection can execute one or more WAITFOR DELAY statements. These statements do not consume significant resources on the server or network (as would happen with a polling approach), but permit applications to receive notification of the message shortly after it is sent.

ESQL and ODBC clients receive messages via message callback functions. In each case, these functions must be registered. To register ESQL message handlers, use the db_register_callback function.

ODBC clients can register callback functions using the SQLSetConnectAttr function.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise. The Transact-SQL PRINT statement provides a similar feature, and is available in Adaptive Server Anywhere.

Permissions

Must be connected to the database.

DBA authority is required to execute a MESSAGE statement containing a FOR clause.

See also

CREATE PROCEDURE statement

“DEBUG_MESSAGES option” on page 51

Adaptive Server Anywhere Programming Guide for information about using callback functions

OPEN statement [ESQL] [SP]

Description

Opens a previously declared cursor to access information from the database.

Syntax

OPEN *cursor-name*
... [**USING** [**DESCRIPTOR** { *sqlda-name* | *host-variable* [, ...] }]]
... [**WITH HOLD**]

Parameters

cursor-name:
identifier or host-variable

sqlda-name:
identifier

Examples

- The following examples show the use of OPEN in Embedded SQL.

```
1. EXEC SQL OPEN employee_cursor;
2. EXEC SQL PREPARE emp_stat FROM
'SELECT empnum, empname FROM employee WHERE name like
?';
EXEC SQL DECLARE employee_cursor CURSOR FOR emp_stat;
EXEC SQL OPEN employee_cursor USING :pattern;
```

- The following example is from a procedure.

```
BEGIN
DECLARE cur_employee CURSOR FOR
    SELECT emp_lname
    FROM employee ;
DECLARE name CHAR(40) ;
OPEN cur_employee;
LOOP
FETCH NEXT cur_employee into name ;
     ...
END LOOP
CLOSE cur_employee;
END
```

Usage

The OPEN statement opens the named cursor. The cursor must be previously declared.

By default, all cursors are automatically closed at the end of the current transaction (COMMIT or ROLLBACK). The optional WITH HOLD clause keeps the cursor open for subsequent transactions. The cursor remains open until the end of the current connection or until an explicit CLOSE statement is executed. Cursors are automatically closed when a connection is terminated.

The cursor is positioned before the first row (see Chapter 8, “Using Procedures and Batches” of the *Sybase IQ System Administration Guide*).

Embedded SQL

The USING DESCRIPTOR sqlda-name, host-variable and BLOCK n formats are for Embedded SQL only.

If the cursor name is specified by an identifier or string, then the corresponding DECLARE CURSOR STATEMENT must appear prior to the OPEN in the C program; if the cursor name is specified by a host variable, then the DECLARE cursor statement must execute before the OPEN statement.

The optional USING clause specifies the host variables that will be bound to the place-holder bind variables in the SELECT statement for which the cursor has been declared.

After successful execution of the OPEN statement, the *sqlerrd[3]* field of the SQLCA (SQLIOESTIMATE) is filled in with an estimate of the number of input/output operations required to fetch all rows of the query. Also, the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) is filled in with either the actual number of rows in the cursor (a value greater than or equal to 0), or an estimate thereof (a negative number whose absolute value is the estimate). The *sqlerrd[2]* field is the actual number of rows, if the database server can compute this value without counting the rows.

Side effects

None.

Standards

- **SQL/92** Embedded SQL use is an entry-level feature. Procedures use is a Persistent Stored Modules feature.
- **Sybase** The simple OPEN *cursor-name* syntax is supported by Adaptive Server Enterprise. None of the other clauses are supported in Adaptive Server Enterprise stored procedures. Open Client/Open Server supports the USING descriptor or host name variable syntax.

Permissions

- Must have SELECT permission on all tables in a SELECT statement or EXECUTE permission on the procedure in a CALL statement.
- When the cursor is on a CALL statement, OPEN causes the procedure to execute until the first result set (SELECT statement with no INTO clause) is encountered. If the procedure completes and no result set is found, the SQLSTATE_PROCEDURE_COMPLETE warning is set.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- PREPARE statement [ESQL]
- FETCH statement [ESQL] [SP]
- RESUME statement

- CLOSE statement [ESQL] [SP]

OUTPUT statement [DBISQL]

Description

Writes the current query results to a file.

Syntax

OUTPUT TO *filename*
[**APPEND**] [**VERBOSE**]
[**FORMAT** *output-format*]
[**ESCAPE CHARACTER** *character*]
[**DELIMITED BY** *string*]
[**QUOTE** *string* [**ALL**]]
[**COLUMN WIDTHS (***integer*, *…***)**]
[**HEXADECIMAL** { **ON** | **OFF** | **ASIS** }]
[**ENCODING** *encoding*]

Parameters

output-format:
ASCII| DBASEII | DBASEIII | EXCEL | FIXED | FOXPRO | HTML | LOTUS | SQL | XML

encoding:
string or *identifier*

Examples

Example 1 Place the contents of the employee table in a file in ASCII format:

```
SELECT * FROM employee; OUTPUT TO employee.txt FORMAT
ASCII
```

Example 2 Place the contents of the employee table at the end of an existing file, and include any messages about the query in this file as well:

```
SELECT * FROM employee; OUTPUT TO employee.txt APPEND
VERBOSE
```

Example 3 Suppose you need to export a value that contains an embedded line feed character. A line feed character has the numeric value 10, which you can represent as the string '\x0a' in a SQL statement. You could execute the following statement, with HEXADECIMAL set to ON:

```
SELECT 'line1\x0aline2'; OUTPUT TO file.txt HEXADECIMAL
ON
```

You get a file with one line in it containing the following text:

```
line10x0aline2
```

But if you execute the same statement with HEXADEMICAL set to OFF, you get the following:

```
line1\x0aline2
```

Finally, if you set HEXADECIMAL to ASIS, you get a file with two lines:

```
line1 line2
```

You get two lines when you use ASIS because the embedded line feed character has been exported without being converted to a two digit hex representation, and without being prefixed by anything.

Usage

The OUTPUT statement copies the information retrieved by the current query to a file.

The output format can be specified with the optional FORMAT clause. If no FORMAT clause is specified, the Interactive SQL OUTPUT_FORMAT option setting is used.

The current query is the SELECT or LOAD TABLE statement which generated the information that appears on the Results tab in the Results pane. The OUTPUT statement will report an error if there is no current query.

Note OUTPUT statement is especially useful in making the results of a query or report available to another application, but is not recommended for bulk operations. For high volume data movement, use the ASCII and BINARY data extraction functionality with the SELECT statement. The extraction functionality provides much better performance for large scale data movement, and creates an output file you can use for loads.

APPEND clause This optional keyword is used to append the results of the query to the end of an existing output file without overwriting the previous contents of the file. If the APPEND clause is not used, the OUTPUT statement overwrites the contents of the output file by default. The APPEND keyword is valid if the output format is ASCII, FIXED, or SQL.

VERBOSE clause When the optional VERBOSE keyword is included, error messages about the query, the SQL statement used to select the data, and the data itself are written to the output file. If VERBOSE is omitted (the default) only the data is written to the file. The VERBOSE keyword is valid if the output format is ASCII, FIXED, or SQL.

FORMAT clause Allowable output formats are:

- **ASCII** The output is an ASCII format file with one row per line in the file. All values are separated by commas, and strings are enclosed in apostrophes (single quotes). The delimiter and quote strings can be changed using the DELIMITED BY and QUOTE clauses. If ALL is specified in the QUOTE clause, all values (not just strings) are quoted.

Three other special sequences are also used. The two characters \n represent a newline character, \\ represents a single \, and the sequence \xDD represents the character with hexadecimal code DD. This is the default output format.

If you are exporting Java methods that have string return values, you must use the HEXADECIMAL OFF clause.

- **DBASEII** The output is a dBASE II format file with the column definitions at the top of the file. Note that a maximum of 32 columns can be output. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **DBASEIII** The output is a dBASE III format file with the column definitions at the top of the file. Note that a maximum of 128 columns can be output. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **EXCEL** The output is an Excel 2.1 worksheet. The first row of the worksheet contains column labels (or names if there are no labels defined). Subsequent worksheet rows contain the actual table data.
- **FIXED** The output is fixed format with each column having a fixed width. The width for each column can be specified using the COLUMN WIDTHS clause. No column headings are output in this format.

  If the COLUMN WIDTHS clause is omitted, the width for each column is computed from the data type for the column, and is large enough to hold any value of that data type. The exception is that LONG VARCHAR and LONG BINARY data defaults to 32KB.
- **FOXPRO** The output is a FoxPro format file (the FoxPro memo field is different than the dBASE memo field) with the column definitions at the top of the file. Note that a maximum of 128 columns can be output. Column names are truncated to 11 characters. Column names are truncated to 11 characters, and each row of data in each column is truncated to 255 characters.
- **HTML** The output is in the Hyper Text Markup Language format.
- **LOTUS** The output is a Lotus WKS format worksheet. Column names will be put as the first row in the worksheet. Note that there are certain restrictions on the maximum size of Lotus WKS format worksheets that other software (such as Lotus 1-2-3) can load. There is no limit to the size of file Interactive SQL can produce.

- **SQL** The output is an Interactive SQL INPUT statement required to recreate the information in the table.

  Note Sybase IQ does not support the INPUT statement. You would need to edit this statement to a valid LOAD TABLE (or INSERT) statement in order to use it to load data back in.

- **XML** The output is an XML file encoded in UTF-8 and containing an embedded DTD. Binary values are encoded in CDATA blocks with the binary data rendered as 2-hex-digit strings. The LOAD TABLE statement does not accept XML as a file format.

ESCAPE CHARACTER clause The default escape character for characters stored as hexadecimal codes and symbols is a backslash (\), so \x0A is the linefeed character, for example.

This can be changed using the ESCAPE CHARACTER clause. For example, to use the exclamation mark as the escape character, you would enter

```
... ESCAPE CHARACTER '!'
```

DELIMITED BY clause The DELIMITED BY clause is for the ASCII output format only. The delimiter string is placed between columns (default comma).

QUOTE clause The QUOTE clause is for the ASCII output format only. The quote string is placed around string values. The default is a single quote character. If ALL is specified in the QUOTE clause, the quote string is placed around all values, not just around strings.

COLUMN WIDTHS clause The COLUMN WIDTHS clause is used to specify the column widths for the FIXED format output.

HEXADECIMAL clause The HEXADECIMAL clause specifies how binary data is to be unloaded for the ASCII format only. When set to ON, binary data is unloaded in the format 0xabcd. When set to OFF, binary data is escaped when unloaded (\xab\xcd). When set to ASIS, values are written as is, that is, without any escaping—even if the value contains control characters. ASIS is useful for text that contains formatting characters such as tabs or carriage returns.

ENCODING clause The *encoding* argument allows you to specify the encoding that is used to write the file. The ENCODING clause can only be used with the ASCII format.

If *encoding* is not specified, Interactive SQL determines the code page that is used to write the file as follows, where code page values occurring earlier in the list take precedence over those occurring later in the list:

- the code page specified with the DEFAULT_ISQL_ENCODING option (if this option is set)
- the code page specified with the -codepage option when Interactive SQL was started
- the default code page for the computer Interactive SQL is running on

Side effects

In Interactive SQL, the Results tab displays only the results of the current query. All previous query results are replaced with the current query results.

Standards

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** Not applicable.

Permissions

None.

See also

SELECT statement

"OUTPUT_FORMAT option [ISQL]" on page 105

"DEFAULT_ISQL_ENCODING option [DBISQL]" on page 52

PARAMETERS statement [DBISQL]

Description

Specifies parameters to a DBISQL command file.

Syntax

PARAMETERS *parameter1*, *parameter2*, ...

Examples

The following DBISQL command file takes two parameters.

```
PARAMETERS department_id, file ;
SELECT emp_lname
FROM employee
WHERE dept_id = {department_id}
>#{file}.dat;
```

Usage

The PARAMETERS statement specifies how many parameters there are to a command file and also gives names to those parameters so that they can be referenced later in the command file.

Parameters are referenced by putting:

```
{parameter1}
```

into the file where you wish the named parameter to be substituted. There must be no spaces between the braces and the parameter name.

If a command file is invoked with fewer than the required number of parameters, DBISQL prompts for values of the missing parameters.

Side effects

None.

Standards

- **SQL/92** Vendor extension
- **Sybase** Not applicable.

Permissions

None.

See also

READ statement [DBISQL]

PREPARE statement [ESQL]

Description

Prepares a statement to be executed later or used for a cursor.

Syntax

PREPARE *statement-name*
FROM *statement*
... [**DESCRIBE** *describe-type* **INTO** [[**SQL**] **DESCRIPTOR**] *descriptor*]
... [**WITH EXECUTE**]

Parameters

statement-name:
identifier or host-variable

statement:
string, or host-variable

describe-type:
{ ALL | BIND VARIABLES | INPUT | OUTPUT | SELECT LIST }
... { LONG NAMES [[OWNER.]TABLE.]COLUMN] | WITH VARIABLE RESULT }

Examples

The following statement prepares a simple query:

```
EXEC SQL PREPARE employee_statement FROM
'SELECT emp_lname FROM employee';
```

Usage

The PREPARE statement prepares a SQL statement from the statement and associates the prepared statement with statement-name. This statement name is referenced to execute the statement, or to open a cursor if the statement is a SELECT statement. Statement-name may be a host variable of type a_sql_statement_number defined in the sqlca.h header file that is automatically included. If an identifier is used for the statement-name, then only one statement per module may be prepared with this statement-name.

If a host variable is used for statement-name, it must have the type short int. There is a typedef for this type in sqlca.h called a_sql_statement_number. This type is recognized by the SQL preprocessor and can be used in a DECLARE section. The host variable is filled in by the database during the PREPARE statement and need not be initialized by the programmer.

If the DESCRIBE INTO DESCRIPTOR clause is used, the prepared statement is described into the specified descriptor. The describe type may be any of the describe types allowed in the DESCRIBE statement.

If the WITH EXECUTE clause is used, the statement is executed if and only if it is not a CALL or SELECT statement, and it has no host variables. The statement is immediately dropped after a successful execution. If the PREPARE and the DESCRIBE (if any) are successful but the statement cannot be executed, a warning SQLCODE 111, SQLSTATE 01W08 is set, and the statement is not dropped.

The DESCRIBE INTO DESCRIPTOR and WITH EXECUTE clauses may improve performance, as they cut down on the required client/server communication.

Describing variable result sets

The WITH VARIABLE RESULT clause is used to describe procedures that may have more than one result set, with different numbers or types of columns.

If WITH VARIABLE RESULT is used, the database server sets the SQLCOUNT value after the describe to one of the following values:

- **0** The result set may change: the procedure call should be described again following each OPEN statement.
- **1** The result set is fixed. No re-describing is required.

Statements that can be prepared

The following is a list of statements that can be PREPARED.

- ALTER
- CALL

- COMMENT ON
- CREATE
- DELETE
- DROP
- GRANT
- INSERT
- REVOKE
- SELECT
- SET OPTION

Compatibility issue
For compatibility reasons, preparing COMMIT, PREPARE TO COMMIT, and ROLLBACK statements is still supported. However, we recommend that you do all transaction management operations with static Embedded SQL because certain application environments may require it. Also, other Embedded SQL systems do not support dynamic transaction management operations.

Note You should make sure that you DROP the statement after use. If you do not, then the memory associated with the statement is not reclaimed.

Side effects

Any statement previously prepared with the same name is lost.

Standards

- **SQL/92** Entry level feature
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- DESCRIBE statement [ESQL]
- OPEN statement [ESQL] [SP]
- EXECUTE statement [ESQL]
- DROP STATEMENT statement [ESQL]

PRINT statement [T-SQL]

Description

Displays a message on the message window of the database server.

Syntax

PRINT *format-string* [, *arg-list*]

Examples

Example 1 The following procedure displays a message on the server message window:

```
CREATE PROCEDURE print_test
AS
PRINT 'Procedure called successfully'
```

The statement

```
EXECUTE print_test
```

returns the string Procedure called successfully to the client.

Example 2 The following statement illustrates the use of placeholders in the PRINT statement:

```
DECLARE @var1 INT, @var2 INT
SELECT @var1 = 3, @var2 = 5
PRINT 'Variable 1 = %1!, Variable 2 = %2!', @var1, @var2
```

Example 3 The next example uses RAISERROR to disallow connections.

```
create procedure DBA.login_check()
begin
  // Allow a maximum of 3 concurrent connections
  if( db_property('ConnCount') > 3 ) then
  raiserror 28000
    'User %1! is not allowed to connect -- there are
       already %2! users logged on',
     current user,
     cast(db_property('ConnCount') as int)-1;
   else
  call sp_login_environment;
   end if;
end
go
grant execute on DBA.login_check to PUBLIC
go
set option PUBLIC.Login_procedure='DBA.login_check'
go
```

For an alternate way to disallow connections, see “LOGIN_PROCEDURE option” on page 85 or “sp_iqmodifylogin procedure” on page 655.

Usage

The PRINT statement returns a message to the client window if you are connected from an Open Client application or JDBC application. If you are connected from an Embedded SQL or ODBC application, the message is displayed on the database server window.

The format string can contain placeholders for the arguments in the optional argument list. These placeholders are of the form *%nn!*, where *nn* is an integer between 1 and 20.

Side effects

None.

Standards

- **SQL/92** Transact-SQL extension.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also

MESSAGE statement

PUT statement [ESQL]

Description

Inserts a row into the specified cursor.

Syntax

PUT *cursor-name* [**USING DESCRIPTOR** *sqlda-name* | **FROM** *hostvar-list*] [**INTO** { **DESCRIPTOR** *into-sqlda-name* | *into-hostvar-list* }] [**ARRAY** :*nnn*]

cursor-name : *identifier* or *hostvar*

sqlda-name : *identifier*

hostvar-list : may contain indicator variables

Examples

The following statement illustrates the use of PUT in Embedded SQL:

```
EXEC SQL PUT cur_employee FROM :emp_id, :emp_lname;
```

Usage

Inserts a row into the named cursor. Values for the columns are taken from the first SQLDA or the host variable list, in a one-to-one correspondence with the columns in the INSERT statement (for an INSERT cursor) or the columns in the select list (for a SELECT cursor).

The PUT statement can be used only on a cursor over an INSERT or SELECT statement that references a single table in the FROM clause, or that references an updateable view consisting of a single base table.

If the sqldata pointer in the SQLDA is the null pointer, no value is specified for that column. If the column has a DEFAULT VALUE associated with it, that will be used; otherwise, a NULL value will be used.

The second SQLDA or host variable list contains the results of the PUT statement.

The optional ARRAY clause can be used to carry out wide puts, which insert more than one row at a time and which may improve performance. The value nnn is the number of rows to be inserted. The SQLDA must contain nnn * (columns per row) variables. The first row is placed in SQLDA variables 0 to (columns per row)-1, and so on.

Inserting into a cursor
For scroll (values sensitive) cursors, the inserted row will appear if the new row matches the WHERE clause and the keyset cursor has not finished populating. For dynamic cursors, if the inserted row matches the WHERE clause, the row may appear. Insensitive cursors cannot be updated.

For information on putting LONG VARCHAR or LONG BINARY values into the database, see .

Side Effects

When inserting rows into a value-sensitive (keyset driven) cursor, the inserted rows appear at the end of the result set, even when they do not match the WHERE clause of the query or if an ORDER BY clause would normally have placed them at another location in the result set. For more information, see *Adaptive Server Anywhere Programming Guide*.

Standards

- **SQL/92** Entry-level feature.
- **SQL/99** Core feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

Must have INSERT permission.

See also

UPDATE statement, UPDATE (positioned) statement [ESQL] [SP], DELETE (positioned) statement [ESQL] [SP], INSERT statement

RAISERROR statement [T-SQL]

Description

Signals an error and sends a message to the client.

Syntax

RAISERROR *error-number* [*format-string*] [, *arg-list*]

Examples

The following statement raises error 99999, which is in the range for user-defined errors, and sends a message to the client.

```
RAISERROR 99999 'Invalid entry for this
column: %1!', @val
```

There is no comma between the *error-number* and the *format-string* parameters. The first item following a comma is interpreted as the first item in the argument list.

Usage

The RAISERROR statement allows user-defined errors to be signaled, and sends a message on the client.

The *error-number* is a five-digit integer greater than 17000. The error number is stored in the global variable @@error.

If *format-string* is not supplied or is empty, the error number is used to locate an error message in the system tables. Adaptive Server Enterprise obtains messages 17000-19999 from the SYSMESSAGES table. In Sybase IQ this table is an empty view, so errors in this range should provide a format string. Messages for error numbers of 20000 or greater are obtained from the SYS.SYSUSERMESSAGES table.

The *format-string* can be up to 255 bytes long. This is the same as in Adaptive Server Enterprise.

The extended values supported by the SQL Server or Adaptive Server Enterprise RAISERROR statement are not supported in Sybase IQ.

The format string can contain placeholders for the arguments in the optional argument list. These placeholders are of the form *%nn!*, where *nn* is an integer between 1 and 20.

Intermediate RAISERROR status and code information is lost after the procedure terminates. If at return time an error occurs along with the RAISERROR then the error information is returned and the RAISERROR information is lost. The application can query intermediate RAISERROR statuses by examining @@error global variable at different execution points.

Side effects

None.

Standards

- **SQL/92** Transact-SQL extension.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also
"CONTINUE_AFTER_RAISERROR option [TSQL]" on page 43

"ON_TSQL_ERROR option [TSQL]" on page 103

READ statement [DBISQL]

Description
Reads DBISQL statements from a file.

Syntax
READ *filename* [*parameters*]

Examples
The following are examples of the READ statement.

```
READ status.rpt '160'
READ birthday.sql [>= '1988-1-1'] [<= '1988-1-30']
```

Usage
The READ statement reads a sequence of DBISQL statements from the named file. This file can contain any valid DBISQL statement including other READ statements. READ statements can be nested to any depth. To find the command file, DBISQL will first search the current directory, then the directories specified in the environment variable SQLPATH, then the directories specified in the environment variable PATH. If the named file has no file extension, DBISQL also searches each directory for the same file name with the extension *SQL*.

Parameters can be listed after the name of the command file. These parameters correspond to the parameters named on the PARAMETERS statement at the beginning of the statement file (see PARAMETERS statement [DBISQL]). DBISQL will then substitute the corresponding parameter wherever the source file contains

```
{ parameter-name }
```

where *parameter-name* is the name of the appropriate parameter.

The parameters passed to a command file can be identifiers, numbers, quoted identifiers, or strings. When quotes are used around a parameter, the quotes are put into the text during the substitution. Parameters which are not identifiers, numbers, or strings (contain spaces or tabs) must be enclosed in square brackets ([ ]). This allows for arbitrary textual substitution in the command file.

If not enough parameters are passed to the command file, DBISQL prompts for values for the missing parameters.

Encoding

The READ statement also supports an ENCODING clause, which allows you to specify the encoding that is used to read the file. For more information, see the READ statement in the *Adaptive Server Anywhere SQL Reference*.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions

None.

See also

PARAMETERS statement [DBISQL]

"DEFAULT_ISQL_ENCODING option [DBISQL]"

RELEASE SAVEPOINT statement

Description

Releases a savepoint within the current transaction.

Syntax

RELEASE SAVEPOINT [*savepoint-name*]

Usage

Release a savepoint. The *savepoint-name* is an identifier specified on a SAVEPOINT statement within the current transaction. If *savepoint-name* is omitted, the most recent savepoint is released.

For a description of savepoints, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*. Releasing a savepoint does not do any type of COMMIT. It simply removes the savepoint from the list of currently active savepoints.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise. A similar feature is available in an Adaptive Server Enterprise-compatible manner using nested transactions.

Permissions

There must have been a corresponding SAVEPOINT within the current transaction.

See also

- SAVEPOINT statement

- ROLLBACK TO SAVEPOINT statement

REMOVE statement

Description

Removes a class, a package or a jar file from a database. Removed classes are no longer available for use as a variable type.

A class, package or jar must be installed in order to be removed.

Syntax

REMOVE JAVA *classes_to_remove*

Parameters

classes_to_remove:
{ CLASS *java_class_name* [, *java_class_name*]...
| PACKAGE *java_package_name* [, *java_package_name*]...
| JAR *jar_name* [, *jar_name*]... [RETAIN CLASSES] }

jar_name:
character_string_expression

Examples

The following statement removes a Java class named Demo from the current database.

```
REMOVE JAVA CLASS Demo
```

Usage

java_class_name The name of one or more Java class to be removed. Those classes must be installed classes in the current database.

java_package_name The name of one or more Java packages to be removed. Those packages must be the name of packages in the current database.

jar_name A character string value of maximum length 255.

Each *jar_name* must be equal to the *jar_name* of a retained jar in the current database. Equality of *jar_name* is determined by the character string comparison rules of the SQL system.

If JAR...RETAIN CLASSES is specified, then the specified jars are no longer retained in the database, and the retained classes have no associated jar. If RETAIN CLASSES is specified, then this is the only action of the REMOVE statement.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise. A similar feature is available in an Adaptive Server Enterprise-compatible manner using nested transactions.

Permissions — Must have DBA authority or must own the object.

RESIGNAL statement

Description — Resignals an exception condition.

Syntax — **RESIGNAL** [*exception-name*]

Examples — The following fragment returns all exceptions except for Column Not Found to the application.

```
...
DECLARE COLUMN_NOT_FOUND EXCEPTION
    FOR SQLSTATE '52003';
...
EXCEPTION
WHEN COLUMN_NOT_FOUND THEN
SET message='Column not found' ;
WHEN OTHERS THEN
RESIGNAL ;
```

Usage — Within an exception handler, RESIGNAL allows you to quit the compound statement with the exception still active, or to quit reporting another named exception. The exception will be handled by another exception handler or returned to the application. Any actions by the exception handler before the RESIGNAL are undone.

Side effects

None.

Standards

- **SQL/92** Persistent stored module feature.
- **Sybase** Not supported in Adaptive Server Enterprise. Error handling in Transact-SQL procedures is carried out using the RAISERROR statement.

Permissions — None.

See also

- SIGNAL statement
- BEGIN... END statement

RESTORE statement

Description

Restores an IQ database backup from one or more archive devices.

Syntax

RESTORE DATABASE '*db_file*'
FROM '*archive_device*' [**FROM** '*archive_device*']...
...[**KEY** *key_spec*]
... [**RENAME** *dbspace-name* **TO** '*new-dbspace-path*']...
... [**CATALOG ONLY**]

Parameters

db_file:
relative or absolute path of the database to be restored. Can be the original location, or a new location for the Catalog Store file.

key_spec:
quoted string including mixed cases, numbers, letters, and special characters. It may be necessary to protect the key from interpretation or alteration by the command shell.

Examples

- The following UNIX example restores the asiqdemo database from tape devices */dev/rmt/0* and */dev/rmt/2* on a Sun Solaris platform. On Solaris, the letter *n* after the device name specifies the "no rewind on close" feature. To specify this feature with RESTORE, use the naming convention appropriate for your UNIX platform. (Windows does not support this feature.)

```
RESTORE DATABASE 'asiqdemo'
FROM '/dev/rmt/0n'
FROM '/dev/rmt/2n'
```

- The following example restores an encrypted database named *marvin* that was encrypted with the key *is!seCret*.

```
RESTORE DATABASE 'marvin'
FROM 'marvin_bkup_file1'
FROM 'marvin_bkup_file2'
FROM 'marvin_bkup_file3'
KEY 'is!seCret'
```

Usage

The RESTORE command requires exclusive access by the DBA to the database. This exclusive access is achieved by setting the -gd switch to DBA, which is the default when you start the server engine. You issue the RESTORE command before you start the database (you must be connected to the utility_db database). Once you finish specifying RESTORE commands for the type of backup, that database is ready to be used. The database is left in the state that existed at the end of the first implicit CHECKPOINT of the last backup you restored. You can now specify a START DATABASE to allow other users to access the restored database.

Note IQ 12.6 can only restore databases created using IQ 12.4.3 and higher versions. If the database was created using a 12.x version prior to 12.4.3, you must upgrade it to 12.4.3 or greater before backup. For instructions, see the *Adaptive Server IQ Installation and Configuration Guide* for the version to which you are upgrading.

Note When restoring to a raw device, you need to make sure that the device is large enough to hold the dbspace you are restoring. IQ RESTORE checks the raw device size and returns an error, if the raw device is not large enough to restore the dbspace. For more information, see “Restoring to a raw device” in Chapter 14, “Backup and Data Recovery” of the *Sybase IQ System Administration Guide*.

The BACKUP command allows you to specify full or incremental backups. You can choose two kinds of incremental backups. INCREMENTAL only backs up those blocks that have changed and committed since the last backup of any type (incremental or full). INCREMENTAL SINCE FULL backs up all of the blocks that have changed since the last full backup. If a RESTORE of a full backup is followed by one or more incremental backups (of either type), no modifications to the database are allowed between successive RESTORE commands. This rule prevents a RESTORE from incremental backups on a database in need of crash recovery, or one that has been modified. You can still overwrite such a database with a RESTORE from a full backup.

Before starting a full restore you must delete two files: the Catalog Store file (default name *dbname.db)* and the transaction log file (default name *dbname.log).*

If you restore an incremental backup, RESTORE ensures that backup media sets are accessed in the proper order. This order is to restore the last full backup tape set first, then the first incremental backup tape set, then the next most recent set, and so forth until the most recent incremental backup tape set. If the DBA produced an INCREMENTAL SINCE FULL backup, only the full backup tape set and the most recent INCREMENTAL SINCE FULL backup tape set is required; however, if there is an INCREMENTAL made since the INCREMENTAL SINCE FULL, it also must be applied.

Sybase IQ ensures that the restoration order is appropriate, or it gives an error. Any other errors that occur during the restore will result in the database being marked corrupt and unusable. To clean up such a corrupt database, you need to do a RESTORE from a full backup, potentially followed by any additional incremental backups. Since the corruption probably happened with one of those backups, you may need to ignore a later backup set and use an earlier set.

FROM clause Specifies the name of the *archive_device* from which you are restoring, delimited with single quotation marks. If you are using multiple archive devices, specify them using separate FROM clauses. (A comma-separated list is not allowed.) Archive devices must be distinct. The number of FROM clauses determines the amount of parallelism IQ attempts with regard to input devices.

The backup/restore API DLL implementation allows you to specify arguments to pass to the DLL when opening an archive device. For third party implementations, the *archive_device* string has the following format:

```
'DLLidentifier::vendor_specific_information'
```

A specific example is:

```
'spsc::workorder=12;volname=ASD002'
```

The *archive_device* string length can be up to 1023 bytes. The *DLLidentifier* portion must be 1 to 30 bytes in length and can only contain alphanumeric and underscore characters. The *vendor_specific_information* portion of the string is passed to the third party implementation without checking its contents.

Note Only certain third party products are certified with Sybase IQ using this syntax. See the *Sybase IQ Release Bulletin* for additional usage instructions or restrictions. Before using any third party product to back up your IQ database in this way, make sure it is certified. See the *Sybase IQ Release Bulletin*, or see the Sybase Certification Reports for the Sybase IQ product in Technical Documents at http://www.sybase.com/support/techdocs/.

For the Sybase implementation of the backup/restore API, you do not have to specify this other information, just the tape device name or filename. However, if you use disk devices, you must specify the same number of archive_devices on the RESTORE as given on the backup. (Otherwise, you can have a different number of restoration devices from the number used to perform the backup.) A specific example of an archive device for the Sybase API DLL that specifies a non-rewinding tape device for a UNIX system is:

```
'/dev/rmt/0n'
```

RENAME clause Allows you to restore one or more IQ database files to a new location. Specify each *dbspace-name* you are moving as it appears in the SYSFILE table. Specify *new-dbspace-path* as the new raw partition, or the new full or relative pathname, for that dbspace.

If relative paths were used to create the database files, the files are restored by default relative to the Catalog Store file (the SYSTEM dbspace), and a rename clause is not required. If absolute paths were used to create the database files and a rename clause is not specified for a file, it will be restored to its original location.

Relative pathnames in the RENAME clause work as they do when you create a database or dbspace: the main IQ Store dbspace, Temporary Store dbspaces, and Message Log are restored relative to the location of *db_file* (the Catalog Store); user-created IQ Store dbspaces are restored relative to the directory that holds the main IQ dbspace.

Do not use the RENAME clause to move the SYSTEM dbspace, which holds the Catalog Store. To move the Catalog Store, and any files created relative to it and not specified in a RENAME clause, specify a new location in the *db_file* parameter.

CATALOG ONLY option Restores only the backup header record from the archive media.

Note other RESTORE issues:

- RESTORE to disk does not support raw devices as archival devices.
- Sybase IQ does not rewind tapes before using them; on rewinding tape devices, it does rewind tapes after using them. You must position each tape to the start of the IQ data before starting the RESTORE.

- During BACKUP and RESTORE operations, if IQ cannot open the archive device (for example, when it needs the media loaded) and the ATTENDED option is ON, it waits for ten seconds for you to put the next tape in the drive, and then tries again. It continues these attempts indefinitely until either it is successful or the operation is terminated with a Ctrl-C.
- If you enter a Ctrl-C, RESTORE fails and returns the database to its state before the restoration began.
- If disk striping is used, the striped disks are treated as a single device.

The maximum size for a complete RESTORE command, including all clauses, is 32KB.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

Must have DBA authority.

See also

BACKUP statement

RESUME statement

Description

Resumes a procedure after a query.

Syntax

Syntax 1

RESUME *cursor-name*

Syntax 2

RESUME [**ALL**]

Parameters

cursor-name:
identifier

cursor-name:
identifier or host-variable

Examples

- Embedded SQL example

```
1. EXEC SQL RESUME cur_employee;
2. EXEC SQL RESUME :cursor_var;
```

- DBISQL examples

```
CALL sample_proc() ;
RESUME ALL;
```

Usage

This statement resumes execution of a procedure that returns result sets. The procedure executes until the next result set (SELECT statement with no INTO clause) is encountered. If the procedure completes and no result set is found, the SQLSTATE_PROCEDURE_COMPLETE warning is set. This warning is also set when you RESUME a cursor for a SELECT statement.

The DBISQL RESUME statement (Format 2) resumes the current procedure. If ALL is not specified, executing RESUME displays the next result set or, if no more result sets are returned, completes the procedure.

The DBISQL RESUME ALL statement cycles through all result sets in a procedure, without displaying them, and completes the procedure. This is useful mainly in testing procedures.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise.

Permissions

The cursor must have been previously opened.

See also

DECLARE CURSOR statement [ESQL] [SP]

RETURN statement

Description

Exits a function or procedure unconditionally, optionally providing a return value. Statements following RETURN are not executed.

Syntax

RETURN [(*expression*)]

Examples

- The following function returns the product of three numbers:

```
CREATE FUNCTION product ( a numeric,
                          b numeric ,
                          c numeric)
RETURNS numeric
BEGIN
   RETURN ( a * b * c ) ;
END
```

- Calculate the product of three numbers:

```
SELECT product (2, 3, 4)
```

```
product (2,3,4)
24
```

- The following procedure uses the RETURN statement to avoid executing a complex query if it is meaningless:

```
CREATE PROCEDURE customer_products
( in customer_id integer DEFAULT NULL)
RESULT ( id integer, quantity_ordered integer )
BEGIN
    IF customer_id NOT IN (SELECT id FROM customer)
    OR customer_id IS NULL THEN
       RETURN
    ELSE
       SELECT product.id,sum(
          sales_order_items.quantity )
       FROM  product,
             sales_order_items,
             sales_order
       WHERE sales_order.cust_id=customer_id
       AND sales_order.id=sales_order_items.id
       AND sales_order_items.prod_id=product.id
       GROUP BY product.id
    END IF
END
```

Usage

A RETURN statement causes an immediate exit from the function or procedure. If *expression* is supplied, the value of *expression* is returned as the value of the function or procedure.

Within a function, the expression should be of the same data type as the function's RETURNS data type.

RETURN is used in procedures for Transact-SQL-compatibility, and is used to return an integer error code.

Side effects

None.

Standards

- **SQL/92** Persistent stored module feature.
- **Sybase** Transact-SQL procedures use the return statement to return an integer error code.

Permissions

None.

See also

- CREATE PROCEDURE statement
- BEGIN... END statement

REVOKE statement

Description

Removes permissions for specified user(s).

Syntax

Syntax 1

REVOKE
{ **CONNECT** | **DBA** | **INTEGRATED LOGIN** | **GROUP**
| **MEMBERSHIP IN GROUP** *userid* [, ...] | **RESOURCE** }
... **FROM** *userid* [, ...]

Syntax 2

REVOKE
{ **ALL** [**PRIVILEGES**] | **ALTER** | **DELETE** | **INSERT**
| **REFERENCE** | **SELECT** [(*column-name* [, ...])] | **UPDATE** [(*column-name*,...)] }
... **ON** [*owner*.]*table-name* **FROM** *userid* [, ...]

Syntax 3

REVOKE EXECUTE ON [*owner*.]*procedure-name* **FROM** *userid* [, ...]

Examples

- Prevent user dave from inserting into the employee table.

  ```
  REVOKE INSERT ON employee FROM dave ;
  ```

- Revoke resource permissions from user Jim.

  ```
  REVOKE RESOURCE FROM Jim ;
  ```

- Prevent user dave from updating the employee table.

  ```
  REVOKE UPDATE ON employee FROM dave ;
  ```

- Revoke integrated login mapping from user profile name Administrator.

  ```
  REVOKE INTEGRATED LOGIN FROM Administrator ;
  ```

- Disallow the finance group from executing the procedure sp_customer_list.

  ```
  REVOKE EXECUTE ON sp_customer_list
  FROM finance ;
  ```

- Drop user ID FranW from the database.

  ```
  REVOKE CONNECT FROM FranW ;
  ```

Usage

The REVOKE statement is used to remove permissions that were given using the GRANT statement. Form 1 is used to revoke special user permissions and Form 2 is used to revoke table permissions. Form 3 is used to revoke permission to execute a procedure. REVOKE CONNECT is used to remove a user ID from a database. REVOKE GROUP will automatically REVOKE MEMBERSHIP from all members of the group.

Note You cannot revoke a user's connect privileges if that user owns database objects, such as tables. Attempting to do so with a REVOKE statement or sp_dropuser procedure returns an error like "Cannot drop a user that owns tables in runtime system."

Side effects

Automatic commit.

Standards

- **SQL/92** Syntax 1 is a vendor extension. Syntax 2 is an entry-level feature. Syntax 3 is a Persistent stored module feature.
- **Sybase** Syntax 2 and 3 are supported by Adaptive Server Enterprise. Syntax 1 is not supported by Adaptive Server Enterprise. User management and security models are different for Sybase IQ and Adaptive Server Enterprise.

Permissions

Must be the grantor of the permissions that are being revoked or must have DBA authority.

If revoking CONNECT permissions or revoking table permissions from another user, the other user must not be connected to the database.

See also

GRANT statement

ROLLBACK statement

Description

Undoes any changes made since the last COMMIT or ROLLBACK.

Syntax

ROLLBACK [**WORK**]

Usage

The ROLLBACK statement ends a logical unit of work (transaction) and undoes all changes made to the database during this transaction. A transaction is the database work done between COMMIT or ROLLBACK statements on one database connection.

Side effects

Closes all cursors not opened WITH HOLD.

Releases locks held by the transaction issuing the ROLLBACK.

Standards

- **SQL/92** Entry level feature.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also

- COMMIT statement
- ROLLBACK TO SAVEPOINT statement

ROLLBACK TO SAVEPOINT statement

Description

Cancels any changes made since a SAVEPOINT.

Syntax

ROLLBACK TO SAVEPOINT [*savepoint-name*]

Usage

The ROLLBACK TO SAVEPOINT statement will undo any changes that have been made since the SAVEPOINT was established. Changes made prior to the SAVEPOINT are not undone; they are still pending. For a description of savepoints, see Chapter 8, “Using Procedures and Batches” of the *Sybase IQ System Administration Guide*.

The *savepoint-name* is an identifier that was specified on a SAVEPOINT statement within the current transaction. If *savepoint-name* is omitted, the most recent savepoint is used. Any savepoints since the named savepoint are automatically released.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Savepoints are not supported by Adaptive Server Enterprise. To implement similar features in an Adaptive Server Enterprise-compatible manner, you can use nested transactions.

Permissions

There must have been a corresponding SAVEPOINT within the current transaction.

See also

- SAVEPOINT statement
- RELEASE SAVEPOINT statement

- ROLLBACK statement

SAVEPOINT statement

Description — Establishes a savepoint within the current transaction.

Syntax — **SAVEPOINT** [*savepoint-name*]

Usage — Establish a savepoint within the current transaction. The *savepoint-name* is an identifier that can be used in a RELEASE SAVEPOINT or ROLLBACK TO SAVEPOINT statement. All savepoints are automatically released when a transaction ends. SeeChapter 8, “Using Procedures and Batches” of the *Sybase IQ System Administration Guide*.

Savepoints that are established while a trigger is executing or while an atomic compound statement is executing are automatically released when the atomic operation ends.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported in Adaptive Server Enterprise. To implement similar features in an Adaptive Server Enterprise-compatible manner, you can use nested transactions.

Permissions — None.

See also

- RELEASE SAVEPOINT statement
- ROLLBACK TO SAVEPOINT statement

SELECT statement

Description — Retrieves information from the database.

Syntax

SELECT [**ALL** | **DISTINCT**] [**FIRST** | **TOP** *number-of-rows*] *select-list*
... [**INTO** { *host-variable-list* | *variable-list* | *table-name* }]
... [**FROM** *table-list*]
... [**WHERE** *search-condition*]
... [**GROUP BY** [*expression* [,...]
| **ROLLUP** (*expression* [,...])

| **CUBE** (*expression* [,...])]]
... [**HAVING** *search-condition*]
... [**ORDER BY** { *expression* | *integer* } [**ASC** | **DESC**] [, ...]]

Parameters

select-list:
{ *column-name*
| *expression* [[AS] *alias-name*]
| * }

Examples

- List all the tables and views in the system catalog.

```
SELECT tname
FROM SYS.SYSCATALOG
WHERE tname LIKE 'SYS%' ;
```

- List all customers and the total value of their orders.

```
SELECT company_name,
    CAST( sum(sales_order_items.quantity *
    product.unit_price) AS INTEGER) VALUE
FROM customer
    LEFT OUTER JOIN sales_order
    LEFT OUTER JOIN sales_order_items
    LEFT OUTER JOIN product
GROUP BY company_name
ORDER BY VALUE DESC
```

- How many employees are there?

```
SELECT count(*)
FROM Employee ;
```

- The following statement shows an Embedded SQL SELECT statement:

```
SELECT count(*) INTO :size FROM employee
```

- List the total sales by year, model, and color.

```
SELECT year, model, color, sum(sales) FROM sales_tab
GROUP BY ROLLUP (year, model, color);
```

- Select all items with a certain discount into a temporary table:

```
SELECT * INTO #TableTemp FROM lineitem WHERE l_discount
< 0.5
```

Usage

The SELECT statement is used for retrieving results from the database.

A SELECT statement can be used in DBISQL to browse data in the database or to export data from the database to an external file.

A SELECT statement can also be used in procedures or in Embedded SQL. The SELECT statement with an INTO clause is used for retrieving results from the database when the SELECT statement only returns one row. (Tables created with SELECT INTO do not inherit IDENTITY/AUTOINCREMENT tables.) For multiple-row queries, you must use cursors.When you select more than one column and do not use *#table*, SELECT INTO creates a permanent base table. SELECT INTO *#table* always creates a temporary table regardless of the number of columns. SELECT INTO table with a single column selects into a host variable.

Tables with the same name but different owners require aliases. A query like the following returns incorrect results:

```
SELECT * FROM user1.t1
WHERE NOT EXISTS
(SELECT *
FROM user2.t1
WHERE user2.t1.col1 = user1.t.col1);
```

For correct results, use an alias for each table, as follows:

```
SELECT * FROM user1.t1 U1
WHERE NOT EXISTS
(SELECT *
FROM user2.t1 U2
WHERE U2.col1 = U1.col1);
```

The INTO clause with a *variable-list* is used in procedures only.

A SELECT statement can also be used to return a result set from a procedure. The various parts of the SELECT statement are described below:

ALL or DISTINCT If Neither ALL nor DISTINCT is specified, ALL rows that satisfy the clauses of the SELECT statement are retrieved. If DISTINCT is specified, duplicate output rows are eliminated. This is called the projection of the result of the statement. In many cases, statements take significantly longer to execute when DISTINCT is specified. Thus, the use of DISTINCT should be reserved for cases where it is necessary.

If DISTINCT is used, the statement cannot contain an aggregate function with a DISTINCT parameter.

FIRST or TOP number-of-rows Specifies the number of rows returned from a query. FIRST returns the first row selected from the query. TOP returns the specified number of rows from the query, where *number-of-rows* is in the range 1 - 32767, and can be an integer constant or integer variable.

FIRST and TOP are used primarily with the ORDER BY clause. If these keywords are used without an ORDER BY clause, then the result may vary from run to run of the same query, as the optimizer may choose a different query plan.

FIRST and TOP are permitted only in the top level SELECT of a query, so they cannot be used in derived tables or view definitions. Using FIRST or TOP in a view definition may result in the keyword being ignored when a query is run on the view.

Using FIRST is the same as setting the ROW_COUNT database option to 1. Using TOP is the same as setting the ROW_COUNT option to the same number of rows, except that the maximum number of rows returned for TOP is 32767. ROW_COUNT does not have an upper limit for the number of rows returned. If both TOP and ROW_COUNT are set, then the value of TOP takes precedence.

Specifying FIRST or TOP in the SELECT statement has exactly the same effect as setting the ROW_COUNT option, as long as you can limit the number of rows returned to 32767. If you need the query to return more than 32K rows, then use ROW_COUNT. For more information on the ROW_COUNT database option, see “ROW_COUNT option” on page 119.

select-list The *select-list* is a list of expressions separated by commas specifying what will be retrieved from the database. If asterisk (*) is specified, it is expanded to select all columns of all tables in the FROM clause (table-name all columns of the named table). Aggregate functions and analytical functions are allowed in the *select-list* (see Chapter 5, “SQL Functions”).

Note In Sybase IQ, scalar subqueries (nested selects) are allowed in the select list of the top level SELECT, as in Adaptive Server Anywhere and Adaptive Server Enterprise. Subqueries cannot be used inside a conditional value expression (for example, in a CASE statement).

In Sybase IQ, subqueries can also be used in a WHERE or HAVING clause predicate (one of the supported predicate types). However, inside the WHERE or HAVING clause, subqueries cannot be used inside a value expression or inside a BETWEEN, CONTAINS, or LIKE predicate. Subqueries are not allowed in the ON clause of outer joins or in the GROUP BY clause.

For more details on the use of subqueries, see “Subqueries in expressions” on page 155 and “Subqueries in search conditions” on page 165.

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alias-names can be used throughout the query to represent the aliased expression. Alias names are also displayed by DBISQL at the top of each column of output from the SELECT statement. If the optional *alias-name* is not specified after an expression, DBISQL will display the expression. You cannot use the same name or expression for a column alias as the column name; IQ prevents this usage because it would be a recursive reference.

INTO host-variable-list This clause is used in Embedded SQL only. It specifies where the results of the SELECT statement will go. There must be one host-variable item for each item in the *select-list*. Select list items are put into the host variables in order. An indicator host variable is also allowed with each *host-variable* so the program can tell if the select list item was NULL.

INTO variable-list This clause is used in procedures only. It specifies where the results of the SELECT statement will go. There must be one variable for each item in the select list. Select list items are put into the variables in order.

INTO table-name This clause is used to create a table and fill it with data.

If the table name starts with # then the table is created as a temporary table. Otherwise, the table is created as a permanent base table. For permanent tables to be created, the query must satisfy the following conditions:

- The *select-list* contains more than one item, and the INTO target is a single *table-name* identifier, or
- The select-list contains a * and the INTO target is specified as *owner.table*.

To create a permanent table with one column, the table name must be specified as *owner.table*. Omit the owner specification for a temporary table.

This statement causes a COMMIT before execution as a side effect of creating the table. RESOURCE authority is required to execute this statement. No permissions are granted on the new table: the statement is a short form for CREATE TABLE followed by INSERT... SELECT.

Tables created using this statement do not have a primary key defined. You can add a primary key using ALTER TABLE. A primary key should be added before applying any UPDATEs or DELETEs to the table; otherwise, these operations result in all column values being logged in the transaction log for the affected rows.

Use of this clause is restricted to queries that are valid Adaptive Server Anywhere queries. Sybase IQ extensions are not supported.

FROM table-list Rows are retrieved from the tables and views specified in the *table-list*. Joins can be specified using join operators. For more information, see FROM clause on page 486. A SELECT statement with no FROM clause can be used to display the values of expressions not derived from tables. For example:

```
SELECT @@version
```

displays the value of the global variable @@version. This is equivalent to:

```
SELECT @@version
FROM DUMMY
```

Note If you omit the FROM clause, or if all tables in the query are in the SYSTEM dbspace, the query is processed by Adaptive Server Anywhere instead of Sybase IQ and may behave differently, especially with respect to syntactic and semantic restrictions and the effects of option settings. See the Adaptive Server Anywhere documentation for rules that may apply to processing.

If you have a query that does not require a FROM clause, you can force the query to be processed by Sybase IQ by adding the clause "FROM iq_dummy," where iq_dummy is a one row, one column table that you create in your database.

WHERE search-condition This clause specifies which rows will be selected from the tables named in the FROM clause. It is also used to do joins between multiple tables. This is accomplished by putting a condition in the WHERE clause that relates a column or group of columns from one table with a column or group of columns from another table. Both tables must be listed in the FROM clause.

Note The use of the same CASE statement in both the SELECT and the WHERE clause of a grouped query is not allowed.

See "Search conditions" on page 162 for a full description.

GROUP BY clause You can group by columns or alias names or functions. GROUP BY expressions must also appear in the select list. The result of the query contains one row for each distinct set of values in the named columns, aliases, or functions. The resulting rows are often referred to as *groups* since there is one row in the result for each group of rows from the table list. For the sake of GROUP BY, all NULL values are treated as identical. Aggregate functions can then be applied to these groups to get meaningful results.

The GROUP BY expression must contain more than a single constant. You do not need to add constants to the GROUP BY clause in order to select the constants in grouped queries. An error is returned and the query is rejected, if the GROUP BY expression contains only a single constant.

When GROUP BY is used, the select list, HAVING clause, and ORDER BY clause cannot reference any identifiers except those named in the GROUP BY clause. The following exception applies: The *select-list* and HAVING clause may contain aggregate functions.

You can use GROUP BY to calculate results or display a column or expression that does not appear in the *select list*. The GROUP BY clause displays all groups, even those excluded from calculations by a WHERE clause.

The following extensions to ANSI standards GROUP BY are supported in order to make Adaptive Server Enterprise queries run easily with Sybase IQ.

- A *select list* that includes aggregates can include extended columns that are not arguments of aggregate functions and are not included in the GROUP BY clause.
- The GROUP BY ALL clause displays all groups, even those excluded from calculations by a WHERE clause.
- The HAVING clause can include columns or expressions that are not in the select list and not in the group by clause
- An item in the ORDER BY clause could also contain extended columns as long as that item is either in the *select list* or the GROUP BY clause.

Some exceptions apply to this support:

- If any extended column is from a view or derived table that is base on a query with group by, distinct or aggregation syntax, IQ will reject the query.
- If there are two or more base tables involved in the extended group by query, IQ rejects the query. This means IQ only supports the extended group by clause for single table reference.
- ASE does not support any OLAP function, so if there is any OLAP function in the extended group by clause, IQ rejects the query.

See the Examples in this section.

ROLLUP operator The ROLLUP operator in the GROUP BY clause allows you to analyze subtotals using different levels of detail. It creates subtotals that “roll up” from a very detailed level to a grand total.

The ROLLUP operator requires an ordered list of grouping expressions to be supplied as arguments. ROLLUP first calculates the standard aggregate values specified in the GROUP BY. Then ROLLUP moves from right to left through the list of grouping columns and creates progressively higher-level subtotals. A grand total is created at the end. If *n* is the number of grouping columns, then ROLLUP creates *n+1* levels of subtotals.

Restrictions on the ROLLUP operator are:

- The ROLLUP operator supports all of the aggregate functions available to the GROUP BY clause, but ROLLUP does not currently support COUNT DISTINCT and SUM DISTINCT.
- ROLLUP can only be used in the SELECT statement; you cannot use ROLLUP in a SELECT subquery.
- A multiple grouping specification that combines ROLLUP, CUBE, and GROUP BY columns in the same GROUP BY clause is not currently supported.
- Constant expressions as GROUP BY keys are not supported.

GROUPING is used with the ROLLUP operator to distinguish between stored NULL values and "NULL" values in query results created by ROLLUP.

ROLLUP syntax:

SELECT ... [**GROUPING** (*column-name*) ...] ...
GROUP BY [*expression* [,...]
| **ROLLUP** (*expression* [,...])]

See the section "Expressions" on page 153 in Chapter 3, "SQL Language Elements" for the format of an operator expression.

GROUPING takes a column name as a parameter and returns a Boolean value as listed in Table 6-12.

Table 6-12: Values returned by GROUPING with the ROLLUP operator

If the value of the result is	GROUPING returns
NULL created by a ROLLUP operation	1 (TRUE)
NULL indicating the row is a subtotal	1 (TRUE)
not created by a ROLLUP operation	0 (FALSE)
a stored NULL	0 (FALSE)

ROLLUP example 1 The following example illustrates the use of ROLLUP and GROUPING and displays a set of mask columns created by GROUPING. The digits 0 and 1 displayed in columns S, N, and C are the values returned by GROUPING to represent the value of the ROLLUP result. A program can analyze the results of this query by using a mask of "011" to identify subtotal rows and "111" to identify the row of overall totals.

```
select size, name, color, SUM(quantity),
grouping (size) as S,
grouping (name) as N,
grouping (color) as C
from product
group by rollup (size, name, color)
having (S=1 or N=1 or C=1)
order by size, name, color;
```

size	name	color	SUM(product_quantity)	S	N	C
Large	Sweatshirt	(NULL)	71	0	0	1
Large	(NULL)	(NULL)	71	0	1	1
Medium	Shorts	(NULL)	80	0	0	1
Medium	Tee Shirt	(NULL)	54	0	0	1
Medium	(NULL)	(NULL)	134	0	1	1
One size fits all	Baseball Cap	(NULL)	124	0	0	1
One size fits all	Tee Shirt	(NULL)	75	0	0	1
One size fits all	Visor	(NULL)	64	0	0	1
One size fits all	(NULL)	(NULL)	263	0	1	1
Small	Tee Shirt	(NULL)	28	0	0	1
Small	(NULL)	(NULL)	28	0	1	1
(NULL)	(NULL)	(NULL)	496	1	1	1

ROLLUP example 2 The following example illustrates the use of GROUPING to distinguish stored NULL values and "NULL" values created by the ROLLUP operation. GROUPING checks the result of the ROLLUP and returns 0 for a stored NULL or 1 for a "NULL" value created by ROLLUP. Stored NULL values are then displayed as [NULL] in column prod_id, and "NULL" values created by ROLLUP are replaced with ALL in column PROD_IDS, as specified in the query.

```
select ship_date, prod_id, SUM(quantity),
case grouping (prod_id) when 1 then 'ALL' else CAST (prod_id as VARCHAR(15) END
as PROD_IDS,
case grouping (ship_date) when 1 then 'ALL' else CAST (ship_date as VARCHAR(20))
END as SHIP_DATE
from sales_order_items
group by rollup (ship_date, prod_id)
having SUM(quantity) > 36 ORDER BY ship_date, prod_id;
```

ship_date	prod_id	SUM (sales_order_items. quantity)	PROD_IDS	SHIP_DATES
2004-01-03 00:00:00.000	(NULL)	60	ALL	2004-01-03 00:00:00.000
2004-01-09 00:00:00.000	400	48	400	2004-01-09 00:00:00.000
2004-01-09 00:00:00.000	401	48	401	2004-01-09 00:00:00.000
2004-01-09 00:00:00.000	(NULL)	96	ALL	2004-01-09 00:00:00.000
2004-01-13 00:00:00.000	(NULL)	72	ALL	2004-01-13 00:00:00.000
2004-01-14 00:00:00.000	500	60	500	2004-01-14 00:00:00.000
2004-01-14 00:00:00.000	501	60	501	2004-01-14 00:00:00.000
2004-01-14 00:00:00.000	(NULL)	120	ALL	2004-01-14 00:00:00.000
2004-01-15 00:00:00.000	500	60	500	2004-01-15 00:00:00.000
2004-01-15 00:00:00.000	(NULL)	72	ALL	2004-01-15 00:00:00.000
2004-01-17 00:00:00.000	(NULL)	72	ALL	2004-01-17 00:00:00.000
2004-01-20 00:00:00.000	700	60	700	2004-01-20 00:00:00.000
2004-01-20 00:00:00.000	(NULL)	84	ALL	2004-01-20 00:00:00.000
2004-01-21 00:00:00.000	(NULL)	120	ALL	2004-01-21 00:00:00.000
2004-01-23 00:00:00.000	(NULL)	48	ALL	2004-01-23 00:00:00.000
2004-01-24 00:00:00.000	600	48	600	2004-01-24 00:00:00.000
2004-01-24 00:00:00.000	601	48	601	2004-01-24 00:00:00.000
2004-01-24 00:00:00.000	(NULL)	120	ALL	2004-01-24 00:00:00.000
2004-01-28 00:00:00.000	(NULL)	84	ALL	2004-01-28 00:00:00.000
2004-01-29 00:00:00.000	(NULL)	168	ALL	2004-01-29 00:00:00.000

CUBE operator The CUBE operator in the GROUP BY clause analyzes data by forming the data into groups in more than one dimension. CUBE requires an ordered list of grouping expressions (dimensions) as arguments and enables the SELECT statement to calculate subtotals for all possible combinations of the group of dimensions.

Restrictions on the CUBE operator are:

- The CUBE operator supports all of the aggregate functions available to the GROUP BY clause, but CUBE does not currently support COUNT DISTINCT and SUM DISTINCT.
- CUBE can only be used in the SELECT statement; you cannot use CUBE in a SELECT subquery.
- A multiple GROUPING specification that combines ROLLUP, CUBE, and GROUP BY columns in the same GROUP BY clause is not currently supported.
- Constant expressions as GROUP BY keys are not supported.

GROUPING is used with the CUBE operator to distinguish between stored NULL values and "NULL" values in query results created by CUBE.

CUBE syntax:

SELECT ... [**GROUPING** (*column-name*) ...] ...
GROUP BY [*expression* [,...]
| **CUBE** (*expression* [,...])]

GROUPING takes a column name as a parameter and returns a Boolean value as listed in Table 6-13.

Table 6-13: Values returned by GROUPING with the CUBE operator

If the value of the result is	GROUPING returns
NULL created by a CUBE operation	1 (TRUE)
NULL indicating the row is a subtotal	1 (TRUE)
not created by a CUBE operation	0 (FALSE)
a stored NULL	0 (FALSE)

See the examples in the description of the ROLLUP operator for illustrations of the use of the GROUPING function to interpret results.

When generating a query plan, the IQ optimizer estimates the total number of groups generated by the GROUP BY CUBE hash operation. The MAX_CUBE_RESULTS database option sets an upper boundary for the number of estimated rows the optimizer will consider for a hash algorithm that can be run. If the actual number of rows exceeds the MAX_CUBE_RESULT option value, the optimizer stops processing the query and returns the error message "Estimate number: nnn exceed the DEFAULT_MAX_CUBE_RESULT of GROUP BY CUBE or ROLLUP", where nnn is the number estimated by the IQ optimizer. See the section "MAX_CUBE_RESULT option" in Chapter 2, "Database Options" for information on setting the MAX_CUBE_RESULT option.

CUBE example

The following queries use data from a census, including the state (geographic location), gender, education level, and income of people. The first query contains a GROUP BY clause that organizes the results of the query into groups of rows, according to the values of the columns state, gender, and education in the table census and computes the average income and the total counts of each group. This query uses only the GROUP BY clause without the CUBE operator to group the rows.

```
SELECT state, gender, education, COUNT(*),
CAST (ROUND ( AVG ( income ), 2 ) AS NUMERIC (18,2))
FROM census
GROUP BY state, gender, education;
```

The results of this query are:

state	gender	education	count(*)	avg income
MA	f	BA	3	48333.33
MA	f	HS	2	40000.00
MA	f	MS	1	45000.00
MA	m	BA	4	55000.00
MA	m	HS	1	55000.00
MA	m	MS	3	85000.00
NH	f	HS	2	50000.00
NH	f	MS	1	85000.00
NH	m	BA	3	55000.00
NH	m	MS	1	49000.00

Use the CUBE extension of the GROUP BY clause, if you want to compute the average income in the entire census of state, gender, and education and compute the average income in all possible combinations of the columns state, gender, and education, while making only a single pass through the census data. For example, use the CUBE operator if you want to compute the average income of all females in all states, or compute the average income of all people in the census according to their education and geographic location.

When CUBE calculates a group, CUBE puts a NULL value in the column(s) whose group is calculated. The distinction is difficult between the type of group each row represents and whether the NULL is a NULL stored in the database or a NULL resulting from CUBE. The GROUPING function solves this problem by returning 1, if the designated column has been merged to a higher level group.

The following query illustrates the use of the GROUPING function with GROUP BY CUBE.

```
SELECT
CASE GROUPING ( state ) WHEN 1 THEN 'ALL' ELSE state END
AS c_state,
CASE GROUPING ( gender ) WHEN 1 THEN 'ALL' ELSE gender
END AS c_gender,
CASE GROUPING ( education ) WHEN 1 THEN 'ALL' ELSE
education END AS c_education,
COUNT(*), CAST (ROUND ( AVG ( income ), 2 ) AS NUMERIC
(18,2)) AS average
FROM census
GROUP BY CUBE (state, gender, education);
```

The results of this query are shown below. Note that the NULLs generated by CUBE to indicate a subtotal row are replaced with ALL in the subtotal rows, as specified in the query.

c_state	c_gender	c_education	count(*)	average
MA	f	BA	3	48333.33
MA	f	HS	2	40000.00
MA	f	MS	1	45000.00
MA	f	ALL	6	45000.00
MA	m	BA	4	55000.00
MA	m	HS	1	55000.00
MA	m	MS	3	85000.00
MA	m	ALL	8	66250.00
MA	ALL	ALL	14	57142.86

c_state	c_gender	c_education	count(*)	average
NH	f	HS	2	50000.00
NH	f	MS	1	85000.00
NH	f	ALL	3	61666.67
NH	m	BA	3	55000.00
NH	m	MS	1	49000.00
NH	m	ALL	4	53500.00
NH	ALL	ALL	7	57000.00
ALL	ALL	ALL	21	57095.24
ALL	ALL	BA	10	53000.00
ALL	ALL	MS	6	72333.33
ALL	ALL	HS	5	47000.00
ALL	f	ALL	9	50555.56
ALL	m	ALL	12	62000.00
ALL	f	BA	3	48333.33
ALL	m	HS	1	55000.00
ALL	m	MS	4	76000.00
ALL	m	BA	7	55000.00
ALL	f	MS	2	65000.00
ALL	f	HS	4	45000.00
NH	ALL	HS	2	50000.00
NH	ALL	MS	2	67000.00
MA	ALL	MS	4	75000.00
MA	ALL	HS	3	45000.00
MA	ALL	BA	7	52142.86
NH	ALL	BA	3	55000.00

HAVING search-condition based on the group values and not on the individual row values. The HAVING clause can only be used if either the statement has a GROUP BY clause or if the select list consists solely of aggregate functions. Any column names referenced in the HAVING clause must either be in the GROUP BY clause or be used as a parameter to an aggregate function in the HAVING clause.

ORDER BY clause Orders the results of a query. Each item in the ORDER BY list can be labeled as ASC for ascending order or DESC for descending order. Ascending is assumed if neither is specified. If the expression is an integer n, then the query results will be sorted by the nth item in the select list.

In Embedded SQL, the SELECT statement is used for retrieving results from the database and placing the values into host variables via the INTO clause. The SELECT statement must return only one row. For multiple row queries, you must use cursors.

You cannot include a java class in the SELECT list, but you can, for example, create a function or variable that acts as a wrapper for the Java class and then select it.

Side effects

None.

Standards

- **SQL/92** Entry level feature. check clauses.
- **Sybase** Supported by Adaptive Server Enterprise, with some differences in syntax.

Permissions

Must have SELECT permission on the named tables and views.

See also

- CREATE VIEW statement
- DECLARE CURSOR statement [ESQL] [SP]
- "Expressions" on page 153
- FETCH statement [ESQL] [SP]
- FROM clause
- OPEN statement [ESQL] [SP]
- "Search conditions" on page 162
- UNION operation
- "Access fields and methods of the Java object" in the *Adaptive Server Anywhere Programming Guide* chapter "Welcome to Java in the Database"

SET statement

Description

Assigns a value to a SQL variable.

Syntax

SET *identifier = expression*

Examples

- The following code fragment could be used to insert a large text value into the database.

```
EXEC SQL BEGIN DECLARE SECTION;
```

```
char buffer[5001];
EXEC SQL END DECLARE SECTION;


EXEC SQL CREATE VARIABLE hold_text VARCHAR;
EXEC SQL SET hold_text = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( buffer, 1, 5000, fp );
    if( size <= 0 ) break;

    /* buffer must be null-terminated */
    buffer[size] = '\0';
    /* add data to blob using concatenation */
    EXEC SQL SET hold_text = hold_text || :buffer;
}
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_text );
EXEC SQL DROP VARIABLE hold_text;
```

- The following code fragment could be used to insert a large binary value into the database.

```
EXEC SQL BEGIN DECLARE SECTION;
DECL_BINARY( 5000 ) buffer;
EXEC SQL END DECLARE SECTION;
EXEC SQL CREATE VARIABLE hold_blob LONG BINARY;
EXEC SQL SET hold_blob = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( &(buffer.array), 1, 5000, fp );
    if( size <= 0 ) break;
    buffer.len = size;


    /* add data to blob using concatenation
       Note that concatenation works for
       binary data too! */
    EXEC SQL SET hold_blob = hold_blob || :buffer;
}
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_blob );
EXEC SQL DROP VARIABLE hold_blob;
```

Usage

The SET statement assigns a new value to a variable that was previously created using the CREATE VARIABLE statement.

A variable can be used in a SQL statement anywhere a column name is allowed. If there is no column name that matches the identifier, the database server checks to see if there is a variable that matches and uses its value.

Variables are local to the current connection, and disappear when you disconnect from the database or when you use the DROP VARIABLE statement. They are not affected by COMMIT or ROLLBACK statements.

Variables are necessary for creating large text or binary objects for INSERT or UPDATE statements from Embedded SQL programs because Embedded SQL host variables are limited to 32,767 bytes.

Side effects

None.

Standards

- **SQL/92** Persistent stored module feature.
- **Sybase** Not supported. In Adaptive Server Enterprise, variables are assigned using the SELECT statement with no table, a Transact-SQL syntax that is also supported by Sybase IQ. The SET statement is used to set database options in Adaptive Server Enterprise.

Permissions

None.

See also

- CREATE VARIABLE statement
- DROP VARIABLE statement
- “Expressions” on page 153

SET statement [T-SQL]

Description

Sets database options in an Adaptive Server Enterprise-compatible manner.

Syntax

SET *option-name option-value*

Usage

Table 6-14 lists the available options.

Table 6-14: Transact-SQL SET options

Option name	Option value
ANSINULL	ON | OFF
ANSI_PERMISSIONS	ON | OFF
CLOSE_ON_ENDTRANS	ON | OFF
QUOTED_IDENTIFIER	ON | OFF
ROWCOUNT	*integer*
STRING_RTRUNCATION	ON | OFF
TRANSACTION ISOLATION LEVEL	0 | 1 | 2 | 3

Database options in Sybase IQ are set using the SET OPTION statement. However, IQ also provides support for the Adaptive Server Enterprise SET statement for a set of options particularly useful for compatibility.

The following options can be set using the Transact-SQL SET statement in Sybase IQ, as well as in Adaptive Server Enterprise:

- **SET ANSINULL { ON | OFF }** The default behavior for comparing values to NULL in Sybase IQ and Adaptive Server Enterprise is different. Setting ANSINULL to OFF provides Transact-SQL compatible comparisons with NULL
- **SET ANSI_PERMISSIONS { ON | OFF }** The default behavior in Sybase IQ and Adaptive Server Enterprise regarding permissions required to carry out a DELETE containing a column reference is different. Setting ANSI_PERMISSIONS to OFF provides Transact-SQL compatible permissions on DELETE
- **SET CLOSE_ON_ENDTRANS { ON | OFF }** The default behavior in Sybase IQ and Adaptive Server Enterprise for closing cursors at the end of a transaction is different. Setting CLOSE_ON_ENDTRANS to OFF provides Transact-SQL compatible behavior.
- **SET QUOTED_IDENTIFIER { ON | OFF }** Controls whether strings enclosed in double quotes are interpreted as identifiers (ON) or as literal strings (OFF).

- **SET ROWCOUNT** *integer* The Transact-SQL ROWCOUNT option limits to the specified integer the number of rows fetched for any cursor. This includes rows fetched by re-positioning the cursor. Any fetches beyond this maximum return a warning. The option setting is considered when returning the estimate of the number of rows for a cursor on an OPEN request.

  Note The ROWCOUNT option has no effect on UPDATE and DELETE operations in IQ. Also note that Sybase IQ does not support the @@rowcount global variable.

In Sybase IQ, if the ROWCOUNT setting is greater than the number of rows that DBISQL can display, DBISQL may do some extra fetches to reposition the cursor. Thus, the number of rows actually displayed may be less than the number requested. Also, if any rows are re-fetched due to truncation warnings, the count may be inaccurate.

A value of zero resets the option to get all rows.

- **SET STRING_RTRUNCATION { ON | OFF }** The default behavior in Sybase IQ and Adaptive Server Enterprise when non-space characters are truncated on assigning SQL string data is different. Setting STRING_RTRUNCATION to ON provides Transact-SQL compatible string comparisons, including hexadecimal string (binary data type) comparisons.
- **SET TRANSACTION ISOLATION LEVEL { 0 | 1 | 2 | 3 }** Sets the locking isolation level for the current connection, as described in Chapter 10, “Transactions and Versioning” in the *Sybase IQ System Administration Guide*. For Adaptive Server Enterprise, only 1 and 3 are valid options. For Sybase IQ, only 3 is a valid option.

In addition, the following SET statement is allowed by Sybase IQ for compatibility, but has no effect:

- **SET PREFETCH {ON | OFF}**

Side effects

None.

Standards

- **SQL/92** Transact-SQL extension
- **Sybase** Sybase IQ supports a subset of the Adaptive Server Enterprise database options.

Permissions

None.

See also SET OPTION statement

SET CONNECTION statement [DBISQL] [ESQL]

Description Changes the active database connection.

Syntax **SET CONNECTION** [*connection-name*]

Parameters *connection-name*:
identifier, string or host-variable

Examples
- The following example is in Embedded SQL:

```
EXEC SQL SET CONNECTION :conn_name;
```

- From DBISQL, set the current connection to the connection named conn1:

```
SET CONNECTION conn1 ;
```

Usage The SET CONNECTION statement changes the active database connection to *connection-name*. The current connection state is saved and will be resumed when it again becomes the active connection. If *connection-name* is omitted and there is a connection that was not named, that connection becomes the active connection.

Note When cursors are opened in Embedded SQL, they are associated with the current connection. When the connection is changed, the cursor names will not be accessible. The cursors remain active and in position and will become accessible when the associated connection becomes active again.

Side effects

None.

Standards
- **SQL/92** DBISQL use is a vendor extension. Embedded SQL is a Full level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions None.

See also
- CONNECT statement [ESQL] [DBISQL]
- DISCONNECT statement [DBISQL]

SET DESCRIPTOR statement [ESQL]

Description

Describes the variables in a SQL descriptor area, and places data into the descriptor area.

Syntax

SET DESCRIPTOR *descriptor-name*
... { **COUNT** = { *integer* | *hostvar* }
| **VALUE** *n assignment* [, ...] }

Parameters

assignment:
{ { TYPE | SCALE | PRECISION | LENGTH | INDICATOR }
= { *integer* | *hostvar* }
| DATA = *hostvar* }

Examples

For an example, see ALLOCATE DESCRIPTOR statement [ESQL].

Usage

The SET DESCRIPTOR statement is used to describe the variables in a descriptor area, and to place data into the descriptor area.

The SET...COUNT statement sets the number of described variables within the descriptor area. The value for count must not exceed the number of variables specified when the descriptor area was allocated.

The value *n* specifies the variable in the descriptor area upon which the assignment(s) will be performed.

Type checking is performed when doing SET...DATA to ensure that the variable in the descriptor area has the same type as the host variable.

If an error occurs, the code is returned in the SQLCA.

Side effects

None.

Standards

- **SQL/92** Intermediate level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

See also

DEALLOCATE DESCRIPTOR statement [ESQL]

SET OPTION statement

Description

Changes database options.

Syntax

SET [**EXISTING**] [**TEMPORARY**] **OPTION**
... [*userid*. | **PUBLIC**.]*option-name* = [*option-value*]

Parameters

userid:
identifier, string or host-variable

option-name:
identifier, string or host-variable

option-value:
host-variable (indicator allowed), string, identifier, or number

Examples

- Set the DATE_FORMAT option.

```
SET OPTION public.date_format = 'Mmm dd yyyy' ;
```

- Set the WAIT_FOR_COMMIT option to on.

```
SET OPTION wait_for_commit = 'on' ;
```

- Embedded SQL examples:

```
1. EXEC SQL SET OPTION :user.:option_name = :value;
2. EXEC SQL SET TEMPORARY OPTION Date_format =
'mm/dd/yyyy';
```

Usage

The SET OPTION statement is used to change options that affect the behavior of the database and its compatibility with Transact-SQL. Setting the value of an option can change the behavior for all users or an individual user, in either a temporary or permanent scope.

The classes of options are:

- General database options
- Transact-SQL compatibility database options

Specifying either a user ID or the PUBLIC user ID determines whether the option is set for an individual user, a user group represented by *userid* or the PUBLIC user ID, the user group to which all users are a member. If no user group is specified, the option change is applied to the currently logged on user ID which issued the SET OPTION statement.

For example, the following statement applies an option change to the user DBA, if DBA is the user issuing the SQL statement:

```
SET OPTION login_mode = mixed
```

However the following statement applies the change to the PUBLIC user ID, a user group to which all users belong.

```
SET OPTION Public.login_mode = standard
```

Only users with DBA privileges have the authority to Set an option for the PUBLIC user ID.

In Embedded SQL, only database options can be set temporarily.

Changing the value of an option for the PUBLIC user ID sets the value of the option for any user which has not SET their own value. Option values cannot be set for an individual user ID unless there is already a PUBLIC user ID setting for that option.

Users cannot set the options of another user, unless they have DBA authority.

Users can use the SET OPTION statement to change the values for their own user ID. Setting the value of an option for a user id other then your own is permitted only if you have DBA authority.

If you use the EXISTING keyword, option values cannot be set for an individual user ID unless there is already a PUBLIC user ID setting for that option.

Adding the TEMPORARY keyword to the Set Option statement changes the duration that the change takes effect. Without the TEMPORARY keyword, an option change is permanent: it will not change until it is explicitly changed using the SET OPTION statement.

When the SET TEMPORARY OPTION statement is applied using an individual user ID, the new option value is in effect as long as that user is logged in to the database.

When the SET TEMPORARY OPTION is used with the PUBLIC user ID, the change is in place for as long as the database is running. When the database is shut down, TEMPORARY options for the PUBLIC user ID revert back to their permanent value.

Temporarily setting an option for the PUBLIC user ID as opposed to setting the value of the option permanently offers a security advantage. For example, when the login_mode option is enabled the database relies on the log in security of the system on which it is running. Enabling it temporarily means a database relying on the security of a Windows domain will not be compromised if the database is shutdown and copied to a local machine. In that case, the temporary enabling of the login_mode option will revert to its permanent value, which could be Standard, a mode where integrated logins are not permitted.

If *option-value* is omitted, the specified option setting will be deleted from the database. If it was a personal option setting, then the value used will revert back to the PUBLIC setting. If a TEMPORARY option is deleted, the option setting will revert back to the permanent setting.

Note For all database options that accept integer values, Sybase IQ truncates any decimal *option-value* setting to an integer value. For example, the value 3.8 is truncated to 3.

The maximum length of *option-value* when set to a string is 127 bytes.

Warning! Changing option settings while fetching rows from a cursor is not supported, as it can lead to ill-defined behavior. For example, changing the DATE_FORMAT setting while fetching from a cursor returns different date formats among the rows in the result set. Do not change option settings while fetching rows.

Database options

For information about the specific options, see Chapter 2, “Database Options”.

Side effects

If TEMPORARY is not specified, an automatic commit is performed.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Adaptive Server Enterprise. Sybase IQ does support some Adaptive Server Enterprise options using the SET statement.

Permissions

None required to set your own options. Must have DBA authority to set database options for another user or PUBLIC.

See also

Chapter 2, “Database Options”

SET OPTION statement [DBISQL]

Description

Changes DBISQL options.

Syntax

Syntax 1

SET [**TEMPORARY**] **OPTION**
... [*userid*. | **PUBLIC**.]*option-name* = [*option-value*]

Syntax 2

SET PERMANENT

Syntax 3

SET

Parameters

userid:
identifier, string or host-variable

option-name:
identifier, string or host-variable

option-value:
host-variable (indicator allowed), string, identifier, or number

Usage

SET PERMANENT (Syntax 2) stores all current DBISQL options in the SYSOPTION system table. These settings are automatically established every time DBISQL is started for the current user ID.

Syntax 3 is used to display all of the current option settings. If there are temporary options set for DBISQL or the database server, these will be displayed; otherwise, the permanent option settings are displayed.

If you incorrectly type the name of an option when you are setting the option, the incorrect name is saved in the SYSOPTION table. You can remove the incorrectly typed name from the SYSOPTION table by setting the option PUBLIC with an equality after the option name and no value:

```
SET OPTION PUBLIC.a_mistyped_name=;
```

See also

Chapter 2, “Database Options”

SET SQLCA statement [ESQL]

Description

Tells the SQL preprocessor to use a SQLCA other than the default global *sqlca*.

Syntax

SET SQLCA *sqlca*

Parameters

sqlca:
identifier or string

Examples

- The owing function could be found in a Windows DLL. Each application that uses the DLL has its own SQLCA.

  ```
  an_sql_code FAR PASCAL ExecuteSQL( an_application *app,
  char *com )
  ```

```
{
    EXEC SQL BEGIN DECLARE SECTION;
    char *sqlcommand;
    EXEC SQL END DECLARE SECTION;
    EXEC SQL SET SQLCA "&app->.sqlca";
    sqlcommand = com;
    EXEC SQL WHENEVER SQLERROR CONTINUE;
    EXEC SQL EXECUTE IMMEDIATE :sqlcommand;
return( SQLCODE );
}
```

Usage

The SET SQLCA statement tells the SQL preprocessor to use a SQLCA other than the default global *sqlca*. The *sqlca* must be an identifier or string that is a C language reference to a SQLCA pointer.

The current SQLCA pointer is implicitly passed to the database interface library on every Embedded SQL statement. All Embedded SQL statements that follow this statement in the C source file will use the new SQLCA. This statement is only necessary when you are writing code that is reentrant. The *sqlca* should reference a local variable. Any global or module static variable is subject to being modified by another thread.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not supported by Open Client/Open Server.

Permissions

None.

See also

The chapter “The Embedded SQL Interface” of the Adaptive Server Anywhere *Programming Interfaces Guide*

SIGNAL statement

Description

Signals an exception condition.

Syntax

SIGNAL *exception-name*

Usage

SIGNAL allows you to raise an exception. See Chapter 8, “Using Procedures and Batches” of the *Sybase IQ System Administration Guide* for a description of how exceptions are handled.

Side effects

None.

Standards

- **SQL/92** Persistent Stored Module feature.
- **Sybase** SIGNAL is not supported by Adaptive Server Enterprise.

Permissions

None.

See also

- RESIGNAL statement
- BEGIN... END statement

START DATABASE statement [DBISQL]

Description

Starts a database on the specified database server

Syntax

START DATABASE *database-file*
... [**AS** *database-name*]
... [**ON** *engine-name*]
... [**AUTOSTOP** { **YES** | **NO** }]
... [**KEY** *key*]

Examples

- On a UNIX system, start the database file */s1/sybase/sample_2.db* on the current server.

  ```
  START DATABASE '/s1/sybase/sample_2.db'
  ```

- On a Windows system, start the database file *c:\sybase\sample_2.db* as sam2 on the server named eng1.

  ```
  START DATABASE 'c:\sybase\sample_2.db'
  AS sam2
  ON eng1
  ```

Usage

The START DATABASE statement starts a specified database on a specified database server. The database server must be running. The full path must be specified for the database-file unless the file is located in the current directory.

The START DATABASE statement does not connect DBISQL to the specified database: a CONNECT statement needs to be issued in order to make a connection.

If *database-name* is not specified, a default name is assigned to the database. This default name is the root of the database file. For example, a database in file *c:\sybase\ASIQ-12_5\demo\asiqdemo.db* would be given the default name of asiqdemo.

If *engine-name* is not specified, the default database server is assumed. The default database server is the first started server among those currently running.

The default setting for the AUTOSTOP clause is YES. With AUTOSTOP set to YES, the database is unloaded when the last connection to it is dropped. If AUTOSTOP is set to NO, the database is not unloaded.

If the database is strongly encrypted, enter the KEY value (password) using the KEY clause

Sybase recommends that you start only one database on a given IQ database server.

Side effects

None

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions

Must have DBA authority.

START ENGINE statement [DBISQL]

Description

Starts a database server.

Syntax

START ENGINE AS *engine-name* [**STARTLINE** *command-string*]

Examples

- Start a database server, named eng1, without starting any databases on it.

  ```
  START ENGINE AS eng1
  ```

- The following example shows the use of a STARTLINE clause.

  ```
  START ENGINE AS eng1 STARTLINE 'start_asiq -c 8096'
  ```

Usage

The START ENGINE statement starts a database server. If you wish to specify a set of options for the server, use the STARTLINE keyword together with a command string. Valid command strings are those that conform to the database server command-line description in Chapter 1, "Running the Database Server" in the *Sybase IQ Utility Guide*.

Note Several server options are required for IQ to operate well. To ensure that you are using the right set of options, Sybase recommends that you start your server by using Sybase Central, or a configuration file with the start_asiq command.

Side effects

None

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions

None

See also

- STOP ENGINE statement [DBISQL]
- Chapter 1, "Running the Database Server" in the *Sybase IQ Utility Guide*

START JAVA statement

Description

Starts the Java VM.

Syntax

START JAVA

Examples

Start the Java VM.

```
START JAVA
```

Usage

The START JAVA statement starts the Java VM. The main use is to load the VM at a convenient time so that when the user starts to use Java functionality there is no initial pause while the VM is loaded.

Side effects

None

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions

Must have DBA authority.

See also STOP JAVA statement

STOP DATABASE statement [DBISQL]

Description Stops a database on the specified database server

Syntax **STOP DATABASE** *database-name*
... [**ON** *engine-name*]
... [**UNCONDITIONALLY**]

Examples Stop the database named sample on the default server:

```
STOP DATABASE sample
```

Usage The STOP DATABASE statement stops a specified database on a specified database server. If *engine-name* is not specified, all running engines will be searched for a database of the specified name.

The *database-name* is the name specified in the -n parameter when the database is started, or in the DBN (DatabaseName) connection parameter. This name is typically the file name of the database file that holds the Catalog Store, without the *.db* extension, but can be any user-defined name

If the UNCONDITIONALLY keyword is supplied, the database will be stopped even if there are connections to the database. If UNCONDITIONALLY is not specified, the database will not be stopped if there are connections to it.

Side effects

None

Standards
- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions Must have DBA authority.

See also
- START DATABASE statement [DBISQL]
- DISCONNECT statement [DBISQL]

STOP ENGINE statement [DBISQL]

Description: Stops a database server

Syntax: **STOP ENGINE** *engine-name* [**UNCONDITIONALLY**]

Examples: Stop the database server named sample.

```
STOP ENGINE sample
```

Usage: The STOP ENGINE statement stops the specified database server. If the UNCONDITIONALLY keyword is supplied, the database server is stopped even if there are connections to the server. If UNCONDITIONALLY is not specified, the database server will not be stopped if there are connections to it.

Side effects

None

Standards:

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions: None

See also: START ENGINE statement [DBISQL]

STOP JAVA statement

Description: Stops the Java VM.

Syntax: **STOP JAVA**

Examples: Stop the Java VM.

```
STOP JAVA
```

Usage: The STOP JAVA statement unloads the Java VM when it is not in use. The main use is to economize on the use of system resources.

Side effects

None

Standards:

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions: DBA authority

See also: START JAVA statement

SYNCHRONIZE JOIN INDEX statement

Description

Synchronizes one or more join indexes after one of their base tables has been updated.

Syntax

SYNCHRONIZE JOIN INDEX [*join-index-name* [, *join-index-name*]...]

Examples

Synchronizes the join indexes emp_dept_join1 and emp_dept_join2:

```
SYNCHRONIZE JOIN INDEX emp_dept_join1, emp_dept_join2
```

Usage

When a base table that contributes to a join index is updated, Sybase IQ flags the join index as unavailable. Queries that previously took advantage of the join index will perform an ad-hoc join instead, perhaps affecting their performance. The SYNCHRONIZE JOIN INDEX command allows you to bring the join index up to date making it available for queries to use.

Note A join index defines a “one” to “many” relationship (also known as primary key to foreign key) between two table columns. If an insert into the “one” (or primary key) column results in one or more duplicate values, the join index becomes invalid and cannot be synchronized. You must delete the rows containing the duplicate values before SYNCHRONIZE JOIN INDEX can make it valid again.

Synchronizing join indexes can be a time consuming process depending on the size of the base tables that make up the join. It is up to you to decide when to use this command. You can schedule it as a batch job at night or on weekends when you expect your system to have less work to do. You can perform it immediately after Sybase IQ commits a series of inserts and deletes to make the join index available as soon as possible. However, do not synchronize a join index after each insert or delete as the time to update the join index depends on the order of the updates to the tables.

SYNCHRONIZE JOIN INDEX allows you to specify one *join-index-name* after another separated by commas. You must be the owner of each join index or the DBA. If you do not specify a *join-index-name*, Sybase IQ will synchronize all the join indexes you own (or all the join indexes in the database if you are the DBA), which may adversely affect the performance of your system.

Side effects

None

Standards

- **SQL/92** Vendor extension.
- **Sybase** Not applicable.

Permissions Must be owner of the join indexes or be DBA.

See also CREATE JOIN INDEX statement

TRIGGER EVENT statement

Description Triggers a named event. The event may be defined for event triggers or be a scheduled event.

Syntax **TRIGGER EVENT** *event-name* [(*parm* = *value*, ...)]

Usage Actions are tied to particular trigger conditions or schedules by a CREATE EVENT statement. You can use the TRIGGER EVENT statement to force the event handler to execute, even when the scheduled time or trigger condition has not occurred. TRIGGER EVENT does not execute disabled event handlers.

parm = value When a triggering condition causes an event handler to execute, the database server can provide context information to the event handler using the event_parameter function. The TRIGGER EVENT statement allows you to explicitly supply these parameters, in order to simulate a context for the event handler.

When you trigger an event using the TRIGGER EVENT statement, you specify the event name. You can list event names by querying the system table SYSEVENT. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

Side effects

None.

Permissions Must have DBA authority.

See also ALTER EVENT statement

CREATE EVENT statement

Chapter 18, "Automating Tasks Using Schedules and Events" in the *Sybase IQ System Administration Guide*

TRUNCATE TABLE statement

Description Deletes all rows from a table without deleting the table definition.

Syntax **TRUNCATE TABLE** [*owner*.]*table-name*

Examples Delete all rows from the department table.

```
TRUNCATE TABLE department
```

Usage The TRUNCATE TABLE statement deletes all rows from a table. It is equivalent to a DELETE statement without a WHERE clause, except each individual row deletion is not entered into the transaction log. After a TRUNCATE TABLE statement, the table structure and all of the indexes continue to exist until you issue a DROP TABLE statement. The column definitions and constraints remain intact, and permissions remain in effect.

The TRUNCATE TABLE statement is entered into the transaction log as a single statement, like data definition statements. Each deleted row is not entered into the transaction log.

Side effects

None.

Standards
- **SQL/92** Transact-SQL extension.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions
- Must be the table owner or have DBA authority.
- For both temporary and base tables, you can execute TRUNCATE TABLE statement while other users have read access to the table. This behavior differs from Adaptive Server Anywhere, which requires exclusive access to truncate a base table. Sybase IQ table versioning ensures that TRUNCATE TABLE can occur while other users have read access; however, the version of the table these users see depends on when the read and write transactions commit.

See also DELETE statement

Chapter 10, “Transactions and Versioning” in *Sybase IQ System Administration Guide*

UNION operation

Description Combines the results of two or more select statements.

Syntax *select-without-order-by*
... **UNION** [**ALL**] *select-without-order-by*
... [**UNION** [**ALL**] *select-without-order-by*]...
... [**ORDER BY** *integer* [**ASC** | **DESC**] [, ...]]

Examples

List all distinct surnames of employees and customers.

```
SELECT emp_lname
FROM employee
UNION
SELECT lname
FROM customer
```

Usage

The results of several SELECT statements can be combined into a larger result using UNION. The component SELECT statements must each have the same number of items in the select list, and cannot contain an ORDER BY clause.

The results of UNION ALL are the combined results of the component SELECT statements. The results of UNION are the same as UNION ALL except that duplicate rows are eliminated. Eliminating duplicates requires extra processing, so UNION ALL should be used instead of UNION where possible.

If corresponding items in two select lists have different data types, Sybase IQ will choose a data type for the corresponding column in the result and automatically convert the columns in each component SELECT statement appropriately.

If ORDER BY is used, only integers are allowed in the order by list. These integers specify the position of the columns to be sorted.

The column names displayed are the same column names that would be displayed for the first SELECT statement.

Side effects

None.

Standards

- **SQL/92** Entry level.
- **Sybase** Supported by Adaptive Server Enterprise, which also supports a COMPUTE clause.

Permissions

Must have SELECT permission for each of the component SELECT statements.

See also

SELECT statement

UPDATE statement

Description

Modifies existing rows of a single table or a view that contains only one table.

Syntax

UPDATE *table*
... **SET** [*column-name = expression*, ...
... [**FROM** *table-expression*,]
... [**WHERE** *search-condition*]
... [**ORDER BY** *expression* [**ASC** | **DESC**] ,...]

FROM *table-expression*
table-expression:
table-spec | *table-expression join-type table-spec* [**ON** *condition*] | *table-expression*, ...

Examples

- Transfer employee Philip Chin (employee 129) from the sales department to the marketing department.

```
UPDATE employee
SET dept_id = 400
WHERE emp_id = 129 ;
```

- The Marketing Department (400) will increase bonus from 4% to 6% of each employee's base salary.

```
UPDATE employee
SET bonus = base * 6/100
WHERE dept_id=400;
```

- Each employee gets a pay increase with her department bonus.

```
UPDATE employee
SET emp.salary = emp.salary + dept.bonus
FROM employee emp, department dept
WHERE emp.deptnum = dept.deptnum;
```

- Here's another way to give each employee a pay increase with the department bonus.

```
UPDATE employee
SET emp.salary = emp.salary + dept.bonus
FROM employee emp JOIN department dept
ON emp.deptnum = dept.deptnum;
```

Usage

The UPDATE statement is used to modify rows of a single table or view that contains only one table. The table may be a base table or a temporary table. The base table cannot be part of any join index. Each named column is set to the value of the expression on the right hand side of the equal sign. Even *column-name* can be used in the expression—the old value will be used.

The FROM clause can contain multiple tables with join conditions and returns all the columns from all the tables specified and filtered by the join condition and/or WHERE condition.

Note Using the wrong join condition in a FROM clause causes unpredictable results. If the FROM clause specifies a one-to-many join and the SET clause references a cell from the "many" side of the join, the cell is updated from the first value selected. In other words, if the join condition causes multiple rows of the table to be updated per row id, the first row returned becomes the update result. For example:

```
UPDATE T1
SET T1.c2 = T2.c2
FROM T1 JOIN TO T2
ON T1.c1 = T2.c1
```

If table T2 has more than one row per T2.c1, results might be as follows:

```
T2.c1           T2.c2           T2.c3
1               4               3
1               8               1
1               6               4
1               5               2
```

With no ORDER BY clause, T1.c2 may be 4, 6, 8, or 9.

- With ORDER BY T2.c3, T1.c2 will be updated to 8.
- With ORDER BY T2.c3 DESC, T1.c2 will be updated to 6.

Sybase IQ rejects any UPDATE statement in which the table being updated is on the null-supplying side of an outer join. In other words:

- In a left outer join, the table on the left side of the join must not be missing any rows on joined columns.
- In a right outer join, the table on the right side of the join must not be missing any rows on joined columns.
- In a full outer join, neither table can be missing any rows on joined columns.

For example, in the following statement, table T1 is on the left side of a left outer join, and thus cannot contain be missing any rows:

```
UPDATE T1
SET T1.c2 = T2.c4
FROM T1 LEFT OUTER JOIN T2
```

```
ON T1.rowid = T2.rowid
```

Normally, the order in which rows are updated does not matter. However, in conjunction with the NUMBER(*) function, an ordering can be useful to get increasing numbers added to the rows in some specified order. If you are not using the NUMBER(*) function, avoid using the ORDER BY clause, because the UPDATE statement performs better without it.

In an UPDATE statement, if the NUMBER(*) function is used in the SET clause and the FROM clause specifies a one-to-many join, NUMBER(*) generates unique numbers that increase, but do not increment sequentially due to row elimination. For more information about the NUMBER(*) function, see "NUMBER function [Miscellaneous]" on page 288.

You can use the ORDER BY clause to control the result from an UPDATE when the FROM clause contains multiple joined tables.

Sybase IQ ignores the ORDER BY clause in searched UPDATE and returns a message that the syntax is not ANSI valid syntax.

If no WHERE clause is specified, every row is updated. If you specify a WHERE clause, then Sybase IQ only updates rows satisfying the search condition.

The left hand side of each SET clause must be a column in a base table.

Views can be updated provided the SELECT statement defining the view does not contain a GROUP BY clause, an aggregate function, or involve a UNION operation. The view should contain only one table.

Character strings inserted into tables are always stored in the case they are entered, regardless of whether the database is case sensitive or not. Thus a character data type column updated with a string Value is always held in the database with an upper-case V and the remainder of the letters lower case. SELECT statements return the string as Value. If the database is not case-sensitive, however, all comparisons make Value the same as value, VALUE, and so on. Further, if a single-column primary key already contains an entry Value, an INSERT of value is rejected, as it would make the primary key not unique.

If the update violates any check constraints, the whole statement is rolled back.

Sybase IQ supports scalar subqueries within the SET clause, for example:

```
UPDATE r
SET r.o= (SELECT MAX(t.o) FROM t ... WHERE t.y = r.y),
       r.s= (SELECT SUM(x.s) FROM x ... WHERE x.x = r.x)
WHERE r.a = 10
```

See the CREATE TABLE statement on page 435 for details about updating IDENTITY/AUTOINCREMENT columns.

Side effects

None.

Standards

- **SQL/92** Vendor extension.
- **Sybase** With the following exceptions, syntax of the IQ UPDATE statement is generally compatible with the Adaptive Server Enterprise UPDATE statement Syntax 1: Sybase IQ supports multiple tables with join conditions in the FROM clause.

  The Transact-SQL ROWCOUNT option has no effect on UPDATE operations in Sybase IQ.

  Updates of remote tables are limited to Sybase IQ syntax supported by CIS, as described in Chapter 17, "Server Classes for Remote Data Access" and Chapter 16, "Accessing Remote Data" in the *Sybase IQ System Administration Guide*.

Permissions

Must have UPDATE permission for the columns being modified.

UPDATE (positioned) statement [ESQL] [SP]

Description

Modifies the data at the current location of a cursor.

Syntax

UPDATE *table-list*
SET *set-item*, …
WHERE CURRENT OF *cursor-name*

Parameters

cursor-name:
identifier | hostvar

set-item:
column-name [.*field-name*…] = *scalar-value*)

SET clause

The columns that are referenced in *set-item* must be in the base table that is updated. They cannot refer to aliases, nor to columns from other tables or views. If the table you are updating is given a correlation name in the cursor specification, you must use the correlation name in the SET clause.

The expression on the right side of the SET clause may reference columns, constants, variables, and expressions from the SELECT clause of the query. The *set-item* expression cannot contain functions or expressions.

Examples

The following is an example of an UPDATE statement WHERE CURRENT OF cursor:

```
UPDATE employee SET emp_lname = 'Jones'
WHERE CURRENT OF emp_cursor;
```

Usage

This form of the UPDATE statement updates the current row of the specified cursor. The current row is defined to be the last row successfully fetched from the cursor, and the last operation on the cursor must not have been a positioned DELETE statement.

The requested columns are set to the specified values for the row at the current row of the specified query. The columns must be in the select list of the specified open cursor.

Changes effected by positioned UPDATE statements are visible in the cursor result set, except where client side caching prevents seeing these changes. Rows that are updated so that they no longer meet the requirements of the WHERE clause of the open cursor are still visible.

Sybase does not recommend the use of ORDER BY in the WHERE CURRENT OF clause. The ORDER BY columns may be updated, but the result set does not reorder. The results appear to fetch out of order and appear to be incorrect.

Since Sybase IQ does not support the CREATE VIEW... WITH CHECK OPTION, positioned UPDATE does not support this option. The WITH CHECK OPTION does not allow an update that creates a row that is not visible by the view.

A rowid column cannot be updated by a positioned UPDATE.

Sybase IQ supports repeatedly updating the same row in the result set.

Standards

- **SQL/92** Entry-level feature. The range of cursors that can be updated may contain vendor extensions if the ANSI_UPDATE_CONSTRAINTS option is set to OFF.

- **SQL/99** Core feature. The range of cursors that can be updated may contain vendor extensions if the ANSI_UPDATE_CONSTRAINTS option is set to OFF.
- **Sybase** Embedded SQL use is supported by Open Client/Open Server, and procedure and trigger use is supported in Adaptive Server Anywhere.

Permissions

Must have UPDATE permission on the columns being modified.

See also

- DECLARE CURSOR statement [ESQL] [SP]
- DELETE statement
- DELETE (positioned) statement [ESQL] [SP]
- UPDATE statement

WAITFOR statement

Description

Use this statement to delay processing for the current connection for a specified amount of time or until a given time.

Syntax

WAITFOR { **DELAY** *time* | **TIME** *time* }

time: *string*

Examples

Example 1 The following example waits for three seconds:

```
WAITFOR DELAY '00:00:03'
```

Example 2 The following example waits for 0.5 seconds (500 milliseconds):

```
WAITFOR DELAY '00:00:00:500'
```

Example 3 The following example waits until 8 PM:

```
WAITFOR TIME '20:00'
```

Usage

If DELAY is used, processing is suspended for the given interval. If TIME is specified, processing is suspended until the server time reaches the time specified.

If the current server time is greater than the time specified, processing is suspended until that time on the following day.

WAITFOR provides an alternative to the following statement, and may be useful for customers who choose not to enable Java in the database:

```
call java.lang.Thread.sleep(
<time_to_wait_in_millisecs> )
```

In many cases, scheduled events are a better choice than using WAITFOR TIME, because scheduled events execute on their own connection.

Side effects

The implementation of this statement uses a worker thread while it is waiting. This uses up one of the threads specified by the -gn server command-line option.

Standards

- **SQL/92** Vendor extension.
- **SQL/99** Vendor extension.
- **Sybase** This statement is also implemented by Adaptive Server Enterprise.

Permissions

None

See also

CREATE EVENT statement on page 396

WHENEVER statement [ESQL]

Description

Specifies error handling in an Embedded SQL program.

Syntax

WHENEVER
{ **SQLERROR** | **SQLWARNING** | **NOTFOUND** }
... {**GOTO** *label* | **STOP** | **CONTINUE** | *C code;* }

Parameters

label:
identifier

Examples

The following are examples of the WHENEVER statement:

```
EXEC SQL WHENEVER NOTFOUND GOTO done;
EXEC SQL WHENEVER SQLERROR
    {
       PrintError( &sqlca );
       return( FALSE );
    };
```

Usage

The WHENEVER statement is used to trap errors, warnings and exceptional conditions encountered by the database when processing SQL statements. The statement can be put anywhere in an Embedded SQL C program and does not generate any code. The preprocessor will generate code following each successive SQL statement. The error action remains in effect for all Embedded SQL statements from the source line of the WHENEVER statement until the next WHENEVER statement with the same error condition, or the end of the source file.

Note The error conditions are in effect based on positioning in the C language source file and not on when the statements are executed.

The default action is CONTINUE.

Note that this statement is provided for convenience in simple programs. Most of the time, checking the sqlcode field of the SQLCA (SQLCODE) directly is the easiest way to check error conditions. In this case, the WHENEVER statement would not be used. If fact, all the WHENEVER statement does is cause the preprocessor to generate an *if (SQLCODE)* test after each statement.

Side effects

None.

Standards

- **SQL/92** Entry-level feature.
- **Sybase** Supported by Open Client/Open Server.

Permissions

None.

WHILE statement [T-SQL]

Description

Provides repeated execution of a statement or compound statement.

Syntax

WHILE *expression*
... statement

Examples

The following illustrates the use of WHILE:

```
WHILE (SELECT AVG(unit_price) FROM product) < $30
BEGIN
    DELETE FROM product
    WHERE unit_price = MAX(unit_price)
    IF ( SELECT MAX(unit_price) FROM product ) < $50
       BREAK
```

```
    END
```

The BREAK statement breaks the WHILE loop if the most expensive product has a price less than $50. Otherwise the loop continues until the average price is greater than $30.

Usage

The WHILE conditional affects the performance of only a single SQL statement, unless statements are grouped into a compound statement between the keywords BEGIN and END.

The BREAK statement and CONTINUE statement can be used to control execution of the statements in the compound statement. The BREAK statement terminates the loop, and execution resumes after the END keyword marking the end of the loop. The CONTINUE statement causes the WHILE loop to restart, skipping any statements after the CONTINUE.

Side effects

None.

Standards

- **SQL/92** Transact-SQL extension.
- **Sybase** Supported by Adaptive Server Enterprise.

Permissions

None.

CHAPTER 7

Differences from Other SQL Dialects

About this chapter

Sybase IQ conforms to the ANSI SQL89 standard but has many additional features defined in IBM's DB2 and SAA specification, and in ANSI SQL/92.

This chapter describes those features of Sybase IQ that are not commonly found in other SQL implementations.

Sybase IQ features

The following IQ features are not found in many other SQL implementations.

Dates

Sybase IQ has date, time and timestamp types that includes a year, month and day, hour, minutes, seconds and fraction of a second. For insertions or updates to date fields, or comparisons with date fields, a free format date is supported.

In addition, the following operations are allowed on dates:

- **date + integer** Add the specified number of days to a date.
- **date - integer** Subtract the specified number of days from a date.
- **date - date** Compute the number of days between two dates.
- **date + time** Make a timestamp out of a date and time.

Also, many functions are provided for manipulating dates and times. See Chapter 5, “SQL Functions” for a description of these.

Joins

Sybase IQ allows automatic joins between tables. In addition to the NATURAL and OUTER join operators supported in other implementations, Sybase IQ allows KEY joins between tables based on foreign key relationships. This reduces the complexity of the WHERE clause when performing joins.

Subqueries not always allowed	Unlike Adaptive Server Anywhere, Sybase IQ does not allow subqueries to appear wherever expressions are allowed. Sybase IQ only supports subqueries as allowed in the SQL-1989 grammar, plus in the SELECT list of the top level query block or in the SET clause of an UPDATE statement. It does not support Adaptive Server Anywhere's extensions.
Additional functions	Sybase IQ supports several functions not in the ANSI SQL definition. See Chapter 5, “SQL Functions” for a full list of available functions.

CHAPTER 8

Physical Limitations

About this chapter

This chapter describes the limitations on size and number of objects in Sybase IQ databases. For limitations that apply to only one platform, see the platform-specific documentation.

Size and number limitations

The following table lists the limitations on size and number of objects in an IQ database. The memory and disk drive of the computer are more limiting factors in most cases.

Table 8-1: IQ database object size and number limitations

Item	Limitation
Database size	Dbspace size multiplied by the number of files. Upper limit is typically 8PB.
Dbspace size	Raw: No limit (as large as the device allows) Operating system files: 4TB
Catalog file size	Maximum is 1TB for all platforms except for Windows systems with FAT 32 file systems which have a 4GB limit. Windows systems with NTFS support the 1TB maximum.
Number of files per database	Operating system limit that user can adjust (for example, using NOFILE). Typically, 2047 files per database.
Number of tables per database	32,767
Number of tables referenced per transaction	No limit
Number of tables or views referenced per query	128
Number of UNION branches per query	128. (If each branch has multiple tables in its FROM clause, the limit on tables per query reduces the number of UNION branches allowed.)
Number of tables or views in a single FROM clause	16 to 64, depending on the query, with join optimizer turned on
Table size	Limited by database size

Item	Limitation
Number of columns per table	IQ supports up to 45,000 columns in a table. There may be performance penalties with more than 10,000 columns in a table
Number of rows per table	Limited by table size, upper limit 127 billion
Row size	Sybase recommends a limit of half the page size
Field size	255 bytes for most data types (32,767 for CHAR, VARCHAR, BINARY, or VARBINARY)
Maximum length of variable-length FILLER column	512 bytes
Number of indexes	32,767 per table
Maximum key size	255 bytes for single-column index 5300 bytes for multicolumn index
Number of tables per join index (number of tables that can be joined in one query block)	32
Number of values in an IN list	250,000
Number of stored procedures per database	2^32 – 1 = 4 294 967 295
Number of events per database	2^31 – 1 = 2 147 483 647
IQ page size	Must be between 64KB and 512KB
Maximum number of users (connected and concurrent)	1000 on 64-bit platforms (AIX, Sun Solaris, and HP) 200 on 32-bit platforms (Linux and Windows)
Maximum size of temp extract file	Set by TEMP_EXTRACT_SIZEn option. Platform limits are: AIX & HP-UX: 0 - 64GB Sun Solaris: 0 - 512GB Windows: 0 - 128GB Linux: 0 - 512GB

CHAPTER 9

System Procedures

About this chapter

This chapter documents the system-supplied stored procedures in IQ databases that you can use to retrieve system information.

System procedure overview

Sybase IQ includes the following kinds of system procedures:

- System functions that are implemented as stored procedures.
- Catalog stored procedures, for displaying system information in tabular form.
- Multiplex stored procedures, both of the above types of procedures, for multiplex server operations.
- Transact-SQL system and catalog procedures. For a list of these system procedures, see the section “Adaptive Server Enterprise system and catalog procedures” on page 712.

This chapter describes the different types of system procedures.

Syntax rules for stored procedures

Use of parentheses and quotes in stored procedure calls varies, depending on whether you enter the procedure name directly, as you can in Interactive SQL, or invoke it with a CALL statement. Some variations are permitted because the product supports both Sybase IQ SQL and Transact-SQL syntax. If you need Transact-SQL compatibility, be sure to use Transact-SQL syntax.

See Table 9-1 for an explanation of syntax variations.

Table 9-1: Stored procedure syntax variations

Syntax	Syntax type	Explanation
procedure_name ('*param*')	Sybase IQ	Quotes are required if you enclose parameters in parentheses
procedure_name '*param*'	Sybase IQ	Parentheses are optional if you enclose parameters in quotes
procedure_name param	Transact-SQL	If you omit quotes around parameters, you must also omit parentheses
procedure_name	Sybase IQ or Transact-SQL	Use this syntax if you run a procedure with no parameters directly in DBISQL, and the procedure has no parameters
call *procedure_name* (*param='value'*)	Sybase IQ	Use this syntax to call a procedure that passes a parameter value

Whenever you use Transact-SQL stored procedures, you must use the Transact-SQL syntax.

Understanding statistics reported by stored procedures

Many stored procedures report back information on the state of IQ at the time the procedure executes. This means that you get a snapshot view. For example, a report column that lists space in use by a connection shows only the space in use at the instant the procedure executes, not the maximum space used by that connection.

If you want to monitor IQ usage over an extended period, use the IQ monitor, which collects and reports statistics from the time you start the monitor until you stop it, at an interval you specify.

System stored procedures

System stored procedures are owned by the user ID dbo. The following system procedures carry out system administrator tasks in the IQ Store.

Note By default, the maximum length of column values displayed by DBISQLC is 30 characters. This may be inadequate for displaying output of stored procedures such as sp_iqstatus. To avoid truncated output, increase the length by setting the TRUNCATION_LENGTH option using `SET OPTION DBO.TRUNCATION_LENGTH = 80`. Alternatively, from the dbisql menu select Command → Options and enter a higher value for Limit Display Columns and/or Limit Output Columns.

sp_iqaddlogin procedure

Function: Adds a new IQ user account.

Syntax1: **call sp_iqaddlogin** (‘*loginname*’, ‘*password*’, [*number_of_connections*] [, *password_expiration*])

Syntax2: **sp_iqaddlogin** ‘*loginname*’, ‘*password*’, [*number_of_connections*] [, *password_expiration*]

Syntax3: **sp_iqaddlogin** *loginname*, *password*, [*number_of_connections*] [, *password_expiration*]

Permissions: DBA authority required.

Usage:

loginname The user’s login name. Login names must conform to the rules for identifiers.

password The user’s password. Passwords must conform to Adaptive Server Anywhere rules for passwords, that is, they must be valid identifiers.

number_of_connections Maximum number of concurrent database connections for the user. Default is 0: IQ does not enforce a maximum number of connections.

password_expiration Password expiration interval, in days. Must be a value from 0 through 32767. Default is 0: the password does not expire. You cannot set a password expiration for the user DBA.

See also: “sp_iqmodifyadmin procedure” on page 652

GRANT statement

Chapter 12, “Managing User IDs and Permissions” in *Sybase IQ System Administration Guide*

Description

Adds a new IQ user account, specifies the number of concurrent logins the user may have and the password expiration interval, and adds the user to the IQ_USER_LOGIN_INFO_TABLE system table. If the user already has a user ID for the database but is not in IQ_USER_LOGIN_INFO_TABLE (for example, if the user ID was added using the GRANT CONNECT statement or Sybase Central), sp_iqaddlogin adds the user to the table.

You must add users with sp_iqaddlogin in order to manage them with the Sybase IQ User Administration facility.

Errors

The following errors may occur. Causes are listed after each error.

```
Permission denied:  you do not have permission to
execute the procedure sp_iqaddlogin.
```

Cause: A user without DBA role tried to execute sp_iqaddlogin.

```
RAISERROR executed: User <loginname> already exists.
```

Cause: The message will appear if a user being created already exists for the database.

```
RAISERROR executed: "NUMBER_OF_CONNECTIONS must be
greater than or equal to zero and less than of equal to
32767."
```

Cause: Number of connections value was something other than 0 through 32767.

```
RAISERROR executed: "PASSWORD_EXPIRATION must be
greater than or equal to zero and less than or equal to
32767."
```

Cause: Number of days for password expiration was something other than 0 through 32767.

Examples

The following stored procedure calls add the user rose and allow that user 5 concurrent connections with a password irk324 that expires in 180 days.

```
call sp_iqaddlogin ('rose','irk324',5,180)
```

```
sp_iqaddlogin 'rose','irk324',5,180
```

sp_iqcheckdb procedure

Function

Checks the validity of the current database, and optionally repairs indexes and allocation problems.

This stored procedure reads all storage within the database. On successful completion, the database free list is updated to reflect the true storage allocation for the database, if the -iqdroplks server switch is used. sp_iqcheckdb then generates a report listing the actions it has performed.

If an error is found, sp_iqcheckdb reports the name of the object and the type of error. sp_iqcheckdb does not update the free list, if any errors are detected.

The sp_iqcheckdb stored procedure also allows you to check the consistency of, and optionally repair, either a specified table, index, or the entire database.

Note The stored procedure sp_iqcheckdb is the user interface to the IQ Database Consistency Checker (DBCC) and is sometimes referred to as DBCC.

Syntax

sp_iqcheckdb '*mode target* [...] [resources *resource-percent*]'

This is the general syntax of sp_iqcheckdb. There are three modes for checking database consistency and one repair mode. The syntax for each mode is listed separately below. If both mode and target are not specified in the parameter string, IQ returns the error message "At least one mode and target must be specified to DBCC."

Parameters

mode:
{ allocation | check | verify } | repair

target:
[main | local] database | database resetclocks | { table *table-name* | index *index-name* […] }

Allocation mode

sp_iqcheckdb 'allocation *target* [resources *resource-percent*]'

Check mode

sp_iqcheckdb 'check *target* [resources *resource-percent*]'

Verify mode

sp_iqcheckdb 'verify *target* [resources *resource-percent*]'

Repair mode

sp_iqcheckdb 'repair *target* [resources *resource-percent*]'

Usage

main All tables and indexes checked are from the IQ Store. In a multiplex, they are from the shared IQ Store.

local All tables and indexes checked are from the local IQ Store on a particular query server in a multiplex.

index-name The *index-name* parameter may contain owner and table qualifiers: `[[owner.]table-name.]index-name`

If *owner* is not specified, current user and database owner (dbo) are substituted in that order. If *table* is not specified, then *index-name* must be unique.

table-name The *table-name* parameter may contain an owner qualifier: `[owner.]table-name`

If *owner* is not specified, current user and database owner (dbo) are substituted in that order. *table-name* cannot be a temporary or pre-join table.

Note If either the table name or the index name contains spaces, enclose the *table-name* or *index-name* parameter in double quotes, as shown in this example:

```
sp_iqcheckdb 'check index "dbo.ss tab.i2" resources 75'
```

---

resource-percent The input parameter *resource-percent* must be an integer greater than 0. The resources percentage allows you to limit the CPU utilization of the database consistency checker by controlling the number of threads with respect to the number of CPUs. If *resource-percent* = 100, then 1 thread is created per CPU. If *resource-percent* > 100, then there are more threads than CPUs, which may increase performance for some machine configurations. The minimum number of threads is 1. The default value of *resource-percent* is 100.

Note The sp_iqcheckdb parameter string must be enclosed in single quotes and must not be greater than 255 bytes in length.

Allocation problems can be repaired in check, verify, and allocation mode by starting the database with the -iqdroplks server switch.

Description

sp_iqcheckdb checks the allocation of every block in the database and saves the information in the current session until the next sp_iqdbstatistics procedure is issued. sp_iqdbstatistics displays the latest result from the most recent execution of sp_iqcheckdb.

The sp_iqcheckdb stored procedure can perform several different functions, depending on the parameters specified. The four modes for checking and repairing database consistency are:

Allocation mode Checks allocation with blockmap information for the entire database, a specific index, or a specific table; repairs the free list if the -iqdroplks server switch is specified. Does not check index consistency.

Note that sp_iqcheckdb cannot check or repair all allocation problems, if you specify the name of a single index or table in the input parameter string.

When to run in allocation mode:

- After forced recovery, run sp_iqcheckdb with the -iqdroplks server switch to reset the allocation map (must use database as the target)
- To check for duplicate or unowned blocks (use database or specific tables or indexes as the target)
- If you encounter page header errors

The DBCC option resetclocks is used only with allocation mode. The resetclocks option is used in conjunction with forced recovery to convert a multiplex query server to a write server. resetclocks corrects the values of internal database versioning clocks, in the event that these clocks are behind. Do not use the resetclocks option for any other purpose, unless you contact Sybase IQ Technical Support.

The resetclocks option must be run in single user mode and is only allowed with the DBCC command 'allocation database'. resetclocks does not require the -iqdroplks server startup switch. The syntax of the resetclocks command is:

```
sp_iqcheckdb 'allocation database resetclocks'
```

Check mode Checks allocation with index information; performs quick index checks for the entire database, a specific index, or a specific table. Detects all types of allocation problems and most types of index inconsistencies.

When to run in check mode:

- If metadata, null count, or distinct count errors are returned when running a query

Verify mode Checks allocation with index information; performs detailed index checks for the entire database, a specific index, or a specific table. Detects all types of allocation problems and all types of index inconsistencies.

When to run in verify mode:

- If metadata, null count, or distinct count errors are returned when running a query

Repair mode Performs a detailed check and repair of all indexes, a specific index, or a specific table. Does not check allocation.

When to run in repair mode:

- If index errors are reported in sp_iqcheckdb check or verify mode

In this example, sp_iqcheckdb checks the allocation for the entire database:

```
sp_iqcheckdb 'allocation database'
```

In the second example, sp_iqcheckdb performs a detailed check on indexes i1, i2, and dbo.t1.i3. If you do not specify a new mode, sp_iqcheckdb applies the same mode to the remaining targets, as illustrated in the following command:

```
sp_iqcheckdb 'verify index i1 index i2 index dbo.t1.i3'
```

You can combine all modes, except for repair mode, and run multiple checks on a database in a single session. In the following example, sp_iqcheckdb performs a quick check of table t2, a detailed check of index i1 and allocation checking for the entire database using half of the CPUs:

```
sp_iqcheckdb 'check table t2 verify index i1
allocation database resources 50'
```

Note The sp_iqcheckdb stored procedure does not check referential integrity or repair referential integrity violations.

See Chapter 2, "System Recovery and Database Repair" in the *Sybase IQ Troubleshooting and Error Messages Guide* for details on using sp_iqcheckdb and more information on checking database consistency.

DBCC performance

The execution time of DBCC varies according to the size of the database for an entire database check, the number of tables or indexes specified, and the size of the machine. Checking only a subset of the database, i.e., only specified tables or indexes, requires less time than checking an entire database.

Table 9-2 summarizes the actions and output of the four sp_iqcheckdb modes.

Table 9-2: Actions and output of sp_iqcheckdb modes

Mode	Errors detected	Output	Speed
allocation	allocation errors	allocation statistics only	4TB per hour
check	allocation errors most index errors	all available statistics	60GB per hour
verify	allocation errors all index errors	all available statistics	15GB per hour
repair	all index errors	repair statistics	15+GB per hour*

* The processing time of sp_iqcheckdb repair mode depends on the number of errors repaired.

Output

The output of sp_iqcheckdb contains summary results, errors, informational statistics, and repair statistics, depending on the execution mode. The output may contain as many as three results sets, if you specify multiple modes in a single session. Error statistics are indicated by asterisks (*****) and are displayed only if errors are detected.

Repair statistics are displayed only in repair mode and only if repairs are actually made. Asterisks (*****) indicate repairs that were made, not errors. Note that if sp_iqcheckdb encounters errors and makes repairs, some of the statistics reported by DBCC in repair mode may be inaccurate.

The output of sp_iqcheckdb is also copied to the Sybase IQ message file *.iqmsg*. If the DBCC_LOG_PROGRESS option is ON, sp_iqcheckdb sends progress messages to the IQ message file, allowing the user to follow the progress of the DBCC operation as it executes.

Example

The following is an example of the output you see when you run sp_iqcheckdb 'allocation database' and there is leaked space. Leaked space is a block that is allocated according to the database free list, but DBCC finds that the block is not part of any database object. In this example, DBCC reports 32 leaked blocks.

```
                    Stat                    Value             Flags
=================================|==========================|=====
DBCC Allocation Mode Report
=================================|==========================|=====
** DBCC Status                   |Errors Detected           |*****
   DBCC Work units Dispatched    |163                       |
   DBCC Work units Completed     |163                       |
=================================|==========================|=====
Allocation Summary               |                          |
=================================|==========================|=====
   Blocks Total                  |8192                      |
   Blocks in Current Version     |4954                      |
   Blocks in All Versions        |4954                      |
   Blocks in Use                 |4986                      |
   % Blocks in Use               |60                        |
** Blocks Leaked                 |32                        |*****
                                 |                          |
=================================|==========================|=====
Allocation Statistics            |                          |
=================================|==========================|=====
   Blocks Created in Current TXN |382                       |
   Blocks To Drop in Current TXN |382                       |
   Marked Logical Blocks         |8064                      |
   Marked Physical Blocks        |4954                      |
   Marked Pages                  |504                       |
```

```
   Blocks in Freelist                |126553                     |
   Imaginary Blocks                  |121567                     |
   Highest PBN in Use                |5432                       |
** 1st Unowned PBN                   |452                        |*****
   Total Free Blocks                 |3206                       |
   Usable Free Blocks                |3125                       |
   % Free Space Fragmented           |2                          |
   Max Blocks Per Page               |16                         |
   1  Block Page Count               |97                         |
   3  Block Page Count               |153                        |
   4  Block Page Count               |14                         |
   ...
   9  Block Hole Count               |2                          |
   16 Block Hole Count               |194                        |
                                     |                           |
   Database Objects Checked          |1                          |
   B-Array Count                     |1                          |
   Blockmap Identity Count           |1                          |
===================================|===========================|=====
Connection Statistics                |                           |
===================================|===========================|=====
                                     |                           |
                                     |                           |
```

sp_iqcheckoptions procedure

Function

For the connected user, displays a list of the current value and the default value of database and server startup options that have been changed from the default.

Syntax

sp_iqcheckoptions

Usage

Requires no parameters. Returns one row for each option that has been changed from the default value. The output is sorted by option name, then by user name.

Permissions

None. The DBA sees all options set on a permanent basis for all groups and users and sees temporary options set for DBA. Non-DBA users see their own temporary options. All users see non-default server startup options.

Description

For the connected user, the sp_iqcheckoptions stored procedure displays a list of the current value and the default value of database and server startup options that have been changed from the default. sp_iqcheckoptions considers all IQ and ASA database options. IQ modifies some ASA option defaults, and these modified values become the new default values. Unless the new IQ default value is changed again, sp_iqcheckoptions does not list the option.

When sp_iqcheckoptions is run, the DBA sees all options set on a permanent basis for all groups and users and sees temporary options set for DBA. Non-DBA users see their own temporary options. All users see non-default server startup options.

Table 9-3: sp_iqcheckoptions columns

Column name	Description
User_name	The name of the user or group for whom the option has been set. At database creation, all options are set for the PUBLIC group. Any option that has been set for a group or user other than PUBLIC is displayed.
Option_name	The name of the option
Current_value	The current value of the option
Default_value	The default value of the option
Option_type	"Temporary" for a TEMPORARY option, else "Permanent"

Examples

In these examples, the temporary option Append_Load is set to ON and the group mygroup has the option Max_Warnings set to 9. The user joel has a temporary value of 55 set for Max_Warnings.

In the first example, sp_iqcheckoptions is run by the DBA.

```
User_name Option_name          Current_value   Default_value   Option_type
DBA       Ansi_update_constr   CURSORS         Off             Permanent
PUBLIC    Ansi_update_constr   Cursors         Off             Permanent
DBA       Append_Load          ON              OFF             Temporary
DBA       Checkpoint_time      20              60              Temporary
DBA       Connection_authent   Company=MyComp;                 Temporary
                               Application=DBTools;Signa
DBA       Login_procedure      DBA.sp_iq_proce sp_login_envir  Permanent
PUBLIC    Login_procedure      DBA.sp_iq_proce sp_login_envir  Permanent
mygroup   Max_Warnings         9               281474976710655 Permanent
DBA       Min_NLPDJ_Table_Size 1000000         10000           Permanent
PUBLIC    Min_NLPDJ_Table_Size 1000000         10000           Permanent
DBA       Thread_count         25              0               Temporary
```

In the second example, sp_iqcheckoptions is run by the user joel.

```
User_name Option_name          Current_value   Default_value   Option_type
joel      Ansi_update_constr   CURSORS         Off             Permanent
PUBLIC    Ansi_update_constr   Cursors         Off             Permanent
joel      Checkpoint_time      20              60              Temporary
joel      Connection_authent   Company=MyComp;                 Temporary
                               Application=DBTools;Signa
```

```
joel      Login_procedure      DBA.sp_iq_proce sp_login_envir  Permanent
PUBLIC    Login_procedure      DBA.sp_iq_proce sp_login_envir  Permanent
joel      Max_Warnings         55              281474976710655 Temporary
joel      Min_NLPDJ_Table_Size 1000000         10000           Permanent
PUBLIC    Min_NLPDJ_Table_Size 1000000         10000           Permanent
joel      Thread_count         25              0               Temporary
```

sp_iqcolumn procedure

Function

Displays columns in a database and information about them.

Syntax1

sp_iqcolumn ([*table_name*],[*table_owner*])

Syntax2

sp_iqcolumn [table_name=*'tablename'*],[table_owner=*'tableowner'*]

Usage

Syntax1 If you specify *table_owner* without specifying *table_name*, you must substitute NULL for *table_name*. For example, `sp_iqcolumn NULL,DBA`.

Syntax2 The parameters can be specified in any order. Be sure to enclose *'tablename'* and *'tableowner'* in single quotes.

Description

Displays information about columns in a database. Specifying the table_name parameter returns the columns only from tables with that name. Specifying the table_owner parameter returns only tables owned by that user. Specifying both parameters chooses the columns from a unique table, if that table exists. Specifying no parameters returns all columns for all tables in a database. This procedure does not return column information for system tables.

Table 9-4: sp_iqcolumn columns

Column name	Description
table_name	The name of the table
table_owner	The owner of the table
column_name	The name of the column
domain_name	The data type
width	The precision of numeric data types that have precision and scale or the storage width of numeric data types without scale; the width of character data types
scale	The scale of numeric data types
nulls	'Y' if the column can contain Nulls, 'N' if the column cannot contain Nulls
default	'Identity/Autoincrement' if the column is an identity/autoincrement column, null if not.
cardinality	The distinct count, if known, by indexes
est_cardinality	The estimated number of distinct values, set to 255 automatically if the column was created with the MINIMIZE_STORAGE option ON, or a user-supplied value from the IQ UNIQUE constraint specified in CREATE TABLE
location	TEMP = IQ Temp Store, MAIN = IQ Store, LOCAL = IQ Local Store, SYSTEM = Catalog Store
remarks	User comments added with the COMMENT statement
check	the check constraint expression

Examples

The following variations in syntax both return all of the columns in the table department:

```
sp_iqcolumn department

call sp_iqcolumn (table_name='department')
```

table_ name	table_ owner	column_ name	domain _name	width	scale	nulls	default	cardi- nality	est_ cardi- nality	location	remarks	check
department	DBA	dept_id	unsigned int	4	0	N	N	5	5	(NULL)	(NULL)	
department	DBA	dept_ name	char	40	0	N	N	0	5	(NULL)	(NULL)	
department	DBA	dept_head _id	unsigned int	4	0	Y	N	5	5	(NULL)	(NULL)	

The following variations in syntax both return all of the columns in all of the tables owned by table owner DBA. For brevity, some rows have been omitted from the results shown:

```
sp_iqcolumn table_owner='DBA'
sp_iqcolumn NULL,DBA
```

table_ name	table_ owner	column _name	domain _name	width	scale	nulls	default	cardi- nality	est_ cardi- nality	location	remarks	check
contact	DBA	id	unsigned int	4	0	N	(NULL)	60	60	(NULL)	(NULL)	
contact	DBA	last_ name	char	15	0	N	(NULL)	0	60	(NULL)	(NULL)	
...	...	...	...	...	...	...	(NULL)	...	...	...	...	...
contact	DBA	phone	char	10	0	Y	(NULL)	0	59	(NULL)	(NULL)	
contact	DBA	fax	char	10	0	Y	(NULL)	0	58	(NULL)	(NULL)	
customer	DBA	id	unsigned int	4	0	N	(NULL)	126	126	(NULL)	(NULL)	
customer	DBA	fname	char	15	0	N	(NULL)	0	116	(NULL)	(NULL)	
...	...	...	...	...	...	...	...	..	...	...	...	...
customer	DBA	phone	char	12	0	N	(NULL)	0	117	(NULL)	(NULL)	
customer	DBA	company _name	char	35	0	Y	(NULL)	0	126	(NULL)	(NULL)	
department	DBA	dept_id	unsigned int	4	0	N	(NULL)	5	5	(NULL)	(NULL)	
department	DBA	dept_ name	char	40	0	N	(NULL)	0	5	(NULL)	(NULL)	
department	DBA	dept_ head_id	unsigned int	4	0	Y	(NULL)	5	5	(NULL)	(NULL)	
...	...	...	...	...	...	...	...	...	...	...	...	...

sp_iqconnection procedure

Function

Shows information about connections and versions, including which users are using temporary dbspace, which users are keeping versions alive, what the connections are doing inside IQ, connection status, database version status, and so on.

Syntax

sp_iqconnection [*connhandle*]

Usage

The input parameter *connhandle* is equal to the Number connection property and is the ID number of the connection. The connection_property system function returns the connection ID:

```
SELECT connection_property ( 'Number' )
```

When called with an input parameter of a valid *connhandle*, sp_iqconnection returns the one row for that connection only.

Description

sp_iqconnection returns a row for each active connection. The columns ConnHandle, Name, Userid, LastReqTime, ReqType, CommLink, NodeAddr, and LastIdle are the connection properties Number, Name, Userid, LastReqTime, ReqType, CommLink, NodeAddr, and LastIdle respectively, and return the same values as the system function sa_conn_info. The additional columns return connection data from the IQ side of the Sybase IQ engine. Rows are ordered by ConnCreateTime.

Table 9-5: sp_iqconnection columns

Column name	Description
ConnHandle	The ID number of the connection.
Name	The name of the server.
Userid	The user ID for the connection.
LastReqTime	The time at which the last request for the specified connection started.
ReqType	A string for the type of the last request.
IQCmdType	The current command executing on the IQ side, if any. The command type reflects commands defined at the implementation level of the engine. These commands consists of transaction commands, DDL and DML commands for data in the IQ store, internal IQ cursor commands, and special control commands such as open and close db, backup, restore, etc.
LastIQCmdTime	The time the last IQ command started or completed on the IQ side of the Sybase IQ engine on this connection.
IQCursors	The number of cursors open in the IQ store on this connection.
LowestIQCursorState	The IQ cursor state, if any. If multiple cursors exist on the connection the state displayed is the lowest cursor state of all the cursors, i.e. the furthest from completion. Cursor state reflects internal IQ implementation detail and is subject to change in the future. For this version, cursor states are: NONE, INITIALIZED, PARSED, DESCRIBED, COSTED, PREPARED, EXECUTED, FETCHING, END_OF_DATA, CLOSED and COMPLETED. As suggested by the names, cursor state changes at the end of the operation. A state of PREPARED, for example, indicates that the cursor is executing.
IQthreads	The number of IQ threads currently assigned to the connection. Some threads may be assigned but idle. This column can help you determine which connections are using the most resources.
TxnID	The transaction id of the current transaction on the connection. This is the same as the transaction id displayed in the *.iqmsg* file by the BeginTxn, CmtTxn and PostCmtTxn messages, as well as the Txn ID Seq logged when the database is opened.
ConnCreateTime	The time the connection was created.
TempTableSpaceKB	The number of kilobytes of IQ Temporary Store space in use by this connection for data stored in IQ temp tables.

Column name	Description
TempWorkSpaceKB	The number of kilobytes of IQ Temporary Store space in use by this connection for working space such as sorts, hashes and temporary bitmaps. Space used by bitmaps or other objects that are part of indexes on IQ temporary tables are reflected in TempTableSpaceKB.
IQConnID	The ten digit connection id displayed as part of all messages in the *.iqmsg* file. This is a monotonically increasing integer unique within a server session.
satoiq_count	An internal counter used to display the number of crossings from the ASA side to the IQ side of the Sybase IQ engine. This may occasionally be useful in determining connection activity. Note that result sets are returned in buffers of rows and DO NOT increment satoiq_count or iqtosa_count once per row.
iqtosa_count	An internal counter used to display the number of crossings from the IQ side to the ASA side of the Sybase IQ engine. This may occasionally be useful in determining connection activity.
CommLink	The communication link for the connection. This is one of the network protocols supported by Sybase IQ, or is "local" for a same-machine connection.
NodeAddr	The node for the client in a client/server connection.
LastIdle	The number of ticks between requests.
Dbremote	Dbremote: A bit data column that indicates the transaction is an internal transaction used to replicate multiplex version information between a query server and the write server within a multiplex database.

Example

Here is an example of sp_iqconnection output:

```
ConnHandle     Name Userid       LastReqTime                 ReqType                IQCmdType
========== ======== ====== ======================== =================== ====================
 419740283     red2  DBA  2004-01-02 15:54:54.605        STMT_EXECUTE_IMM                INSERT
 640038605    blue1  DBA  2004-01-02 13:32:42.505         CURSOR_PREFETCH                  NONE
2094200996           DBA  2004-01-02 13:30:27.486    STMT_EXECUTE_ANY_IMM                  NONE
 954498130  fromSCJ  DBA  2004-01-02 15:55:02.787752            STMT_DROP                  NONE
 167015670    blue2  DBA  2004-01-02 13:45:50.232752            STMT_DROP                  NONE
1306718536           DBA  2004-01-02 15:08:36.716    STMT_EXECUTE_ANY_IMM                  NONE
1779741471  ntJava2  DBA  2004-01-02 15:54:58.558752            STMT_DROP                  NONE
 710225777      nt1  DBA  2004-01-02 15:56:02.729           CURSOR_OPEN  IQUTILITYOPENCURSOR


LastIQCmdTime           IQCursors LowestIQCursorState IQthreads TxnID      ConnCreateTime
======================= ========= ================== ========= ===== =======================
2004-01-02 15:54:54.630     1           EXECUTED         7     10701  2004-01-02 13:17:27.599
2004-01-02 13:32:42.295     1           FETCHING         2     10568  2004-01-02 13:21:19.953
2004-01-02 13:30:27.548     0               NONE         1     10604  2004-01-02 13:24:35.145
2004-01-02 15:55:02.590     0               NONE         1     10619  2004-01-02 13:31:26.001
2004-01-02 13:45:50.225     0               NONE         1     10678  2004-01-02 13:35:01.160
2004-01-02 15:09:30.320     0               NONE         1     16687  2004-01-02 13:37:50.814
2004-01-02 15:54:58.553     0               NONE         1     10676  2004-01-02 13:43:57.907
2004-01-02 15:56:02.755     0               NONE         1     10699  2004-01-02 14:05:15.748


TempTableSpaceKB TempWorkSpaceKB IQconnID satoiq_count iqtosa_count CommLink   NodeAddr  LastIdle
```

```
================ =============== ======== ============ ============ ======== ==========  =======
           68736             680       14           82         2031 TCPIP    157.133.82.17  9905
               0          102592       17           76          360 local                    606
               0               0       18          397          688 TCPIP   157.133.83.151  8322
               0               0       20          709         1541 TCPIP   157.133.83.151  5378
               0             128       21          131         2082 local                   5122
               0               0       23        18313          821 TCPIP   157.133.83.151 10000
               0               0       24          994         1667 TCPIP   157.133.83.151  1467
               0               0       28          900          478 TCPIP   157.133.83.151  5473
```

sp_iqconstraint procedure

Function

Lists referential integrity constraints defined using CREATE TABLE or ALTER TABLE for the specified table or column.

Syntax

sp_iqconstraint (*table-name*, *column-name*, *table-owner*)

Description

If table name and column name are omitted, reports all referential integrity constraints for all tables including temporary ones in the current connected database. The information includes unique or primary key constraint, referential constraint and associated role name that are defined by the CREATE TABLE and/or ALTER TABLE statements.

Example

This is sample output that displays all primary key/foreign key pairs where either the candidate key or foreign key contains column `ck1` for owner `bob` in all tables:

```
call_sp_iqconstraint('','ck1','bob')

PTAB1 bob ASIQ_IDX_T27_HG  unique   ck1,ck2  selftab bob CK6FK3  Y
ASIQ_IDX_T42_HG  ck1,ck2

PTAB2 bob ASIQ_IDX_T27_HG  unique   ck1,ck2  selftab bob CK6FK4  Y
ASIQ_IDX_T206_I42_HG  ck1,ck2

selftab bob ASIQ_IDX_T26_HG  unique   ck1,ck2  selftab bob CK3FK1  Y
ASIQ_IDX_T206_I42_HG  ck1,ck2
```

The columns displayed are:

- Primary enforced table
- Owner
- Candidate key index
- Primary key or Unique
- Primary key columns
- Foreign table

- Owner
- Foreign key role name
- Enforced status (“Y” for enforced, “N” for unenforced)
- Foreign key index
- Foreign key columns
- Location (“TEMP,” “MAIN,” “LOCAL,” or “SYSTEM”)

sp_iqcontext procedure

Function

Tracks and displays, by connection, information about statements currently executing.

Syntax

sp_iqcontext [*connhandle*]

Usage

The input parameter *connhandle* is equal to the Number connection property and is the ID number of the connection.

When called with an input parameter of a valid *connhandle*, sp_iqcontext returns the information for that connection only.

Description

sp_iqcontext lets the DBA determine what statements are running on the system at any given moment, and to identify the user and connection that issued the statement. With this information, you can use this utility to quickly:

- Match the statement text with the equivalent line in sp_iqconnection to get resource usage and transactional information about each connection
- Match the statement text to the equivalent line in the SQL log created when the -zr server option is set to ALL or SQL
- Use connection information to match the statement text in sp_iqcontext to the equivalent line in the *.iqmsg* file, which includes the query plan when it is possible for IQ to collect it
- Match statement text to an IQ stack trace (*stktrc-yyyymmdd-hhnnss_#.iq*), if one is produced
- Collate this information with an operating system stack trace that may be produced, such as pstack on Sun Solaris

The maximum size of statement text collected is the page size of the Catalog Store.

Table 9-6: sp_iqcontext columns

Column name	Description
ConnOrCursor	CONNECTION or CURSOR
ConnHandle	The ID number of the connection.
Name	The name of the server.
Userid	The user ID for the connection or cursor.
numIQCursors	If column 1 is CONNECTION, this is the number of cursors open on this connection. If column 1 is CURSOR, this is a number assigned sequentially to cursors associated with this connection.
IQthreads	The number of IQ threads currently assigned to the connection. Some threads may be assigned but idle.
TxnID	The transaction ID of the current transaction.
ConnOrCurCreateTime	The time this connection or cursor was created.
IQConnID	The ten-digit connection id displayed as part of all messages in the *.iqmsg* file. This is a monotonically increasing integer unique within a server session.
IQGovernPriority	A value that indicates the order in which a user's queries are queued for execution. In the range of allowed values, 1 indicates high priority, 2 (the default) medium priority, and 3 low priority. This value is set per user with the database option IQGOVERN_PRIORITY. For details, see *Sybase IQ Reference Manual*.
CmdLine	First 4096 characters of the user command being executed.

Example

The following example shows an excerpt from output when sp_iqcontext is issued with no parameter, producing results for all current connections.

```
CONNECTION 701773517 dba7 DBA 6 1 1324 2004-01-04 09:24:17.000 4 NO COMMAND
CURSOR 701773517 dba7 DBA 1 0 1324 2004-01-04 09:24:46.000 4 2 select * from
foo1
CURSOR 701773517 dba7 DBA 2 0 1324 2004-01-04 09:24:47.000 4 2 select a from
foo1
...
CURSOR 701773517 dba7 DBA 6 0 1324 2004-01-04 09:24:47.000 4 2 select e from
foo1
CONNECTION 1271624950 dba7 DBA 0 12 1377 2004-01-04 09:24:12.000 3 2
sp_iqcheckdb
CONNECTION 1841476383 dba7 DBA 10 1 1337 2004-01-04 09:24:19.000 5 2 call
sp_iqcontext()
CURSOR 1841476383 dba7 DBA 1 0 1337 2004-01-04 09:24:47.000 5 2 select *
from foo
...
CURSOR 1841476383 dba7 DBA 10 0 1337 2004-01-04 09:24:48.000 5 2 select i
from foo
```

The first line of output shows connection 701773517 (IQ Connection ID 4). This connection is on server dba7, user DBA. It has six active cursors and one IQ thread, and was created from transaction 1324. This connection was not executing a command when sp_iqcontext was issued. The next six lines of output list cursors in use by this connection (only three are shown here.)

Two connections are running stored procedures. Connection 1271624950 is running sp_iqcheckdb directly from dbisql, has no active cursors but is using 12 IQ threads. Connection 1841476383 has called sp_iqcontext as a procedure, is using only 1 IQ thread, and has 10 active cursors (only the first and last are shown here.) Note that in both cases, the name of the stored procedure appears but not the line of code executing within it.

The connection handle (701773517 for the first connection in this example) identifies results in the -zr log. The IQ connection ID (4 for the first connection in this example) identifies results in the *.iqmsg* file. On UNIX systems you can use the grep command to locate all instances of the connection handle or connection ID, making it easy to correlate information from all sources. The 2 before the user command fragment indicates that this is a medium priority query.

sp_iqdbsize procedure

Function

Displays the size of the current database.

Syntax

sp_iqdbsize(
[**main** | **local**]
)

See also

"Specifying page size" in the section "Overview of memory use" in Chapter 4, "Managing System Resources" of the *Sybase IQ Performance and Tuning Guide*

"Working with database objects" in Chapter 5, "Working with Database Objects" of the *Sybase IQ System Administration Guide*

Description

Returns the total size of the database, including all dbspace file segments, in blocks, kbytes, and Nblocks (IQ blocks). Also returns the number of pages required to hold the database in memory and the number of IQ pages when the database is compressed (on disk). If a multiplex database, the default is main, the size of the shared IQ Store. The optional parameter local specifies only information about the IQ Local Store owned by the query server.

Table 9-7: sp_iqdbsize columns

Column name	Description
Database	The path name of the database file
Physical Blocks	Total database size in blocks
KBytes	Total database size in kilobytes
Pages	Number of IQ pages needed to hold the database in memory
Compressed Pages	Number of IQ pages when the database is compressed (on disk)
Nblocks	Total size in IQ blocks used to store the data in tables and join indexes
Catalog Blocks	Total size in IQ blocks used to store the metadata for tables and join indexes

Descriptions of sp_iqdbsize columns:

Database The path name of the current database file.

Physical Blocks An IQ database consists of one or more dbspaces. Each dbspace has a fixed size, which is originally specified in units of megabytes. This megabyte quantity is converted to blocks using the IQ page size and the corresponding block size for that IQ page size. The Physical Blocks column reflects the cumulative total of each Sybase IQ dbspace size, represented in blocks.

For the correspondence between IQ page size and block size, refer to *Table 4-4: Default block sizes* in Chapter 4, "Managing System Resources" of the *Sybase IQ Performance and Tuning Guide*.

KBytes The total size of the database in kilobytes. This value is the total size of the database in blocks (Physical Blocks in the previous sp_iqdbsize column) multiplied by the block size. The block size depends on the IQ page size.

Pages The total number of IQ pages necessary to represent in memory all of the data stored in tables and join indexes, as well as the metadata for these objects. This value is always greater than or equal to the value of Compressed Pages (the next sp_iqdbsize column).

Compressed Pages The total number of IQ pages necessary to store on disk the data in tables and join indexes as well as the metadata for these objects. This value is always less than or equal to the value of Pages (the previous sp_iqdbsize column), because Sybase IQ compresses pages when the IQ page is written from memory to disk. The sp_iqdbsize Compressed Pages column represents the number of compressed pages.

Nblocks The total size in blocks used to store the data in tables and join indexes. This value is always less than or equal to the sp_iqdbsize Physical Blocks value.

Catalog Blocks The total size in blocks used to store the metadata for tables and join indexes.

Example

This example displays size information for the database asiqdemo.

```
sp_iqdbsize

Database
PhysicalBlocks KBytes Pages CompressedPages NBlocks CatalogBlocks
============== ====== ===== =============== ======= =============
/system1/sybase/ASIQ-12_5/demo/asiqdemo.db
          1280    522   688             257    1119             18
```

sp_iqdbspace procedure

Function

Displays detailed information about each dbspace.

Syntax

sp_iqdbspace [*dbspace-name*]

Permissions

DBA authority required.

See also

- "sp_iqdbspaceinfo procedure", "sp_iqindexinfo procedure", and "sp_iqrelocate procedure"

- Chapter 5, “Working with Database Objects” in the *Sybase IQ System Administration Guide*

Description

The sp_iqdbspace stored procedure displays the usage, properties, and types of data on each dbspace. You can use this information to determine if data must be relocated, and for data that has been relocated, whether the old versions have been deallocated.

sp_iqdbspace output fields include the dbspace name, path, type, mode, percent used, size, reserve, writes per stripe, block type, first block, and last block.

Name Name of the dbspace in the SYSFILE system table and as specified in the CREATE DBSPACE statement. Dbspace names are case sensitive for databases created with CASE RESPECT and case insensitive for databases created with CASE IGNORE.

Path Location of the dbspace file or raw partition.

Segment Type Type of dbspace: MAIN, TEMPORARY, or LOCAL.

RWMode Mode of the dbspace: readwrite (RW), relocate (RR), or readonly (RO).

Usage Percent of dbspace currently in use.

DBSSize Current size of the dbspace file or raw partition. For a raw partition, this size value can be less than the physical size.

Reserve Reserved space that can be added to the dbspace.

StripeSize Amount of data written to the dbspace before moving to the next dbspace, if disk striping is on.

BlkTypes Shows the space used by both user data and internal system structures. See Table 9-8 for identifier values.

FirstBlk First IQ block number assigned to the dbspace.

LastBlk Last IQ block number assigned to the dbspace.

Table 9-8 lists the values of the block type identifiers.

Table 9-8: sp_iqdbspace block types

Identifier	Block Type
H	Header Blocks of the free list
F	Freelist
R	Readonly Freelist
D	Database Identity
A	Active Version
O	Old Version
X	Drop at checkpoint
M	Multiplex CM
B	Backup Structures
C	Checkpoint Log

Examples

The following output displays information about dbspaces.

```
sp_iqdbspace;
```

Name	Path	Segment Type	RW Mode	Usage	DBS Size	Reserve	Stripe Size	Blk Types	First Blk	Last Blk
IQ__SYSTEM_MAIN	D:\IQ\dbspacedb.iq	MAIN	RW	24	10M	100M	8K	1H,64F,32D,62A,20X,128M	1	1280
dbspacedb2	D:\IQ\dbspacedb.iq2	MAIN	RW	9	10M	20M	8K	1H,32F,56A,19X	1045440	1046719
dbspacedb3	D:\IQ\dbspacedb.iq3	MAIN	RW	12	10M	40M	8K	1H,32F,59A,49X	2090880	2092159
IQ_SYSTEM_TEMP	dbspacedb.iqtmp	TEMPORARY	RW	8	10M	10M	8K	1H,64F,12A,20X	1	1280

The following output displays information about dbspaces with three different readwrite modes (the RWMode column):

```
sp_iqdbspace;
```

Name	Path	Segment Type	RW Mode	Usage	DBS Size	Reserve	Stripe Size	Blk Types	First Blk	Last Blk
IQ__SYSTEM_MAIN	D:\IQ\dbspacedb.iq	MAIN	RR	4	15M	95M	8K	1H,64F,62A	1	1920

Name	Path	Segment Type	RW Mode	Usage	DBS Size	Reserve	Stripe Size	Blk Types	First Blk	Last Blk
dbspacedb2	D:\IQ\ dbspacedb.iq2	MAIN	RO	5	10M	20M	8K	1H,32F, 56A	1045440	1046719
dbspacedb3	D:\IQ\ dbspacedb.iq3	MAIN	RW	25	10M	40M	8K	1H,64F 33R,32D ,59A, 128M	2090880	2092159
IQ_ SYSTEM_ TEMP	dbspacedb. iqtmp	TEMPO RARY	RW	8	10M	10M	8K	1H,64F, 32A	1	1280

sp_iqdbspaceinfo procedure

Function

Displays the number of blocks used per index per main or local dbspace for one or all dbspaces.

Syntax

sp_iqdbspaceinfo ['*dbspace-name-pattern*'] [,'local']

Permissions

DBA authority required.

See also

- "sp_iqdbspace procedure", "sp_iqindexinfo procedure", "sp_iqspaceinfo procedure", and "sp_iqrelocate procedure"
- Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*

Usage

dbspace-name-pattern If specified, sp_iqdbspaceinfo only displays output for dbspaces that match LIKE pattern. sp_iqdbspaceinfo displays all dbspace names, if *dbspace-name-pattern* is not specified.

local The local keyword is specified to enable the display of objects in the multiplex local IQ store. By default on a query server, sp_iqdbspaceinfo displays information about the shared main IQ store on a query server.

Description

The sp_iqdbspaceinfo stored procedure shows the DBA which objects reside on each dbspace. The DBA can use this information to determine which objects must be relocated before a dbspace can be dropped.

The results of sp_iqdbspaceinfo are displayed from the point of view of the version seen by the transaction running the command. Blocks used by other versions are not shown.

Table 9-9: sp_iqdbspaceinfo columns

Column name	Description
dbspace_name	Name of the dbspace
Object	Table, index, or join index name
MinBlk	First block used by this object on this dbspace
MaxBlk	Last block used by this object on this dbspace; useful for determining which objects must be relocated before the dbspace is resized to a smaller size
ObjSize	Size of data for this object on this dbspace
DBSpSz	Size of the dbspace

Example

The following output displays information about all main dbspaces.

```
sp_iqdbspaceinfo;
```

dbspace_name	Object	MinBlk	MaxBlk	ObjSize	DBSpSz
dbspacedb2	t2	1045495	1045495	8K	10M
dbspacedb2	t2.DBA.t2c1hng	1045537	1045553	136K	10M
dbspacedb3	t1	2090913	2091321	200K	10M
dbspacedb3	t1.DBA.ASIQ_IDX_T429_C1_FP	2090914	2091316	288K	10M
dbspacedb3	t1.DBA.t1c1hg	2090931	2091280	304K	10M
dbspacedb3	t2	2090930	2091261	192K	10M
dbspacedb3	t2.DBA.ASIQ_IDX_T430_C1_FP	2091027	2091277	288K	10M

The following output displays information about a specific dbspace in the database:

```
sp_iqdbspaceinfo IQ_SYSTEM_MAIN;
```

dbspace_name	Object	MinBlk	MaxBlk	ObjSize	DBSpSz
IQ_SYSTEM_MAIN	t1	82	125	40K	10M
IQ_SYSTEM_MAIN	t1.DBA.ASIQ_IDX_T429_C1_FP	109	322	136K	10M
IQ_SYSTEM_MAIN	t1.DBA.t1c1hg	127	305	152K	10M
IQ_SYSTEM_MAIN	t2	84	107	32K	10M
IQ_SYSTEM_MAIN	t2.DBA.ASIQ_IDX_T430_C1_FP	126	321	136K	10M

sp_iqdbstatistics procedure

Function

Reports results of the most recent sp_iqcheckdb.

Syntax **sp_iqdbstatistics**

See also For more information on the use of sp_iqcheckdb and the interpretation of the sp_iqcheckdb output, see Chapter 2, "System Recovery and Database Repair" in the *Sybase IQ Troubleshooting and Error Messages Guide*.

Description Displays the database statistics collected by the most recent execution of the sp_iqcheckdb procedure.

Example The following example shows the output from the sp_iqdbstatistics stored procedure. For this example, the most recent execution of sp_iqcheckdb was the command sp_iqcheckdb 'allocation database'.

```
            DB Statistics                    Value                Flags
===================================|==========================|=====
DBCC Allocation Mode Report        |                          |
===================================|==========================|=====
** DBCC Status                     |Errors Detected           |*****
   DBCC Work units Dispatched      |163                       |
   DBCC Work units Completed       |163                       |
===================================|==========================|=====
Allocation Summary                 |                          |
===================================|==========================|=====
   Blocks Total                    |8192                      |
   Blocks in Current Version       |4954                      |
   Blocks in All Versions          |4954                      |
   Blocks in Use                   |4986                      |
   % Blocks in Use                 |60                        |
** Blocks Leaked                   |32                        |*****
                                   |                          |
===================================|==========================|=====
Allocation Statistics              |                          |
===================================|==========================|=====
   Blocks Created in Current TXN   |382                       |
   Blocks To Drop in Current TXN   |382                       |
   Marked Logical Blocks           |8064                      |
   Marked Physical Blocks          |4954                      |
   Marked Pages                    |504                       |
   Blocks in Freelist              |126553                    |
   Imaginary Blocks                |121567                    |
   Highest PBN in Use              |5432                      |
** 1st Unowned PBN                 |452                       |*****
   Total Free Blocks               |3206                      |
   Usable Free Blocks              |3125                      |
   % Free Space Fragmented         |2                         |
   Max Blocks Per Page             |16                        |
   1  Block Page Count             |97                        |
   3  Block Page Count             |153                       |
```

```
   4  Block Page Count              |14                          |
   ...
   9  Block Hole Count              |2                           |
   16 Block Hole Count              |194                         |
                                    |                            |
   Database Objects Checked         |1                           |
   B-Array Count                    |1                           |
   Blockmap Identity Count          |1                           |
=====================================|============================|=====
Connection Statistics               |                            |
=====================================|============================|=====
                                    |                            |
                                    |                            |
                                    |                              |
```

sp_iqdroplogin procedure

Function	Drops an Sybase IQ user account.
Syntax1	**call sp_iqdroplogin** (‘*userid*’)
Syntax2	**sp_iqdroplogin** ‘*userid*’
Syntax3	**sp_iqdroplogin** *userid*
Syntax4	**sp_iqdroplogin** (‘*userid*’)
Permissions	DBA authority required.
Usage	**userid** User ID of the user to drop.
See also	“sp_iqaddlogin procedure” on page 609 REVOKE statement Chapter 12, “Managing User IDs and Permissions” in *Sybase IQ System Administration Guide*
Description	sp_iqdroplogin drops the specified user, and removes the user from the IQ_USER_LOGIN_INFO_TABLE.

Errors	The following errors may occur. Causes are listed after each error.
	`Permission denied: You do not have permission to execute the procedure sp_iqdroplogin.`
	Cause: A user without DBA role tried to execute sp_iqdroplogin.
	`RAISERROR executed: User <loginname> does not exist.`
	Cause: The message will appear if the user tries to drop a nonexistent login.

Examples

The following stored procedure calls remove the user rose.

```
sp_iqdroplogin 'rose'
sp_iqdroplogin rose
call sp_iqdroplogin ('rose')
```

sp_iqestjoin procedure

Function

Estimates the space needed to create join indexes for the tables you specify.

Syntax

sp_iqestjoin (*table1_name, table1_row_#, table2_name, table2_row_#, relation, iq_page_size*)

Description

Returns the amount of space a join index will use based on the tables being joined. This procedure assumes that the database was created with the default block size for the specified IQ page size (or else the estimate will be incorrect). Table 9-10 lists the sp_iqestjoin parameters.

Table 9-10: sp_iqestjoin parameters

Name	Datatype	Description
table1_name	char(256)	Name of the first table in the join.
table1_row_#	int	Number of rows in the first table that will participate in the join.
table2_name	char(256)	Name of the second table in the join.
table2_row_#	int	Number of rows in the second table that will participate in the join.
relation	char(9)	Type of join, which can be “one>>many” or “one>>one” (do not leave any spaces between the words and the operator). The default is “one>>many”.
iq_page_size	smallint	The page size defined for the IQ segment of the database (must be a power of 2 between 1024 and 524288; the default is 131072).

Example

```
call sp_iqestjoin ( ‘customer’, 1500000, ‘orders’,
15000000, ‘one>>many’, 65536 )
```

Cases	Indexsize	Create time	Msg
Table1:customer			
Rows: 1500000			
Columns:			
8			

Cases	Indexsize	Create time	Msg
Width:			
223			
Table2: orders			
Rows: 15000000			
Columns:			
9			
Width:			
134			
IQpagesize:			
65536			
Min Case	48001024	3h0m/CPU	
Max Case	95449088	9h6m/CPU	
Avg Case	70496256	5h53m/CPU	

sp_iqestdbspaces procedure

Function

Estimates the number and size of dbspaces needed for a given total index size.

Syntax

sp_iqestdbspaces (*db_size_in_bytes, iq_page_size, min_#_of_bytes, max_#_of_bytes*)

Description

Displays information about the number and size of dbspace segments based on the size of the database, the IQ page size, and the range of bytes per dbspace segment. This procedure assumes that the database was created with the default block size for the specified IQ page size (or else the estimate will be incorrect). Table 9-11 lists the sp_iqestdbspaces parameters.

Table 9-11: sp_iqestdbspaces parameters

Name	Datatype	Description
db_size_in_bytes	decimal(16)	Size of the database in bytes.
iq_page_size	smallint	The page size defined for the IQ segment of the database (must be a power of 2 between 65536 and 524288; the default is 131072).
min_#_of_bytes	int	The minimum number of bytes per dbspace segment. The default is 20,000,000 (20 MB).
max_#_of_bytes	int	The maximum number of bytes per dbspace segment. The default is 2,146,304,000 (2.146 GB).

Usage

sp_iqestdbspaces displays four types of recommendations, depending on how much of the data is unique:

min If there is little variation in data, you can choose to create only the dbspace segments of the size(s) recommended as min. These recommendations reflect the best possible compression on data with the least possible variation.

avg If your data has an average amount of variation, create the dbspace segments recommended as min, plus additional segments of the size(s) recommended as avg.

max If your data has a high degree of variation (many unique values), create the dbspace segments recommended as min, avg, and max.

spare If you are uncertain about the number of unique values in your data, create the dbspace segments recommended as min, avg, max, and spare. You can always delete unused segments after loading your data, but creating too few can cost you some time.

❖ **Using sp_iqestdbspaces with other system stored procedures**

1 Run sp_iqestjoin for all the table pairs you expect to join frequently.

2 Select one of the suggested index sizes for each pair of tables.

3 Total the index sizes you selected for all tables.

4 Run sp_iqestspace for all tables.

5 Total all of the RAW DATA index sizes returned by sp_iqestspace.

6 Add the total from step 3 to the total from step 5 to determine total index size.

7 Use the total index size calculated in step 6 as the *db_size_in_bytes* parameter in sp_iqestdbspaces.

Results of sp_iqestdbspaces are only estimates, based on the average size of an index. The actual size depends on the data stored in the tables, particularly on how much variation there is in the data.

Sybase strongly recommends that you create the spare dbspace segments, because you can delete them later if they are unused.

Example

```
sp_iqestdbspaces 12000000000, 65536, 500000000,
2146304000
```

dbspaces	Type	Size	Msg
1	min	2146304000	
2	min	2146304000	
3	min	507392000	
4	avg	2146304000	
5	max	2053697536	
6	spare	1200001024	

This example estimates the size and number of dbspace segments needed for a 12GB database. Sybase IQ recommends that you create a minimum of 3 segments (listed as min) for the best compression, if you expect little uniqueness in the data. If the data has an average amount of variation, 1 more segment (listed as avg) should be created. Data with a lot of variation (many unique values, requiring extensive indexing), may require 1 more segment (listed as max). You can ensure that your initial load will succeed by creating a spare segment of 1200001024 bytes. Once you have loaded the database, you can delete any unused dbspace segments.

sp_iqestspace procedure

Function

Estimates the amount of space needed to create an index based on the number of rows in the table.

Syntax

sp_iqestspace (*table_name, #_of_rows, iq_page_size*)

Description

Displays the amount of space that a database requires based on the number of rows in the underlying database tables and on the database IQ page size. This procedure assumes that the database was created with the default block size for the specified IQ page size (or else the estimate will be incorrect). Table 9-12 lists the sp_iqestspace parameters.

Table 9-12: sp_iqestspace parameters

Name	Datatype	Description
table_name	char(256)	Name of the table
#_of_rows	int	Number of rows in the table
iq_page_size	smallint	The page size defined for the IQ segment of the database (must be a power of 2 between 65536 and 524288; the default is 131072).

sp_iqindex and sp_iqindex_alt procedures

Function

Lists indexes and information about them.

Syntax 1

sp_iqindex ([*table_name*],[*column_name*],[*table_owner*])

Syntax 2

sp_iqindex [table_name=*'tablename'*], [column_name=*'columnname'*],[table_owner=*'tableowner'*]

Syntax 3

sp_iqindex_alt ([*table_name*],[*column_name*],[*table_owner*])

Syntax 4

sp_iqindex_alt [table_name=*'tablename'*], [column_name=*'columnname'*],[table_owner=*'tableowner'*]

Usage

Syntax1 If you do not specify either of the first two parameters, but specify the next parameter in the sequence, you must substitute NULL for the omitted parameter(s). For example, `sp_iqindex NULL,NULL,DBA` and `sp_iqindex department,NULL,DBA`.

Syntax2 The parameters can be specified in any order. Be sure to enclose them in single quotes.

Syntax 3 and 4 Produces slightly different output when a multicolumn index is present. Allows the same options as Syntax 1 and 2.

Description

Displays information about indexes in the database. Specifying one of the parameters returns the indexes from only that table, column, or tables owned by the specified user. Specifying more than one parameter filters the results by all of the parameters specified. Specifying no parameters returns all indexes for all tables in the database.

Table 9-13: sp_iqindex and sp_iqindex_alt columns

Column name	Description
table_name	The name of the table
table_owner	The owner of the table
column_name	The name of the column; multiple names can appear in a multicolumn index
index_type	The abbreviated index type (for example, HG, LF)
index_name	The name of the index
unique_index	'U' indicates the index is a unique index; otherwise, 'N'
location	TEMP = IQ Temp Store, MAIN = IQ Store, LOCAL = IQ Local Store, SYSTEM = Catalog Store
remarks	User comments added with the COMMENT statement

The sp_iqindex format always produces one line per index. The sp_iqindex_alt format produces one line per index per column if there is a multicolumn index.

Examples

The following variations in syntax both return all indexes on columns with the name dept_id:

```
call sp_iqindex (NULL,'dept_id')
sp_iqindex column_name='dept_id'
```

table_ name	table_ owner	column_ name	index_ type	index_name	unique_ index	location	remarks
department	DBA	dept_id	FP	ASIQ_IDX_T201_C1_FP	N	Main	(NULL)
department	DBA	dept_id	HG	ASIQ_IDX_T201_C1_HG	U	Main	(NULL)
employee	DBA	dept_id	FP	ASIQ_IDX_T202_C5_FP	N	Main	(NULL)

The following variations in syntax both return all indexes in the table department that is owned by table owner DBA:

```
sp_iqindex department,NULL,DBA
sp_iqindex table_name='department',table_owner='DBA'
```

table_ name	table_ owner	column_ name	index_ type	index_name	unique_ index	location	remarks
department	DBA	dept_head_id	FP	ASIQ_IDX_T201_C3_FP	N	Main	(NULL)
department	DBA	dept_id	FP	ASIQ_IDX_T201_C1_FP	N	Main	(NULL)
department	DBA	dept_id	HG	ASIQ_IDX_T201_C1_HG	U	Main	(NULL)
department	DBA	dept_name	FP	ASIQ_IDX_T201_C2_FP	N	Main	(NULL)

The following variations in syntax for sp_iqindex_alt both return indexes on the table employee that contain the column city. The index emp_loc is a multicolumn index on the columns city and state. sp_iqindex_alt displays one row per column for a multicolumn index.

```
sp_iqindex_alt employee,city
sp_iqindex_alt table_name='employee',
               column_name='city'
```

table_ name	table_ owner	column_ name	index_ type	index_name	unique_ index	remarks
employee	DBA	city	FP	ASIQ_IDX_T452_C7_FP	N	(NULL)
employee	DBA	city	HG	emp_loc	N	(NULL)
employee	DBA	state	HG	emp_loc	N	(NULL)

Notice that the output from the sp_iqindex procedure for the same table and column is slightly different:

```
sp_iqindex employee,city
sp_iqindex table_name='employee',column_name='city'
```

table_ name	table_ owner	column_ name	index_ type	index_name	unique_ index	location	remarks
employee	DBA	city	FP	ASIQ_IDX_T452_C7_FP	N	Main	(NULL)
employee	DBA	city,state	HG	emp_loc	N	Main	(NULL)

sp_iqindexfragmentation procedure

Function

Reports information about the amount of empty space within the btrees, garrays and bitmaps in IQ indexes.

Syntax

dbo.sp_iqindexfragmentation ('*target* ')

target: **table** *table-name* (**index***index-name* (...))

Permissions

This procedure is owned by dbo. Users without DBA authority need to be granted execute permission in order to run it.

Usage

table-name Target table *table-name* reports on all non-default indexes in the named table.

index-name Target index *index-name* reports on the named index within the specified table. You may specify multiple indexes within the table, but must repeat the index keyword with each index specified.

Example

The following procedure reports the internal index fragmentation for nonunique HG index cidhg in table customers:

```
dbo.sp_iqindexfragmentation ('index customers.cidhg')
```

Index	Index type	Btree node pages	Fill factor percent
dba.customers.cidhg	HG	3	75
SQLCODE	0		
Fill Percent	btree pages	garray pages	bitmap pages
0 - 10%	0	0	0
11 - 20%	0	0	0
21 - 30%	0	0	0
31-40%	0	0	22
41 - 50%	0	0	0
51 - 60%	0	0	10
61 - 70%	2	0	120
71 - 80 5	138	3	64
81 - 90%	24	122	14
91 - 100%	18	1	0

According to this output, of the 182 btree pages in nonunique HG index cidhg, 2 are between 61% and 70% full, 138 are 71% to 80% full, 24 pages are 81% - 90% full, and 18 pages are 91% - 100% full. Usage for garray and bitmap pages is reported in the same manner. All percentages are truncated to the nearest percentage point. HG indexes also display the value of option GARRAY_FILL_FACTOR_PERCENT. Those index types that use a btree also display the number of node (nonleaf) pages. These are HG, LF, WD, DATE, and DTTM.

If an error occurred during execution of the stored procedure for this index, the SQLCODE would be nonzero.

sp_iqindexinfo procedure

Function

Displays the number of blocks used per index per main or local dbspace for a given object.

Syntax

sp_iqindexinfo '{ **database | local**
| [**table** *table-name* | **index** *index-name*] [...] }
[**resources** *resource-percent*]'

Permissions

DBA authority required.

See also

- "sp_iqdbspace procedure", "sp_iqdbspaceinfo procedure", "sp_iqspaceinfo procedure", and "sp_iqrelocate procedure"
- Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*

Usage

You can request index information for the entire database or you can specify any number of table or index parameters. If a table name is specified, sp_iqindexinfo returns information on all indexes in the table. If an index name is specified, only the information on that index is returned.

Note that you cannot specify a join index by name. Use the database or local keyword to display join indexes.

If the specified *table-name* or *index-name* is ambiguous or the object cannot be found, an error is returned.

The local keyword is specified as a target to enable the display of objects in the IQ Local Store. By default in a multiplex database, sp_iqindexinfo displays information about the shared IQ Store on a query server. If individual tables or indexes are specified, then the store to display is selected automatically. You cannot specify targets from both the shared IQ Store and IQ Local Stores.

resource-percent must be an integer greater than 0. The resources percentage allows you to limit the CPU utilization of the sp_iqindexinfo procedure by specifying the percent of total CPUs to use.

Description

The sp_iqindexinfo stored procedure shows the DBA on which dbspaces a given object resides. The DBA can use this information to determine which dbspaces must be given relocate mode to relocate the object.

The results of sp_iqindexinfo are displayed from the point of view of the version seen by the transaction running the command. Blocks used by other versions are not shown.

Table 9-14: sp_iqindexinfo columns

Column name	Description
Object	Table, index, or join index name
dbspace_name	Name of the dbspace
ObjSize	Size of data for this object on this dbspace
DBSpPct	Percent of dbspace used by this object
MinBlk	First block used by this object on this dbspace
MaxBlk	Last block used by this object on this dbspace; useful for determining which objects must be relocated before the dbspace is resized to a smaller size

Examples

The following command displays index information about the table t2:

```
sp_iqindexinfo 'table t2';
```

Object	dbspace_name	ObjSize	DBSpPct	MinBlk	MaxBlk
t2	IQ_SYSTEM_MAIN	32K	1	84	107
t2	dbspacedb2	160K	2	1045495	1045556
t2	dbspacedb3	8K	1	2090930	2090930
t2.DBA.ASIQ_IDX_T430_C1_FP	IQ_SYSTEM_MAIN	136K	2	126	321
t2.DBA.ASIQ_IDX_T430_C1_FP	dbspacedb3	152K	2	2091032	2091053
t2.DBA.t2c1hng	dbspacedb2	136K	2	1045537	1045553

Because you cannot specify targets from both the shared IQ Store and IQ Local Stores, the following command returns an error, if local_tab1 is a local table and main_tab1 is a shared IQ table:

```
sp_iqindexinfo ‘table local_tab1 table main_tab1’
```

sp_iqindexsize procedure

Function

Gives the size of the specified index.

Syntax

sp_iqindexsize [[*owner*.] *table*.] *index_name*

Description

Table 9-15: sp_iqindexsize columns

Column name	Description
Username	Index owner.
Indexname	Index for which results are returned, including the table name.
Type	Index type.
Info	Component of the IQ index for which the Kbytes, Pages, and Compressed Pages are being reported. The components vary by index type. For example, the default (FP) index includes BARRAY (barray) and Bitmap (bm) components. The Low_Fast (LF) index includes Btree (bt) and Bitmap (bm) components.
Kbytes	Physical object size in KB.
Pages	Number of IQ pages needed to hold the object in memory.
Compressed Pages	Number of IQ pages when the object is compressed (on disk).

Returns the total size of the index in bytes and kilobytes, and an Info column that describes the component of the IQ index for which the Kbytes, Pages and Compressed Pages are reported. The components described vary by index type. For example, the default (FP) index includes BARRAY (barray) and Bitmap (bm) components. The Low_Fast (LF) index includes Btree (bt) and Bitmap (bm) components.

Also returns the number of pages required to hold the object in memory and the number of IQ pages when the index is compressed (on disk).

You must specify the *index_name* parameter with this procedure. To restrict results to this index name in a single table, include *owner.table.* when specifying the index.

Example

```
sp_iqindexsize ASIQ_IDX_T452_C19_FP
```

Username	Indexname	Type	Info	KBytes	Pages	Compressed Pages
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	Total	288	4	2
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	vdo	0	0	0
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	bt	0	0	0
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	garray	0	0	0
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	bm	136	2	1
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	barray	152	2	1
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	dpstore	0	0	0

Username	Indexname	Type	Info	KBytes	Pages	Compressed Pages
DBA	employee.ASIQ_IDX_T452_C19_FP	FP	largelob	0	0	0

sp_iqjoinindexsize procedure

Function: Gives the size of the specified join index.

Syntax: **sp_iqjoinindexsize** (*join_index_name*)

Description: Returns the total size of the index in bytes, Kbytes and Nblocks (IQ blocks). Also returns the number of pages required to hold the join index in memory and the number of IQ pages when the join index is compressed (on disk). You must specify the *join_index_name* parameter with this procedure.

Table 9-16: sp_iqjoinindexsize columns

Column name	Description
Username	Owner of the join index.
JoinIndexName	Join index for which results are returned.
Number of Tables	Number of tables in the join index.
Kbytes	Physical object size in KB
Pages	Number of IQ pages needed to hold the object in memory
Compressed Pages	Number of IQ pages when the object is compressed (on disk)
Nblocks	Number of IQ blocks

Example:

```
sp_iqjoinindexsize ( 't1t2' )
```

Username	JoinIndexName	Number of Tables	KBytes	Pages	Compressed Pages	NBlocks
DBA	t1t2	2	13	15	4	26

sp_iqlistexpiredpasswords procedure

Function: Lists users with expired passwords.

Syntax: **sp_iqlistexpiredpasswords**

Permissions: DBA authority required.

See also: “sp_iqmodifyadmin procedure” on page 652

"sp_iqmodifylogin procedure" on page 655

Errors

The following error may occur. Cause is listed after the error.

```
Permission denied: You do not have permission to execute
the procedure "sp_iqlistexpiredpasswords".
```

Cause: A user without DBA role tried to execute sp_iqlistexpiredpasswords.

Example

```
call sp_iqlistexpiredpasswords
```

Expired_Users
jack
jill

sp_iqlistlockedusers procedure

Function

Lists user IDs that are locked out of the database.

Syntax

sp_iqlistlockedusers

Permissions

DBA authority required.

See also

"sp_iqlocklogin procedure" on page 648

Description

Lists the user IDs of all users that have been locked out the database with sp_iqlocklogin.

Errors

The following error may occur. Cause is listed after the error.

```
Permission denied: You do not have permission to execute
the procedure "sp_iqlistlockedusers".
```

Cause: A user without DBA role tried to execute sp_iqlistlockedusers.

Example

```
call sp_iqlistlockedusers
```

Locked_Users
rose

sp_iqlistpasswordexpirations procedure

Function

Lists users, their password creations dates, and how many days the password is valid from the creation date.

Syntax

sp_iqlistpasswordexpirations

Permissions

DBA authority required.

See also

“sp_iqaddlogin procedure” on page 609

“sp_iqmodifylogin procedure” on page 655

Errors

The following error may occur. Cause is listed after the error.

```
Permission denied: You do not have permission to execute
the procedure "sp_iqlistpasswordexpirations".
```

Cause: A user without DBA role tried to execute sp_iqlistpasswordexpirations.

Example

```
sp_iqlistpasswordexpirations
```

UserName	Password_Created	Days_till_Expiration
DBA	2004-01-02 10:13:53.625	0
rose	2004-01-05 14:36:38.099	365
jack	2004-01-07 14:44:34.645	0

A value of 0 for Days_till_Expiration indicates that the password does not expire.

sp_iqlocklogin procedure

Function

Locks an IQ user account so that the user cannot log in.

Syntax1

call sp_iqlocklogin (‘*login-name*’, ‘[lock | unlock]’)

Syntax2

sp_iqlocklogin ‘*login-name*’, ‘[lock | unlock]’

Syntax3

sp_iqlocklogin *login-name*, ‘[lock | unlock]’

Permissions

DBA authority required.

Usage

login-name Name of the account to be locked or unlocked.

See also

“sp_iqmodifyadmin procedure” on page 652

Description

When Sybase IQ User Administration is enabled, the DBA uses sp_iqlocklogin to prevent or enable a specified user’s ability to log in to the database.

You cannot lock yourself or the DBA account out of the database. Connected users can be locked, but they remain connected. A locked account can be specified as a database owner, and can own objects in any database.

Errors

The following errors may occur. Causes are listed after each error.

```
Permission denied: You do not have permission to execute
the procedure sp_iqlocklogin.
```

Cause: A user without DBA role tried to execute sp_iqlocklogin.

```
RAISERROR executed: You cannot lock yourself out.
```

Cause: User tries to lock him or herself out.

```
RAISERROR executed: "The user DBA cannot be locked."
```

Cause: User tried to lock the DBA user.

```
RAISERROR executed: "Invalid option <what the user
entered> was specified.” "
```

Cause: User typed in invalid input.

Examples

The following examples lock out the user rose.

```
sp_iqlocklogin 'rose', 'lock'
call sp_iqlocklogin ('rose', 'lock')
```

The following example unlocks the account of the user rose.

```
sp_iqlocklogin rose, 'unlock'
```

sp_iqlocks procedure

Function

Shows information about locks in the database, for both the IQ Store and the Catalog Store.

Syntax

sp_iqlocks ([*connection*,] [[*owner*.]*table_name*] *max_locks*,] [*sort_order*])

Usage

Table 9-17 lists the optional sp_iqlocks parameters you can specify to restrict results.

Table 9-17: Optional sp_iqlocks parameters

Name	Data type	Description
connection	integer	Connection ID. With this option, the procedure returns information about locks for the specified connection only. Default is zero, which returns information about all connections
owner.table_name	char (128)	Table name. With this option, the procedure returns information about locks for the specified table only. Default is NULL, which returns information about all tables in the database. If you do not specify *owner*, it is assumed that the caller of the procedure owns the table.
max_locks	integer	Maximum number of locks for which to return information. Default is 0 which returns all lock information.
sort_order	char(1)	Order in which to return information: • C sorts by connection (default) • T sorts by table_name

Description

Displays information about current locks in the database. Depending on the options you specify, you can restrict results to show locks for a single connection, a single table, or a specified number of locks.

The sp_iqlocks procedure displays the following information, sorted as specified in the *sort_order* parameter:

Table 9-18: sp_iqlocks columns

Column	Description
connection ID	Connection ID that has the lock
user name	User associated with this connection ID
table name	Table on which the lock is held
lock type	String of characters indicating the type of lock: S Shared E Exclusive P Phantom A Antiphantom W Write All locks listed have exactly one of S, E, or W, and may also have P, A, or both. Phantom and antiphantom locks also have a qualifier of T or * T The lock is with respect to a sequential scan * The lock is with respect to all scans *nnn* Index number; the lock is with respect to a particular index
lock name	Value identifying the lock

If sp_iqlocks cannot find the connection ID or user name of the user who has a lock on a table, it displays a 0 (zero) for the connection id and `User unavailable` for the user name.

Note Exclusive, Phantom, or Anti-phantom locks can be placed on Adaptive Server Anywhere tables, but not on IQ tables. Unless you have explicitly taken out locks on a table in the Catalog Store, you will never see these types of locks (or their qualifiers T, *, and *nnn*) in an IQ database. For information on how locking works in Adaptive Server Anywhere tables, see the *Adaptive Server Anywhere SQL User's Guide*.

Examples

The first example shows the sp_iqlocks procedure call and its output in an IQ database. The procedure is called with all default options, so that the output shows all locks, sorted by connection.

```
call sp_iqlocks()

connection      user_id table_name      lock_type       lock_name

70187172        'mary'  'DBA.t2'        'S'             (NULL)
604945019       'russ'  'russ.t3'       'S'             (NULL)
604945019       'russ'  'russ.t3'       'W'             (NULL)
1550990889      'DBA'   'dbo.spt_mda'   'S'             (NULL)
```

```
1744647885      'DBA'   'russ.t1'       'S'             (NULL)
1744647885      'DBA'   'russ.t1'       'W'             (NULL)
1744647885      'DBA'   'russ.t3'       'S'             (NULL)
2120842322      'shemp' 'shemp.t1'      'S'             (NULL)
2120842322      'shemp' 'shemp.t1'      'W'             (NULL)
```

The next example shows sp_iqlocks with sorting by table name.

```
call sp_iqlocks(0,null,0,'t')

connection      user_id table_name      lock_type       lock_name

70187172        'mary'  'DBA.t2'        'S'             (NULL)
1550990889      'DBA'   'dbo.spt_mda'   'S'             (NULL)
1744647885      'DBA'   'russ.t1'       'S'             (NULL)
1744647885      'DBA'   'russ.t1'       'W'             (NULL)
604945019       'russ'  'russ.t3'       'S'             (NULL)
604945019       'russ'  'russ.t3'       'W'             (NULL)
1744647885      'DBA'   'russ.t3'       'S'             (NULL)
2120842322      'shemp' 'shemp.t1'      'S'             (NULL)
2120842322      'shemp' 'shemp.t1'      'W'             (NULL)
```

sp_iqmodifyadmin procedure

Function — Enables Sybase IQ User Administration, and modifies IQ user account information in the IQ_SYSTEM_LOGIN_INFO_TABLE system table.

Syntax1 — **call sp_iqmodifyadmin** ('{ enable | disable| user_connections | db_connections | password_expiration | password_warning }' , [*value*])

Syntax2 — **sp_iqmodifyadmin** '{ enable | disable| user_connections | db_connections | password_expiration | password_warning }' , [*value*]

Permissions — DBA authority required.

Usage — **enable | disable** Enables or disables Sybase IQ User Administration. Use `enable` at any time to bring the IQ_USER_LOGIN_INFO_TABLE system table up to date.

The next four options require a *value*.

user_connections Sets the default number of connections per user. 0 means no limit is enforced.

db_connections Sets the default number of connections to the database. 0 means no limit is enforced.

password_expiration Sets the default number of days a password is valid. 0 means the password does not expire.

password_warning Sets the number of days before a password expires that a warning is sent to the user console.

value Value to which the named option is set. Values can be from 0 through 32767.

See also

"sp_iqaddlogin procedure" on page 609

"sp_iqmodifylogin procedure" on page 655

"LOGIN_PROCEDURE option" on page 85

Description

Sybase IQ User Administration relies on two system tables:

- IQ_SYSTEM_LOGIN_INFO_TABLE contains database-wide defaults for connection limits and password expirations. When you execute sp_iqmodifyadmin, Sybase IQ modifies this table.
- IQ_USER_LOGIN_INFO_TABLE contains connection limits and password expiration information for individual users. When you enable Sybase IQ User Administration, IQ updates this table with users created or modified without sp_iqaddlogin or sp_iqmodifylogin since Sybase IQ User Administration was last enabled.

The values in IQ_SYSTEM_LOGIN_INFO_TABLE are the default option settings for users in the IQ_USER_LOGIN_INFO_TABLE.

When a user logs on, Sybase IQ calls the stored procedure specified by the database option Login_Procedure. The default setting of this option is DBA.sp_iq_process_login. When Sybase IQ User Administration is enabled, this procedure checks that the user is not locked out, that the maximum number of connections for the user and database is not exceeded, and that the user's password has not expired, then either allows the user to log in or sends an error message. When Sybase IQ User Administration is disabled, the user is allowed to log in without any checking. If you set Login_Procedure to a different value, no checking occurs.

Note Database upgrades automatically add existing users to the Sybase IQ User Administration tables. New users added with the GRANT CONNECT command after a database upgrade are *not* automatically added to the Sybase IQ User Administration tables.

Users added to the database with GRANT CONNECT after IQ User Administration has been enabled or a database upgrade has been done will not be managed by IQ User Administration until IQ User Administration is enabled again.

To identify such users, compare the output of SELECT * FROM SYSUSERPERM and sp_iqlistpasswordexpirations. Users who appear in the SYSUSERPERM table but not in the output of sp_iqlistpasswordexpirations are not managed by IQ User Administration. To manage these users with IQ User Administration, simply enable IQ User Administration again, as follows:

```
call sp_iqmodifyadmin('enable');
```

Errors

The following errors may occur. Causes are listed after each error.

```
Permission denied: You do not have permission to execute
the procedure sp_iqmodifyadmin.
```

Cause: A user without DBA role tried to execute sp_iqmodifyadmin.

```
RAISERROR executed: "The number of connections allowed
must specified and be greater than or equal to zero and
less than or equal to 32767."
```

Cause: A value other than 0 through 32767 was entered for user_connections.

```
RAISERROR executed: "The number of connections allowed
must specified and be greater than or equal to zero and
less than or equal to 32767."
```

Cause: A value other than 0 through 32767 was entered for db_connections.

```
RAISERROR executed: "The number of days the password is
```

```
valid must specified and be greater than or equal to
zero and less than or equal to 32767."
```

Cause: A value other than 0 through 32767 was entered for password_expiration.

```
RAISERROR executed: "The number of days to warn before
a password expires must specified and be greater than
or equal to zero and less than or equal to 32767."
```

Cause: A value other than 0 through 32767 was entered for password_warning.

```
RAISERROR executed: "Invalid input was supplied to
sp_iqmodifyadmin."
```

Cause: Invalid data was entered somewhere in the command.

Examples

The following procedure calls set the maximum number of connections to the database at 200. They do not enable or disable Sybase IQ User Administration.

```
call sp_iqmodifyadmin ('db_connections', 200)
```

```
sp_iqmodifyadmin 'db_connections', 200
```

If Sybase IQ User Administration is not enabled, this change is not enforced.

sp_iqmodifylogin procedure

Function

Modifies the maximum number of connections or the password expiration interval for a given user.

Syntax1

call sp_iqmodifylogin ('{*loginname* | all overrides }', '*option*', *value*)

Syntax2

sp_iqmodifylogin '{*loginname* | all overrides }', '*option*', *value*

Permissions

DBA authority required.

Usage

loginname Name of the account to be modified. If `all overrides` is specified, the option and its value apply to all users, except for the user DBA which cannot be set to expire.

option Name of the option to be changed:

- `password_expiration` Password expiration interval in days, from 0 through 32767. 0 means the password does not expire.
- `number_of_connections` Maximum number of concurrent database connections permitted for a given user. 0 means unlimited connections.

See also

"sp_iqmodifyadmin procedure" on page 652

Description

sp_iqmodifylogin lets the DBA limit connections or set password expiration for a specified existing user, or for all other users. Changes take effect when Sybase IQ User Administration is enabled with sp_iqmodifyadmin, or immediately if Sybase IQ User Administration is already enabled.

Errors

The following errors may occur. Causes are listed after each error.

```
Permission denied: You do not have permission to change
this password.
```

Cause: A user without DBA role tried to change another user's password.

```
RAISERROR executed: "Userid <loginname not found."
```

Cause: The user tried to change the password of a user that does not exist.

Examples

The following stored procedure calls set password to expire in 365 days for all users except DBA.

```
sp_iqmodifylogin 'all overrides',
'password_expiration', 365
```

```
call sp_iqmodifylogin ('all overrides',
'password_expiration', 365)
```

sp_iqpassword procedure

Function

Adds or changes a password for a Sybase IQ user account.

Syntax1

call sp_iqpassword ('*caller_password*', '*new_password*' [, '*loginname*'])

Syntax2

sp_iqpassword '*caller_password*', '*new_password*' [, '*loginname*']

Permissions

None to set your own password; DBA authority required to set other users' passwords.

Usage

caller_password Your password. When you are changing your own password, this is your old password. When the DBA is changing another user's password, caller_password is the DBA's password.

new_password New password for the user, or for *loginname*.

loginname Login name of the user whose password is being changed by the DBA. Do not specify loginname when changing your own password.

Description

Any user can change his or her own password using sp_iqpassword. The DBA can change the password of any existing user. Changes take effect when Sybase IQ User Administration is enabled with sp_iqmodifyadmin, or immediately if IQ User Administration is already enabled.

Examples

The following procedure calls by a DBA set the password of the user Jack to jacknew.

```
sp_iqpassword 'SQL', 'jacknew', 'jack'
call sp_iqpassword ('SQL', 'jacknew', 'jack')
```

sp_iq_process_login procedure

Function

Checks that a user is permitted to connect.

Syntax

sp_iq_process_login

Permissions

None.

See also

"sp_iqmodifyadmin procedure" on page 652

"LOGIN_PROCEDURE option" on page 85

Description

When a user logs on, IQ calls the stored procedure specified by the database option LOGIN_PROCEDURE. The default setting of the LOGIN_PROCEDURE option is DBA.sp_iq_process_login.

When Sybase IQ User Administration is enabled, sp_iq_process_login checks that the user is not locked out, that the maximum number of connections for the user and database is not exceeded, and that the user's password has not expired, and then either allows user login to proceed or sends an error message. When Sybase IQ User Administration is disabled, user login proceeds without any checking.

When user login is allowed to proceed, sp_iq_process_login calls the sp_login_environment system procedure for additional processing.

This procedure is called automatically. You do not need to call it directly, unless you are creating your own login procedures. If you set LOGIN_PROCEDURE to call a different procedure, no login checking occurs.

sp_iqrebuildindex procedure

Function

Rebuilds one or more indexes on a table with the original IQ UNIQUE value specified in the CREATE TABLE statement, or a new IQ UNIQUE value in order to change storage required and/or query performance. To rebuild an index other than the default index, specify the index name.

Syntax

sp_iqrebuildindex (*table_name*, *index_clause*)

Permissions

You must have INSERT permission on a table to rebuild an index on that table.

Usage

table_name Partial or fully-qualified table name on which the index rebuild process takes place. If the user both owns the table and executes the procedure, a partially qualified name may be used; otherwise, the table name must be fully qualified.

index_clause One or more of the following strings, separated by spaces:

column *column_name [count]*

index *index_name*

Each *column_name* or *index_name* must refer to a column or index on the specified table. If you specify a *column_name* or *index_name* multiple times, the procedure returns an error and no index is rebuilt.

The *count* is a non-negative number that represents the IQ UNIQUE value. In a CREATE TABLE statement, IQ UNIQUE (count) approximates how many distinct values can be in a given column. The number of distinct values affects query speed and storage requirements. For details, see "Optimizing storage and query performance," "Working with Database Objects,"*Sybase IQ System Administration Guide*.

You must specify the keywords column and index. These keywords are not case sensitive.

Description

If you specify a column name, the procedure rebuilds the default index for that column, and no index name is needed. Specifying the name of the default index assigned by Sybase IQ in addition to the column name in this situation returns an error. If you omit *count* after the *column_name*, value 0 (zero) is used as the default.

If the default index is a one-byte index, sp_iqrebuildindex always rebuilds it as a one-byte index no matter what IQ UNIQUE value the user specified.

For one-byte default indexes, if the specified value in *column_name (count)* is 0 or greater than 256, the column's cardinality value is used to update the approx_unique_count column in SYS.SYSIQCOLUMN.

If the column has the data type VARCHAR or VARBINARY greater than 255 bytes, sp_iqrebuildindex will not rebuild a default index.

If the default index is a two-byte index, and the specified count is 0 or greater than 65536, the column's cardinality value determines whether to rebuild the default into a one-byte or two-byte index, and that value is used to update the approx_unique_count column in SYS.SYSIQCOLUMN.

If you specify a non-zero IQ UNIQUE value, the default index is rebuilt as a one-byte, two-byte, or flat default index, with exceptions described above.

If you specify an IQ UNIQUE value of zero or no IQ UNIQUE value, the MINIMIZE_STORAGE option controls how the index is rebuilt:

- If MINIMIZE_STORAGE option is set ON, the index is rebuilt as a one-byte default index first, and converted to two-byte or flat if necessary.
- If MINIMIZE_STORAGE is set OFF, the index is rebuilt using the default for the data type. For more information, see "Sybase IQ index types" in *Sybase IQ System Administration Guide*.

See also

"sp_iqindexfragmentation procedure" on page 641,"sp_iqrowdensity procedure" on page 662, and "SYSIQCOLUMN system table" on page 739.

Examples

The following procedure rebuilds the default index on column *emp_lname*:

```
sp_iqrebuildindex 'employee', 'column emp_lname'
```

or

```
call sp_iqrebuildindex ('employee', 'column emp_lname')
```

The following SQL statement creates a flat default index on column *c1*:

```
CREATE TABLE mytable (c1 int IQ UNIQUE 1000000000)
```

This procedure converts the default one-byte index to a two-byte index:

```
sp_iqrebuildindex 'mytable', 'column c1 1024'
```

or

```
call sp_iqrebuildindex ('mytable', 'column c1 1024')
```

sp_iqrelocate procedure

Function

Relocates specified tables and indexes on main dbspaces with relocate mode to main dbspaces with readwrite mode.

Syntax

sp_iqrelocate '*target* [**maxsize** *nMB*] [**resources** *resource-percent*]'

Parameters

target:
{ database | { table *table-name* | index *index-name* } […] }

Permissions

DBA authority required.

See also

- "sp_iqdbspace procedure", "sp_iqdbspaceinfo procedure", and "sp_iqindexinfo procedure"

- Chapter 5, “Working with Database Objects” in the *Sybase IQ System Administration Guide*

Usage

nMB Specifies the maximum number of megabytes of data to relocate.

resource-percent Must be an integer greater than 0. The resources percentage allows you to limit the CPU utilization of the sp_iqrelocate procedure by specifying the percent of total CPUs to use.

Description

This procedure relocates specified tables and indexes on main dbspaces with relocate mode to main dbspaces with readwrite mode. If the database keyword is specified, then all objects found in relocate dbspaces are relocated. If one or more tables or indexes are specified, only the specified tables and indexes are relocated. Data that belongs to the specified tables or indexes that does not reside on relocate dbspaces is not relocated.

sp_iqrelocate can also be used to relocate tables and indexes on local dbspaces.

An object is relocated by creating a new version, the same as for DML operations. This new version must be committed before old versions are relocated and the dbspace is dropped. sp_iqrelocate does not automatically commit. You must commit the changes before they are persistent.

You can use the optional maxsize keyword to limit the amount of data relocated by the sp_iqrelocate procedure.

sp_iqrelocate returns a result set that indicates the numbers of blocks that were relocated for each object specified. The status column for each object is as follows:

- **relocated** All blocks in relocate dbspaces were relocated.
- **partial** The number of blocks in relocate dbspaces exceeds the *maxsize* parameter.
- **no relocs** The object has no blocks in relocate dbspaces.

Examples

The following command relocates the index t1c1hg on table t1 and relocates the entire table t2:

```
sp_iqrelocate 'index t1c1hg table t2';
```

ObjectName	NRelocated	RelocStatus
t1.DBA.t1c1hg	19	relocated
t2	4	relocated
t2.DBA.ASIQ_IDX_T430_C1_FP	17	relocated

ObjectName	NRelocated	RelocStatus
t2.DBA.t2c1hng	0	no relocs

All data on dbspaces with the readwrite mode of relocate can be relocated using a single sp_iqrelocate command. The following command relocates all data on relocate dbspaces in the database:

```
sp_iqrelocate 'database';
```

ObjectName	NRelocated	RelocStatus
t1	5	relocated
t1.DBA.ASIQ_IDX_T429_C1_FP	17	relocated
t1.DBA.t1c1hg	0	no relocs
t2	0	no relocs
t2.DBA.ASIQ_IDX_T430_C1_FP	0	no relocs
t2.DBA.t2c1hng	0	no relocs

Note that the four objects with relocation status of no relocs were relocated by the previous sp_iqrelocate command.

sp_iq_reset_identity procedure

Function — Sets the seed of the Identity/Autoincrement column associated with the specified table to the specified value.

Syntax — **sp_iq_reset_identity** (*table_name* , *table_owner* , *value*)

Usage — **Syntax** You must specify *table_name*, *table owner*, and *value.*

Permissions — None required.

See also — “sp_iqcolumn procedure”

Description — The Identity/Autoincrement column stores a number that is automatically generated. These values are unique identifiers for incoming data. The values are sequential, are generated automatically, and are never reused, even when rows are deleted from the table. The seed value specified replaces the default seed value and will persist across database shutdowns and failures.

Example — The following example creates an Identity column with a starting seed of 50.:

```
CREATE TABLE mytable(c1 INT identity)
call sp_iq_reset_identity('mytable', 'dba', 50)
```

sp_iqrowdensity procedure

Function

Reports information about the internal row fragmentation for a table at the FP index level.

Syntax

dbo.sp_iqrowdensity ('*target* ')

target:(**table** *table-name* | (**column** *column-name* (...))

Permissions

This procedure is owned by dbo. Users without DBA authority must be granted execute permission for the stored procedure in order to run it.

Usage

table-name Target table *table-name* reports on all columns in the named table.

column-name Target column *column-name* reports on the named column in the target table. You may specify multiple target columns, but must repeat the keyword each time.

You must specify the keywords table and column. These keywords are not case sensitive.

Description

This procedure measures row fragmentation at the default index level. Density is the ratio of the minimum number of pages required by an index for existing table rows to the number of pages actually used by the index. This procedure returns density as a number such that $0 < density \leq 1$. For example, if an index that requires 8 pages minimum storage occupies 10 pages, its density is .8.

The density reported does not indicate the number of disk pages that could be reclaimed by recreating or reorganizing the default index.

This procedure displays information about the row density of a column, but does not recommend further action. You must determine whether or not to recreate, reorganize, or rebuild an index.

Example

The following procedure reports the row density on column *order_id* in table *orders*:

```
dbo.sp_iqrowdensity ('column orders.order_id')
```

Table	Column	Index Type	Density
orders	order_id	Flat FP	.88

sp_iqspaceinfo procedure

Function

Displays the number of blocks used by each object in the current database and the name of the dbspace in which the object is located.

Syntax

sp_iqspaceinfo ['**main** | **local**
| [**table** *table-name* | **index** *index-name*] [...] ']

Permissions

DBA authority required.

See also

- "sp_iqindexinfo procedure", "sp_iqdbspace procedure", and "sp_iqdbspaceinfo procedure"
- Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*

Description

For the current database, displays the object name, number of blocks used by each object, and the name of the dbspace. sp_iqspaceinfo requires no parameters. If the database is a multiplex database, the default is main, the size of the shared IQ main store. The optional parameter local specifies only information about the local IQ store owned by the query server.

The information returned by sp_iqspaceinfo is helpful in managing dbspaces.

Example

The following output is from the sp_iqspaceinfo stored procedure run on the asiqdemo database. Note that lines of output for some tables and indexes have been removed in this example.

```
                Name                                    NBlocks    dbspace_name
   contact                                              19         IQ_SYSTEM_MAIN
   sales_order_items.DBA.ASIQ_IDX_T205_C5_FP            56         IQ_SYSTEM_MAIN
   contact.DBA.ASIQ_IDX_T206_C10_FP                     55         IQ_SYSTEM_MAIN
   contact.DBA.ASIQ_IDX_T206_C1_FP                      61         IQ_SYSTEM_MAIN
   ...
   contact.DBA.ASIQ_IDX_T206_C9_FP                      55         IQ_SYSTEM_MAIN
   contact.DBA.ASIQ_IDX_T206_I11_HG                     19         IQ_SYSTEM_MAIN
   customer                                             20         IQ_SYSTEM_MAIN
   customer.DBA.ASIQ_IDX_T207_C1_FP                     61         IQ_SYSTEM_MAIN
   customer.DBA.ASIQ_IDX_T207_C2_FP                     55         IQ_SYSTEM_MAIN
   ...
   customer.DBA.ASIQ_IDX_T207_I10_HG                    19         IQ_SYSTEM_MAIN
   ...
```

sp_iqspaceused procedure

Function

Shows information about space available and space used in the IQ Store and IQ Temporary Store.

Syntax

sp_iqspaceused(out mainKB unsigned bigint,
out mainKBUsed unsigned bigint,
out tempKB unsigned bigint,
out tempKBUsed unsigned bigint)

Usage

sp_iqspaceused returns four values as unsigned bigint out parameters. This system stored procedure can be called by user-defined stored procedures to determine the amount of Main and Temporary IQ Store space in use. In a multiplex, this procedure applies to the server on which it runs. If a query server has no IQ Local Store, it returns 0 in the first two out parameters.

Description

sp_iqspaceused returns a subset of the information provided by sp_iqstatus, but allows the user to return the information in SQL variables to be used in calculations.

Table 9-19: sp_iqspaceused columns

Column name	Description
mainKB	The total main IQ Store space in kilobytes.
mainKBUsed	The number of kilobytes of main IQ Store space used by the database.
tempKB	The total temp IQ Store space in kilobytes.
tempKBUsed	The number of kilobytes of temp IQ Store space in use by the database.

Example

The sp_iqspaceused system stored procedure requires four output parameters. The following example shows the creation of a user-defined stored procedure myspace that declares the four output parameters and then calls sp_iqspaceused.

```
create procedure dbo.myspace()
begin
  declare mt unsigned bigint;
  declare mu unsigned bigint;
  declare tt unsigned bigint;
  declare tu unsigned bigint;
  call sp_iqspaceused(mt,mu,tt,tu);
  select cast(mt/1024 as unsigned bigint) as mainMB,
        cast(mu/1024 as unsigned bigint) as mainusedMB,
        mu*100/mt as mainPerCent,
        cast(tt/1024 as unsigned bigint) as tempMB,
        cast(tu/1024 as unsigned bigint) as tempusedMB,
        tu*100/tt as tempPerCent;
end
```

To display the output of sp_iqspaceused, run the procedure myspace:

```
myspace
```

sp_iqstatus procedure

Function

Displays a variety of IQ status information about the current database.

Syntax

sp_iqstatus

Description

Shows status information about the current database, including the database name, creation date, page size, number of dbspace segments, block usage, buffer usage, I/O, backup information, and so on. On a query server in a multiplex, this procedure lists information about the IQ Local Store as well as the shared IQ Store and IQ Temporary Store.

The system stored procedure sp_iqspaceused returns a subset of the same information as that provided by sp_iqstatus, but allows the user to return the information in SQL variables to be used in calculations. See “sp_iqspaceused procedure” on page 663.

Example

The following output is from the sp_iqstatus stored procedure:

```
Adaptive Server IQ (TM)              Copyright (c) 1992-2004 by Sybase, Inc.
                                      All rights reserved.
Version:                             12.6.0/040810/P/GA/MS/
                                     Windows 2000/32bit/2004-08-10
09:54:19
Time Now:                            2004-08-11 18:53:34.274
Build Time:                          2004-08-10 09:54:19
File Format:                         23 on 03/18/1999
Server mode:                         IQ Server
Catalog Format:                      2
Stored Procedure Revision:           1
Page Size:                           131072/8192blksz/16bpp
Number of DB Spaces:                 1
Number of Temp Spaces:               1
DB Blocks: 1-5632                    IQ_SYSTEM_MAIN
Temp Blocks: 1-2816                  IQ_SYSTEM_TEMP
Create Time:                         2004-08-03 14:14:06.124
Update Time:                         2004-08-03 14:14:26.687
Main IQ Buffers:                     127, 16Mb
Temporary IQ Buffers:                95, 12Mb
Main IQ Blocks Used:                 4541 of 5632, 80%=35Mb, Max Block#:
5120
Temporary IQ Blocks Used:            65 of 2816, 2%=0Mb, Max Block#: 0
Main Reserved Blocks Available:      512 of 512, 100%=4Mb
Temporary Reserved Blocks Available: 256 of 256, 100%=2Mb
IQ Dynamic Memory:                   Current: 41mb, Max: 41mb
Main IQ Buffers:                     Used: 4, Locked: 0
Temporary IQ Buffers:                Used: 4, Locked: 0
Main IQ I/O:                         I: L168/P2 O: C2/D16/P15 D:0 C:100.0
```

```
Temporary IQ I/O:                    I: L862/P0 O: C136/D150/P17 D:132
C:100.0
Other Versions:                      0 = 0Mb
Active Txn Versions:                 0 = C:0Mb/D:0Mb
```

The following is a key to understanding the `Main IQ I/O` and `Temporary IQ I/O` output codes:

- `I:` Input
- `L:` Logical pages read (“Finds”)
- `P:` Physical pages read
- `O:` Output
- `C` Pages Created
- `D` Pages Dirtied
- `P:` Physically Written
- `D:` Pages Destroyed
- `C:` Compression Ratio

sp_iqtable procedure

Function — Lists tables and information about them.

Syntax1 — **sp_iqtable** ([*table_name*],[*table_owner*],[*table_type*])

Syntax2 — **sp_iqtable** [table_name=*'tablename'*], [table_owner=*'tableowner'*],[table_type=*'tabletype'*]

Usage — **Syntax1** If you do not specify either of the first two parameters, but specify the next parameter in the sequence, you must substitute NULL for the omitted parameter(s). For example, `sp_iqtable NULL,NULL,TEMP` and `sp_iqtable NULL,dbo,SYSTEM`.

Note The *table_type* values ALL and VIEW must be enclosed in single quotes in Syntax1.

Syntax2 The parameters can be specified in any order. Be sure to enclose them in single quotes.

Table 9-20 lists the allowed values for the *table_type* parameter.

Table 9-20: sp_iqtable table_type values

table_type value	information displayed
SYSTEM	system tables
TEMP	global temporary tables
VIEW	views
ALL	IQ tables, system tables, and views
any other value	IQ tables

Description

Displays information about tables in the database. Specifying one of the parameters returns only the tables that match that parameter. Specifying more than one parameter filters the results by all of the parameters specified. Specifying no parameters returns all IQ tables in the database. There is no method for returning the names of local temporary tables.

Table 9-21: sp_iqtable columns

Column name	Description
table_name	The name of the table
table_type	SYSTEM, BASE = a base table VIEW = a view TEMP, JVT = all join virtual tables of both IQ Store and IQ Local Stores, ALL, GBL = a global temporary table, JVT_MAIN = join virtual table of the IQ Store, JVT_LOCAL = join virtual table of an IQ Local Store.
table_owner	The owner of the table
server_type	IQ = an object created in the IQ Store SA = an object created in the SA Store Note that all views are created in the SA store.
location	TEMP = IQ Temp Store, MAIN = IQ Store, LOCAL = IQ Local Store, SYSTEM = Catalog Store
remarks	User comments added with the COMMENT statement

Examples

The following variations in syntax both return information about the table department:

```
call sp_iqtable ('department')
sp_iqtable table_name='department'
```

table_name	table_type	table_owner	server_type	location	remarks
department	BASE	DBA	IQ	MAIN	(NULL)

The following variations in syntax both return all tables that are owned by table owner DBA:

```
sp_iqtable NULL,DBA
sp_iqtable table_owner='DBA'
```

table_name	table_type	table_owner	server_type	location	remarks
contact	BASE	DBA	IQ	MAIN	(NULL)
customer	BASE	DBA	IQ	MAIN	(NULL)
department	BASE	DBA	IQ	MAIN	(NULL)
employee	BASE	DBA	IQ	MAIN	(NULL)
fin_code	BASE	DBA	IQ	MAIN	(NULL)
fin_data	BASE	DBA	IQ	MAIN	(NULL)
product	BASE	DBA	IQ	MAIN	(NULL)
sales_order	BASE	DBA	IQ	MAIN	(NULL)
sales_order_items	BASE	DBA	IQ	MAIN	(NULL)

sp_iqtablesize procedure

Function

Returns the size of the specified table.

Syntax

sp_iqtablesize (*table_owner.table_name*)

Description

Returns the total size of the table in Kbytes and Nblocks (IQ blocks). Also returns the number of pages required to hold the table in memory and the number of IQ pages that are compressed when the table is compressed (on disk). You must specify the *table_name* parameter with this procedure. If you are the owner of *table_name*, then you do not have to specify the *table_owner* parameter.

Table 9-22: sp_iqtablesize columns

Column name	Description
Ownername	Name of owner
Tablename	Name of table
Columns	Number of columns in the table
KBytes	Physical table size in KB
Pages	Number of IQ pages needed to hold the table in memory
CompressedPages	Number of IQ pages that are compressed, when the table is compressed (on disk)
NBlocks	Number of IQ blocks

Pages is the total number of IQ pages for the table. The unit of measurement for pages is IQ page size. All in-memory buffers (buffers in the IQ buffer cache) are the same size.

IQ pages on disk are compressed. Each IQ page on disk uses 1 to 16 blocks. If the IQ page size is 128KB, then the IQ block size is 8KB. In this case, an individual on-disk page could be 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, or 128 KB.

If you divide the KBytes value by page size, you see the average on-disk page size. Note that IQ always reads and writes an entire page, not blocks. For example, if an individual page compresses to 88K, then IQ reads and writes the 88K in one I/O. The average page is compressed by a factor of 2 to 3.

NBlocks is Kbytes divided by IQ block size.

CompressedPages is the number of pages that are compressed. For example, if Pages is 1000 and CompressedPages is 992, this means that 992 of the 1000 pages are compressed. CompressedPages divided by Pages is usually near 100%, because most pages compress. An empty page is not compressed, since IQ does not write empty pages. IQ pages compress well, regardless of the fullness of the page.

Example

```
call sp_iqtablesize ('dba.tab1')
```

Ownername	Tablename	Columns	KBytes	Pages	CompressedPages	NBlocks
DBA	tab1	16	5838548	124260	91344	1459637

sp_iqtransaction procedure

Function

Shows information about transactions and versions.

Syntax

sp_iqtransaction

Description

sp_iqtransaction returns a row for each transaction control block in the IQ transaction manager. The columns Name, Userid, and ConnHandle are the connection properties Name, Userid, and Number respectively. Rows are ordered by TxnID.

The sp_iqtransaction output does not contain rows for connections that do not have a transaction started. To see all connections, use sp_iqconnection.

Note While sp_iqtransaction can be used to identify users who are blocking other users from writing to a table, sp_iqlocks is a better choice for this purpose.

Table 9-23: sp_iqtransaction columns

Column name	Description
Name	The name of the server.

Column name	Description
Userid	The user ID for the connection.
TxnID	The transaction id of this transaction control block. The transaction id is assigned during begin transaction. This is the same as the transaction id displayed in the *.iqmsg* file by the BeginTxn, CmtTxn and PostCmtTxn messages as well as the and Txn ID Seq logged when the database is opened.
CmtID	The id assigned by the transaction manager when the transaction commits. It will be zero for active transactions.
VersionID	In non-multiplex databases and multiplex write servers, the VersionID is the same as the TxnID. In multiplex query servers, the VersionID is the TxnID of the transaction which created the database version on the multiplex write server. It is used internally by the IQ in-memory catalog and the IQ transaction manager to uniquely identify a database version to all nodes within a multiplex database.
State	The state of the transaction control block. This variable reflects internal IQ implementation detail and is subject to change in the future. At the time of this writing, transaction states are NONE, ACTIVE, ROLLING_BACK, ROLLED_BACK, COMMITTING, COMMITTED, and APPLIED.
ConnHandle	The ID number of the connection.
IQConnID	The ten digit connection id displayed as part of all messages in the *.iqmsg* file. This is a monotonically increasing integer unique within a server session.
MainTableKBCreated	The number of kilobytes of IQ Store space created by this transaction.
MainTableKBDropped	The number of kilobytes of IQ Store space dropped by this transaction, but which persist on disk in the Store because the space is visible in other db versions or other savepoints of this transaction.
TempTableKBCreated	The number of kilobytes of IQ Temporary Store space created by this transaction for storage of IQ temporary table data.
TempTableKBDropped	The number of kilobytes of IQ temp table space dropped by this transaction, but which persist on disk in the temp IQ Store because the space is visible to IQ cursors or is owned by other savepoints of this transaction.

Column name	Description
TempWorkSpaceKB	For ACTIVE transactions, this is a snapshot of the work space in use at this instant by this transaction for working space, such as sorts, hashes, and temporary bitmaps. The number varies depending on the moment you run sp_iqtransaction. For example, the query engine may create 60MB in the temp cache but release most of it quickly, even though query processing continues. If you run sp_iqtransaction after the query finishes, this column shows a much smaller number. When the transaction is no longer active, this column is zero. For ACTIVE transactions, this column is the same as the TempWorkSpaceKB column of sp_iqconnection.
TxnCreateTime	The time that the transaction began. All IQ transactions begin implicitly as soon as an active connection is established or when the previous transaction commits or rolls back.
Dbremote	Dbremote: A bit data column that indicates the transaction is an internal transaction used to replicate multiplex version information between a query server and the write server within a multiplex database.
CursorCount	The number of open IQ cursors that reference this transaction control block. If the transaction is ACTIVE, it indicates the number of open cursors created within the transaction. If the transaction is COMMITTED, it indicates the number of HOLD cursors that reference a database version owned by this transaction control block.
SpCount	The number of savepoint structures which exist within the transaction control block. Savepoints may be created and released implicitly. Therefore, this number does not indicate the number of user created savepoints within the transaction.
SpNumber	The active savepoint number of the transaction. This is an implementation detail and may not reflect a user created savepoint.

Example Here is an example of sp_iqtransaction output:

```
Name   Userid  TxnID  CmtID VersionID    State    ConnHandle IQConnID
======= ===== ====== ====== ========= ========== =========== ========
red2       DBA  10058  10700     10058  COMMITTED   419740283       14
blue1      DBA  10568      0     10568     ACTIVE   640038605       17
           DBA  10604      0     10604     ACTIVE  2094200996       18
fromSCJ    DBA  10619      0     10619     ACTIVE   954498130       20
blue2      DBA  10634  10677     10634  COMMITTED   167015670       21
ntJava2    DBA  10676      0     10676     ACTIVE  1779741471       24
blue2      DBA  10678      0     10678     ACTIVE   167015670       21
nt1        DBA  10699      0     10699     ACTIVE   710225777       28
red2       DBA  10701      0     10701     ACTIVE   419740283       14
           DBA  16687      0     16687     ACTIVE  1306718536       23

MainTableKBCreated MainTableKBDropped TempTableKBCreated TempTableKBDropped
================== ================== ================== ==================
                 0                  0              65824                  0
                 0                  0                  0                  0
                 0                  0                  0                  0
                 0                  0                  0                  0
              3960                152                  0                  0
                 0                  0                  0                  0
              2440               1992                  0                  0
                 0                  0                  0                  0
                 0                  0               2912              22096
                 0                  0                  0                  0

TempWorkSpaceKB TxnCreateTime      Dbremote CursorCount SpCount SpNumber
==============  ================== ======== =========== ======= =======
       0    2004-01-02 13:17:27.612     0           1       3       2
  102592    2004-01-02 13:27:28.491     0           1       1       0
       0    2004-01-02 13:30:27.548     0           0       1       0
       0    2004-01-02 13:31:27.151     0           0      24     262
       0    2004-01-02 13:35:02.128     0           0       0       0
       0    2004-01-02 13:43:58.805     0           0      39     408
     128    2004-01-02 13:45:28.379     0           0       1       0
       0    2004-01-02 14:05:15.759     0           0      42     413
     680    2004-01-02 14:57:51.104     0           1       2      20
       0    2004-01-02 15:09:30.319     0           0       1       0
```

sp_iqview procedure

Function Displays information about views in a database.

Syntax1 **sp_iqview** ([*view_name*],[*view_owner*],[*view_type*])

Syntax2 **sp_iqview** [view_name=*'viewname'*], [view_owner=*'viewowner'*],[view_type=*'viewtype'*]

Usage **Syntax1** If you do not specify either of the first two parameters, but specify the next parameter in the sequence, you must substitute NULL for the omitted parameter(s). For example, `sp_iqview NULL,NULL,SYSTEM` and `sp_iqview deptview,NULL,'ALL'`.

Note The *view_type* value ALL must be enclosed in single quotes in Syntax1.

Syntax2 The parameters can be specified in any order. Be sure to enclose them in single quotes.

Table 9-24 lists the allowed values for the *view_type* parameter.

Table 9-24: sp_iqview view_type values

view_type value	information displayed
SYSTEM	system views
ALL	user and system views
any other value	user views

Description Displays information about views in a database. Specifying one of the parameters returns only the views with the specified view name or views that are owned by the specified user. Specifying more than one parameter filters the results by all of the parameters specified. Specifying no parameters returns all user views in a database.

Table 9-25: sp_iqview columns

Column name	Description
view_name	The name of the view
view_owner	The owner of the view
view_def	The view definition as specified in the CREATE VIEW statement
remarks	User comments added with the COMMENT statement

Examples The following variations in syntax both return information about the view deptview:

```
call sp_iqview('deptview')
sp_iqview view_name='deptview'
```

view_name	view_owner	view_def	remarks
deptview	DBA	create view DBA.deptview(vdep	(NULL)

The following variations in syntax both return all views that are owned by view owner DBA:

```
sp_iqview NULL,DBA
sp_iqview view_owner='DBA'
```

view_name	view_owner	view_def	remarks
deptview	DBA	create view DBA.deptview(vdep	(NULL)
empview	DBA	create view DBA.empview(vemp	(NULL)

Catalog stored procedures

The following Catalog Store procedures return result sets displaying database server, database, and connection properties in tabular form. These procedures are owned by the dbo user ID. The PUBLIC group has EXECUTE permission on them.

sa_audit_string system procedure

Function: Adds a string to the transaction log.

Syntax: **sa_audit_string** (*string*)

Permissions: DBA authority required.

Description: If auditing is turned on, this system procedure adds a comment into the audit log. The string can be a maximum of 200 bytes long.

Example:

- The following call adds a comment into the audit log:

```
CALL sa_audit_string( 'Auditing test' )
```

sa_checkpoint_execute system procedure

Function: Allows the execution of shell commands during a checkpoint.

Syntax: **sa_checkpoint_execute** '*shell_commands*'

Parameters

shell_commands One or more user commands to be executed in a system shell. The shell commands are specific to the system shell. Commands are separated by a semi-colon (;).

Permissions

None.

Description

The sa_checkpoint_execute procedure allows users to execute shell commands to copy a running database from the middle of a checkpoint operation, when the server is quiescent. The copied database can be started and goes through normal recovery, similar to recovery following a system failure.

sa_checkpoint_execute initiates a checkpoint and then executes a system shell from the middle of the checkpoint, passing the user commands to the shell. The server then waits for the shell to complete, hence creating an arbitrary size time window in which to copy database files. Note that most database activity stops while the checkpoint is executing, so the duration of the shell commands should be limited to acceptable user response time.

If the shell commands return a non-0 status, sa_checkpoint_execute returns an error.

The sa_checkpoint_execute procedure should not be used with interactive commands, as the server must wait until the interactive command is killed. Be sure to supply override flags to disable prompting for any shell commands that may become interactive (i.e., the copy, move, and delete commands may prompt for confirmation).

The intended use of sa_checkpoint_execute is in conjunction with disk mirroring to split mirrored devices.

Example

The following statement issues a checkpoint, copies all of the asiqdemo database files to a backup directory, then completes the checkpoint.

```
sa_checkpoint_execute 'cp asiqdemo.* /backup'
```

sa_conn_activity system procedure

Function

Returns the most recently-prepared SQL statement for each connection to databases on the server.

Syntax

sa_conn_activity

Permissions

None

Side effects

None

Description

The sa_conn_activity procedure returns a result set consisting of the most recently-prepared SQL statement for each connection if the server has been told to collect the information. To obtain the result set, specify the -zl option when starting the database server or execute the following:

```
CALL sa_server_option('Remember_last_statement','ON')
```

This procedure is useful when the database server is busy and you want to obtain information about what SQL statement is prepared for each connection. This feature can be used as an alternative to request-level logging.

For information on the LastStatement property from which these values are derived, see the *Adaptive Server Anywhere Database Administration Guide*.

For information about the -zl command line option, see Chapter 1, "Running the Database Server" in *Sybase IQ Utility Guide.*

For information about the remember_last_statement setting, see "sa_server_option system procedure" on page 685.

sa_conn_info system procedure

Function

Reports connection property information.

Syntax

sa_conn_info ([*connection-id*])

Permissions

None.

Description

Returns a result set consisting of the following connection properties for the supplied connection. If no *connection-id* is supplied, information for all current connections to databases on the server is returned.

- Number
- Name
- Userid
- DBNumber
- LastReqTime
- ProcessTime
- Port
- ReqType
- CommLink

- NodeAddr
- LastIdle
- CurrTaskSwitch
- BlockedOn
- UncommitOp

Example

```
sa_conn_info
```

```
569851433,'','DBA',0,'','0.0',1,
'CURSOR_OPEN','local','',6821,0,0,1008
```

sa_conn_properties system procedure

Function

Reports connection property information

Syntax

sa_conn_properties ([*connection-id*])

Description

Returns the connection id as Number, and the PropNum, PropName, PropDescription, and Value for each available connection property. Omitting the connection-id produces results for all connections.

For a listing of available connection properties, see the section “Database properties” in the chapter “Database Performance and Connection Properties” in the *Adaptive Server Anywhere Database Administration Guide*.

Example

```
sa_conn_properties
```

```
569851433,29,'CacheHits','Cache hits','0'
569851433,30,'CacheRead','Cache reads','0'
569851433,31,'DiskRead','Disk reads','57'
569851433,32,'DiskSyncRead','Disk synchronous
reads','0'
569851433,33,'DiskWaitRead','Disk wait for reads','0'
569851433,34,'DiskWaitWrite','Disk wait for writes','0'
569851433,35,'CacheReadTable','Cache table reads','0'
569851433,36,'CacheReadIndLeaf','Cache index leaf
reads','0'
569851433,37,'CacheReadIndInt','Cache index interior
reads','0'
569851433,38,'DiskReadTable','Disk table reads','0'
569851433,39,'DiskReadIndLeaf','Disk index leaf
reads','0'
569851433,40,'DiskReadIndInt','Disk index interior
reads','0'
569851433,41,'CacheWrite','Cache writes','0'
```

```
569851433,42,'DiskWrite','Disk writes','4'
```

Note `CacheHits` is always reported as 0 by sa_conn_properties, as this information is not stored by user connection. To get cache hit statistics for the entire cache, use sa_eng_properties, and see the output lines for `CacheHitsEng`, `CacheReadEng`, and `DiskReadEng`. If you run the same query on the Catalog Store repeatedly, the first time you should see reads increase but no cache hits; as you repeat the query, cache hits increase in step with cache reads.

sa_conn_properties_by_conn system procedure

Function: Reports connection property information

Syntax: **sa_conn_properties_by_conn** ([*property-name*])

Permissions: None.

See also: "sa_conn_properties system procedure"

Description: This is a variant on the sa_conn_properties system procedure. It returns results only for connection properties that match the *property-name* string. You can use wild cards in *property-name*, as the comparison uses a LIKE operator. The result set is sorted by connection number and property name.

For a listing of available connection properties, see the section "Database properties" in the chapter "Database Performance and Connection Properties" in the *Adaptive Server Anywhere Database Administration Guide*.

Examples:

- The following statement returns CacheHits settings:

```
sa_conn_properties_by_conn CacheHits
569851433,29,'CacheHits','Cache hits','0'
```

- The following statement returns the AnsiNull option setting for the current connection:

```
call sa_conn_properties_by_conn( 'ansinull' )
569851433,202,'Ansinull','Ansinull','ON'
```

- The following statement returns the ANSI-related option settings for the current connection:

```
call sa_conn_properties_by_conn( 'ansi%' )
'569851433,198,'Ansi_blanks',
```

```
'Ansi_blanks','OFF'
569851433,225,
'Ansi_close_cursors_on_rollback',
'Ansi_close_cursors_on_rollback','ON'
569851433,199,'Ansi_integer_overflow',
'Ansi_integer_overflow','OFF'
569851433,203,'Ansi_permissions',
'Ansi_permissions','ON'
569851433,202,'Ansinull','Ansinull','ON'
```

sa_conn_properties_by_name system procedure

Function: Reports connection property information

Syntax: **sa_conn_properties_by_name** ([*connection-id*])

Permissions: None.

See also: "sa_conn_properties system procedure"

Description: This is a variant on the sa_conn_properties system procedure. It returns the same result columns. The information is sorted by property name and connection number.

For a listing of available connection properties, see the section "Database properties" in the chapter "Database Performance and Connection Properties" in the *Adaptive Server Anywhere Database Administration Guide*.

Example:

```
sa_conn_properties_by_name
```

For an example of the results returned by sa_conn_properties_by_name, see "sa_conn_properties system procedure" on page 677.

sa_db_info system procedure

Function: Reports database property information.

Syntax: **sa_db_info** ([*database-id*])

Permissions: None.

See also: "sa_db_properties system procedure"

Description: Returns a single row containing the Number, Alias, File, ConnCount, PageSize, and LogName for the specified database.

Example

- The following statement returns a single row describing the current database. Table 9-26 lists sample values.

Table 9-26: sa_db_info sample values

Property	Value
Number	0
Alias	asiqdemo
File	c:\ASIQ-12_5\demo\asiqdemo.db
ConnCount	1
PageSize	4096
LogName	c:\ASIQ-12_5\demo\asiqdemo.log

```
sa_db_info

0,'asiqdemo','
/sys1/users/janed/sybase/ASIQ-12_5/demo/asiqdemo.db
',
1,4096,'/sys1/users/janed/sybase/ASIQ-12_5/demo/asi
qdemo.log'
```

sa_db_properties system procedure

Function

Reports database property information.

Syntax

sa_db_properties ([*database-id*])

Permissions

None.

See also

"sa_db_info system procedure"

Description

Returns the database ID number and the Number, PropNum, PropName, PropDescription, and Value, for each property returned by the sa_db_info system procedure.

Example

```
sa_db_properties

0,125,'Name','Database name','asiqdemo'
0,126,'Alias','Mounted database name','asiqdemo'
0,127,'File','Database file',
'/sys1/users/janed/sybase/ASIQ-12_5/demo/asiqdemo.db'
0,128,'PageSize','Database page size','4096'
0,129,'LogName','Database log file name',
'/sys1/users/janed/sybase/ASIQ-12_5/demo/asiqdemo.log'
0,131,'ConnCount','Number of connections','1'
0,146,'FileVersion',
'Database file version number','1005'
```

```
0,147,'CheckpointUrgency',
'Database checkpoint urgency','30'
0,148,'RecoveryUrgency',
'Database recovery urgency','0'
0,151,'IQStore','IQ store is on/off','ON'
0,163,'CharSet','Character Set','iso_1'
0,164,'MultiByteCharSet',
'Multi Byte Character Set ( on/off )','OFF'
0,165,'Language','Language','unknown'
```

sa_enable_auditing_type system procedure

Function
Enables auditing and specifies which events to audit.

Syntax
sa_enable_auditing_type(['*string*])

Parameters
string is a comma-delimited string containing one or more of:

Permissions
DBA authority required.

See also
"AUDITING option [database]"

Description
sa_enable_auditing_type works in conjunction with the PUBLIC.AUDITING option to enable auditing of specific types of information.

If you set the PUBLIC.AUDITING option to ON, and do not specify which type of information to audit, the default setting (all) takes effect. In this case, all types of auditing information are recorded.

If you set the PUBLIC.AUDITING option to ON, and disable all types of auditing using sa_disable_auditing_type, no auditing information is recorded. In order to re-establish auditing, you must use sa_enable_auditing_type to specify which type of information you want to audit.

If you set the PUBLIC.AUDITING option to OFF, then no auditing information is recorded, regardless of the sa_enable_auditing_type setting.

Example
- To enable only option auditing:

```
sa_disable_auditing_type('all')
sa_enable_auditing_type('options')
```

sa_eng_properties system procedure

Function
Reports database server property information.

Syntax

sa_eng_properties

Permissions

None.

Description

Returns the PropNum, PropName, PropDescription, and Value for each available server property.

For a listing of available engine properties, see the section “Database properties” in the chapter “Database Performance and Connection Properties” in the *Adaptive Server Anywhere Database Administration Guide*.

Examples

- The following statement returns a set of available server properties:

```
call sa_eng_properties()
```

PropNum	PropName	...
0	IdleCheck	...
1	IdleWrite	...
2	IdleChkPt	...
...	...	...

- The following statement returns a set of available server properties:

```
sa_eng_properties
```

```
0,'IdleCheck','Idle I/O checked','0'
1,'IdleWrite','Idle I/O writes','0'
2,'IdleChkpt','Idle I/O checkpoints','0'
3,'IdleChkTime','Idle I/O checkpoint time','0'
4,'Chkpt','Checkpoints','5'
5,'ChkptPage','Checkpoint log pages','19'
6,'ChkptFlush','Checkpoint flushed pages','24'
7,'ExtendDB','Extend database file writes','0'
8,'ExtendTempWrite','Extend temporary file
writes','198'
9,'FreeWritePush','Free list write to pushable
list','0'
10,'FreeWriteCurr','Free list write to current
list','0'
11,'CommitFile','Commit writes to disk','59'
12,'PendingReq','Pending requests detected','0'
13,'CurrRead','Active disk read requests','0'
14,'MaxRead','Maximum active disk read requests','3'
15,'CurrWrite','Active disk write requests','0'
16,'MaxWrite','Maximum active disk write
requests','4'
17,'CurrIO','Active disk read/write requests','0'
18,'MaxIO','Maximum active disk read/write
```

```
requests','4'
19,'JavaNSSize','Java VM Namespace size','0'
20,'IOToRecover','','0'
```

sa_disable_auditing_type system procedure

Function: Disables auditing of specific events.

Syntax: **sa_disable_auditing_type**(['*string*])

Parameters: *string* is a comma-delimited string containing one or more of:

all enables all types of auditing.

connect enables auditing of both successful and failed connection attempts.

connectFailed enables auditing of failed connection attempts.

DDL enables auditing of DDL statements.

options enables auditing of public options.

permission enables auditing of permission checks, user checks, and setuser statements.

permissionDenied enables auditing of failed permission and user checks.

triggers enables auditing after a trigger event.

Permissions: DBA authority required.

Description: You can use the sa_disable_auditing_type system procedure to disable auditing of one or more categories of information.

Setting this option to all disables all auditing. You can also disable auditing by setting the public.auditing option to OFF.

sa_flush_cache system procedure

Function: Empties all pages in the database server cache.

Syntax: **sa_flush_cache** ( )

Permissions: DBA authority required.

Description: Database administrators can use this procedure to empty the contents of the database server cache. This procedure affects the Catalog Store. It is of use in performance measurement to ensure repeatable results.

sa_make_object system procedure

Function

Used in a SQL script, ensures that a skeletal instance of an object exists before executing an ALTER statement that provides the actual definition.

Syntax

sa_make_object (*objtype*, *objname* [, *owner* [, *tabname*])

object-type: '**procedure**' | '**function**' | '**view**' | '**trigger**'

Permissions

Resource authority required to create or modify database objects.

See also

"sa_db_info system procedure"

Description

This procedure is particularly useful in scripts or command files that are run repeatedly to create or modify a database schema. A common problem in such scripts is that the first time they are run, a CREATE statement must be executed, but subsequent times an ALTER statement must be executed. This procedure avoids the necessity of querying the system tables to find out whether the object exists.

To use the procedure, follow it by an ALTER statement that contains the entire object definition.

You can also use the sa_make_object system procedure to add a skeleton web service.

```
CALL sa_make_object( 'service','my_web_service' )
```

Table 9-27 lists the meaning of the sa_make_object parameters.

Table 9-27: sa_make_object options

Option name	Values
objtype	The type of object being created. The parameter must be one of 'procedure', 'function', 'view', 'service', or 'trigger'.
objname	The name of the object to be created.
owner	The owner of the object to be created. The default value is CURRENT USER.
tabname	Required only if objtype is 'trigger', in which case it specifies the name of the table on which the trigger is to be created.

Examples

- The following statements ensure that a skeleton procedure definition is created, define the procedure, and grant permissions on it. A command file containing these instructions could be run repeatedly against a database without error.

```
CALL sa_make_object( 'procedure','myproc' ); ALTER
PROCEDURE myproc( in p1 int, in p2 char(30) ) BEGIN
```

```
// ... END; GRANT EXECUTE ON myproc TO public;
```

- The following example uses the sa_make_object system procedure to add a skeleton web service.

```
CALL sa_make_object( 'service','my_web_service' )
```

sa_server_option system procedure

Function

Overrides a database server command-line option while the database server is running.

Syntax

sa_server_option (*option_name*, *option_value*)

Permissions

DBA authority required.

See also

"sa_get_request_profile system procedure," "sa_get_request_times system procedure," and "sa_statement_text system procedure" in *Adaptive Server Anywhere SQL Reference*.

Description

Database administrators can use this procedure to override some database server options without restarting the database server.

The options that can be reset are as follows:

Option name	Values	Default
Disable_connections	ON or OFF	OFF
Liveness_timeout	integer, in seconds	120
Procedure_profiling	ON, OFF, RESET, CLEAR	OFF
Quitting_time	valid date and time	
Remember_last_statement	ON or OFF	OFF
Request_level_log_file	*Filename*	
Request_level_log_size	*File-size*, in bytes,	
Request_level_logging	ALL, SQL, NONE, SQL+hostvars	NONE
Requests_for_connection	connection-id, -1	
Requests_for_database	database-id, -1	

disable_connections When set to ON, no other connections are allowed to any databases on the database server.

liveness_timeout A liveness packet is sent periodically across a client/server TCP/IP or SPX network to confirm that a connection is intact. If the network server runs for a liveness_timeout period without detecting a liveness packet, the communication is severed.

For more information, see -tl command-line option in "Server command-line options" on page 7 in Chapter 1, "Running the Database Server" of the *Sybase IQ Utility Guide*.

procedure_profiling Controls procedure profiling for stored procedures, functions, events, and triggers. Procedure profiling shows you how long it takes your stored procedures, functions, events, and triggers to execute, as well as how long each line takes to execute. You can also set procedure profiling options on the Database property sheet in Sybase Central.

- **ON** enables procedure profiling for the database you are currently connected to.
- **OFF** disables procedure profiling and leaves the profiling data available for viewing.
- **RESET** returns the profiling counters to zero, without changing the ON or OFF setting.
- **CLEAR** returns the profiling counters to zero and disables procedure profiling.

Once profiling is enabled, you can use the sa_procedure_profile_summary and sa_procedure_profile stored procedures to retrieve profiling information from the database. For more information about these procedures, see the *Adaptive Server Anywhere SQL Reference*.

For more information about viewing procedure profiling information in Sybase Central, see "Profiling database procedures" in *Sybase IQ Performance and Tuning Guide*.

quitting_time Instruct the database server to shut down at the specified time.

For more information, see the -tq server option in Chapter 1, "Running the Database Server" in the *Sybase IQ Utility Guide*.

remember_last_statement Instruct the database server to capture the most recently-prepared SQL statement for each connection to databases on the server. For stored procedure calls, only the outermost procedure call appears, not the statements within the procedure.

You can obtain the current value of the remember_last_statement setting using the RememberLastStatement property function as follows:

```
SELECT property( 'RememberLastStatement' )
```

For more information, see -zl server option in Chapter 1, "Running the Database Server" in the *Sybase IQ Utility Guide*.

When remember_last_statement is turned on, the following statement returns the most recently-prepared statement for the specified connection.

```
SELECT connection_property( 'LastStatement', conn_id )
```

The stored procedure sa_conn_activity returns this same information for all connections.

request_level_log_file The name of the file used to record logging information. A name of NULL stops logging to file. Any backslash characters in the filename must be doubled as this is a SQL string.

request_level_log_size The maximum size of the file used to record logging information, in bytes.

When the request-level log file reaches the size specified by either the sa_server_option system procedure or the -zs server option, the file is renamed with the extension *.old* appended (replacing an existing file with the same name if one exists). The request-level log file is then restarted.

request_level_logging Can be ALL, SQL, NONE, or SQL+hostvars. ON and ALL are equivalent. OFF and NONE are equivalent. This call turns on logging of individual SQL statements sent to the database server, for use in troubleshooting, in conjunction with the database server -zr and -zo options. The settings request_level_debugging and request_level_logging are equivalent.

When you set request_level_logging to OFF, the request-level log file is closed.

If you select SQL, only the following types of request are recorded:

- START DATABASE
- STOP ENGINE
- STOP DATABASE
- Statement preparation
- Statement execution
- EXECUTE IMMEDIATE statements
- Option settings
- COMMIT statements

- ROLLBACK statements
- PREPARE TO COMMIT operations
- Connections
- Disconnections
- Beginnings of transactions
- DROP STATEMENT statement
- Cursor explanations
- Cursor closings
- Cursor resume
- Errors

Setting request_level_logging to SQL+hostvars outputs *both* SQL (as though you specified `request_level_logging=SQL`) *and* host variable values to the log.

You can find the current value of the request_level_logging setting using `property('RequestLogging')`.

For more information, see the -z, -zr, -zs, -zo, and -o command line options in Chapter 1, "Running the Database Server" of the *Sybase IQ Utility Guide*. See "-zr level" on page 26 of the *Sybase IQ Utility Guide* for a list of requests that are logged by SQL request-level logging.

requests_for_connection Filter the request-level logging information so that only information for a particular connection is logged. This can help reduce the size of the request-level log file when monitoring a server with many active connections or multiple databases. You can obtain the connection ID by executing the following:

```
CALL sa_conn_info()
```

To specify a specific connection to be logged once you have obtained the connection ID, execute the following:

```
CALL sa_server_option( 'requests_for_connection',
connection-id )
```

Filtering remains in effect until it is explicitly reset, or until the database server is shut down. To reset filtering, use the following statement:

```
CALL sa_server_option( 'requests_for_connection', -1)
```

requests_for_database Filter the request-level logging information so that only information for a particular database is logged. This can help reduce the size of the request-level log file when monitoring a server with many active connections or multiple databases. You can obtain the database ID by executing the following statement when you are connected to the desired database:

```
SELECT connection_property( 'DBNumber' )
```

To specify that only information for a particular database is to be logged, execute the following:

```
CALL sa_server_option( 'requests_for_database',
database-id )
```

Filtering remains in effect until it is explicitly reset, or until the database server is shut down. To reset filtering, use the following statement:

```
CALL sa_server_option( 'requests_for_database', -1 )
```

Example

The following statement disallows new connections to the database server.

```
call sa_server_option( 'disable_connections', 'ON')
```

sa_set_http_header system procedure

Function

Permits a web service to set an HTTP header in the result.

Syntax

sa_set_http_header (*field-name*, *value*)

Permissions

None.

See also

“sa_set_http_option system procedure”

Description

```
call dbo.sa_set_http_header( 'Content-Type',
'text/html' )
```

Setting the special header field @HttpStatus sets the status code returned with the request. For example, the following command sets the status code to 404 Not Found.

```
dbo.sa_set_http_header( '@HttpStatus', '404' )
```

The body of the error message is inserted automatically. Only valid HTTP error codes can be used. Setting the status to an invalid code causes an SQL error.

sa_set_http_option system procedure

Function — Permits a web service to set an HTTP option in the result.

Syntax — **sa_set_http_option** (*option-name*, *value*)

Permissions — None.

See also — "sa_set_http_header system procedure"

Description — Use this procedure within statements or procedures that handle web services to set options within an HTTP result set.

Currently only one option is supported:

- **CharsetConversion** Controls whether the result set is to be automatically converted from the character set of the database to the character set of the client. The only permitted values are ON and OFF. The default value is ON.

sa_validate system procedure

Function — Validates all tables in the Catalog Store.

Syntax — **sa_validate** [*tbl_name*,] [*owner_name*,] [*check_type*]

Permissions — DBA authority required.

Description — This procedure validates each SQL Anywhere table or index in the Catalog Store.

For more information, see "The Validation utility (dbvalid)" in Chapter 3, "Database Administration Utilities" of the *Sybase IQ Utility Guide*.

Table 9-28 lists the meaning of the sa_validate parameters.

Table 9-28: sa_validate options

Option name	Values
tbl_name	Validate only the specified table. When NULL (the default), validate all tables.
owner_name	Validate only the tables owned by the specified user. When NULL (the default), validate tables for all users.
check_type	When NULL (the default), each table is checked without additional checks. The *check_type* value can be one of the following: data, express, full, index, or checksum.

Values for the *tbl_name*, *owner_name*, and *check_type* arguments are strings and must be enclosed in quotes.

The procedure returns a single column, named Messages. If all tables are valid, the column contains

```
No errors detected
```

Warning! Validate a table or the entire Catalog Store while no connections are making changes to the database; otherwise, spurious errors may be reported indicating some form of database corruption even though no corruption actually exists.

Example

The following statement validates all of the Catalog Store tables owned by the DBA with an index check:

```
CALL sa_validate (owner_name='DBA', check_type =
'index')
```

sp_login_environment system procedure

Function

Sets connection options when users log in.

Permissions

None.

Syntax

sp_login_environment

See also

"LOGIN_PROCEDURE option" on page 85

Description

At startup, sp_login_environment is called by DBA.sp_iq_process_login, the default procedure called by the LOGIN_PROCEDURE database option.

Sybase recommends that you *not* edit this procedure. Instead, to change the login environment, set the LOGIN_PROCEDURE option to point to a different procedure.

For more information about setting the LOGIN_PROCEDURE option to the name of a new procedure, see Chapter 15, "Sybase IQ as a Data Server" in the *Sybase IQ System Administration Guide*.

Here is the text of the sp_login_environment procedure:

```
CREATE PROCEDURE dbo.sp_login_environment()
BEGIN
  IF connection_property('CommProtocol')='TDS' THEN
    CALL dbo.sp_tsql_environment()
  END IF
END
```

sp_remote_columns system procedure

Function

Produces a list of the columns on a remote table and a description of those columns. For each column, the procedure returns its database, owner, table, column, domain ID, width, scale, and nullability.

The server must be defined with the CREATE SERVER statement to use this system procedure.

Note You cannot capture output from this procedure in a file. If you use the redirection operator, you receive the message "Cursor is restricted to Fetch Next operations."

Syntax

sp_remote_columns *servername* [, *tablename*] [, *owner*] [, *database*]

Permissions

None.

See also

Chapter 17, "Server Classes for Remote Data Access" and Chapter 16, "Accessing Remote Data" in the *Sybase IQ System Administration Guide*

CREATE SERVER statement

Description

If you are entering a CREATE EXISTING statement and you are specifying a column list, it may be helpful to get a list of the columns that are available on a remote table. sp_remote_columns produces a list of the columns on a remote table and a description of those data types.

Standards and compatibility

- **Sybase** Supported by Open Client/Open Server.

Example

To get a list of the columns in the sysobjects table in the production database in an ASE server named asetest:

```
sp_remote_columns asetest, sysobjects,
null, production
```

sp_remote_exported_keys system procedure

Function

Provides information about tables with foreign keys on a specified primary key table.

The server must be defined with the CREATE SERVER statement to use this system procedure.

Syntax

sp_remote_exported_keys *@server_name* , *@sp_name* [, *@sp_owner*] [, *@sp_qualifier*]

Permissions

None.

See also

Chapter 16, “Accessing Remote Data” and Chapter 17, “Server Classes for Remote Data Access” in *Sybase IQ System Administration Guide*

CREATE SERVER statement on page 430

Description

This procedure provides information about the remote table that has a foreign key on a particular primary key table. The sp_remote_exported_keys stored procedure's result set includes the database, owner, table, column, and name for both the primary and the foreign key, as well as the foreign key sequence for the foreign key column. The result set may vary because of the underlying ODBC and JDBC calls, but information about the table and column for a foreign key is always returned.

To use the sp_remote_exported_keys stored procedure, your database must be created or upgraded using version 12.4.3 or higher of Sybase IQ.

Parameters

Table 9-29 list the sp_remote_exported_keys arguments.

Table 9-29: sp_remote_exported_keys arguments

Name	Data type	Description
@server_name	varchar	Server the primary key table is located on. Required.
@sp_name	varchar(30)	Table containing the primary key. Required.
@sp_owner	varchar	Owner of primary key table. Optional.
@sp_qualifier	varchar	Database containing the primary key table. Optional.

Example

To get information about the remote tables with foreign keys on the sysobjects table, in the production database, in a server named asetest:

```
call sp_remote_exported_keys
(@server_name='asetest', @sp_name='sysobjects',
@sp_qualifier='production')
```

sp_remote_imported_keys system procedure

Function

Provides information about remote tables with primary keys that correspond to a specified foreign key.

The server must be defined with the CREATE SERVER statement to use this system procedure.

Syntax

sp_remote_imported_keys *@server_name* , *@sp_name* [, *@sp_owner*] [, *@sp_qualifier*]

Permissions

None.

See also

Chapter 16, “Accessing Remote Data” and Chapter 17, “Server Classes for Remote Data Access” in *Sybase IQ System Administration Guide*.

CREATE SERVER statement on page 430

Description

Foreign keys reference a row in a separate table that contains the corresponding primary key. This procedure allows you to obtain a list of the remote tables with primary keys that correspond to a particular foreign key table. The sp_remote_imported_keys stored procedure's result set includes the database, owner, table, column, and name for both the primary and the foreign key, as well as the foreign key sequence for the foreign key column. The result set may vary because of the underlying ODBC and JDBC calls, but information about the table and column for a primary key is always returned.

To use the sp_remote_exported_keys stored procedure, your database must be created or upgraded using version 12.4.3 or higher of Sybase IQ.

Parameters

Table 9-30 lists the sp_remote_imported_keys arguments.

Table 9-30: sp_remote_imported_keys arguments

Name	Data type	Description
@server_name	varchar	Server the foreign key table is located on. Required.
@sp_name	varchar(30)	Table containing the foreign key. Required.
@sp_owner	varchar	Owner of foreign key table. Optional.
@sp_qualifier	varchar	Database containing the foreign key table. Optional.

Example

To get information about the tables with primary keys that correspond to a foreign key on the sysobjects table, owned by fred, in the asetest server:

```
call sp_remote_imported_keys
(@server_name='asetest', @sp_name='sysobjects',
@sp_qualifier='production')
```

sp_remote_primary_keys system procedure

Function

To provide primary key information about remote tables using remote data access.

Syntax

sp_remote_primary_keys *@server_name* [, *@table_name*] [, *@table_owner*] [, *@table_qualifier*]

The procedure accepts these parameters:

@server_name Selects the server the remote table is located on.

@table_name Selects the remote table.

@table_owner Selects the owner of the remote table.

@table_qualifier Selects the database.

Permissions

None

Side effects

None

Description

This stored procedure provides primary key information about remote tables using remote data access.

Because of differences in the underlying ODBC/JDBC calls, the information returned differs slightly in terms of the catalog/database value depending upon the remote data access class that is specified for the server. However, the important information (for example, column name) is as expected.

Standards and compatibility

Sybase Supported by Open Client/Open Server.

sp_remote_tables system procedure

Function

Returns a list of the tables on a server.

Syntax

sp_remote_tables *servername* [, *tablename*] [, *owner*] [, *table_qualifier*] [, *with_table_type*]

The server must be defined with the CREATE SERVER statement to use this system procedure.

Permissions

None.

See also

CREATE SERVER statement on page 430

Chapter 16, “Accessing Remote Data” and Chapter 17, “Server Classes for Remote Data Access” in *Sybase IQ System Administration Guide*

Description

It may be helpful when you are configuring your database server to get a list of the remote tables available on a particular server. This procedure returns a list of the tables on a server.

The procedure accepts five parameters:

server_name Selects the server the remote table is located on.

table_name Selects the remote table.

table_owner Selects the owner of the remote table.

table_qualifier Selects the database.

with_table_type Selects the type of remote table. This argument is a bit type and accepts two values, 0 (the default) and 1. You must enter the value 1 if you want the result set to include a column that lists table types.

The with_table_type argument is only available for databases created in Adaptive Server Anywhere 7.0.2 and higher. If you use this argument with an older database, the following error message is returned:

```
Wrong number of parameters to function 'sp_remote_tables'
```

If a table, owner, or database name is given, the list of tables will be limited to only those that match the arguments.

Note You cannot capture output from this procedure in a file. If you use the redirection operator, you receive the message "Cursor is restricted to Fetch Next operations."

Standards and compatibility

- **Sybase** Supported by Open Client/Open Server.

Examples

- To list all of the Microsoft Excel worksheets available from an ODBC data source named 'excel':

  ```
  sp_remote_tables  excel
  ```

- To list all of the tables in the production database in an Adaptive Server Enterprise server named asetest, owned by user fred:

  ```
  sp_remote_tables  asetest, null, fred, production
  ```

sp_servercaps system procedure

Function

Displays information about a remote server's capabilities.

The server must be defined with the CREATE SERVER statement to use this system procedure.

Syntax

sp_servercaps *servername*

Permissions

None.

See also

CREATE SERVER statement on page 430

Chapter 16, “Accessing Remote Data” and Chapter 17, “Server Classes for Remote Data Access” in *Sybase IQ System Administration Guide*

Description

This procedure displays information about a remote server's capabilities. Sybase IQ uses this capability information to determine how much of a SQL statement can be forwarded to a remote server. The system tables which contain server capabilities are not populated until after Sybase IQ first connects to the remote server. This information comes from syscapability and syscapabilityname system tables. The *servername* specified must be the same server name used in the CREATE SERVER statement.

Standards and compatibility

- **Sybase** Supported by Open Client/Open Server.

Example

- To display information about the remote server testiq issue the following stored procedure (output has been truncated):

```
sp_servercaps testiq

1,’Alter table with add’,’T’
2,’Alter table with drop’,’T’
3,’Owner supported’,’T’
4,’Primary key requires index’,’F’
5,’Create table constraints’,’T’
6,’Truncate table’,’T’
7,’Create index’,’T’ 7,’Create index’,’T’
8,’Create unique index’,’T’
9,’Syscapability system table initialized’,’T’
10,’Subquery’,’T’
11,’Subquery in group by’,’T’
12,’Subquery in comparison’,’T’
13,’Subquery in exist’,’T’
14,’Subquery in IN’,’T’
15,’Subquery correlated’,’T’
16,’Subquery in select list’,’T’
17,’Subquery in update’,’T’
20,’Order by’,’T’
21,’Order by expressions’,’T’
22,’Order by column not in select list’,’T’
23,’Order by allowed in update’,’T’
25,’Joins’,’T’
26,’Outer joins’,’T’
27,’Full outer joins’,’T’
28,’Multiple outer joins’,’T’
29,’Logical operators in outer join’,’T’
30,’Outer joins mixed with normal joins’,’T’
```

```
31,'ANSI join syntax','T'
32,'TSQL join syntax','F'
33,'ODBC outer join syntax','F'
34,'Unrestricted ANSI ON','T'
40,'Group by','T'
41,'Group by ALL','T'
45,'Aggregates','T'
46,'Aggregates with column name','T'
50,'And','T'
51,'Or','T'
52,'Like','T'
53,'Like - TSQL','T'
54,'Distinct','T'
55,'In','T'
```

sp_tsql_environment system procedure

Function

To set connection options when users connect from jConnect or Open Client applications.

Syntax

sp_tsql_environment

Permissions

None.

See also

"sp_login_environment system procedure" on page 691

"LOGIN_PROCEDURE option" on page 85

Description

At startup, sp_login_environment is called by DBA.sp_iq_process_login, the default procedure called by the LOGIN_PROCEDURE database option. If the connection uses the TDS communication protocol (that is, if it is an Open Client or jConnect connection), then sp_login_environment in turn calls sp_tsql_environment.

This procedure sets database options so that they are compatible with default Sybase Adaptive Server Enterprise behavior.

If you wish to change the default behavior, it is recommended that you create new procedures and alter your LOGIN_PROCEDURE option to point to these new procedures.

For more information about setting the LOGIN_PROCEDURE option to the name of a new procedure, see Chapter 15, "Sybase IQ as a Data Server" in the *Sybase IQ System Administration Guide*.

Here is the text of the sp_tsql_environment procedure:

```
create procedure dbo.sp_tsql_environment()
```

```
begin
  if db_property('IQStore')='OFF' then
    -- ASA datastore
    set temporary option AUTOMATIC_TIMESTAMP='ON'
  end if;
  set temporary option ANSINULL='OFF';
  set temporary option TSQL_VARIABLES='ON';
  set temporary option ANSI_BLANKS='ON';
  set temporary option TSQL_HEX_CONSTANT='ON';
  set temporary option CHAINED='OFF';
  set temporary option QUOTED_IDENTIFIER='OFF';
  set temporary option ALLOW_NULLS_BY_DEFAULT='OFF';
  set temporary option CONTINUE_AFTER_RAISERROR='ON';
  set temporary option FLOAT_AS_DOUBLE='ON';
  set temporary option ISOLATION_LEVEL='1';
  set temporary option DATE_FORMAT='YYYY-MM-DD';
  set temporary option TIMESTAMP_FORMAT='YYYY-MM-DD
HH:NN:SS.SSS';
  set temporary option TIME_FORMAT='HH:NN:SS.SSS';
  set temporary option DATE_ORDER='MDY';
  set temporary option ESCAPE_CHARACTER='OFF'
end
```

Multiplex system procedures

The procedures in this section affect multiplex databases and servers. These procedures are intended to be called by a program.You should not run them by specifying the procedure name in an Interactive SQL window. Generally, these procedures are intended for use:

- Within the server
- From Sybase Central
- From administration scripts

Most of these procedures require DBA privileges.

sp_iq_mpx_init procedure

Function

Internal initialization routine for multiplex configuration during database startup.

Syntax **dbo.sp_iq_mpx_init** ( )

Usage Do not invoke this procedure. If the server is not running normally, there could be unfortunate side effects.

sp_iqendmpx procedure

Function Checks whether the configuration should be reset from multiplex to a single IQ server.

Syntax **dbo.sp_iqendmpx**()

Usage Called internally when dropping a query server, and when replacing the write server with a query server, to see whether the resulting configuration has no more query servers. If so, resets the multiplex configuration for single-server operation. Can be used to correct certain problems detected by sp_iqmpxvalidate.

sp_iqevbegintxn procedure

Function Triggers the ev_iqbegintxn event.

Syntax **"DBA".sp_iqevbegintxn** ( )

Description Invoked within the query server while beginning a new transaction when the new table version is available from the write server.

Permissions Owned by DBA.

sp_iqmakempx procedure

Function Converts a database to a multiplex database, and converts the server to the write server for the multiplex.

Syntax
```
sp_iqmakempx( IN l_host_name   VARCHAR(40),
              IN l_server_name VARCHAR(30),
              IN l_db_path     VARCHAR(1024),
              IN l_port_number VARCHAR(40),
              )
```

Description Modifies IQ_MPX_INFO and IQ_MPX_STATUS and sets up the SQL Remote configuration for the write server.

Table 9-31: sp_iqmpx_makempx columns

Column name	Description
l_host_name	Name of machine where write server will run
l_server_name	Server name for the write server to use
l_db_path	Full path to the write server's catalog database (.db) file
l_port_number	TCP port number the write server should listen on

sp_iqmpxaddremoteusers procedure

Function: Configure all remote users for this server.

Syntax:

```
"DBA".sp_iqmpxaddremoteusers( IN l_server_name varchar(30)
default NULL,
IN qName varchar(30) default NULL)
```

Description

Table 9-32: sp_iqmpxaddremoteusers columns returned

Column	Data type	Description
l_server_name	varchar(30)	Server to configure if not NULL; otherwise configure this server (@@servername).
qName	varchar(30)	Individual query server to configure if not NULL; otherwise configure all query servers (if on write server) or write server (if on a query server).

sp_iqmpxaliasdbspace procedure

Function: Adds a dbspace alias to SYSIQFILE.

Syntax:

```
"DBA".sp_iqmpxaliasdbspace( IN _dbspace_name VARCHAR(128),
IN _server VARCHAR(30),
IN _path VARCHAR(255) default NULL,
IN _fromserver VARCHAR(30) default ' ',
IN _offset UNSIGNED BIGINT default NULL)
```

Description

Table 9-33: sp_iqmpxaliasdbspace columns returned

Column	Data type	Description
_dbspace_name	varchar(128)	Name of dbspace for which to add alias
_server	varchar(30)	Server name for the alias
_path	varchar(255)	Path to dbspace file or partition on _server
_fromserver	varchar(30)	Server whose definition is copied
_offset	unsigned bigint	offset to start of user data on raw partition

sp_iqmpxcountdbremote procedure

Function — Returns a count of dbremote connections for a multiplex database. This is a function implemented as a stored procedure.

Syntax

dbo.sp_iqmpxcountdbremote ( )

Examples — When dbremote is running, the result is 5 connections. The following Interactive SQL statement returns results as a table:

```
select dbo.sp_iqmpxcountdbremote()
```

dbo.sp_iqmpxcountdbremote(*)

5

You could also display the output as a table using the following SQL:

```
begin
    declare dbremotes int;
    set dbremotes = dbo.sp_iqmpxcountdbremote();
    select dbremotes;
end
```

sp_iqmpxcreatepublication procedure

Function — Creates the publication IQMP_PUB and subscribes all the remote users to it.

Syntax

sp_iqmpxcreatepublication(IN l_newserver VARCHAR(255)
default NULL)

Usage — Run only on write server.

sp_iqmpxcreatequeryserver procedure

Function — Adds a query server.

Syntax

sp_iqmpxcreatequeryserver(IN l_host_name VARCHAR(40),
IN l_server_name VARCHAR(30),
IN l_db_path VARCHAR(1024),
IN l_port_number VARCHAR(40))

Usage — Run only on write server.

Description — Updates IQ_MPX_INFO and IQ_MPX_STATUS, and sets up the new SQL Remote configuration for a new query server.

Table 9-34: sp_iqmpxcreatequeryserver columns

Column name	Description
l_host_name	Name of machine where query server will run
l_server_name	Server name for the query server to use
l_db_path	Full path to the query server's catalog database (.db) file
l_port_number	TCP Port number the query server should listen on

sp_iqmpxdropdbspace procedure

Function: Drops a dbspace that may have multiple entries in SYSIQFILE. Used for dropping dbspaces from IQ Store in a multiplex, where there are multiple such entries.

.

Syntax: **sp_iqmpxdropdbspace** (*l_dbspace_name varchar(128)*)

Usage: **l_dbspace_name** Name of the dbspace to drop.

sp_iqmpxdroppublication procedure

Function: Removes the publication IQMP_PUB.

Syntax: **sp_iqmpxdroppublication**( )

sp_iqmpxdropqueryserver procedure

Function: Drops a query server.

Syntax: **sp_iqmpxdropqueryserver**(IN l_server_name VARCHAR(30))

Description: Procedure to drop a query server from the multiplex. Must run on write server. Must run while no other user is connected as DBA. Drops all of the server's dbspaces and removes configuration information from system tables, IQ_MPX_INFO and IQ_MPX_STATUS.

Usage: **l_server_name** Name of the server to drop.

sp_iqmpxdropserverdbspaces procedure

Function — Drops all of a server's dbspace definitions. A server cannot drop its own dbspaces with this routine.

Syntax — **sp_iqmpxdropserverdbspaces** (*ln_server_name varchar(30)*)

Description — Part of Replace Write Server and Create Query Server operations.

See also — *Sybase IQ Installation and Configuration Guide*, Chapter 2, "Migrating Data from Previous Versions"

sp_iqmpxdumptlvlog procedure

Function — Dump records from the table version log. For diagnostic purposes only.

Syntax — **sp_iqmpxdumptlvlog**( )

Description — Returns a table with columns:

Table 9-35: sp_iqmpxdumptlvlog columns returned

Column	Data type	Description
RowId	unsigned bigint	Row number of this record in the table version log
Contents	varchar(1024)	Contents of this row in a printable format

sp_iqmpxexcludeserver procedure

Function — Routine to logically remove or include a query server for versioning purposes.

Syntax — **sp_iqmpxexcludeserver**(IN _server VARCHAR(30),
IN _reqStat VARCHAR(10))

Description — Updates a query server's *node_state* column in IQ_MPX_INFO. If the status is already as expected, then does nothing. Drops or recreates SQL Remote subscriptions as needed.

Table 9-36: sp_iqmpxexcludeserver arguments

Argument	Description
_server	Server to modify
_reqStat	Server status. Set to 'include' to bring a query server back into the multiplex and set its node_status to 'ACTIVE', or 'exclude' to remove a query server from multiplex versioning and set its node_status to 'INACTIVE'. Updates SQL Remote configuration as necessary. If the node_status for the server is already in the requested state, does nothing.

sp_iqmpxgetconnversion procedure

Function

Display the version number for a specified connection.

Syntax

call sp_iqmpxgetconnversion ( )

Usage

On a Multiplex Query server, returns in an UNSIGNED BIGINT the version number that the current connection will use for the current transaction. On a Write server, always returns 0.

The version number is a database-wide monotonically-increasing integer that increases any time the write server commits new data in the IQ Main store.

Description

This procedure lets you determine versions across connections on one or more multiplex query servers in a multiplex environment.

For instance, assume that two different connections are made to IQ multiplex query servers at nearly the same time, and you need to coordinate by SELECT statements between the two connections so that they are using the same version of the data. If any transaction committed between the moment of the first and the second connections, they will see two different versions.

This procedure lets you determine whether both connections are using the same version of the data.

You cannot determine whether write server connections will see the same version of the data.

sp_iqmpxmakeclean procedure

Function

Removes unneeded multiplex-related objects in the database.

Syntax **dbo.sp_iqmpxmakeclean**()

Description The sp_iqmpxmakeclean procedure removes the following unneeded multiplex-related objects in the database:

- Extra rows in IQ_MPX_STATUS
- Any dbspace with a non-empty server_name that is not a query server in IQ_MPX_INFO
- CONNECT privilege for any user MpxRemoteUserNN that is not in IQ_MPX_INFO.
- Any remote user with an address like '<*write_server_home*>/*repDirs%*' and any corresponding subscriptions.

Be careful using this procedure; it may have consequences you did not intend.

sp_iqmpxpassthrough procedure

Function Propagates an operation from the write server to all query servers for execution. Requires DBA authority.

Syntax **sp_iqmpxpassthrough**(IN VARCHAR(1024) sqlcmd)

Usages **sqlcmd** Command to execute.

sp_iqmpxpostsyncqueryserver procedure

Function Reconfigures a newly-synchronized query server.

Syntax **sp_iqmpxpostsyncqueryserver**( )

Description Sets up query server for SQL Remote replication. Automatically invokes the procedure *DBA.sp_mpxcfg_*<*server*> if it exists, where *server* is the query server name. When finished, this procedure places the following message in the server log: `Query server auto-configuration complete`. If the query server is already configured or if you run this procedure on a write server, the procedure does nothing.

sp_iqmpxprotectexec procedure

Function Internal routine to execute one SQL command and log any errors to the server log.

Syntax **sp_iqmpxprotectexec**(IN _cmd VARCHAR(1024))

Usage **_cmd** Command to execute.

sp_iqmpxreplacewriteserver procedure

Function Converts the query server on which it runs into the new write server for the multiplex. Must be called on the query server. Other steps are needed to move to a new write server. For details, see Chapter 5, "Working with Database Objects" in the *Sybase IQ System Administration Guide*.

Syntax **sp_iqmpxreplacewriteserver**(IN l_new_server_name VARCHAR(30))

Description Drops and recreates main IQ Store definitions for the new write server to match those of the query server. Drops any IQ Temporary Store definitions for the former write server. Adjusts SYSIQFILE, IQ_MPX_STATUS, IQ_MPX_INFO and SQL Remote configuration.

Table 9-37: sp_iqmpxreplacewriteserver columns

Column name	Description
l_new_server_name	Name for the new write server. Must differ from each server name currently in the multiplex.

sp_iqmpxresetquerysubscription procedure

Function Resets the subscription for the remote user associated with a query server. Should be called at the write server in the course of synchronizing a query server. Does nothing on a query server.

Syntax **sp_iqmpxresetquerysubscription**(IN l_server_name VARCHAR(30),)

Description

Table 9-38: sp_iqmpxresetquerysubscription columns

Column name	Description
l_server_name	Name of query server to reset

sp_iqmpxretryexec procedure

Function Helps operations that may have to be retried.

Syntax **sp_iqmpxretryexec**(IN _cmd VARCHAR(1024),
IN _msg VARCHAR(1024)
)

Usage

Executes a command, retrying up to 10 times if there is a lock conflict (SQLSTATE 42W18). Catches and logs all errors to the server log.

Description

Table 9-39: sp_iqmpxretryexec columns

Column name	Description
_cmd	SQL statement to execute
_msg	Text to place in error message, if any

sp_iqmpxsetpublisher procedure

Function

Sets the publisher for this database appropriate to the server.

Syntax

sp_iqmpxsetpublisher(IN l_server_name VARCHAR(30) default NULL)

Description

Sybase IQ uses SQL Remote to replicate data among multiplex servers. Data replicated by SQL Remote is arranged in publications. The publisher is a remote user (a user with GRANT REMOTE or GRANT CONSOLIDATE privileges) who has GRANT PUBLISH privileges. For more details, see the Adaptive Server Anywhere *SQL Remote User's Guide*.

Usage

l_server_name Server name to use to configure publisher (defaults to current server).

sp_iqmpxstopdbremote procedure

Function

Stops the dbremote client on this server by dropping all of its connections.

sp_iqmpxsubscribeuser procedure

Function

Creates the SQL Remote subscription to IQMP_PUB for a multiplex user.

Syntax

sp_iqmpxsubscribeuser(IN _user VARCHAR(30),
IN _path LONG VARCHAR default NULL,
IN _perm VARCHAR(15) default 'REMOTE'
)

Description

Table 9-40: sp_iqmpxsubscribeuser columns

Column name	Description
_user	User name to subscribe
_path	Directory path for this remote. If NULL, se t the subscription but do not change the SQL Remote configuration otherwise.
_perm	'REMOTE' or 'CONSOLIDATE.' This user's role in SQL Remote.

Sybase IQ uses SQL Remote to replicate data among multiplex servers. Data replicated by SQL Remote is arranged in publications. The consolidated database is the one where changes will be replicated, and the remote databases is the one where changes are made. Each database that shares information in a publication must have a subscription to the publication. For more details, see the Adaptive Server Anywhere *SQL Remote User's Guide*.

Usage

Used internally by other stored procedures.

sp_iqmpxunsubscribeuser procedure

Function

Removes the publication IQMP_PUB.

Syntax

sp_iqmpxunsubscribeuser(IN _user VARCHAR(30)
)

Description

Table 9-41: sp_iqmpxunsubscribeuser columns

Column name	Description
_user	User name to unsubscribe

Sybase IQ uses SQL Remote to replicate data among multiplex servers. Data replicated by SQL Remote is arranged in publications. The consolidated database is the one where changes will be replicated, and the remote databases is the one where changes are made. Each database that shares information in a publication must have a subscription to the publication. For more details, see the Adaptive Server Anywhere *SQL Remote User's Guide*.

Usage

Used internally by other stored procedures

sp_iqmpxvalidate procedure

Function

Checks multiplex configuration.

Syntax

dbo.sp_iqmpxvalidate(IN _show_msgs CHAR(1),
DEFAULT 'Y')

Description

Multiple checks on
tables SYS.SYSIQFILE and DBA.IQ_MPX_INFO, and SQL Remote
configuration. May run on any server. Returns a result to the caller: severity.
Values are:
0 - no configuration errors.
1 - dynamic state is not as expected (e.g., dbremote process not running)
2 - non-fatal configuration error (multiplex operation impaired)
3 - fatal configuration problem (one or more servers may not start)

If called interactively, the stored procedure also returns a table
of the errors found, if any, unless the calling
argument is not 'Y'.
Each error indicates its severity. If there are no errors, the
procedure returns "No errors detected".

sp_iqmpxversionfetch procedure

Function

Fetches the current version information for this
server into argument variables.

Syntax

sp_iqmpxversionfetch(out CatalogID unsigned bigint,
out VersionID unsigned bigint,
out OAVID unsigned bigint,
out ServerType char(1),
out CatalogSync char(1),
out WCatalogID unsigned bigint,
out WVersionID unsigned bigint,
)

Description

Table 9-42: sp_iqmpxversionfetch arguments returned

Column	Data type	Description
CatalogID	unsigned bigint	Catalog version on this server
VersionID	unsigned bigint	Latest version available on this server
OAVID	unsigned bigint	Oldest active version on this server
ServerType	char(1)	Type of server: 'S,' 'W,' or 'Q'
CatalogSync	char(1)	In catalog synchronization? 'T' or 'F'
WCatalogID	unsigned bigint	Catalog version on the write server
WVersionID	unsigned bigint	Latest version available on the write server

sp_iqmpxversioninfo procedure

Function

Shows the current version information for this server.

Syntax

sp_iqmpxversioninfo( )

Description

Table 9-43: sp_iqmpxversioninfo columns returned

Column	Data type	Description
CatalogID	unsigned bigint	Catalog version on this server
VersionID	unsigned bigint	Latest version available on this server
OAVID	unsigned bigint	Oldest active version on this server
ServerType	char(1)	Type of server: 'S,' 'W,' or 'Q'
CatalogSync	char(1)	In catalog synchronization? 'T' or 'F'
WCatalogID	unsigned bigint	Catalog version on the write server
WVersionID	unsigned bigint	Latest version available on the write server

Adaptive Server Enterprise system and catalog procedures

Adaptive Server Enterprise provides system and catalog procedures to carry out many administrative functions and to obtain system information. Sybase IQ has implemented support for some of these procedures.

System procedures are built-in stored procedures used for getting reports from and updating system tables. Catalog stored procedures retrieve information from the system tables in tabular form.

Note While these procedures perform the same functions as they do in Adaptive Server Enterprise and pre-Version 12 Sybase IQ, they are not identical. If you have preexisting scripts that use these procedures, you may want to examine the procedures. To see the text of a stored procedure, run

```
sp_helptext 'owner.procedure_name'
```

For all system stored procedures delivered by Sybase, the owner is `dbo`. To see the text of a stored procedure of the same name owned by a different user, you must specify that user, for example:

```
sp_helptext 'myname.myprocedure'
```

You may need to reset the width of your DBISQL output to see the full text, by clicking Command→Options and entering a new Limit Display Columns value.

Adaptive Server Enterprise system procedures

Table 9-44 describes the Adaptive Server Enterprise system procedures provided in Sybase IQ.

Table 9-44: ASE system procedures provided in IQ

System procedure	Description
sp_addgroup *group-name*	Adds a group to a database
sp_addlogin *userid, password[, defdb [, deflanguage [, fullname]]]*	Adds a new user account to a database
sp_addmessage *message-num, message_text [, language]*	Adds user-defined messages to SYSUSERMESSAGES for use by stored procedure PRINT and RAISERROR calls
sp_addtype *typename, data-type, [, "identity" | nulltype]*	Creates a user-defined data type. Note that Sybase IQ does not support IDENTITY columns.
sp_adduser *login_name [, name_in_db [, grpname]]*	Adds a new user to a database
sp_changegroup *new-group-name, userid*	Changes a user's group or adds a user to a group
sp_dboption *[dbname, optname, {true | false}]*	Displays or changes database options
sp_dropgroup *group-name*	Drops a group from a database
sp_droplogin *userid*	Drops a user from a database
sp_dropmessage *message-number [, language]*	Drops user-defined messages
sp_droptype *typename*	Drops a user-defined data type
sp_dropuser *userid*	Drops a user from a database
sp_getmessage *message-num, @msg-var output [, language]*	Retrieves stored message strings from SYSMESSAGES and SYSUSERMESSAGES for PRINT and RAISERROR statements.
sp_helptext '*owner.object-name*'	Displays the text of a system procedure or view
sp_password *caller_passwd, new_passwd [, userid]*	Adds or changes a password for a user ID

Note Procedures like sp_dropuser provide minimal compatibility with Adaptive Server Enterprise stored procedures. If you are accustomed to Adaptive Server Enterprise (or Sybase IQ 11.x) stored procedures, you should compare their text with Sybase IQ 12 procedures before using the procedure in dbisql. To compare, use the command

```
sp_helptext 'owner.procedure_name'
```

For system stored procedures delivered by Sybase, the owner is always dbo. To see the text of a stored procedure of the same name owned by a different user, you must specify that user, for example:

```
sp_helptext 'myname.myprocedure'
```

Adaptive Server Enterprise catalog procedures

Sybase IQ implements most of the Adaptive Server Enterprise catalog procedures with the exception of the sp_column_privileges procedure. The implemented catalog procedures are described in Table 9-45.

Table 9-45: ASE catalog procedures implemented in IQ

Catalog procedure	Description
sp_columns *table-name [, table-owner] [, table-qualifier] [, column-name]*	Returns the data types of the specified column
sp_fkeys *pktable_name [, pktable-owner][, pktable-qualifier] [, fktable-name] [, fktable_owner] [, fktable-qualifier]*	Returns foreign key information about the specified table
sp_pkeys *table-name [, table_owner] [, table_qualifier]*	Returns primary key information for a single table
sp_special_columns *table_name [, table-owner] [, table-qualifier] [, col-type]*	Returns the optimal set of columns that uniquely identify a row in a table
sp_sproc_columns *proc-name [, proc_owner] [, proc-qualifier] [, column-name]*	Returns information about a stored procedure's input and return parameters
sp_stored_procedures *[sp-name] [, sp-owner] [, sp-qualifier]*	Returns information about one or more stored procedures
sp_tables *table-name [, table-owner] [, table-qualifier] [, table-type]*	Returns a list of objects that can appear in a FROM clause

The following Adaptive Server Enterprise catalog procedures are not supported:

- sp_column_privileges
- sp_databases
- sp_datatype_info
- sp_server_info

CHAPTER 10

System Tables

About this chapter

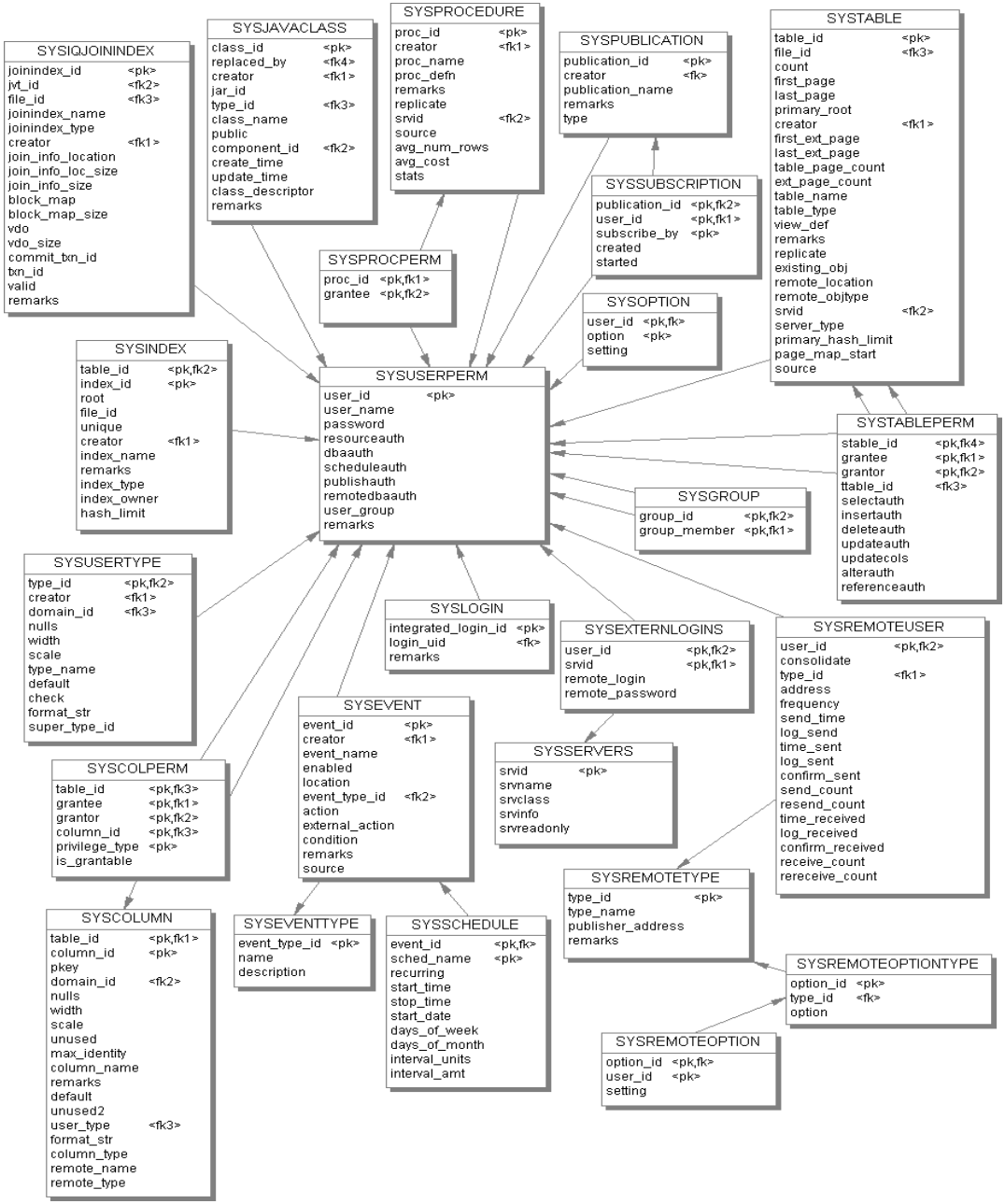
The structure of every IQ database is described in a number of system tables.

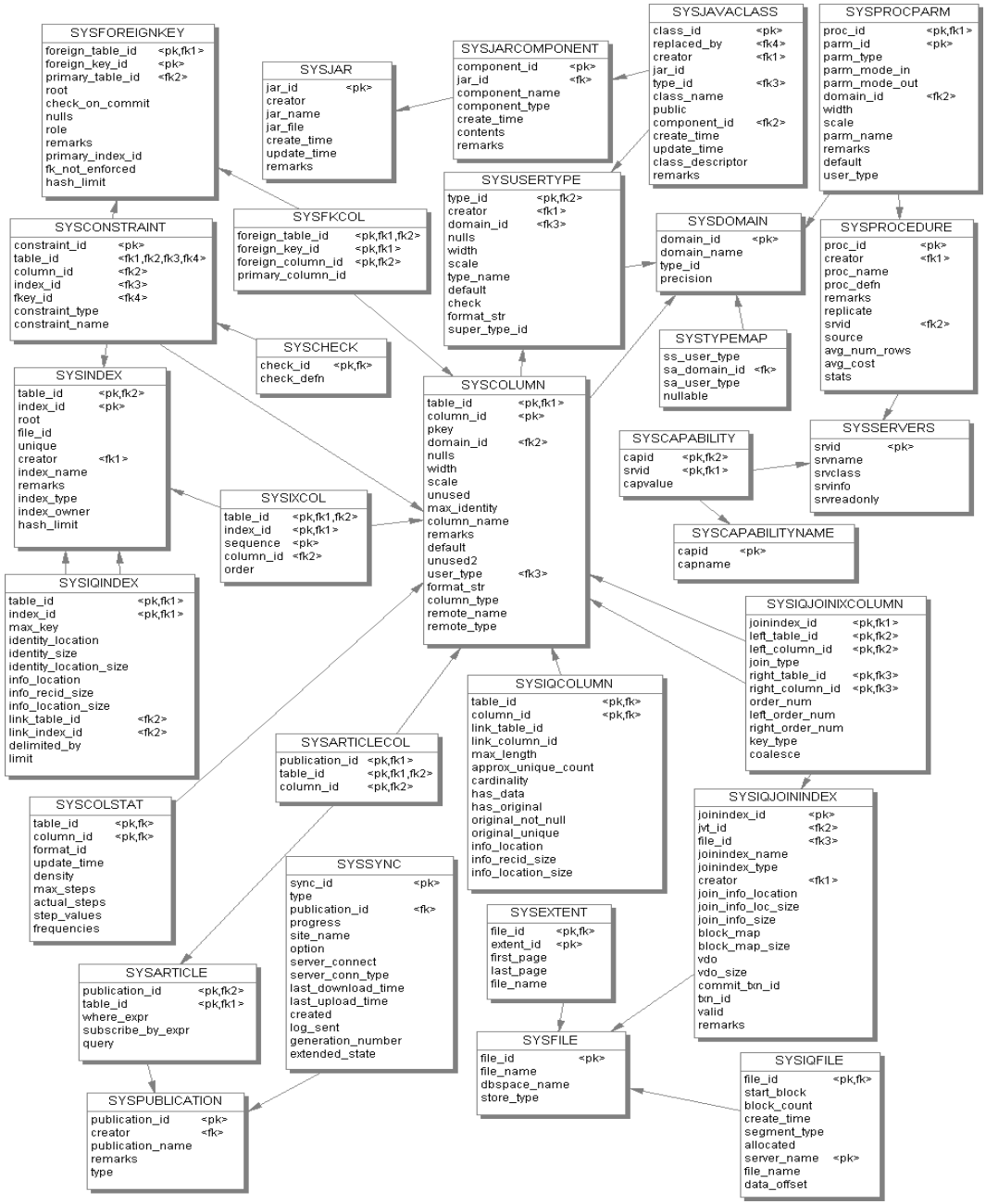
The Entity-Relationship diagram on the next page shows all the system tables and the foreign keys connecting the system tables.

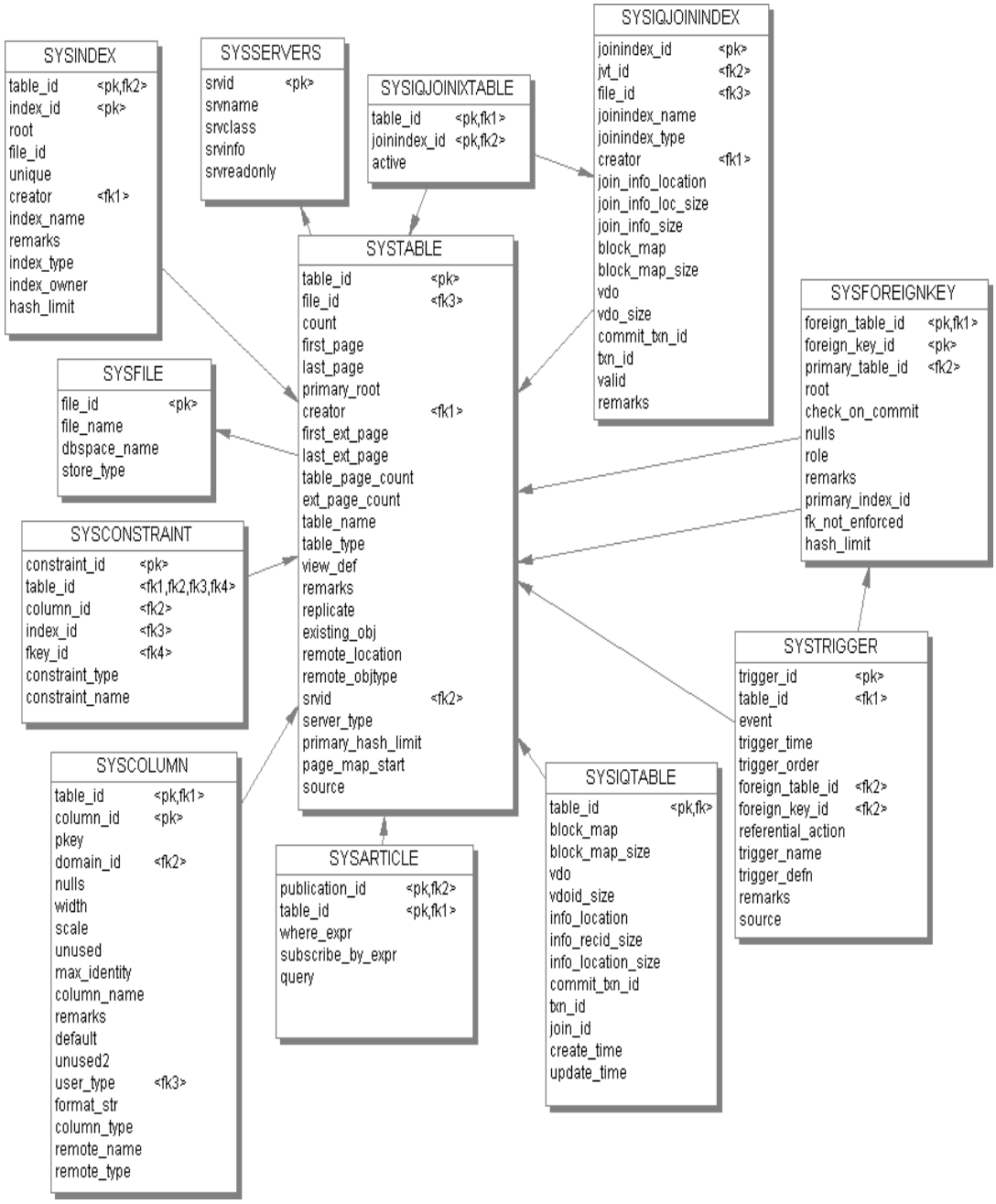
The system tables are owned by the SYS user ID. The contents of these tables can only be changed by the database system. Thus, the UPDATE, DELETE, and INSERT commands cannot be used to modify the contents of these tables. Further, the structure of these tables cannot be changed using the ALTER TABLE and DROP commands.

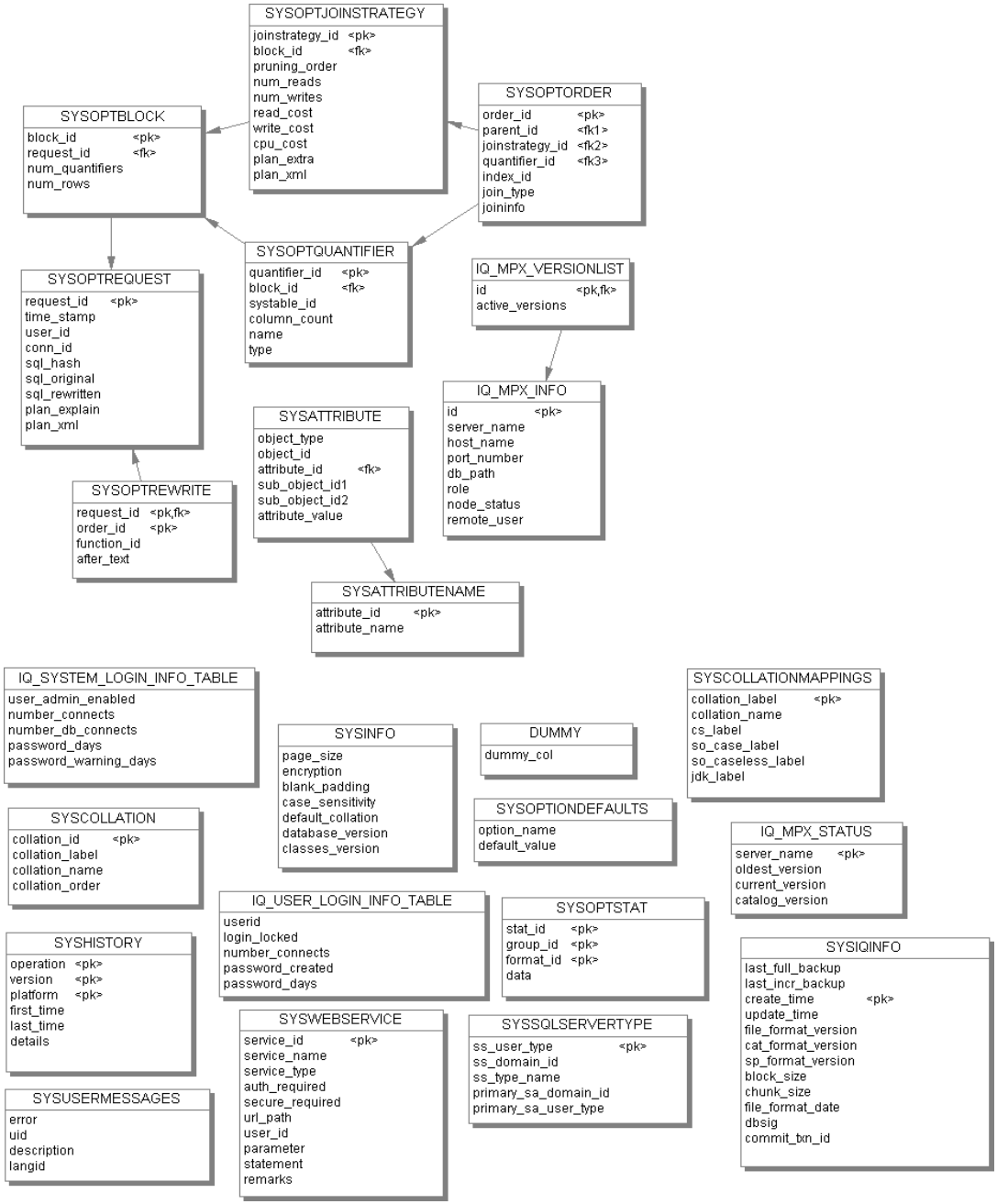
System tables diagrams

The Sybase IQ system tables are shown in the following set of diagrams. Foreign key relations between tables are indicated by arrows; the arrow leads from the foreign table to the primary table.


SYSIQJOININDEX
joinindex_id <pk>
jvt_id <fk2>
file_id <fk3>
joinindex_name
joinindex_type
creator <fk1>
join_info_location
join_info_loc_size
join_info_size
block_map
block_map_size
vdo
vdo_size
commit_txn_id
txn_id
valid
remarks
SYSJAVACLASS
class_id <pk>
replaced_by <fk4>
creator <fk1>
jar_id
type_id <fk3>
class_name
public
component_id <fk2>
create_time
update_time
class_descriptor
remarks
SYSPROCEDURE
proc_id <pk>
creator <fk1>
proc_name
proc_defn
remarks
replicate
srvid <fk2>
source
avg_num_rows
avg_cost
stats
SYSPUBLICATION
publication_id <pk>
creator <fk>
publication_name
remarks
type
SYSTABLE
table_id <pk>
file_id <fk3>
count
first_page
last_page
primary_root
creator <fk1>
first_ext_page
last_ext_page
table_page_count
ext_page_count
table_name
table_type
view_def
remarks
replicate
existing_obj
remote_location
remote_objtype
srvid <fk2>
server_type
primary_hash_limit
page_map_start
source
SYSSUBSCRIPTION
publication_id <pk,fk2>
user_id <pk,fk1>
subscribe_by <pk>
created
started
SYSPROCPERM
proc_id <pk,fk1>
grantee <pk,fk2>
SYSOPTION
user_id <pk,fk>
option <pk>
setting
SYSINDEX
table_id <pk,fk2>
index_id <pk>
root
file_id
unique
creator <fk1>
index_name
remarks
index_type
index_owner
hash_limit
SYSUSERPERM
user_id <pk>
user_name
password
resourceauth
dbaauth
scheduleauth
publishauth
remotedbaauth
user_group
remarks
SYSTABLEPERM
stable_id <pk,fk4>
grantee <pk,fk1>
grantor <pk,fk2>
ttable_id <fk3>
selectauth
insertauth
deleteauth
updateauth
updatecols
alterauth
referenceauth
SYSGROUP
group_id <pk,fk2>
group_member <pk,fk1>
SYSUSERTYPE
type_id <pk,fk2>
creator <fk1>
domain_id <fk3>
nulls
width
scale
type_name
default
check
format_str
super_type_id
SYSLOGIN
integrated_login_id <pk>
login_uid <fk>
remarks
SYSEXTERNLOGINS
user_id <pk,fk2>
srvid <pk,fk1>
remote_login
remote_password
SYSREMOTEUSER
user_id <pk,fk2>
consolidate
type_id <fk1>
address
frequency
send_time
log_send
time_sent
log_sent
confirm_sent
send_count
resend_count
time_received
log_received
confirm_received
receive_count
rereceive_count
SYSEVENT
event_id <pk>
creator <fk1>
event_name
enabled
location
event_type_id <fk2>
action
external_action
condition
remarks
source
SYSSERVERS
srvid <pk>
srvname
srvclass
srvinfo
srvreadonly
SYSCOLPERM
table_id <pk,fk3>
grantee <pk,fk1>
grantor <pk,fk2>
column_id <pk,fk3>
privilege_type <pk>
is_grantable
SYSREMOTETYPE
type_id <pk>
type_name
publisher_address
remarks
SYSREMOTEOPTIONTYPE
option_id <pk>
type_id <fk>
option
SYSCOLUMN
table_id <pk,fk1>
column_id <pk>
pkey
domain_id <fk2>
nulls
width
scale
unused
max_identity
column_name
remarks
default
unused2
user_type <fk3>
format_str
column_type
remote_name
remote_type
SYSEVENTTYPE
event_type_id <pk>
name
description
SYSSCHEDULE
event_id <pk,fk>
sched_name <pk>
recurring
start_time
stop_time
start_date
days_of_week
days_of_month
interval_units
interval_amt
SYSREMOTEOPTION
option_id <pk,fk>
user_id <pk>
setting


SYSFOREIGNKEY
foreign_table_id <pk,fk1>
foreign_key_id <pk>
primary_table_id <fk2>
root
check_on_commit
nulls
role
remarks
primary_index_id
fk_not_enforced
hash_limit
SYSJAR
jar_id <pk>
creator
jar_name
jar_file
create_time
update_time
remarks
SYSJARCOMPONENT
component_id <pk>
jar_id <fk>
component_name
component_type
create_time
contents
remarks
SYSJAVACLASS
class_id <pk>
replaced_by <fk4>
creator <fk1>
jar_id
type_id <fk3>
class_name
public
component_id <fk2>
create_time
update_time
class_descriptor
remarks
SYSPROCPARM
proc_id <pk,fk1>
parm_id <pk>
parm_type
parm_mode_in
parm_mode_out
domain_id <fk2>
width
scale
parm_name
remarks
default
user_type
SYSCONSTRAINT
constraint_id <pk>
table_id <fk1,fk2,fk3,fk4>
column_id <fk2>
index_id <fk3>
fkey_id <fk4>
constraint_type
constraint_name
SYSFKCOL
foreign_table_id <pk,fk1,fk2>
foreign_key_id <pk,fk1>
foreign_column_id <pk,fk2>
primary_column_id
SYSUSERTYPE
type_id <pk,fk2>
creator <fk1>
domain_id <fk3>
nulls
width
scale
type_name
default
check
format_str
super_type_id
SYSDOMAIN
domain_id <pk>
domain_name
type_id
precision
SYSPROCEDURE
proc_id <pk>
creator <fk1>
proc_name
proc_defn
remarks
replicate
srvid <fk2>
source
avg_num_rows
avg_cost
stats
SYSCHECK
check_id <pk,fk>
check_defn
SYSTYPEMAP
ss_user_type
sa_domain_id <fk>
sa_user_type
nullable
SYSINDEX
table_id <pk,fk2>
index_id <pk>
root
file_id
unique
creator <fk1>
index_name
remarks
index_type
index_owner
hash_limit
SYSCOLUMN
table_id <pk,fk1>
column_id <pk>
pkey
domain_id <fk2>
nulls
width
scale
unused
max_identity
column_name
remarks
default
unused2
user_type <fk3>
format_str
column_type
remote_name
remote_type
SYSCAPABILITY
capid <pk,fk2>
srvid <pk,fk1>
capvalue
SYSSERVERS
srvid <pk>
srvname
srvclass
srvinfo
srvreadonly
SYSCAPABILITYNAME
capid <pk>
capname
SYSIXCOL
table_id <pk,fk1,fk2>
index_id <pk,fk1>
sequence <pk>
column_id <fk2>
order
SYSIQINDEX
table_id <pk,fk1>
index_id <pk,fk1>
max_key
identity_location
identity_size
identity_location_size
info_location
info_recid_size
info_location_size
link_table_id <fk2>
link_index_id <fk2>
delimited_by
limit
SYSIQJOINIXCOLUMN
joinindex_id <pk,fk1>
left_table_id <pk,fk2>
left_column_id <pk,fk2>
join_type
right_table_id <pk,fk3>
right_column_id <pk,fk3>
order_num
left_order_num
right_order_num
key_type
coalesce
SYSIQCOLUMN
table_id <pk,fk>
column_id <pk,fk>
link_table_id
link_column_id
max_length
approx_unique_count
cardinality
has_data
has_original
original_not_null
original_unique
info_location
info_recid_size
info_location_size
SYSARTICLECOL
publication_id <pk,fk1>
table_id <pk,fk1,fk2>
column_id <pk,fk2>
SYSIQJOININDEX
joinindex_id <pk>
jvt_id <fk2>
file_id <fk3>
joinindex_name
joinindex_type
creator <fk1>
join_info_location
join_info_loc_size
join_info_size
block_map
block_map_size
vdo
vdo_size
commit_txn_id
txn_id
valid
remarks
SYSCOLSTAT
table_id <pk,fk>
column_id <pk,fk>
format_id
update_time
density
max_steps
actual_steps
step_values
frequencies
SYSSYNC
sync_id <pk>
type
publication_id <fk>
progress
site_name
option
server_connect
server_conn_type
last_download_time
last_upload_time
created
log_sent
generation_number
extended_state
SYSEXTENT
file_id <pk,fk>
extent_id <pk>
first_page
last_page
file_name
SYSARTICLE
publication_id <pk,fk2>
table_id <pk,fk1>
where_expr
subscribe_by_expr
query
SYSFILE
file_id <pk>
file_name
dbspace_name
store_type
SYSIQFILE
file_id <pk,fk>
start_block
block_count
create_time
segment_type
allocated
server_name <pk>
file_name
data_offset
SYSPUBLICATION
publication_id <pk>
creator <fk>
publication_name
remarks
type


SYSINDEX
table_id <pk,fk2>
index_id <pk>
root
file_id
unique
creator <fk1>
index_name
remarks
index_type
index_owner
hash_limit
SYSSERVERS
srvid <pk>
srvname
srvclass
srvinfo
srvreadonly
SYSIQJOINIXTABLE
table_id <pk,fk1>
joinindex_id <pk,fk2>
active
SYSIQJOININDEX
joinindex_id <pk>
jvt_id <fk2>
file_id <fk3>
joinindex_name
joinindex_type
creator <fk1>
join_info_location
join_info_loc_size
join_info_size
block_map
block_map_size
vdo
vdo_size
commit_txn_id
txn_id
valid
remarks
SYSTABLE
table_id <pk>
file_id <fk3>
count
first_page
last_page
primary_root
creator <fk1>
first_ext_page
last_ext_page
table_page_count
ext_page_count
table_name
table_type
view_def
remarks
replicate
existing_obj
remote_location
remote_objtype
srvid <fk2>
server_type
primary_hash_limit
page_map_start
source
SYSFILE
file_id <pk>
file_name
dbspace_name
store_type
SYSFOREIGNKEY
foreign_table_id <pk,fk1>
foreign_key_id <pk>
primary_table_id <fk2>
root
check_on_commit
nulls
role
remarks
primary_index_id
fk_not_enforced
hash_limit
SYSCONSTRAINT
constraint_id <pk>
table_id <fk1,fk2,fk3,fk4>
column_id <fk2>
index_id <fk3>
fkey_id <fk4>
constraint_type
constraint_name
SYSTRIGGER
trigger_id <pk>
table_id <fk1>
event
trigger_time
trigger_order
foreign_table_id <fk2>
foreign_key_id <fk2>
referential_action
trigger_name
trigger_defn
remarks
source
SYSCOLUMN
table_id <pk,fk1>
column_id <pk>
pkey
domain_id <fk2>
nulls
width
scale
unused
max_identity
column_name
remarks
default
unused2
user_type <fk3>
format_str
column_type
remote_name
remote_type
SYSARTICLE
publication_id <pk,fk2>
table_id <pk,fk1>
where_expr
subscribe_by_expr
query
SYSIQTABLE
table_id <pk,fk>
block_map
block_map_size
vdo
vdoid_size
info_location
info_recid_size
info_location_size
commit_txn_id
txn_id
join_id
create_time
update_time


SYSOPTJOINSTRATEGY
joinstrategy_id <pk>
block_id <fk>
pruning_order
num_reads
num_writes
read_cost
write_cost
cpu_cost
plan_extra
plan_xml
SYSOPTBLOCK
block_id <pk>
request_id <fk>
num_quantifiers
num_rows
SYSOPTORDER
order_id <pk>
parent_id <fk1>
joinstrategy_id <fk2>
quantifier_id <fk3>
index_id
join_type
joininfo
SYSOPTQUANTIFIER
quantifier_id <pk>
block_id <fk>
systable_id
column_count
name
type
SYSOPTREQUEST
request_id <pk>
time_stamp
user_id
conn_id
sql_hash
sql_original
sql_rewritten
plan_explain
plan_xml
IQ_MPX_VERSIONLIST
id <pk,fk>
active_versions
IQ_MPX_INFO
id <pk>
server_name
host_name
port_number
db_path
role
node_status
remote_user
SYSATTRIBUTE
object_type
object_id
attribute_id <fk>
sub_object_id1
sub_object_id2
attribute_value
SYSOPTREWRITE
request_id <pk,fk>
order_id <pk>
function_id
after_text
SYSATTRIBUTENAME
attribute_id <pk>
attribute_name
IQ_SYSTEM_LOGIN_INFO_TABLE
user_admin_enabled
number_connects
number_db_connects
password_days
password_warning_days
SYSINFO
page_size
encryption
blank_padding
case_sensitivity
default_collation
database_version
classes_version
DUMMY
dummy_col
SYSCOLLATIONMAPPINGS
collation_label <pk>
collation_name
cs_label
so_case_label
so_caseless_label
jdk_label
SYSCOLLATION
collation_id <pk>
collation_label
collation_name
collation_order
SYSOPTIONDEFAULTS
option_name
default_value
IQ_MPX_STATUS
server_name <pk>
oldest_version
current_version
catalog_version
IQ_USER_LOGIN_INFO_TABLE
userid
login_locked
number_connects
password_created
password_days
SYSOPTSTAT
stat_id <pk>
group_id <pk>
format_id <pk>
data
SYSHISTORY
operation <pk>
version <pk>
platform <pk>
first_time
last_time
details
SYSIQINFO
last_full_backup
last_incr_backup
create_time <pk>
update_time
file_format_version
cat_format_version
sp_format_version
block_size
chunk_size
file_format_date
dbsig
commit_txn_id
SYSWEBSERVICE
service_id <pk>
service_name
service_type
auth_required
secure_required
url_path
user_id
parameter
statement
remarks
SYSSQLSERVERTYPE
ss_user_type <pk>
ss_domain_id
ss_type_name
primary_sa_domain_id
primary_sa_user_type
SYSUSERMESSAGES
error
uid
description
langid

System tables descriptions

This section contains a description of each of the system tables. The system tables are described via the CREATE TABLE commands used to create them. They serve as good examples of how tables are created in SQL. Following the CREATE TABLE command, each column is briefly described.

Several of the columns have only two possible values. Usually these values are "Y" and "N" for "yes" and "no" respectively. These columns are designated by "(Y/N)".

DUMMY system table

```
CREATE TABLE SYS.DUMMY (
    dummy_col INT NOT NULL
)
```

The DUMMY table is provided as a table that always has exactly one row. This can be useful for extracting information from the database, as in the following example that gets the current user ID and the current date from the database.

```
SELECT USER, today(*) FROM SYS.DUMMY
```

dummy_col This column is not used. It is present because a table cannot be created with no columns.

The use of the DUMMY system table is implied for all queries that do not have a FROM clause, e.g., `SELECT NOW();`. These queries are run by Adaptive Server Anywhere (the catalog engine), rather than by IQ. You can create a dummy table in the IQ database, for example:

```
CREATE TABLE iq_dummy (dummy_col INT NOT NULL);
```

and use this table explicitly:

```
SELECT NOW() FROM iq_dummy;
```

For more information, see the section FROM clause in Chapter 6, "SQL Statements".

IQ_MPX_INFO system table

```
CREATE TABLE "DBA".IQ_MPX_INFO (
     id          numeric(8,0) IDENTITY NOT NULL,
     server_name varchar(30) NOT NULL,
     host_name   varchar(40) NOT NULL,
     port_number numeric(8,0),
     db_path varchar(1024) NOT NULL,
     role        char(1) NOT NULL,
     node_status varchar(10) NOT NULL,
     remote_user varchar(40) NOT NULL,
     PRIMARY KEY (id),
     UNIQUE      (server_name)
   )IN SYSTEM;
```

Each row in this table contains information about a particular server in a multiplex. The table contains only one row per server.

Sybase Central uses the information in this table to manage the multiplex. The information is also used internally in the IQ procedures, triggers, and events. SQL Remote automatically replicates changes in this table between servers.

The information in this table only changes:

- when query servers are added or removed from the multiplex
- when a query server replaces the write server
- when query servers are excluded from or included in the multiplex environment

UPDATE permission is not granted to PUBLIC.

SQL Remote automatically replicates changes in this table between multiplex servers.

id The sequence number of this server.

server_name The server name of this server.

host_name The host on which this server runs.

port_number The TCP port number on which to start this server.

db_path The full path to the Catalog Store (.db file) for this server. Each server's database files must be placed on a file system local to its node. Each server may use a different name for its catalog database file (and database name).

role Write server ('W') or query server ('R').

node_status Server is on-line or off-line.

remote_user The remote user ID for SQL Remote replication at this server.

IQ_MPX_STATUS system table

```
CREATE TABLE "DBA".IQ_MPX_STATUS (
      server_name     varchar(30)  NOT NULL,
      oldest_version  unsigned bigint NOT NULL,
     current_version varchar(10)     NOT NULL,
     catalog_version unsigned bigint NOT NULL,
    )
```

This table contains dynamic information to support management of old table versions in a multiplex environment. The information in this table changes as transactions begin or commit on servers of the multiplex.
Each server updates its own row in the table automatically on transaction-commit and begin-transaction. SQL Remote propagates changes between the multiplex servers. UPDATE permission is not granted to PUBLIC.

server_name The server name of this server.

oldest_version The version number of the oldest active transaction on this server.

current_version The current transaction number on this server.

catalog_version Each time the write server modifies the table schema, the catalog_version advances to the current_version. Each time you synchronize query servers, the catalog_version at a query server advances to the write server's version, but remains static until the next synchronization.

By examining the catalog_version column, you can see easily whether query servers are synchronized.

For example, SQL statements such as CREATE, DROP, and ALTER, which modify tables in the IQ Store, increment catalog_version. Once IQ Store tables are modified, query servers cannot see versions of objects subsequently committed in the IQ Store. Query servers must be synchronized to see versions of objects in the IQ Store committed after the statement modified the IQ Store table schema.

IQ_MPX_VERSIONLIST system table

```
CREATE TABLE "DBA".IQ_MPX_VERSIONLIST (
     id integer PRIMARY KEY,
     active_versions long varchar
)IN SYSTEM;
```

This table contains one row for each query server in the multiplex (including inactive ones).

id The identifier for the query server from server name of this server.

active_versions The number of active versions.

IQ_SYSTEM_LOGIN_INFO_TABLE

```
CREATE TABLE DBA.IQ_SYSTEM_LOGIN_INFO_TABLE (
  user_admin_enabled   CHAR(1) NOT NULL,
  number_connects   INT NOT NULL,
  number_db_connects  INT NOT NULL
  password_days  INT NOT NULL
  password_warning_days   INT NOT NULL) IN SYSTEM
```

IQ_SYSTEM_LOGIN_INFO_TABLE contains one row with the system default values for Sybase IQ User Administration. When a new user is added with sp_iqaddlogin, these default values are used for connection and password control.

user_admin_enabled Indicates whether Sybase IQ User Administration is enabled (Y) or disabled (N). Set by sp_iqmodifyadmin.

number_connects Maximum number of concurrent database connections by a single user. Default is 0: IQ does not enforce a maximum number of connections.

number_db_connects Number of connections allowed to the database.

password_days Number of days until a password expires. Default is 0: the password does not expire.

password_warning_days Number of days before a password expires that IQ sends a warning to the user.

IQ_USER_LOGIN_INFO_TABLE

```
CREATE TABLE DBA.IQ_USER_LOGIN_INFO_TABLE
  userid   VARCHAR(128) NOT NULL UNIQUE,
  login_locked   CHAR(1) NOT NULL,
  number_connects   INT NOT NULL,
  password_created TIMESTAMP DEFAULT CURRENT TIMESTAMP
    NOT NULL
  password_days INT NOT NULL) IN SYSTEM
```

IQ_USER_LOGIN_INFO_TABLE contains Sybase IQ User Administration values for each user.

userid The user ID.

login_locked Indicates whether the user is locked (Y) or allowed to connect (N).

number_connects Maximum number of concurrent database connections. Default is 0: IQ does not enforce a maximum number of connections.

password_days Number of days until a password expires. Default is 0: the password does not expire.

password_warning_days Number of days before a password expires that IQ sends a warning to the user.

SYSARTICLE system table

```
CREATE TABLE SYS.SYSARTICLE (
    publication_id UNSIGNED INT NOT NULL,
    table_id UNSIGNED INT NOT NULL,
    where_expr LONG VARCHAR,
    subscribe_by_expr LONG VARCHAR,
    query CHAR(1) NOT NULL,
    PRIMARY KEY ( publication_id, table_id ),
    FOREIGN KEY REFERENCES SYS.SYSPUBLICATION,
    FOREIGN KEY REFERENCES SYS.SYSTABLE
)
```

Each row of SYSARTICLE describes an article in a SQL Remote publication.

publication_id The publication of which this article is a part.

table_id Each article consists of columns and rows from a single table. This column contains the table ID for this table.

where_expr For articles that contain a subset of rows defined by a WHERE clause, this column contains the search condition.

subscribe_by_expr For articles that contain a subset of rows defined by a SUBSCRIBE BY expression, this column contains the expression.

SYSARTICLECOL system table

```
CREATE TABLE SYS.SYSARTICLECOL (
    publication_id UNSIGNED INT NOT NULL,
    table_id UNSIGNED INT NOT NULL,
    column_id UNSIGNED INT NOT NULL,
    PRIMARY KEY (publication_id, table_id, column_id),
    FOREIGN KEY REFERENCES SYS.SYSARTICLE,
    FOREIGN KEY REFERENCES SYS.SYSCOLUMN
)
```

Each row identifies a column in an article, identifying the column, the table it is in, and the publication it is part of.

publication_id A unique identifier for the publication of which the column is a part.

table_id The table to which the column belongs.

column_id The column identifier, from the SYSCOLUMN system table.

SYSCAPABILITY system table

```
CREATE TABLE SYS.SYSCAPABILITY (
    capid INT,
    capvalue CHAR(128),
    svrid INT,
    PRIMARY KEY (svrid),
    FOREIGN KEY REFERENCES SYS.SYSSERVERS,
    FOREIGN KEY REFERENCES SYS.SYSCAPABILITYNAME
)
```

Each row identifies a capability of a remote server.

capid An integer that identifies the capability, as listed in SYSCAPABILITYNAME.

capvalue The value of the capability.

svrid The server to which the capability applies, as listed in SYSSERVERS.

SYSCAPABILITYNAME system table

```
CREATE TABLE SYS.SYSCAPABILITYNAME (
    capid INT,
    capname CHAR(128),
    PRIMARY KEY (capid)
)
```

Each row identifies a capability.

capid An integer that identifies the capability.

capname The name of the capability.

SYSCHECK system table

```
CREATE TABLE SYS.SYSCHECK (
    check_id unsigned int NOT NULL,
    check_defn long varchar NOT NULL,
    primary key( check_id )
)
```

Each row identifies a named check constraint in a table.

check_id An identifier for the constraint.

check_defn The CHECK expression.

SYSCOLLATION system table

```
CREATE TABLE SYS.SYSCOLLATION (
    collation_id SMALLINT NOT NULL,
    collation_label CHAR(10) NOT NULL,
    collation_name CHAR(128) NOT NULL,
```

```
    collation_order BINARY(1280) NOT NULL,
    PRIMARY KEY ( collation_id )
)
```

This table contains the collation sequences available to Sybase IQ. There is no way to modify the contents of this table.

collation_id A unique number identifying the collation sequence.

collation_label A string identifying each of the available collation sequences. The collation sequence to be used is selected when the database is created by specifying the collation label with the COLLATION option of the CREATE DATABASE command.

collation_name The name of the collation sequence.

collation_order An array of bytes defining how each of the 256 character codes are treated for comparison purposes. All string comparisons translate each character according to the collation order table before comparing the characters. For the different ASCII code pages, the only difference is how accented characters are sorted. In general, an accented character is sorted as if it were the same as the non-accented character.

SYSCOLLATIONMAPPINGS system table

```
CREATE TABLE SYS.SYSCOLLATIONMAPPINGS (
    collation_label CHAR(10) NOT NULL,
    collation_name CHAR(128) NOT NULL,
    cs_label CHAR(128),
    so_case_label CHAR(128),
    so_caseless_label CHAR(128),
    jdk_label CHAR(128),
    PRIMARY KEY ( collation_label )
)
```

This table contains the collation mappings available in Sybase IQ. There is no way to modify the contents of this table.

collation_label A string identifying the collation sequence. The collation sequence to be used is selected when the database is created by specifying the collation label with the COLLATION option of the CREATE DATABASE command.

collation_name The collation name used to describe the character set encoding.

cs_label The GPG character set mapping label.

so_case_label The collation sort order for case-sensitive GPG character set mapping.

so_caseless_label The collation sort order for case-insensitive GPG character set mapping.

jdk_label The JDK character set label.

For newly-created databases, this table contains only one row with the database collation mapping. For databases created with version 12.5 or earlier, this table includes collation mappings for all built-in collations.

SYSCOLPERM system table

```
CREATE TABLE SYS.SYSCOLPERM (
    table_id UNSIGNED INT NOT NULL,
    grantee UNSIGNED INT NOT NULL,
    grantor UNSIGNED INT NOT NULL,
    column_id UNSIGNED INT NOT NULL,
    privilege_type SMALLINT NOT NULL,
    is_grantable CHAR( 1 ) NOT NULL,
    PRIMARY KEY ( table_id, grantee,
    grantor, column_id, privilege_type ),
    FOREIGN KEY grantee ( grantee ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY grantor ( grantor ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY REFERENCES SYS.SYSCOLUMN
)
```

The GRANT command can give UPDATE permission to individual columns in a table. Each column with UPDATE permission is recorded in one row of SYSCOLPERM.

table_id The table number for the table containing the column.

grantee The user number of the user ID given UPDATE permission on the column. If the grantee is the user number for the special PUBLIC user ID, the UPDATE permission is given to all user IDs.

grantor The user number of the user ID granting the permission.

column_id This column number, together with the table_id, identifies the column for which UPDATE permission has been granted.

privilege_type The number in this column indicates the kind of column permission (REFERENCES, SELECT or UPDATE).

is_grantable (Y/N). Indicates if the permission on the column was granted by the grantor to the grantee WITH GRANT OPTION.

SYSCOLUMN system table

```
CREATE TABLE SYS.SYSCOLUMN (
    table_id UNSIGNED INT NOT NULL,
    column_id UNSIGNED INT NOT NULL,
    pkey CHAR(1) NOT NULL,
    domain_id SMALLINT NOT NULL,
    nulls CHAR(1) NOT NULL,
    width SMALLINT NOT NULL,
    scale SMALLINT NOT NULL,
    estimate INT NOT NULL,
    max_identity BIGINT NOT NULL,
    column_name CHAR(128) NOT NULL,
    remarks LONG VARCHAR,
    "default" LONG VARCHAR,
    "check"LONG VARCHAR,
    user_type SMALLINT,
    format_str CHAR(128),
    column_type CHAR(1) NOT NULL,
    remote_name VARCHAR(128),
    remote_type UNSIGNED INT,
    PRIMARY KEY ( table_id, column_id ),
    FOREIGN KEY REFERENCES SYS.SYSTABLE,
    FOREIGN KEY REFERENCES SYS.SYSDOMAIN
    FOREIGN KEY REFERENCES SYS.SYSUSERTYPE
)
```

Each column in every table or view is described by one row in SYSCOLUMN.

table_id The table number uniquely identifies the table or view to which this column belongs.

column_id Each table starts numbering columns at 1. The order of column numbers determines the order that columns are displayed in the command select * from table.

pkey Indicates whether this column is part of the primary key for the table (Y or N).

domain_id Identify the data type for the column by the data type number listed in the SYSDOMAIN table.

nulls Indicates whether the NULL value is allowed in this column (Y or N).

width This column contains the length of string columns, the precision of numeric columns, and the number of bytes of storage for all other data types.

scale The number of digits after the decimal point for numeric data type columns, and zero for all other data types.

estimate A self-tuning parameter for the optimizer. Sybase IQ will learn from previous queries by adjusting guesses that are made by the optimizer.

max_identity The largest value of the column, if it is an AUTOINCREMENT, IDENTITY, or GLOBAL AUTOINCREMENT column. Sybase IQ does not support IDENTITY columns.

column_name The name of the column.

remarks A comment string.

"default" The default value for the column. This value is only used when an INSERT statement does not specify a value for the column.

"check" Any CHECK condition defined on the column.

Note The "default" value and "check" condition features are not currently supported by Sybase IQ.

---

user_type If the column is defined on a user-defined data type, the data type is held here.

format_str Currently unused.

column_type The type of column.

remote_name The name of the remote column.

remote_type The type of the remote column. This value is defined by the remote server or interface.

SYSCONSTRAINT system table

```
CREATE TABLE SYS.SYSCONSTRAINT (
```

```
    constraint_id unsigned int NOT NULL,
    table_id nsigned int NOT NULL,
    column_id unsigned int NULL,
    index_id unsigned int NULL,
    fkey_id mallint NULL,
    constraint_type char(1) NOT NULL,
    constraint_name char(128) NOT NULL,

    PRIMARY KEY( constraint_id ),
    UNIQUE( table_id, constraint_name )
)
```

Each row describes a named constraint.

constraint_id The unique constraint ID.

table_id The table ID of the table to which the constraint applies.

column_id The column ID of the column to which the constraint applies. The column is NULL for any constraints that are not column constraints.

index_id The index ID for a unique constraint. The column is NULL for all constraints that are not unique constraints.

fkey_id The foreign key ID for a foreign key constraint. The column is NULL for all constraints that are not foreign key constraints.

constraint_type Set to one of the following values:

- C is the constraint is a column check constraint.
- T if the constraint is a table constraint.
- P if the constraint is a primary key.
- F if the constraint is a foreign key.
- U if the constraint is a unique constraint.

constraint_name The name of the constraint.

SYSDOMAIN system table

```
CREATE TABLE SYS.SYSDOMAIN (
    domain_id SMALLINT NOT NULL,
    domain_name CHAR(128) NOT NULL,
    type_id SMALLINT,
    precision SMALLINT,
```

```
    PRIMARY KEY ( domain_id )
)
```

Each of the predefined data types (also called domains) in Sybase IQ is assigned a unique number. The SYSDOMAIN table is provided for informational purposes to show the association between these numbers and the appropriate data type. This table is never changed by Sybase IQ.

domain_id The unique number assigned to each data type. These numbers cannot be changed.

domain_name A string containing the data type normally found in the CREATE TABLE command, such as char or integer.

type_id The ODBC data type. This corresponds to “data_type” in the Transact-SQL-compatibility DBO.SYSTYPES table.

precision The number of significant digits that can be stored using this data type. The column value is NULL for non-numeric data types.

SYSEVENT system table

```
CREATE TABLE SYS.SYSEVENT (
    event_id INT NOT NULL,
    creator UNSIGNED INT NOT NULL,
    event_name VARCHAR(128) NOT NULL UNIQUE,
    enabled CHAR(1) NOT NULL,
    location CHAR(1) NOT NULL,
    event_type_id INT NULL,
    action LONG VARCHAR NULL,
    external_action LONG VARCHAR NULL,
    condition LONG VARCHAR NULL,
    remarks LONG VARCHAR NULL,
    PRIMARY KEY ( event_id )
)
```

Each row in SYSEVENT describes an event created with CREATE EVENT.

event_id The unique number assigned to each event.

creator The user number of the owner of the event. The name of the user can be found by looking in SYSUSERPERM.

event_name The name of the event.

enabled (Y/N) Indicates whether or not the event is allowed to fire.

location The location where the event is allowed to fire:

- C = consolidated
- R = remote
- A = all

event_type_id For system events, the event type as listed in SYSEVENTTYPE.

action The event handler definition.

external_action Not used.

condition The WHERE condition used to control firing of the event handler.

remarks A comment string.

SYSEVENTTYPE system table

```
CREATE TABLE SYS.SYSEVENTTYPE (
    event_type_id INT NOT NULL,
    name VARHCAR(128) NOT NULL UNIQUE,
    description LONG VARCHAR NULL,
    PRIMARY KEY ( event_type_id )
)
```

Each row in the SYSEVENTTYPE table describes a system event type which can be referenced by CREATE EVENT.

event_type_id The unique number assigned to each event type.

name The name of the system event type.

description A description of the system event type.

SYSEXTERNLOGINS system table

```
CREATE TABLE SYS.SYSEXTERNLOGINS (
    user_id UNSIGNED INT NOT NULL,
    srvid  INT NOT NULL,
    remote_login VARCHAR(128),
```

```
    remote_password VARBINARY(128),
    PRIMARY KEY ( user_id, srvid ),
FOREIGN KEY REFERENCES SYS.SYSUSERPERM,
FOREIGN KEY REFERENCES SYS.SYSSERVERS
)
```

Each row describes an external login for remote data access.

user_id The user ID on the local database.

srvid The remote server, as listed in SYSSERVERS.

remote_login The login name for this user, for the remote server.

remote_password The password for this user, for the remote server.

SYSFILE system table

```
CREATE TABLE SYS.SYSFILE (
    file_id SMALLINT NOT NULL,
    file_name LONG VARCHAR NOT NULL,
    dbspace_name CHAR(128) NOT NULL,
    store_type CHAR(8) NOT NULL,
    PRIMARY KEY ( file_id )
)
```

Every database consists of one or more operating system files. Each file is recorded in SYSFILE.

file_id Each file in a database is assigned a unique number. This file identifier is the primary key for SYSFILE. All system tables are stored in file_id 0.

file_name The database name is stored when a database is created. This name is for informational purposes only. For the SYSTEM dbspace the file name always reflects the name when the data base was created. Changes to the file name will not be reflected here.

dbspace_name Every file has a dbspace name that is unique. It is used in the CREATE TABLE command.

store_type Defines the file as belonging to either the CATALOG STORE (SA) or the IQ STORE.

SYSFKCOL system table

```
CREATE TABLE SYS.SYSFKCOL (
    foreign_table_id UNSIGNED INT NOT NULL,
    foreign_key_id SMALLINT NOT NULL,
    foreign_column_id UNSIGNED INT NOT NULL,
    primary_column_id UNSIGNED INT NOT NULL,
    PRIMARY KEY ( foreign_table_id,
    foreign_key_id, foreign_column_id ),
    FOREIGN KEY REFERENCES SYS.SYSFOREIGNKEY,
    FOREIGN KEY ( foreign_table_id,
    foreign_column_id ) REFERENCES
    SYS.SYSCOLUMN ( table_id, column_id )
)
```

Each row of SYSFKCOL describes the association between a foreign column in the foreign table of a relationship and the primary column in the primary table.

foreign_table_id The table number of the foreign table.

foreign_key_id The key number of the FOREIGN KEY for the foreign table. Together, foreign_table_id and foreign_key_id uniquely identify one row in SYSFOREIGNKEY, and the table number for the primary table can be obtained from that row.

foreign_column_id This column number, together with the foreign_table_id, identify the foreign column description in SYSCOLUMN.

primary_column_id This column number, together with the primary_table_id obtained from SYSFOREIGNKEY, identify the primary column description in SYSCOLUMN.

SYSFOREIGNKEY system table

```
CREATE TABLE SYS.SYSFOREIGNKEY (
    foreign_table_id UNSIGNED INT NOT NULL,
    foreign_key_id SMALLINT NOT NULL,
    primary_table_id UNSIGNED INT NOT NULL,
    root INT NOT NULL,
    check_on_commit CHAR(1) NOT NULL,
    nulls CHAR(1) NOT NULL,
    role CHAR(128) NOT NULL,
    remarks LONG VARCHAR,
```

```
    primary_index_id UNSIGNED INT NOT NULL,
    fk_not_enforced CHAR(1) NOT NULL
    hash_limit SMALLINTO NOT NULL,
    PRIMARY KEY ( foreign_table_id, foreign_key_id ),
    UNIQUE ( role, foreign_table_id ),
    FOREIGN KEY foreign_table ( foreign_table_id )
    REFERENCES SYS.SYSTABLE ( table_id ),
    FOREIGN KEY primary_table ( primary_table_id )
    REFERENCES SYS.SYSTABLE ( table_id )
)
```

A foreign key is a relationship between two tables—the foreign table and the primary table. Every foreign key is defined by one row in SYSFOREIGNKEY and one or more rows in SYSFKCOL. SYSFOREIGNKEY contains general information about the foreign key while SYSFKCOL identifies the columns in the foreign key and associates each column in the foreign key with a column in the primary key of the primary table.

foreign_table_id The table number of the foreign table.

foreign_key_id Each foreign key has a foreign key number that is unique with respect to:

- The key number of all other foreign keys for the foreign table
- The key number of all foreign keys for the primary table
- The index number of all indexes for the foreign table

primary_table_id The table number of the primary table.

root Foreign keys are stored in the database as B-trees. The root identifies the location of the root of the B-tree in the database file.

check_on_commit (Y/N) Indicates whether INSERT and UPDATE commands should wait until the next COMMIT command to check if foreign keys are valid. A foreign key is valid if, for each row in the foreign table, the values in the columns of the foreign key either contain the NULL value or match the primary key values in some row of the primary table.

nulls (Y/N) Indicates whether the columns in the foreign key are allowed to contain the NULL value. Note that this setting is independent of the nulls setting in the columns contained in the foreign key.

role The name of the relationship between the foreign table and the primary table. Unless otherwise specified, the role name will be the same as the name of the primary table. The foreign table cannot have two foreign keys with the same role name.

remarks A comment string.

primary_index_id The index_id of the primary key, or root if the primary key is part of a combined index.

fk_not_enforced (Y/N) Is N if one of the tables is remote.

hash_limit Contains information about physical index representation.

SYSGROUP system table

```
CREATE TABLE SYS.SYSGROUP (
    group_id UNSIGNED INT NOT NULL,
    group_member UNSIGNED INT NOT NULL,
    PRIMARY KEY ( group_id, group_member ),
    FOREIGN KEY group_id ( group_id ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY group_member ( group_member )
    REFERENCES SYS.SYSUSERPERM ( user_id )
)
```

There is one row in SYSGROUP for every member of every group. This table describes a many-to-many relationship between groups and members. A group may have many members and a user may be a member of many groups.

group_id The user number of group.

group_member The user number of a member.

SYSINDEX system table

```
CREATE TABLE SYS.SYSINDEX (
    table_id UNSIGNED INT NOT NULL,
    index_id UNSIGNED INT NOT NULL,
    root INT NOT NULL,
    file_id SMALLINT NOT NULL,
    "unique" CHAR(1) NOT NULL,
    creator UNSIGNED INT NOT NULL,
    index_name CHAR(128) NOT NULL,
    remarks LONG VARCHAR,
    index_type CHAR(4) NOT NULL,
    index_owner CHAR(4) NOT NULL,
    hash_limit   SMALLINT NOT NULL,
```

```
    PRIMARY KEY ( table_id, index_id ),
    UNIQUE ( index_name, creator ),
    FOREIGN KEY REFERENCES SYS.SYSTABLE,
    FOREIGN KEY REFERENCES SYS.SYSFILE,
    FOREIGN KEY ( creator ) REFERENCES
    SYS.SYSUSERPERM ( user_id )
)
```

Each index in the database is described by one row in SYSINDEX.

table_id The table number uniquely identifies the table to which this index applies.

index_id Each index for one particular table is assigned a unique index number.

root Indexes are stored in the database as B-trees. The root identifies the location of the root of the B-tree in the database file.

file_id The index is completely contained in the file with this file_id (see "SYSFILE system table").

"unique" Indicates whether the index is a unique index ("Y"), a non-unique index ("N"), or a unique constraint ("U"). A unique index prevents two rows in the indexed table from having the same values in the index columns.

creator The user number of the creator of the index.

index_name The name of the index. A user ID cannot have two indexes with the same name.

remarks A comment string.

index_type The type of index: FP (known as the default index), HG, HNG, LF, DATE, TIME, DTTM, CMP, WD, LD, or SA (for a non-IQ index created in the CATALOG STORE).

index_owner The name of the index owner: USER, IQ, SA, AUTO.

hash_limit For internal use.

SYSINFO system table

```
CREATE TABLE SYS.SYSINFO (
    page_size INTEGER NOT NULL,
    encryption CHAR(1) NOT NULL,
    blank_padding CHAR(1) NOT NULL,
```

```
    case_sensitivity CHAR(1) NOT NULL,
    default_collation CHAR(10) NOT NULL,
    database_version SMALLINT NOT NULL
    classes_version CHAR(10)
)
```

This table indicates the database characteristics as defined when the database was created using CREATE DATABASE. It always contains only one row.

page_size The Catalog page size specified to CREATE DATABASE. The default value is 1024.

encryption The value "Y" or "N" depending on whether encryption was specified with CREATE DATABASE.

blank_padding The value "Y" or "N" depending on whether the database was created to use blank padding for string comparisons in the database.

case_sensitivity The value "Y" or "N" depending on whether case sensitivity was specified with CREATE DATABASE. Case sensitivity affects value comparisons, but not table and column name comparisons. For example, if case sensitivity is enabled, the system catalog names such as SYSCATALOG must be specified in uppercase since that is how the name was spelled when it was created.

default_collation A string corresponding to the collation_label in SYSCOLLATE corresponding to the collation sequence specified with CREATE DATABASE. The collation sequence is used for all string comparisons, including searches for character strings as well as column and table name comparison.

database_version A small integer value indicating the database format. As newer versions of Sybase IQ become available, new features may require that the format of the database file change. The version number allows Sybase IQ software to determine if this database was created with a newer version of the software and thus cannot be understood by the software in use.

classes_version A small string describing the current version of the SYS.JAVA.CLASSES library that is currently installed on your computer.

SYSIQCOLUMN system table

```
CREATE TABLE SYS.SYSIQCOLUMN (
    table_id UNSIGNED INT NOT NULL,
    column_id UNSIGNED INT NOT NULL,
```

```
    link_table_id UNSIGNED INT NULL,
    link_column_id UNSIGNED INT NULL,
    max_length UNSIGNED INT NOT NULL,
    approx_unique_count ROWID
    cardinality ROWID NOT NULL,
    has_data CHAR(1) NOT NULL,
    has_original CHAR(1) NOT NULL,
    original_not_null CHAR(1) NOT NULL,
    original_unique CHAR(1) NOT NULL,
    info_location    HS_VDORECID NOT NULL,
    info_recid_size  UNSIGNED INT NOT NULL,
    info_location_size  UNSIGNED INT NOT NULL,
    PRIMARY KEY ( table_id, column_id )
)
```

Each column in every table is described by one row in SYSIQCOLUMN, which corresponds to a same row in SYSCOLUMN based on the primary key.

table_id The table number uniquely identifies the table to which this column belongs. It corresponds to the table_id column of SYSTABLE.

column_id Each table starts numbering columns at 1. The order of column numbers determines the order that columns are displayed in the command select * from table.

link_table_id For internal use.

link_column_id For internal use.

max_length Indicates the maximum length allowed by the column.

approx_unique_count Approximate number of unique values (cardinality) of this column.

cardinality The actual number of unique values (cardinality) of this column.

has_data Indicates that the column contains data (T or F).

has_original Indicates the join index has the original data (T or F).

original_not_null Indicates the join index column with the original data was NOT NULL (T or F).

original_unique Indicates the join index column with the original data was UNIQUE (T or F).

info_location Not used. Always zero.

info_recid_size Not used. Always zero.

info_location_size Not used. Always zero.

SYSIQFILE system table

```
CREATE TABLE SYS.SYSIQFILE (
    file_id SMALLINT NOT NULL,
    start_block rowid NOT NULL,
    block_count rowid NOT NULL,
    create_time TIMESTAMP NOT NULL,
    segment_type CHAR(8) NOT NULL,
    allocated CHAR(1) NOT NULL,
    server_name  CHAR(30) NOT NULL,
    file_name    CHAR(128) NOT NULL,
    data_offset  UNSIGNED INT NOT NULL,
    PRIMARY KEY ( file_id )
    UNIQUE ( server_name, file_name )
)
```

Every database consists of one or more operating system files. Each dbspace and IQ Message file is recorded in SYSIQFILE (corresponding to a same entry in SYSFILE).

For multiplex, each server has unique entries in SYSIQFILE for its dbspace files. The rows in SYSIQFILE for a multiplex write server are maintained just like those for a non-multiplex server. You must update the SYSIQFILE table on each server in a multiplex environment once it is modified (through CREATE or DROP DBSPACE commands) on any server, so that the tables contain identical information.

The initial CREATE or DROP DBSPACE must occur on the server that writes to the file (the specific server for IQ Temporary dbspaces, the write server for IQ Main dbspaces). That entry must then also be added to SYSIQFILE on each of the other servers. Sybase Central procedures that create and drop dbspaces, including the procedure that adds a new query server to the multiplex, maintain this agreement.

file_id Each file in a database is assigned a unique number. This file identifier is the primary key for SYSIQFILE, and it is linked to a same value in SYSFILE.

start_block The number of the first block.

block_count Number of blocks for this file (dbspace).

create_time The date and time the file was created.

segment_type Defines the type of segment: Main, Temp, or Msg.

allocated Defines whether the segment is preallocated (T) or autoallocated (F).

server_name For non-multiplex databases and write servers, always blank. For multiplex query servers, always contains the query server's name.

file_name For non-multiplex databases, always equal to SYS.SYSFILE file_name entry. For multiplex, the IQ dbspace name used by the multiplex server to open the IQ dbspace.

data_offset Only used for mixed-platform multiplex. Identifies the byte location of where the IQ data starts relative to the beginning of the raw partition. Sybase IQ does not use the disk header block on a raw device. Because the disk header block is used by entities such as volume managers, Sybase IQ skips the first 65536 bytes of a raw device. Block numbers within Sybase IQ always start at 1. The first block would start at offset 65536.

SYSIQINDEX system table

```
CREATE TABLE SYS.SYSIQINDEX (
    table_id UNSIGNED INT NOT NULL,
    index_id UNSIGNED INT NOT NULL,
    max_key UNSIGNED INT NOT NULL,
    identity_location BINARY(16) NOT NULL,
    identity_size UNSIGNED INT NOT NULL,
    identity_location_size UNSIGNED INT NOT NULL,
    link_table_id UNSIGNED INT NOT NULL,
    link_index_id UNSIGNED INT NOT NULL,
    delimited by VARCHAR(1024),
    limit  UNSIGNED INT,
    PRIMARY KEY ( table_id, index_id )
)
```

Each index in the database is described by one row in SYSIQINDEX, which corresponds to an index in SYSINDEX.

table_id The table number uniquely identifies the table to which this index applies. It corresponds to the table_id column of SYSTABLE.

index_id Each index for one particular table is assigned a unique index number.

max_key For internal use.

identity_location For internal use.

identity_size For internal use.

identity_location_size For internal use.

link_table_id For internal use.

link_index_id For internal use.

delimited_by (WD indexes only.) List of separators used to parse a column's string into the words to be stored in that column's WD index.

limit (WD indexes only.) Maximum word length for WD index (between 1 and 255 bytes).

SYSIQINFO system table

```
CREATE TABLE SYS.SYSIQINFO (
    last_full_backup TIMESTAMP,
    last_incr_backup TIMESTAMP,
    create_time TIMESTAMP NOT NULL,
    update_time TIMESTAMP NOT NULL,
    file_format_version UNSIGNED INT NOT NULL,
    cat_format_version UNSIGNED INT NOT NULL
    sp_format_version UNSIGNED INT NOT NULL,
    block_size UNSIGNED INT NOT NULL
    chunk_size UNSIGNED INT NOT NULL,
    file_format_date CHAR(10) NOT NULL
    dbsig BINARY(136) NOT NULL
PRIMARY KEY ( create_time ),
)
```

This table indicates the database characteristics as defined when the IQ database was created using CREATE DATABASE. It always contains only one row.

last_full_backup The completion time of the most recent full backup.

last_incr_backup The completion time of the most recent incremental backup.

create_time The date and time created.

update_time The date and time of the last update.

file_format_version File format number of files for this database.

cat_format_version Catalog format number for this database.

sp_format_version Stored procedure format number for this database.

block_size Block size specified for the database.

chunk_size Number of blocks per chunk as determined by the block size and page size specified for the database.

file_format_date Date when file format number was last changed.

dbsig Used internally by catalog.

SYSIQJOININDEX system table

```
CREATE TABLE SYS.SYSIQJOININDEX (
    joinindex_id UNSIGNED INT NOT NULL,
    jvt_id UNSIGNED INT NOT NULL,
    joinindex_name CHAR(128) NOT NULL,
    joinindex_type CHAR(12) NOT NULL,
    creator UNSIGNED INT NOT NULL,
    join_info_location BINARY(16) NOT NULL,
    join_info_loc_size UNSIGNED INT NOT NULL,
    join_info_size UNSIGNED INT NOT NULL,
    block_map BINARY(32) NOT NULL,
    block_map_size UNSIGNED INT NOT NULL,
    vdo BINARY(256) NOT NULL,
    vdo_size UNSIGNED INT NOT NULL,
    commit_txn_id XACT_ID NOT NULL,
    txn_id XACT_ID NOT NULL,
    valid  CHAR(1) NOT NULL,
    remarks   LONG VARCHAR,
    PRIMARY KEY ( joinindex_id ),
    UNIQUE ( jvt_id, commit_txn_id, txn_id )
)
```

Each row of SYSIQJOININDEX describes one IQ join index in the database.

joinindex_id Each join index is assigned a unique number that is the primary key for SYSIQJOININDEX.

jvt_id For internal use.

joinindex_name Defines the name of the join index.

joinindex_type For internal use.

creator The number of the user that created the join index. The name of the user can be found by looking in SYSUSERPERM.

join_info_location For internal use.

join_info_loc_size For internal use.

join_info_size For internal use.

block_map For internal use.

block_map_size For internal use.

vdo For internal use.

vdo_size For internal use.

commit_txn_id For internal use.

txn_id For internal use.

valid Indicates whether this join index needs to be synchronized. 'Y' means that it does no, 'N' means that it does require synchronization.

remarks A comment string.

SYSIQJOINIXCOLUMN system table

```
CREATE TABLE SYS.SYSIQJOINIXCOLUMN (
    joinindex_id UNSIGNED INT NOT NULL,
    left_table_id UNSIGNED INT NOT NULL,
    left_column_id UNSIGNED INT NOT NULL,
    join_type CHAR(4) NOT NULL,
    right_table_id UNSIGNED INT NOT NULL,
    right_column_id UNSIGNED INT NOT NULL,
    order_num    UNSIGNED INT NOT NULL,
    left_order_num  UNSIGNED INT NOT NULL,
    right_order_num  UNSIGNED INT NOT NULL,
    key_type  CHAR(8) NOT NULL,
    coalesce  CHAR(1)   NOT NULL,
    PRIMARY KEY ( joinindex_id, left_table_id,
left_column_id, right_table_id, right_column_id )
)
```

The rows of SYSIQJOINIXCOLUMN describes the columns which explicitly participate in a join index.

joinindex_id Corresponds to a join index value in SYSIQJOININDEX.

left_table_id Corresponds to a table value in SYSTABLE that forms the left side of the join operation.

left_column_id Corresponds to a column value in SYSCOLUMN that is part of the left side of the join.

join_type Only value currently supported is "=".

right_table_id Corresponds to a table value in SYSTABLE that forms the right side of the join operation.

right_column_id Corresponds to a column value in SYSCOLUMN that is part of the right side of the join.

order_num For internal use.

left_order_num For internal use.

right_order_num For internal use.

key_type Defines the type of join on the keys. 'NATURAL' is a natural join, 'KEY' is a key join, 'ON' is a left outer/right outer/full join.

coalesce Not used.

SYSIQJOINIXTABLE system table

```
CREATE TABLE SYS.SYSIQJOINIXTABLE (
    table_id UNSIGNED INT NOT NULL,
    joinindex_id UNSIGNED INT NOT NULL,
    active UNSIGNED INT NOT NULL,
    PRIMARY KEY ( table_id, joinindex_id )
)
```

The rows of SYSIQJOINIXTABLE describes the tables which explicitly participate in a join index.

table_id Corresponds to a table value in SYSTABLE that is included in a join operation.

joinindex_id Corresponds to a join index value in SYSIQJOININDEX.

active Defines the number of times the table is used in the join index.

SYSIQTABLE system table

```
CREATE TABLE SYS.SYSIQTABLE (
    table_id UNSIGNED INT NOT NULL,
    block_map BINARY(32) NOT NULL,
    block_map_size UNSIGNED INT NOT NULL,
```

```
    vdo BINARY(256) NOT NULL,
    vdoid_size UNSIGNED INT NOT NULL,
    info_location    HS_VDORECID NOT NULL,
    info_recid_size  UNSIGNED INT NOT NULL,
    info_location_size  UNSIGNED INT NOT NULL,
    commit_txn_id UNSIGNED INT NOT NULL,
    txn_id UNSIGNED INT NOT NULL,
    join_id UNSIGNED INT NOT NULL,
    create_time TIMESTAMP NOT NULL,
    update_time TIMESTAMP NOT NULL,
    PRIMARY KEY ( table_id ),
    UNIQUE ( commit_txn_id, txn_id )
)
```

Each row of SYSIQTABLE describes one table in the database, which corresponds to a table entry in SYSTABLE.

table_id Each table is assigned a unique number (the table number) that is the primary key for SYSIQTABLE.

block_map For internal use.

block_map_size For internal use.

vdo For internal use.

vdoid_size For internal use.

info_location Not used. Always zero.

info_recid_size Not used. Always zero.

info_location_size Not used. Always zero.

commit_txn_id For internal use.

txn_id For internal use.

join_id For internal use.

create_time Defines the date and time the IQ table was created.

update_time Defines the last date and time the IQ table was modified.

SYSIXCOL system table

```
CREATE TABLE SYS.SYSIXCOL (
    table_id UNSIGNED INT NOT NULL,
    index_id UNSIGNED INT NOT NULL,
```

```
    sequence SMALLINT NOT NULL,
    column_id UNSIGNED INT NOT NULL,
    "order" CHAR(1) NOT NULL,
    PRIMARY KEY ( table_id, index_id, sequence ),
    FOREIGN KEY REFERENCES SYS.SYSINDEX,
    FOREIGN KEY REFERENCES SYS.SYSCOLUMN
)
```

Every index has one row in SYSIXCOL for each column in the index.

table_id Identifies the table to which the index applies.

index_id Identifies in which index this column is used. Together, table_id and index_id identify one index described in SYSINDEX.

sequence Each column in an index is assigned a unique number starting at 0. The order of these numbers determines the relative significance of the columns in the index. The most important column has sequence number 0.

column_id The column number identifies which column is indexed. Together, table_id and column_id identify one column in SYSCOLUMN.

"order" Indicates whether this column in the index is kept in ascending or descending order (A or D).

SYSJAR system table

```
CREATE TABLE SYS.SYSJAR(
    jar_id INTEGER NOT NULL,
    creator UNSIGNED INT NOT NULL,
    jar_name LONG VARCHAR NOT NULL,
    jar_file LONG VARCHAR,
    create_time TIMESTAMP NOT NULL,
    update_time TIMESTAMP NOT NULL,
    remarks LONG VARCHAR,
    PRIMARY KEY ( jar_id )
)
```

jar_id A field containing the ID of the jar file.

creator This user number identifies the creator of the jar file. The name of the user can be found by looking in SYSUSERPERM.

jar_name The name of the jar file.

jar_file The file name of the jar file.

create_time The time the jar file was created.

update_time The time the jar file was last updated.

remarks A comment string.

SYSJARCOMPONENT system table

```
CREATE TABLE SYS.SYSJARCOMPONENT(
    component_id INT NOT NULL,
    jar_id INT,
    component_name LONG VARCHAR,
    component_type CHAR(1),
    create_time TIMESTAMP NOT NULL,
    contents LONG BINARY,
    remarks LONG VARCHAR,
    PRIMARY KEY ( component_id ),
    FOREIGN KEY REFERENCES SYS.SYSJAR
)
```

component_id The primary key containing the id of the component.

jar_id A field containing the ID of the jar file. This field also references the SYSJAR system table.

component_name The name of the component.

component_type The type of the component.

create_time The field containing the creation time of the component.

contents The byte code of the jar file.

remarks A comment string.

SYSJAVACLASS system table

```
CREATE TABLE SYS.SYSJAVACLASS(
    class_id INT NOT NULL,
    replaced_by INT,
    creator UNSIGNED INT NOT NULL,
    jar_id INT,
    type_id UNSIGNED INT,
```

```
    class_name LONG VARCHAR NOT NULL,
    public CHAR(1) NOT NULL,
    component_id INT,
    create_time TIMESTAMP NOT NULL,
    update_time TIMESTAMP NOT NULL,
    class_descriptor LONG BINARY,
    remarks LONG VARCHAR,
    PRIMARY KEY ( class_id ),
    FOREIGN KEY ( replaced_by ) REFERENCES
o.SYSJAVACLASS ( class_id ),
    FOREIGN KEY ( creator ) REFERENCES
SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY REFERENCES SYS.SYSUSERTYPE
    FOREIGN KEY REFERENCES SYS.SYSJARCOMPONENT
)
```

The SYSJAVACLASS system table contains all information related to Java classes.

class_id A field containing the ID of the java class.

replaced_by A field that references the primary key field class_id.

creator A field containing user_id of the creator of the class. This field references the user_id field in the SYSUSERPERM system table to obtain the name of the user.

jar_id A field containing the ID of the jar file from which the class came.

type_id The field containing the id of the user type. The field references the SYSUSERTYPE system table to obtain the ID of the user.

class_name This field contains the name of the Java class.

public This field determines whether or not the class is public or private.

component_id This field references the SYSJARCOMPONENT system table and contains the ID of the component.

create_time The field containing the creation time of the component.

update_time The field containing the last update time of the component.

class_descriptor The byte code of the jar file.

remarks A comment string.

SYSLOGIN system table

```
CREATE TABLE SYS.SYSLOGIN (
    integrated_login_id CHAR(128) NOT NULL,
    login_uid UNSIGNED INT NOT NULL,
    remarks LONG VARCHAR,
    PRIMARY KEY ( integrated_login_id )
)
```

This table contains all the User Profile names that can be used to connect to the database using an integrated logon. As a security measure, only users with DBA authority can view the contents of this table.

integrated_login_id Is a string value containing the User Profile name used to map to a user ID in the database. When a user successfully logs on using this User Profile name, and the database is enabled to accept integrated logons, the user can connect to the database without providing a user ID or password.

login_uid Is a foreign key to the system table SYSUSERPERM.

remarks Contains a comment string

SYSOPTION system table

```
CREATE TABLE SYS.SYSOPTION (
    user_id UNSIGNED INT NOT NULL,
    "option" CHAR(128) NOT NULL,
    "setting" LONG VARCHAR NOT NULL,
    PRIMARY KEY ( user_id, "option" ),
    FOREIGN KEY REFERENCES SYS.SYSUSERPERM
)
```

Options settings are stored in the SYSOPTION table by the SET command. Each user can have their own setting for each option. In addition, settings for the PUBLIC user ID define the default settings to be used for user IDs that do not have their own setting.

Note If you try to query the option column of this table in a case-sensitive database, you must match case of the option. For example, the MAIN_CACHE_MEMORY_MB option is stored in SYSOPTION as Main_Cache_Memory_MB. You can run a select * from the SYSOPTION table to see the exact case of the option.

---

user_id The user number to whom this option setting applies.

"option" The name of the option.

"setting" The current setting for the named option.

If you incorrectly type the name of an option when you are setting the option, the incorrect name is saved in the SYSOPTION table. You can remove the incorrectly typed name from the SYSOPTION table by setting the option PUBLIC with an equality after the option name and no value:

```
SET OPTION PUBLIC.a_mistyped_name=;
```

SYSOPTIONDEFAULTS system table

```
create table DBA.SYSOPTIONDEFAULTS (
    option_name varchar(128),
    default_value varchar(40)
)
```

The SYSOPTIONDEFAULTS table stores the default option settings. These values do not change. The sp_iqcheckoptions stored procedure compares the default value in the SYSOPTIONDEFAULTS table to the current setting of the option in the SYSOPTION table and displays the values that have changed for the connected user.

Note If you try to query the option_name column of this table in a case-sensitive database, you must match case of the option. For example, the MAIN_CACHE_MEMORY_MB option is stored in SYSOPTIONDEFAULTS as Main_Cache_Memory_MB. You can run a `select *` from the SYSOPTIONDEFAULTS table to see the exact case of the option.

---

option_name The name of the option.

default_value The default value of the option.

SYSPROCEDURE system table

```
CREATE TABLE SYS.SYSPROCEDURE (
    proc_id UNSIGNED INT NOT NULL,
    creator UNSIGNED INT NOT NULL,
    proc_name CHAR(128) NOT NULL,
    proc_defn LONG VARCHAR,
    remarks LONG VARCHAR,
    replicate CHAR(1) NOT NULL,
    srvid INT NOT NULL,
    PRIMARY KEY ( proc_id ),
    UNIQUE ( proc_name, creator ),
    FOREIGN KEY ( creator ) REFERENCES
       SYS.SYSUSERPERM ( user_id )
)
```

Each procedure in the database is described by one row in SYSPROCEDURE.

proc_id Each procedure is assigned a unique number (the procedure number) that is the primary key for SYSPROCEDURE.

creator This user number identifies the owner of the procedure. The name of the user can be found by looking in SYSUSERPERM.

proc_name The name of the procedure. One creator cannot have two procedures with the same name.

proc_defn The command used to create the procedure.

remarks A comment string.

replicate Holds a Y if the procedure is a primary data source in a Replication Server installation, or an N if not.

srvid If a procedure on a remote database server, indicates the remote server.

SYSPROCPARM system table

```
CREATE TABLE SYS.SYSPROCPARM (
    proc_id UNSIGNED INT NOT NULL,
    parm_id SMALLINT NOT NULL,
    parm_type SMALLINT NOT NULL,
    parm_mode_in CHAR(1) NOT NULL,
    parm_mode_out CHAR(1) NOT NULL,
    domain_id SMALLINT NOT NULL,
    width SMALLINT NOT NULL,
    scale SMALLINT NOT NULL,
    parm_name CHAR(128) NOT NULL,
    remarks LONG VARCHAR,
    "default" LONG VARCHAR,
    user_type INTEGER,
    PRIMARY KEY ( proc_id, parm_id ),
    FOREIGN KEY REFERENCES SYS.SYSPROCEDURE,
    FOREIGN KEY REFERENCES SYS.SYSDOMAIN
)
```

Each parameter to a procedure in the database is described by one row in SYSPROCEDURE.

proc_id The procedure number uniquely identifies the procedure to which this parameter belongs.

parm_id Each procedure starts numbering parameters at 1. The order of parameter numbers corresponds to the order in which they were defined.

parm_type The type of parameter will be one of the following:

- Normal parameter (variable)
- Result variable - used with procedure that return result sets
- SQLSTATE error value

- SQLCODE error value

parm_mode_in (Y/N) Indicates whether this parameter supplies a value to the procedure (IN or INOUT parameters).

parm_mode_out (Y/N) Indicates whether this parameter returns a value from the procedure (OUT or INOUT parameters).

domain_id Identify the data type for the parameter by the data type number listed in the SYSDOMAIN table.

width This column contains the length of string parameters, the precision of numeric parameters, and the number of bytes of storage for all other data types.

scale The number of digits after the decimal point for numeric data type parameters, and zero for all other data types.

parm_name The name of the parameter.

remarks A comment string.

default The default value for the parameter, held as a string.

user_type The user type of the parameter.

SYSPROCPERM system table

```
CREATE TABLE SYS.SYSPROCPERM (
    proc_id UNSIGNED INT NOT NULL,
    grantee UNSIGNED INT NOT NULL,
    PRIMARY KEY ( proc_id, grantee )
    FOREIGN KEY ( grantee ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY REFERENCES SYS.SYSPROCEDURE
)
```

Only users who have been granted permission can call a procedure. Each row of the SYSPROCPERM table corresponds to one user granted permission to call one procedure.

proc_id The procedure number uniquely identifies the procedure for which permission has been granted.

grantee The user number of the user ID receiving the permission.

SYSPUBLICATION system table

```
CREATE TABLE SYS.SYSPUBLICATION (
    publication_id UNSIGNED INT NOT NULL,
    creator UNSIGNED INT NOT NULL,
    publication_name CHAR(128) NOT NULL,
    remarks LONG VARCHAR,
    PRIMARY KEY ( publication_id ),
    FOREIGN KEY ( creator )
    REFERENCES SYS.SYSUSERPERM (user_id )
)
```

Each row describes a SQL Remote publication.

publication_id A unique identifying number for the publication.

creator The owner of the publication.

publication_name The name of the publication, which must be a valid identifier.

remarks Descriptive comments.

SYSREMOTEOPTION system table

```
CREATE table SYS.SYSREMOTEOPTION (
    option_id UNSIGNED INT NOT NULL,
    user_id UNSIGNED INT NOT NULL,
    "setting" VARCHAR( 255 ) NOT NULL,
    PRIMARY KEY ( option_id, user_id ),
    FOREIGN KEY REFERENCES SYS.SYSREMOTEOPTIONTYPE
)
```

Each row describes the values of a SQL Remote message link parameter.

option_id An identification number for the message link parameter.

user_id The user ID for which the parameter is set.

"setting" The value of the message link parameter.

SYSREMOTEOPTIONTYPE system table

```
CREATE table SYS.SYSREMOTEOPTIONTYPE (
    option_id  UNSIGNED INT NOT NULL,
    type_id SMALLINT NOT NULL,
    "option" VARCHAR( 128 )  NOT NULL,
    PRIMARY KEY ( option_id ),
    FOREIGN KEY REFERENCES SYS.SYSREMOTETYPE
)
```

Each row describes one of the SQL Remote message link parameters.

option_id An identification number for the message link parameter.

type_id An identification number for the message type that uses this parameter.

"option" The name of the message link parameter.

SYSREMOTETYPE system table

```
CREATE TABLE SYS.SYSREMOTETYPE (
    type_id SMALLINT NOT NULL,
    type_name CHAR(128) NOT NULL,
    publisher_address LONG VARCHAR NOT NULL,
    remarks LONG VARCHAR,
    PRIMARY KEY ( type_id )
)
```

The SYSREMOTETYPE system table contains information about SQL Remote.

type_id Identifies which of the message systems supported by SQL Remote is used to send messages to this user.

type_name The name of the message system supported by SQL Remote.

publisher_address The address of the remote database publisher.

remarks Descriptive comments.

SYSREMOTEUSER system table

```
CREATE TABLE SYS.SYSREMOTEUSER (
```

```
    user_id UNSIGNED INT NOT NULL,
    consolidate CHAR(1) NOT NULL,
    type_id SMALLINT NOT NULL,
    address LONG VARCHAR NOT NULL,
    frequency CHAR(1) NOT NULL,
    send_time TIME,
    log_send NUMERIC(20,0) NOT NULL,
    time_sent TIMESTAMP,
    log_sent NUMERIC(20,0) NOT NULL,
    confirm_sent NUMERIC(20,0) NOT NULL,
    send_count INTEGER NOT NULL,
    resend_count INTEGER NOT NULL,
    time_received TIMESTAMP,
    log_received NUMERIC(20,0) NOT NULL,
    confirm_received NUMERIC(20,0),
    receive_count INTEGER NOT NULL,
    rereceive_count INTEGER NOT NULL,
    PRIMARY KEY (user_id),
    FOREIGN KEY REFERENCES SYS.SYSUSERPERM
)
```

Each row describes a user ID with REMOTE permissions (a subscriber), together with the status of SQL Remote messages sent to and from that user.

user_id The user ID of the user with REMOTE permissions.

consolidate The column contains either an N to indicate a user granted REMOTE permissions, or a Y to indicate a user granted CONSOLIDATE permissions.

type_id Identifies which of the of the message systems supported by SQL Remote is to be used to send messages to this user.

address The address to which SQL Remote messages are to be sent. The address must be appropriate for the address_type.

frequency How frequently SQL Remote messages are to be sent.

send_time The next time messages are to be sent to this user.

log_send Messages are sent only to subscribers for whom log_send is greater than log_sent.

time_sent The time the most recent message was sent to this subscriber.

log_sent The log offset for the most recently sent operation.

confirm_sent The log offset for the most recently confirmed operation from this subscriber.

send_count How many SQL Remote messages have been sent.

resend_count Counter to ensure messages are applied only once at the subscriber database.

time_received The time the most recent message was received from this subscriber.

log_received The log offset in the subscriber's database for the operation most recently received at the current database.

confirm_received The log offset in the subscriber's database for the most recent operation for which a confirmation message has been sent.

receive_count How many messages have been received.

rereceive_count Counter to ensure messages are applied only once at the current database.

SYSSCHEDULE system table

```
CREATE TABLE SYS.SYSSCHEDULE (
    event_id INT NOT NULL,
    sched_name VARCHAR(128) NOT NULL,
    recurring TINYINT NOT NULL,
    start_time TIME NOT NULL,
    stop_time TIME NULL,
    start_date DATE NULL,
    days_of_week TINYINT NULL,
    days_of_month UNSIGNED INT NULL,
    interval_units CHAR(10) NULL,
    interval_amt INT NULL,
    PRIMARY KEY ( event_id, sched_name )
)
```

Each row in SYSSCHEDULE describes the times at which an event is to fire, as specified by the SCHEDULE clause of CREATE EVENT.

event_id The unique number assigned to each event.

sched_name The name associated with a schedule.

recurring (0/1) Indicates if the schedule is repeating.

start_time The schedule start time.

stop_time The schedule stop time, if BETWEEN was used.

start_date The first date on which the event is scheduled to execute.

days_of_week A bit mask indicating the days of the week on which the event is scheduled:

- x01 = Sunday
- x02 = Monday
- x04 = Tuesday
- x08 = Wednesday
- x10 = Thursday
- x20 = Friday
- x40 = Saturday

days_of_month A bit mask indicating the days of the month on which the event is scheduled:

- x01 = first day of the month
- x02 = second day of the month
- x40000000 = 31st day of the month
- x80000000 = last day of the month

interval_units The interval unit specified by EVERY:

- HH = hours
- NN = minutes
- SS = seconds

interval_amt The period specified by EVERY.

SYSSERVERS system table

```
CREATE TABLE SYS.SYSSERVERS (
    srvid  INT  NOT NULL,
    srvname VARCHAR(128) NOT NULL,
    srvclass LONG VARCHAR NOT NULL,
    srvinfo LONG VARCHAR,
    srvreadonly CHAR(1) NOT NULL,
    PRIMARY KEY ( srvid )
)
```

Each row describes a remote server.

srvid An identifier for the remote server.

srvname The name of the remote server.

srvclass The server class, as specified in the CREATE SERVER statement.

srvinfo Server information.

srvreadonly Y if the server is read only, and N otherwise.

SYSSQLSERVERTYPE system table

```
CREATE TABLE SYS.SYSSQLSERVERTYPE (
    ss_user_type SMALLINT NOT NULL,
    ss_domain_id SMALLINT NOT NULL,
    ss_type_name VARCHAR(30) NOT NULL,
    primary_sa_domain_id SMALLINT NOT NULL,
    primary_sa_user_type SMALLINT NULL,
    PRIMARY KEY ( type_id )
)
```

This table contains information relating to compatibility with Adaptive Server Enterprise.

ss_user_type A field describing the Adaptive Server Enterprise user type.

ss_domain_id A field describing the Adaptive Server Enterprise domain ID.

ss_type_name Contains the Adaptive Server Enterprise type name.

primary_sa_domain_id A field containing the primary domain id.

primary_sa_user_type A field containing the primary user type.

SYSSUBSCRIPTION system table

```
CREATE TABLE SYS.SYSSUBSCRIPTION (
    publication_id UNSIGNED INT NOT NULL,
    user_id UNSIGNED INT NOT NULL,
    subscribe_by CHAR(128) NOT NULL,
```

```
    created NUMERIC(20,0) NOT NULL,
    started NUMERIC(20,0),
    PRIMARY KEY (publication_id, user_id,
subscribe_by),
    FOREIGN KEY REFERENCES SYS.SYSPUBLICATION,
    FOREIGN KEY REFERENCES SYS.SYSREMOTEUSER
);
```

Each row describes a subscription from one user ID (which must have REMOTE permissions) to one publication.

publication_id The identifier for the publication to which the user ID is subscribed.

user_id The user ID that is subscribed to the publication.

subscribe_by For publications with a SUBSCRIBE BY expression, this column holds the matching value for this subscription.

created The offset in the transaction log at which the subscription was created.

started The offset in the transaction log at which the subscription was started.

SYSTABLE system table

```
CREATE TABLE SYS.SYSTABLE (
    table_id UNSIGNED INT NOT NULL,
    file_id SMALLINT NOT NULL,
    count UNSIGNED BIGINT NOT NULL,
    first_page INT NOT NULL,
    last_page INT NOT NULL,
    primary_root INT NOT NULL,
    creator UNSIGNED INT NOT NULL,
    first_ext_page  INT NOT NULL,
    last_ext_page   INT NOT NULL,
    table_page_count    INT NOT NULL,
    ext_page_count  INT NOT NULL,
    table_name CHAR(128) NOT NULL,
    table_type CHAR(10) NOT NULL,
    view_def LONG VARCHAR,
    remarks LONG VARCHAR,
    replicate CHAR(1) NOT NULL,
    "existing_obj" CHAR(1),
```

```
    remote_location LONG VARCHAR,
    remote_objtype CHAR(1),
    srvid INTEGER,
    server_type CHAR(4) NOT NULL,
    primary_hash_limit  SMALLINT NOT NULL,
    PRIMARY KEY ( table_id ),
    UNIQUE ( table_name, creator ),
    FOREIGN KEY ( creator ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY REFERENCES SYS.SYSFILE
)
```

Each row of SYSTABLE describes one table or view in the database.

table_id Each table or view is assigned a unique number (the table number) that is the primary key for SYSTABLE.

file_id The file number indicates which database file contains the table. The file_id is a FOREIGN KEY for SYSFILE.

count The number of rows in the table is updated during each successful CHECKPOINT. This number is used by Sybase IQ when optimizing database access. The count is always 0 for a view.

first_page Each IQ database is divided into a number of fixed size pages. This value identifies the first page containing information for this table, and is used internally to find the start of this table. The first_page is always 0 for a view.

last_page The last page containing information for this table. The last_page is always 0 for a view.

primary_root Primary keys are stored in the database as B-trees. The primary_root locates the root of the B-tree for the primary key for the table. It will be 0 for a view and for a table with no primary key.

creator This user number identifies the owner of the table or view. The name of the user can be found by looking in SYSUSERPERM.

table_name The name of the table or view. One creator cannot have two tables or views with the same name.

first_ext_page For internal use.

last_ext_page For internal use.

table_page_count For internal use.

ext_page_count For internal use.

table_type This column is BASE for base tables and VIEW for views. It will be GBL TEMP for global temporary tables and JVT for join indexes. No entry is created for local temporary tables.

view_def For a view, this column contains the CREATE VIEW command used to create the view. For a table, this column will contain any CHECK constraints for the table.

remarks A comment string.

replicate Holds a Y if the table is a primary data source in a Replication Server installation, or an N if not.

"existing_obj" (Y/N) Indicates whether the table previously existed or not.

remote_location Indicates the storage location of the remote object.

remote_objtype Indicates the type of remote object: 'T' if table; 'V' if view; 'R' if rpc; 'B' if JavaBean.

srvid The unique ID for the server.

server_type Indicates whether the table was created in the CATALOG STORE (SA) or IQ STORE.

primary_hash_limit For internal use.

SYSTABLEPERM system table

```
CREATE TABLE SYS.SYSTABLEPERM (
    stable_id UNSIGNED INT NOT NULL,
    grantee UNSIGNED INT NOT NULL,
    grantor UNSIGNED INT NOT NULL,
    ttable_id UNSIGNED INT NOT NULL,
    selectauth CHAR(1) NOT NULL,
    insertauth CHAR(1) NOT NULL,
    deleteauth CHAR(1) NOT NULL,
    updateauth CHAR(1) NOT NULL,
    updatecols CHAR(1) NOT NULL,
    alterauth CHAR(1) NOT NULL,
    referenceauth CHAR(1) NOT NULL,
    PRIMARY KEY ( stable_id, grantee, grantor ),
    FOREIGN KEY ( stable_id )
    REFERENCES SYS.SYSTABLE ( table_id ),
    FOREIGN KEY future ( ttable_id )
```

```
    REFERENCES SYS.SYSTABLE ( table_id ),
    FOREIGN KEY grantee ( grantee ) REFERENCES
    SYS.SYSUSERPERM ( user_id ),
    FOREIGN KEY grantor ( grantor )
    REFERENCES SYS.SYSUSERPERM ( user_id )
)
```

Permissions given by the GRANT command are stored in SYSTABLEPERM. Each row in this table corresponds to one table, one user ID granting the permission (grantor) and one user ID granted the permission (grantee).

There are several types of permission that can be granted. Each permission can have one of the following three values.

- **N** No, the grantee has not been granted this permission by the grantor.
- **Y** Yes, the grantee has been given this permission by the grantor.
- **G** The grantee has been given this permission. In addition, the grantee can grant the same permission to another user

---

Note The grantee might have been given permission for the same table by another grantor. If so, this information would be recorded in a different row of SYSTABLEPERM.

---

stable_id The table number of the table or view to which the permissions apply.

grantor The user number of the user ID granting the permission.

grantee The user number of the user ID receiving the permission.

ttable_id In the current version of Sybase IQ, this table number is always the same as stable_id.

selectauth (Y/N/G) Indicates whether SELECT permission has been granted.

insertauth (Y/N/G) Indicates whether INSERT permission has been granted.

deleteauth (Y/N/G) Indicates whether DELETE permission has been granted.

updateauth (Y/N/G) Indicates whether UPDATE permission has been granted for all columns in the table. (Only UPDATE permission can be given on individual columns. All other permissions are for all columns in a table.)

updatecols (Y/N) Indicates whether UPDATE permission has only been granted for some of the columns in the table. If updatecols has the value Y, there will be one or more rows in SYSCOLPERM granting update permission for the columns in this table.

alterauth (Y/N/G) Indicates whether ALTER permission has been granted.

referenceauth (Y/N/G) Indicates whether REFERENCE permission has been granted.

SYSTYPEMAP system table

```
CREATE TABLE SYS.SYSTYPEMAP (
    ss_user_type SMALLINT NOT NULL,
    sa_domain_id SMALLINT NOT NULL,
    sa_user_type SMALLINT NULL,
    nullable CHAR(1) NULL,
    FOREIGN KEY REFERENCES SYS.SYSSQLSERVERTYPE
)
```

The SYSTYPEMAP system table contains the compatibility mapping values for the SYSSQLSERVERTYPE system table.

ss_user_type Contains the Adaptive Server Enterprise user type.

sa_domain_id Contains the domain ID.

sa_user_type Contains the user type.

nullable This field describes whether or not the type can be NULL.

primary_sa_user_type A field containing the primary user type.

SYSUSERMESSAGES system table

```
CREATE TABLE SYS.SYSUSERMESSAGES (
    error INT NOT NULL,
    uid UNSIGNED INT NOT NULL,
    description VARCHAR(255) NOT NULL,
    langid SMALLINT NOT NULL,
    UNIQUE ( error, langid )
```

```
)
```

Each row holds a user-defined message for an error condition.

error A unique identifying number for the error condition.

uid The user ID defining the message.

description The message corresponding to the error condition.

langid Reserved.

SYSUSERPERM system table

```
CREATE TABLE SYS.SYSUSERPERM (
    user_id UNSIGNED INT NOT NULL,
    user_name CHAR(128) NOT NULL UNIQUE,
    password BINARY(36),
    resourceauth CHAR(1) NOT NULL,
    dbaauth CHAR(1) NOT NULL,
    scheduleauth CHAR(1) NOT NULL,
    publishauth CHAR(1) NOT NULL,
    remotedbaauth CHAR(1) NOT NULL,
    user_group CHAR(1) NOT NULL,
    remarks LONG VARCHAR,
    PRIMARY KEY ( user_id )
)
```

Note SYSUSERPERM contains passwords, and so DBA permissions are required to SELECT from the table.

Each row of SYSUSERPERM describes one user ID.

user_id Each new user ID is assigned a unique number (the user number) that is the primary key for SYSUSERPERM.

user_name A string containing the name for the user ID. Each userid must have a unique name.

password The password for the user ID. The password contains the NULL value for the special user IDs SYS and PUBLIC, preventing anyone from connecting to these user IDs.

resourceauth (Y/N) Indicates whether the user has RESOURCE authority. Resource authority is required to create tables.

dbaauth (Y/N) Indicates whether the user has DBA (database administrator) authority. DBA authority is very powerful, and should be restricted to as few user IDs as possible for security purposes.

scheduleauth (Y/N) Indicates whether the user has SCHEDULE authority. This is currently not used by Sybase IQ.

publishauth (Y/N) Indicates whether the user has the SQL Remote publisher authority.

remotedbaauth (Y/N) Indicates whether the user has the SQL Remote remote DBA authority.

user_group (Y/N) Indicates whether the user is a group.

remarks A comment string.

When a database is initialized, the following user IDs are created:

- **SYS** The creator of all the system tables.
- **PUBLIC** A special user ID used to record PUBLIC permissions.
- **DBA** The database administrator user ID is the only usable user ID in an initialized system. The initial password is SQL.

There is no way to connect to the SYS or PUBLIC user IDs.

SYSUSERTYPE system table

```
CREATE TABLE SYS.SYSUSERTYPE (
    type_id SMALLINT NOT NULL,
    creator UNSIGNED INT NOT NULL,
    domain_id UNSIGNED INT NOT NULL,
    nulls CHAR(1) NOT NULL,
    width SMALLINT NOT NULL,
    scale SMALLINT NOT NULL,
    type_name CHAR(128) NOT NULL,
    "default" LONG VARCHAR NULL,
    "check" LONG VARCHAR NULL,
    format_str CHAR(128),
    super_type_id SMALLINT NULL,
    UNIQUE ( type_name ),
    PRIMARY KEY ( type_id ),
    FOREIGN KEY ( creator )
    REFERENCES SYS.SYSUSERPERM ( user_id ),
```

```
    FOREIGN KEY REFERENCES SYS.SYSDOMAIN,
    FOREIGN KEY ( super_type_id )
    REFERENCES SYS.SYSUSERTYPE ( type_id )
)
```

Each row holds a description of a user-defined data type.

type_id A unique identifying number for the user-defined data type.

creator The owner of the data type.

domain_id Identifies the data type for the column by the data type number listed in the SYSDOMAIN table.

nulls A *Y* indicates that the user-defined data type does allow nulls. A *N* indicates that the data type does not allow nulls.

width This column contains the length of string columns, the precision of numeric columns, and the number of bytes of storage for all other data types.

scale The number of digits after the decimal point for numeric data type columns, and zero for all other data types.

type_name The name for the data type, which must be a valid identifier.

"default" The default value for the data type.

"check" The CHECK condition for the data type.

Note The “default” value and “check” condition features are not currently supported by Sybase IQ.

---

format_str Currently unused.

SYSWEBSERVICE system table

```
CREATE TABLE SYS.SYSWEBSERVICE (
    service_id UNSIGNED INT NOT NULL,
    service_name CHAR(128) NOT NULL,
    service_type VARCHAR(40) NOT NULL,
    auth_required CHAR(1) NOT NULL,
    secure_required CHAR(1) NOT NULL,
    url_path CHAR(1) NOT NULL,
    user_id UNSIGNED INT,
    parameter VARCHAR(250)
    statement LONG VARCHAR,
```

```
    remarks LONG VARCHAR,
    super_type_id SMALLINT NULL,
    UNIQUE ( type_name ),
    PRIMARY KEY ( service_id )
)
)
```

Each row holds a description of a web service.

service_id A unique identifying number for the web service.

service_name The name assigned to the web service.

service_type The type of the service, for example, RAW, HTTP, XML, SOAP, or DISH.

auth_required (Y/N) Indicates whether all requests must contain a valid user name and password.

secure_required (Y/N) Indicates whether insecure connections, such as HTTP, are to be accepted, or only secure connections, such as HTTPS.

url_path Controls the interpretation of URLs.

user_id If authentication is enabled, identifies the user, or group of users, that have permission to use the service. If authentication is disabled, specifies the account to use when processing requests.

parameter A prefix that identifies the SOAP services to be included in a DISH service.

statement A SQL statement that is always executed in response to a request. If NULL, arbitrary statements contained in each request are executed instead. Ignored for services of type DISH.

CHAPTER 11

System Views

About this chapter

This chapter lists predefined views for the IQ system tables.

The system tables described in **System Tables** use numbers to identify tables, user IDs, and so forth. While this is efficient for internal use, it makes these tables difficult for people to interpret. A number of predefined system views are provided that present the information in the system tables in a more readable format.

The definitions for the system views are included with their descriptions. Some of these definitions are complicated, but need not be understood to use the views. They serve as good examples of what can be accomplished using the SELECT command and views.

SYSARTICLECOLS system view

```
CREATE VIEW SYS.SYSARTICLECOLS
AS SELECT (select publication_name FROM
    SYS.SYSPUBLICATION AS p
WHERE p.publication_id=ac.publication_id) AS
publication_name,
       (select table_name FROM SYS.SYSTABLE AS t
       WHERE t.table_id=ac.table_id) AS table_name,
       select column_name FROM SYS.SYSCOLUMN AS c
       WHERE c.table_id=ac.table_id
    AND c.column_id=ac.column_id) AS column_name
FROM SYS.SYSARTICLECOL AS ac
```

Presents a readable version of the table SYSARTICLECOLS.

SYSARTICLES system view

```
CREATE VIEW SYS.SYSARTICLES
  AS SELECT(select publication_name FROM
```

```
        SYS.SYSPUBLICATION AS p
    WHERE p.publication_id=a.publication_id) AS
        publication_name,
    (select table_name FROM SYS.SYSTABLE AS t
    WHERE t.table_id=a.table_id) AS table_name,
        where_expr,subscribe_by_expr
FROM SYS.SYSARTICLE AS a
```

Presents a readable version of the table SYSARTICLES.

SYSCAPABILITIES system view

```
CREATE VIEW SYS.SYSCAPABILITIES
AS
SELECT t1.capid,srvid,capname,capvalue
FROM
    SYS.SYSCAPABILITY as t1
    JOIN SYS.SYSCAPABILITYNAME as t2
    ON t1.capid = t2.capid
```

Presents the data from the system tables SYSCAPABILITY and SYSCAPABILITYNAME in a more readable format.

SYSCATALOG system view

```
CREATE VIEW SYS.SYSCATALOG ( creator,
    tname, dbspacename, tabletype, ncols,
    primary_key, "check", remarks )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
             WHERE user_id = SYSTABLE.creator ),
        table_name,
        ( SELECT dbspace_name from SYS.SYSFILE
             WHERE file_id = SYSTABLE.file_id ),
        IF table_type='BASE' THEN 'TABLE'
           ELSE table_type ENDIF,
        ( SELECT count(*) FROM SYS.SYSCOLUMN
           WHERE table_id = SYSTABLE.table_id ),
        IF primary_root = 0 THEN 'N' ELSE 'Y' ENDIF,
        IF table_type <> VIEW' THEN view_def ENDIF,
```

```
       remarks
FROM SYS.SYSTABLE
```

Lists all the tables and views from SYSTABLE in a readable format.

SYSCOLAUTH system view

```
CREATE VIEW SYS.SYSCOLAUTH ( grantor, grantee,
    creator, tname, colname )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
           WHERE user_id = SYSCOLPERM.grantor ),
       ( SELECT user_name FROM SYS.SYSUSERPERM
           WHERE user_id = SYSCOLPERM.grantee ),
       ( SELECT user_name
           FROM SYS.SYSUSERPERM == SYS.SYSTABLE
           WHERE table_id = SYSCOLPERM.table_id ),
       ( SELECT table_name FROM SYS.SYSTABLE
           WHERE table_id = SYSCOLPERM.table_id ),
       ( SELECT column_name FROM SYS.SYSCOLUMN
           WHERE table_id = SYSCOLPERM.table_id
           AND column_id = SYSCOLPERM.column_id )
FROM SYS.SYSCOLPERM
```

Presents column update permission information in SYSCOLPERM in a more readable format.

SYSCOLUMNS system view

```
CREATE VIEW SYS.SYSCOLUMNS ( creator, cname, tname,
coltype, nulls, length, syslength,
in_primary_key, "colno", default_value, remarks )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
           WHERE user_id = SYSTABLE.creator ),
       column_name, table_name,
       ( SELECT domain_name FROM SYS.SYSDOMAIN
           WHERE domain_id = SYSCOLUMN.domain_id ),
       nulls, width, scale, pkey, column_id,
       "default", SYSCOLUMN.remarks
```

```
FROM SYS.SYSCOLUMN == SYS.SYSTABLE
```

Presents a readable version of the table SYSCOLUMN. (Note the S at the end of the view name that distinguishes it from the SYSCOLUMN table.)

SYSFOREIGNKEYS system view

```
CREATE VIEW SYS.SYSFOREIGNKEYS ( foreign_creator,
    foreign_tname, primary_creator,
    primary_tname, role, columns )
AS
SELECT ( SELECT user_name FROM
           SYS.SYSUSERPERM == SYS.SYSTABLE
           WHERE table_id = foreign_table_id ),
       ( SELECT table_name FROM SYS.SYSTABLE
           WHERE table_id = foreign_table_id ),
       ( SELECT user_name
           FROM SYS.SYSUSERPERM == SYS.SYSTABLE
           WHERE table_id = primary_table_id ),
       ( SELECT table_name FROM SYS.SYSTABLE
           WHERE table_id = primary_table_id ), role,
       ( SELECT list( string( FK.column_name,
           ' IS ', PK.column_name ) )
           FROM SYS.SYSFKCOL KEY JOIN
           SYS.SYSCOLUMN FK, SYS.SYSCOLUMN PK
           WHERE foreign_table_id =
           SYSFOREIGNKEY.foreign_table_id
           AND foreign_key_id =
                  SYSFOREIGNKEY.foreign_key_id
           AND PK.table_id =
                  SYSFOREIGNKEY.primary_table_id
           AND PK.column_id =
                  SYSFKCOL.primary_column_id )
FROM SYS.SYSFOREIGNKEY
```

Presents foreign key information from SYSFOREIGNKEY and SYSFKCOL in a more readable format.

SYSGROUPS system view

```
CREATE VIEW SYS.SYSGROUPS ( group_name, member_name )
AS
SELECT g.user_name, u.user_name
FROMSYS.SYSGROUP,
       SYS.SYSUSERPERM g,
       SYS.SYSUSERPERM u
WHERE group_id = g.user_id
AND group_member = u.user_id
```

Presents group information from SYSGROUP in a more readable format.

SYSINDEXES system view

```
CREATE VIEW SYS.SYSINDEXES ( icreator, iname, fname,
creator,
tname, indextype, colnames, interval, level )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
WHERE user_id = SYSINDEX.creator ),
index_name,
( SELECT file_name FROM SYS.SYSFILE
WHERE file_id = SYSINDEX.file_id ),
( SELECT user_name FROM SYS.SYSUSERPERM
WHERE user_id = SYSINDEX.creator ),
table_name,
IF "unique" = 'Y' THEN 'Unique'
ELSE 'Non-unique' ENDIF,
( SELECT list( string( column_name,
IF "order" = 'A' THEN ' ASC' i
ELSE ' DESC' ENDIF ) )
FROM SYS.SYSIXCOL == SYS.SYSCOLUMN
WHERE index_id = SYSINDEX.index_id ), 0, 0
FROM SYS.SYSTABLE KEY JOIN SYS.SYSINDEX
```

Presents index information from SYSINDEX and SYSIXCOL in a more readable format.

SYSOPTIONS system view

```
CREATE VIEW SYS.SYSOPTIONS ( user_name, "option",
"setting" )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
          WHERE user_id = SYSOPTION.user_id ),
          "option", "setting"
FROM SYS.SYSOPTION
```

Displays option settings contained in the table SYSOPTION in a more readable format.

SYSPROCAUTH system view

```
CREATE VIEW SYS.SYSPROCAUTH(grantee,
       creator,procname)
AS
SELECT(select user_name FROM SYS.SYSUSERPERM
       WHERE SYSPROCPERM.grantee=SYSUSERPERM.user_id),
       (select user_name FROM SYS.SYSUSERPERM
       WHERE SYSPROCEDURE.creator=SYSUSERPERM.user_id),
       proc_name
FROM
SYS.SYSPROCEDURE JOIN SYS.SYSPROCPERM
```

Presents the procedure authorities from SYSUSERPERM in a more readable format.

SYSPROCPARMS system view

```
CREATE VIEW SYS.SYSPROCPARMS ( creator, parmname,
procname,
parmtype, parmmode, parmdomain, length, remarks )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
          WHERE user_id = SYSPROCEDURE.creator ),
       parm_name, proc_name, parm_type,
       IF parm_mode_in = 'Y' AND
          parm_mode_out = 'N' THEN 'IN'
```

```
        ELSE IF parm_mode_in = 'N'
           AND parm_mode_out = 'Y' THEN 'OUT'
        ELSE 'INOUT' ENDIF ENDIF,
        ( SELECT domain_name FROM SYS.SYSDOMAIN
           WHERE domain_id = SYSPROCPARM.domain_id ),
        width, SYSPROCPARM.remarks
FROM SYS.SYSPROCPARM == SYS.SYSPROCEDURE
```

Lists all the procedure parameters from SYSPROCPARM in a readable format.

SYSPUBLICATIONS system view

```
CREATE VIEW SYS.SYSPUBLICATIONS
AS
SELECT(select user_name FROM SYS.SYSUSERPERM AS u
   WHERE u.user_id=p.creator) AS creator,
   publication_name,remarks
FROM SYS.SYSPUBLICATION AS p
```

Presents the user name from the SYSUSERPERM table for all creators and displays the publication name and remarks from the SYSPUBLICATION table in a more readable format.

SYSREMOTEOPTIONS system view

```
CREATE VIEW SYS.SYSREMOTEOPTIONS
AS
SELECT type_name,
    user_name,
    "option",
    setting
FROM SYS.SYSREMOTETYPE AS srt,
    SYS.SYSREMOTEOPTIONTYPE AS srot,
    SYS.SYSREMOTEOPTION AS sro,
    SYS.SYSUSERPERM AS sup
WHERE srt.type_id = srot.type_id
AND srot.option_id = sro.option_id
AND sro.user_id = sup.user_id
```

Presents the data from the system tables SYSREMOTEOPTION and SYSREMOTEOPTIONTYPE in a more readable format.

SYSREMOTETYPES system view

```
CREATE VIEW SYS.SYSREMOTETYPES
AS SELECT type_id,type_name,publisher_address,remarks
FROM SYS.SYSREMOTETYPE
```

Presents the SQL Remote information from the SYSREMOTETYPE system table in a more readable format.

SYSREMOTEUSERS system view

```
CREATE VIEW SYS.SYSREMOTEUSERS
AS SELECT(SELECT user_name FROM SYS.SYSUSERPERM AS u
      WHERE u.user_id=r.user_id) AS user_name,
    "consolidate",
    (SELECT type_name FROM SYS.SYSREMOTETYPE AS t
      WHERE t.type_id=r.type_id) AS type_name,
    "address",frequency,send_time,
    (IF frequency='A' THEN
      NULL
    ELSE
      IF frequency='P' THEN
        IF time_sent IS NULL THEN
          current timestamp
        ELSE
          (SELECT min(minutes(time_sent,
            60*hour(a.send_time)
            +minute(seconds(a.send_time,59))))
            FROM SYS.SYSREMOTEUSER AS a
            WHERE a.frequency='P'
            AND a.send_time=r.send_time)
        ENDIF
      ELSE
        IF current date+send_time
        >COALESCE(time_sent,current timestamp) THEN
          current date+send_time
        ELSE
```

```
            current date+send_time+1
          ENDIF
        ENDIF
      ENDIF) AS next_send,
    log_send,time_sent,log_sent,
    confirm_sent,send_count,resend_count,
    time_received,log_received,confirm_received,
    receive_count,rereceive_count
FROM SYS.SYSREMOTEUSER AS r
```

Lists the information in SYSREMOTEUSER in a more readable format.

SYSSUBSCRIPTIONS system view

```
CREATE VIEW SYS.SYSSUBSCRIPTIONS
AS
SELECT(select publication_name
       FROM SYS.SYSPUBLICATION AS p
       WHERE p.publication_id=s.publication_id) AS
       publication_name,
       (select user_name FROM SYS.SYSUSERPERM AS u
       WHERE u.user_id=s.user_id) AS user_name,
       subscribe_by,created,started
FROM SYS.SYSSUBSCRIPTION AS s
```

Presents subscription information, such as the publication name, creation time, and start time from the SYSPUBLICATION table in a more readable format.

SYSTABAUTH system view

```
CREATE VIEW SYS.SYSTABAUTH ( grantor, grantee,
    screator, stname, tcreator, ttname,
    selectauth, insertauth, deleteauth,
    updateauth, updatecols, alterauth, referenceauth )
AS
SELECT ( SELECT user_name FROM SYS.SYSUSERPERM
           WHERE user_id = SYSTABLEPERM.grantor ),
       ( SELECT user_name FROM SYS.SYSUSERPERM
           WHERE user_id = SYSTABLEPERM.grantee ),
       ( SELECT user_name
```

```
            FROM SYS.SYSUSERPERM == SYS.SYSTABLE
            WHERE table_id = SYSTABLEPERM.stable_id ),
        ( SELECT table_name FROM SYS.SYSTABLE
            WHERE table_id = SYSTABLEPERM.stable_id ),
        ( SELECT user_name FROM
            SYS.SYSUSERPERM == SYS.SYSTABLE
            WHERE table_id = SYSTABLEPERM.ttable_id ),
        ( SELECT table_name FROM SYS.SYSTABLE
            WHERE table_id = SYSTABLEPERM.ttable_id ),
        selectauth, insertauth, deleteauth,
        updateauth, updatecols,
        alterauth, referenceauthauth
FROM SYS.SYSTABLEPERM
```

Presents table permission information in SYSTABLEPERM in a more readable format.

SYSUSERAUTH system view

```
CREATE VIEW SYS.SYSUSERAUTH ( name, password,
resourceauth, dbaauth,
scheduleauth, user_group )
AS
SELECT user_name, password, resourceauth,
       dbaauth, scheduleauth, user_group
FROM SYS.SYSUSERPERM
```

Displays all the information in the table SYSUSERPERM except for user numbers. Since this view shows passwords, this system view does not have PUBLIC select permission. (All other system views have PUBLIC select permission.)

SYSUSERLIST system view

```
CREATE VIEW SYS.SYSUSERLIST ( name, resourceauth,
    dbaauth, scheduleauth, user_group )
AS
SELECT user_name, resourceauth,
       dbaauth, scheduleauth, user_group
FROM SYS.SYSUSERPERM
```

Presents all information in SYSUSERAUTH except for passwords.

SYSUSEROPTIONS system view

```
CREATE VIEW SYS.SYSUSEROPTIONS ( "user_name",
    "option", "setting" )
AS
SELECT u.name, "option",
       isnull( ( SELECT "setting"
                 FROM sys.sysoptions s
       WHERE s.user_name = u.name
       AND s."option" = o."option" ),
       "setting" )
FROM SYS.SYSOPTIONS o, SYS.SYSUSERAUTH u
WHERE o.user_name = 'PUBLIC'
```

Displays effective permanent option settings for each user. If a user has no setting for an option, this view will display the public setting for the option.

SYSUSERPERMS system view

```
CREATE VIEW SYS.SYSUSERPERMS
AS
SELECT user_id, user_name, resourceauth, dbaauth,
       scheduleauth, user_group, remarks
FROM SYS.SYSUSERPERM
```

Contains exactly the same information as the table SYS.SYSUSERPERM except the password is omitted. All users have read access to this view, but only the DBA has access to the underlying table (SYS.SYSUSERPERM).

SYSVIEWS system view

```
CREATE VIEW SYS.SYSVIEWS ( vcreator, viewname, viewtext
)
AS
```

```
SELECT user_name, table_name, view_def
FROM SYS.SYSTABLE KEY JOIN SYS.SYSUSERPERM
WHERE table_type = 'VIEW'
```

Lists views along with their definitions.

Views for Transact-SQL Compatibility

Adaptive Server Enterprise and Sybase IQ have different system catalogs, reflecting the different uses for the two products.

In Adaptive Server Enterprise there is a single master database containing a set of system tables holding information that applies to all databases on the server. Many databases may exist within the master database, and each has additional system tables associated with it.

In Sybase IQ, each database exists independently, and contains its own system tables. There is no master database that contains system information on a collection of databases. Each server may run several databases at a time, dynamically loading and unloading each database as needed.

The Adaptive Server Enterprise and Sybase IQ system catalogs are different. The Adaptive Server Enterprise system tables and views are owned by the special user dbo, and exist partly in the master database, partly in the sybsecurity database, and partly in each individual database; the IQ system tables and views are owned by the special user SYS and exist separately in each database.

To assist in preparing compatible applications, Sybase IQ provides a set of views owned by the special user dbo, which correspond to the Adaptive Server Enterprise system tables and views. Where architectural differences make the contents of a particular Adaptive Server Enterprise table or view meaningless in a IQ context, the view is empty, containing just the column names and data types.

Table 11-1, Table 11-2, and Table 11-3 list the Adaptive Server Enterprise system tables and their implementation in the IQ system catalog. The owner of all tables is dbo in each DBMS.

Tables existing in each Adaptive Server Enterprise database

Table 11-1: Tables in each ASE database

Table name	Description	Data?
sysalternates	One row for each user mapped to a database user	No
syscolumns	One row for each column in a table or view, and for each parameter in a procedure	Yes
syscomments	One or more rows for each view, rule, default, and procedure, giving SQL definition statement	Yes
sysconstraints	One row for each referential and check constraint associated with a table or column	No
sysdepends	One row for each procedure, view, or table that is referenced by a procedure, view	No
sysindexes	One row for each clustered or nonclustered index, and one row for each table with no indexes, and an additional row for each table containing text or image data.	Yes
syskeys	One row for each primary, foreign, or common key; set by user (not maintained by Adaptive Server Enterprise)	No
syslogs	Transaction log	No
sysobjects	One row for each table, view, procedure, rule, default, log, and (in tempdb only) temporary object	Contains compatible data only
sysprocedures	One row for each view, rule, default, and procedure, giving internal definition	No
sysprotects	User permissions information	No
sysreferences	One row for each referential integrity constraint declared on a table or column	No
sysroles	Maps server-wide roles to local database groups No	
syssegments	One row for each segment (named collection of disk pieces)	No
systhresholds	One row for each threshold defined for the database	No
systypes	One row for each system-supplied and user-defined data type	Yes
sysusermessages	One row for each user-defined message	Yes (this is an IQ system table)
sysusers	One row for each user allowed in the database	Yes

Tables existing in the Adaptive Server Enterprise master database

Table 11-2: ASE master database tables

Table name	Description	Data?
syscharsets	One row for each character set or sort order	No
sysconfigures	One row for each configuration parameter that can be set by a user	No
syscurconfigs	Information about configuration parameters currently being used by the server	No
sysdatabases	One row for each database on the server	No
sysdevices	One row for each tape dump device, disk dump device, disk for databases, and disk partition for databases	No
sysengines	One row for each server currently online	No
syslanguages	One row for each language (except U.S. English) known to the server	No
syslocks	Information about active locks	No
sysloginroles	One row for each server login that possesses a system- defined role	No
syslogins	One row for each valid user account	Yes
sysmessages	One row for each system error or warning	No
sysprocesses	Information about server processes	No
sysremotelogins	One row for each remote user	No
syssrvroles	One row for each server-wide role	No
sysservers	One row for each remote server	No
sysusages	One row for each disk piece allocated to a database	No

Tables existing in the Adaptive Server Enterprise sybsecurity database

Table 11-3: ASE sybsecurity database tables

Table name	Description	Data?
sysaudits	One row for each audit record	No
sysauditoptions	One row for each global audit option	No

APPENDIX A

Compatibility with Other Sybase Databases

About this appendix

This appendix is provided to ease migration to Sybase IQ from other Sybase databases, and to serve as a guide to creating IQ applications that are compatible with Adaptive Server Enterprise or Adaptive Server Anywhere. Beginning with an overview of Transact-SQL, it compares these databases in several areas which you need to be aware of when moving to IQ:

- Architecture
- Data types
- Data definition language
- Data manipulation language
- Stored procedure language

For brevity, in this appendix we occasionally refer to these products as Enterprise, Anywhere, and IQ.

Compatibility features are addressed in each new version of Sybase IQ. This appendix compares Sybase IQ 12.6 with Adaptive Server Enterprise 12.5.2 and Adaptive Server Anywhere 9.0.1.

Compatibility information elsewhere in this book

Compatibility information is also provided in the following chapters:

- In Chapter 2, “Database Options” see the section “Transact-SQL compatibility options” on page 26
- In Chapter 4, “SQL Data Types” see the compatibility information for each data type, and in Data type conversions on page 206
- In Chapter 6, “SQL Statements” see the compatibility information in each command

A note on Adaptive Server Anywhere

Sybase IQ is an extension of Adaptive Server Anywhere. In most cases SQL syntax, functions, options, utilities, procedures, and other features are common to both products. There are, however, important differences. Do not assume that features described in Adaptive Server Anywhere documentation are supported for Sybase IQ.

The IQ documentation set calls out differences in many cases, but not all. *The Sybase IQ documentation always supersedes the Adaptive Server Anywhere documentation.* Except for topics where the IQ documentation refers you to Anywhere documentation, always refer to the documentation listed as "Documentation for Sybase IQ" in "About This Book," immediately after the Table of Contents of each Sybase IQ book.

An overview of Transact-SQL support

Sybase IQ, like Adaptive Server Anywhere, supports a large subset of **Transact-SQL**, which is the dialect of SQL supported by Sybase Adaptive Server Enterprise.

Goals

The goal of Transact-SQL support in IQ is to provide application portability. Many applications, stored procedures, and batch files can be written for use with both Enterprise and IQ databases.

The aim is to write applications to work with both Enterprise and IQ. Existing Adaptive Server Enterprise applications generally require some changes to run on an Adaptive Server Anywhere or IQ database.

How Transact-SQL is supported

Transact-SQL support in IQ takes the following form:

- Most SQL statements are compatible between IQ and Enterprise.
- For some statements, particularly in the procedure language used in procedures and batches, a separate Transact-SQL statement is supported together with the syntax supported in previous versions of IQ. For these statements, Adaptive Server Anywhere and IQ support two dialects of SQL. In this appendix, we name those dialects Transact-SQL and Watcom-SQL.
- A procedure or batch is executed in either the Transact-SQL or Watcom-SQL dialect. You must use control statements from one dialect only throughout the batch or procedure. For example, each dialect has different flow control statements.

Similarities and differences

IQ supports a very high percentage of Transact-SQL language elements, functions, and statements for working with existing data.

Further, IQ supports a very high percentage of the Transact-SQL stored procedure language (CREATE PROCEDURE syntax, control statements, and so on), and many, but not all, aspects of Transact-SQL data definition language statements.

There are design differences in the architectural and configuration facilities supported by each product. Device management, user management, and maintenance tasks such as backups tend to be system-specific. Even here, IQ provides Transact-SQL system tables as views, where the tables that are not meaningful in IQ have no rows. Also, IQ provides a set of system procedures for some of the more common administrative tasks.

Adaptive Server architectures

Adaptive Server Enterprise, Adaptive Server Anywhere, and IQ are complementary products, with architectures designed to suit their distinct purposes. IQ is a high-performance decision support server designed specifically for data warehousing and analytic processing. Adaptive Server Anywhere works well as a workgroup or departmental server requiring little administration, and as a personal database. Adaptive Server Enterprise works well as an enterprise-level server for large databases, with a focus on transaction processing.

This section describes architectural differences among the three products. It also describes the Adaptive Server Enterprise-like tools that IQ and Anywhere include for compatible database management.

Servers and databases

The relationship between servers and databases is different in Adaptive Server Enterprise from Sybase IQ and Adaptive Server Anywhere.

In Adaptive Server Enterprise, each database exists inside a server, and each server can contain several databases. Users can have login rights to the server, and can connect to the server. They can then connect to any of the databases on that server, provided that they have permissions. System-wide system tables, held in a master database, contain information common to all databases on the server.

No master database in IQ

In IQ, there is no level corresponding to the Adaptive Server Enterprise master database. Instead, each database is an independent entity, containing all of its system tables. Users can have connection rights to a database, not to the server. When a user connects, they connect to an individual database. There is no system-wide set of system tables maintained at a master database level. Each IQ database server can dynamically start and stop a database, to which users can maintain independent connections. Sybase strongly recommends that you run only one IQ database per server.

Adaptive Server Anywhere and IQ provide tools in their Transact-SQL support and Open Server support to allow some tasks to be carried out in a manner similar to Adaptive Server Enterprise. There are differences, however, in exactly how these tools are implemented.

For information about Open Server support, see the *Sybase IQ System Administration Guide*. Chapter 15, “Sybase IQ as a Data Server” in that book includes details on how to use isql to connect to a specific database on a server with multiple databases.

Space allocation and device management

All three products use different models for managing devices and allocating disk space initially and later, reflecting the different uses for the products. For example:

- In Adaptive Server Enterprise you allocate space in database devices initially using DISK INIT and then create a database on one or more database devices. You can add more space using the ALTER DATABASE statement or automatically using thresholds.

- In IQ you allocate space initially by listing raw devices in the CREATE DATABASE statement. Additional space can be added manually using the CREATE DBSPACE statement. While space cannot be added automatically, you can create events to warn the DBA before space is actually needed. IQ can also use filesystem space. IQ does not support Transact-SQL DISK statements, such as DISK INIT, DISK MIRROR, DISK REFIT, DISK REINIT, DISK REMIRROR, and DISK UNMIRROR.
- Adaptive Server Anywhere is similar to IQ except that the initial CREATE DATABASE statement takes a single filesystem file instead of a list of raw devices. Adaptive Server Anywhere also lets you initialize its databases using a command utility dbinit, which IQ does not support.

For information on disk management, see *Sybase IQ System Administration Guide*.

System tables, Catalog Store, and IQ Store

An IQ database is a joint data store consisting of three parts:

- The Catalog Store includes system tables and stored procedures, and resides in a set of tables that are compatible with Adaptive Server Anywhere.
- The permanent IQ Store is the set of IQ tables. Table data is stored in indexes.
- The Temporary Store consists of a set of temporary tables which the database server uses for sorting and other temporary processing.

Catalog distinctions and compatibility features include these:

- Anywhere and IQ use a different schema from Adaptive Server Enterprise for the catalog (tables, columns, and so on).
- Anywhere and IQ provide compatibility views that mimic relevant parts of the Adaptive Server Enterprise system tables, although there are performance implications when using them. For a list and individual descriptions, see Chapter 10, “System Tables” and Chapter 11, “System Views.”
- In Adaptive Server Enterprise, the database owner (user ID dbo) owns the catalog objects.

- In Adaptive Server Anywhere and IQ, the system owner (user ID SYS) owns the catalog objects.

Note A dbo user ID owns the Adaptive Server Enterprise-compatible system views provided by IQ. The dba user ID owns a small number of IQ system tables, used for IQ user and multiplex administration.

Administrative roles

Adaptive Server Enterprise has a more elaborate set of administrative roles than either Anywhere or IQ. In Adaptive Server Enterprise there is a set of distinct roles, although more than one login account on an Adaptive Server Enterprise can be granted any role, and one account can possess more than one role.

Adaptive Server Enterprise roles

In Adaptive Server Enterprise distinct roles include:

- **System Administrator** Responsible for general administrative tasks unrelated to specific applications; can access any database object.
- **System Security Officer** Responsible for security-sensitive tasks in Adaptive Server Enterprise, but has no special permissions on database objects.
- **Database Owner** Has full permissions on objects inside the database he or she owns, can add users to a database and grant other users the permission to create objects and execute commands within the database.
- **Data definition statements** Permissions can be granted to users for specific data definition statements, such as CREATE TABLE or CREATE VIEW, enabling the user to create database objects.
- **Object owner** Each database object has an owner who may grant permissions to other users to access the object. The owner of an object automatically has all permissions on the object.

In Adaptive Server Anywhere and IQ, the following database-wide permissions have administrative roles:

- The Database Administrator (DBA authority) has, like the Adaptive Server Enterprise database owner, full permissions on all objects inside the database (other than objects owned by SYS) and can grant other users the permission to create objects and execute commands within the database. The default database administrator is user ID DBA.
- The RESOURCE permission allows a user to create any kind of object within a database. This is instead of the Adaptive Server Enterprise scheme of granting permissions on individual CREATE statements.
- Sybase IQ has object owners in the same way that Adaptive Server Enterprise does. The owner of an object automatically has all permissions on the object, including the right to grant permissions.

For seamless access to data held in both Adaptive Server Enterprise and Sybase IQ, you should create user IDs with appropriate permissions in the database (RESOURCE in Sybase IQ, or permission on individual CREATE statements in Adaptive Server Enterprise) and create objects from that user ID. If you use the same user ID in each environment, object names and qualifiers can be identical in the two databases, providing compatible access.

Data types

This section discusses compatibility information for data types. For details of IQ data types, see Chapter 4, “SQL Data Types.”

Bit data type

All three products support the BIT data type, with these differences:

- Adaptive Server Anywhere only permits 0 or 1
- Adaptive Server Enterprise and IQ implicitly convert integral data types to BIT. Non-zero values are stored as 1 (TRUE).

Integer data types

Unsigned integer support differs:

- Adaptive Server Enterprise does not support unsigned integer data types.
- Adaptive Server Anywhere and IQ support unsigned integer data types.

Note Open Client does not support unsigned integers.

Character data types

All three products permit CHAR and VARCHAR data, but each product treats these types differently.

- Adaptive Server Anywhere treats all strings as VARCHAR, even in a blank-padded database.
- Adaptive Server Enterprise and IQ differentiate between CHAR (fixed-length) and VARCHAR (variable-length) data.

  Adaptive Server Enterprise trims trailing blank spaces from VARCHAR values, but IQ does not.

When inserting into CHAR or VARCHAR:

- Adaptive Server Anywhere permits inserting integral data types into CHAR or VARCHAR (implicit conversion).
- Adaptive Server Enterprise and IQ require explicit conversion.

The maximum size of a column is determined as follows:

- Adaptive Server Enterprise CHAR and VARCHAR depend on the logical page size, which can be 2K, 4K, 8K, and 16K. For example:
  - 2K page size allows a column as large as a single row, about 1962 bytes.
  - 4K page size allows a column as large as about 4010 bytes.
- Adaptive Server Anywhere supports up to 32K-1 with CHAR and VARCHAR, and up to 2GB with LONG VARCHAR

- Anywhere supports the name LONG VARCHAR and its synonym TEXT, while Adaptive Server Enterprise only supports the name TEXT, not the name LONG VARCHAR.
- IQ supports CHAR and VARCHAR up to 32K-1 bytes.

  IQ also supports up to 512TB (with an IQ page size of 128KB) and 2PB (with an IQ page size of 512KB) with LONG VARCHAR. For information on the LONG VARCHAR data type in Sybase IQ, see *Large Objects Management in Sybase IQ*.
- Adaptive Server Enterprise supports NCHAR, NVARCHAR, UNICHAR, UNIVARCHAR data types. N is for multibyte character sets; UNI is for single-byte character sets.
- Adaptive Server Anywhere and IQ support Unicode in the CHAR and VARCHAR data types rather than as a separate data type.
- For compatibility between Sybase IQ and Adaptive Server Enterprise, always specify a length for character data types.

Binary data types

The following table summarizes binary data type support.

Table A-1: Binary data type supported sizes

Data type	Adaptive Server Enterprise	Adaptive Server Anywhere	IQ
BINARY	< page size	32KB - 1	255
VARBINARY	< page size	32KB - 1	32KB - 1
LONG BINARY*	not supported	2GB - 1	512TB (IQ page size 128KB) 2PB (IQ page size 512KB)
IMAGE	2GB	2GB - 1	use LONG BINARY*

*For information on the LONG BINARY data type in Sybase IQ, see *Large Objects Management in Sybase IQ*. This feature requires a separate license.

Adaptive Server Enterprise and Adaptive Server Anywhere display binary data differently when projected:

- IQ supports both Adaptive Server Enterprise and Adaptive Server Anywhere display formats

- If ‘123’ is entered in a BINARY field the Adaptive Server Anywhere display format is by bytes, as ‘123’; the Adaptive Server Enterprise display format is by nibbles, as ‘0x616263’

64-bit data types

Support for 64-bit data types is as follows:

- Adaptive Server Anywhere and IQ support 64-bit BIGINT and UNSIGNED BIGINT
- Adaptive Server Enterprise does not support 64-bit integral data types.

  Note Open Client does not support 64-bit integral data types.

Date, time, datetime, and timestamp data types

While all three products support some form of date and time data, there are some differences.

- Adaptive Server Anywhere and IQ support the 4-byte date and time data types
- Adaptive Server Enterprise supports an 8-byte datetime type, and timestamp as a user-defined data type (domain) implemented as binary (8).
- Adaptive Server Anywhere and IQ support an 8-byte timestamp type, and an 8-byte datetime domain implemented as timestamp. The millisecond precision of the Anywhere/IQ datetime data type differs from that of Adaptive Server Enterprise.
- With the option AUTOMATIC_TIMESTAMP set on, Anywhere has the same behavior as Adaptive Server Enterprise in giving columns whose data type is timestamp an automatic default of timestamp if no other default is provided.

Display formats for dates have different defaults:

- Adaptive Server Enterprise defaults to displaying dates ‘MMM-DD-YYYY’ but can be changed by setting an option.
- Adaptive Server Anywhere and IQ default to the ISO ‘YYYY-MM-DD’ format but can be changed by setting an option.

Time conversions are as follows:

- Adaptive Server Enterprise varies how it converts time stored in a string to an internal time depending on whether the fraction part of the second was delimited by a colon or a period.
- Adaptive Server Anywhere and IQ convert them in the same manner irrespective of the delimiter.

When you insert a time into a datetime column:

- Adaptive Server Enterprise and IQ default to supplying 1st January 1900.
- Adaptive Server Anywhere defaults to supplying the current date.

Numeric data types

Adaptive Server Enterprise, Adaptive Server Anywhere and IQ have different default precision and scale:

- In Adaptive Server Enterprise the default is precision 18 scale 0.
- In Adaptive Server Anywhere the default is precision 30 scale 6.
- In IQ the default is precision 126 scale 38. Because these defaults are too large for TDS and for some client tools, you should always specify a precision and scale for IQ exact numeric types.

Approximate numeric data types

Adaptive Server Enterprise differs from Adaptive Server Anywhere and IQ in how the FLOAT(p) data type is interpreted, that is, when to create a 4-byte data type and when to create an 8-byte data type.

Adaptive Server Anywhere and IQ offer the FLOAT_AS_DOUBLE option to control data width.

Text data type

Support for TEXT data is currently implemented as follows:

- Adaptive Server Enterprise and Adaptive Server Anywhere support up to 2 GB with LONG VARBINARY and TEXT.
- IQ supports up to 32KB - 1 with VARCHAR. IQ also supports up to 512TB (with an IQ page size of 128KB) and 2PB (with an IQ page size of 512KB) with LONG VARCHAR. For information on the LONG VARCHAR data type in Sybase IQ, see *Large Objects Management in Sybase IQ*.

Image data type

Support for IMAGE data is currently implemented as follows:

- Adaptive Server Enterprise and Adaptive Server Anywhere support up to 2 GB with IMAGE.
- IQ supports up to 512TB (with an IQ page size of 128KB) and 2PB (with an IQ page size of 512KB) with LONG BINARY. For information on the LONG BINARY data type in Sybase IQ, see *Large Objects Management in Sybase IQ*.

Java data types

Adaptive Server Enterprise allow Java data types in the database. Adaptive Server Anywhere and IQ do not.

Data definition language

This section discusses compatibility information for creating database objects. See also “System tables, Catalog Store, and IQ Store” on page 789 and “Space allocation and device management” on page 788 for related information.

Creating a Transact-SQL-compatible database

This section describes choices you must make when creating or rebuilding a database.

Quick start

Here are the basic steps you need to take to create a Transact-SQL-compatible database. The remainder of the section describes which options you need to set.

❖ **Creating a Transact-SQL compatible database from Sybase Central**

- One page of the Create Database wizard is named Default Database Attributes. To emulate Adaptive Server Enterprise, choose “Emulate Adaptive Server Enterprise” which automatically selects Case sensitivity for string comparisons and Case sensitivity for passwords.

❖ **Creating a Transact-SQL compatible database using the CREATE DATABASE statement**

- Enter the following statement, for example, in Interactive SQL:

```
CREATE DATABASE 'db-name.db'
CASE RESPECT BLANK PADDING ON
```

Case sensitivity

Case sensitivity in databases refers to:

- **Data** The case sensitivity of the data is reflected in indexes, in the results of queries, and so on.
- **Identifiers** Identifiers include table names, column names, user IDs, and so on.
- **Passwords** Case sensitivity of passwords is treated differently from other identifiers.

Case sensitivity of data

You decide the case-sensitivity of Sybase IQ data in comparisons when you create the database. By default, Sybase IQ databases are case-sensitive in comparisons, although data is always held in the case in which you enter it.

Adaptive Server Enterprise's sensitivity to case depends on the sort order installed on the Adaptive Server Enterprise system. Case sensitivity can be changed for single-byte character sets by reconfiguring the Adaptive Server Enterprise sort order.

Case sensitivity of identifiers

Sybase IQ does not support case-sensitive identifiers. In Adaptive Server Enterprise, the case sensitivity of identifiers follows the case sensitivity of the data.

In Adaptive Server Enterprise, user-defined data type names are case sensitive. In Sybase IQ, they are case insensitive.

User IDs and passwords

In Sybase IQ, passwords follow the case sensitivity of the data by default; however, you can also specify password case sensitivity independently of data case sensitivity. The default password for case-sensitive databases is uppercase SQL. The default user ID is DBA, but it is not case sensitive.

In Adaptive Server Enterprise, the case sensitivity of user IDs and passwords follows the case sensitivity of the server.

Ensuring compatible object names

Each database object must have a unique name within a certain **name space**. Outside this name space, duplicate names are allowed. Some database objects occupy different name spaces in Adaptive Server Enterprise as compared to Adaptive Server Anywhere and IQ.

Table name uniqueness

Table name uniqueness requirements are within a database:

- For IQ and Anywhere, table names must be unique within a database for a given owner. For example, both user1 and user2 can create a table called employee; uniqueness is provided by the fully qualified names, user1.employee and user2.employee.
- For Adaptive Server Enterprise, table names must be unique within the database and to the owner.

Index name uniqueness

Index name uniqueness requirements are within a table. In all three products, indexes are owned by the owner of the table on which they are created. Index names must be unique on a given table, but any two tables may have an index of the same name, even for the same owner. For example, in all three products, the tables t1 and t2 may have indexes of the same name, whether they are owned by the same or different users.

Renaming indexes and foreign keys

Sybase IQ lets you rename explicitly created indexes, foreign key role names of indexes, and foreign keys, using the ALTER INDEX statement. Adaptive Server Anywhere lets you rename indexes, foreign key role names, and foreign keys, using the ALTER INDEX statement. Adaptive Server Enterprise does not allow you to rename these objects.

CREATE TABLE statement

When creating tables for compatibility, be aware of the following items.

NULL in columns

For compatible treatment of NULL:

- Adaptive Server Anywhere and IQ assume that columns can be null unless NOT NULL is stated in the column definition. You can change this behavior by setting the database option ALLOW_NULLS_BY_DEFAULT to the Transact-SQL compatible setting of OFF.
- Anywhere assumes that BIT columns only cannot be NULL.
- Adaptive Server Enterprise assumes that columns cannot be null unless NULL is stated.

Check constraints

Sybase IQ enforces check constraints on base, global temporary, and local temporary tables, and user-defined data types. Users can log check integrity constraint violations and specify the number of violations that can occur before a LOAD statement rolls back.

Sybase IQ does not allow the creation of a check constraint that it cannot evaluate, such as check constraints comprised of user-defined functions, proxy tables, or non-IQ tables. Constraints that cannot be evaluated are detected the first time the table on which the check constraint is defined is used in a LOAD, INSERT, or UPDATE statement. Sybase IQ does not allow check constraints containing:

- Subqueries
- Expressions specifying a host language parameter, an SQL parameter, or a column as the target for a data value
- Set functions
- Invocations of non-deterministic functions or functions that modify data

If you have databases created with a previous version of Sybase IQ, you should run the stored procedure sp_iqprintconstraints, to list all IQ tables and columns in a format that allows you to recreate them after deletion. If you want to drop all constraints on IQ tables in the database, you can then run the sp_iqdropconstraints procedure.

Adaptive Server Enterprise and Adaptive Server Anywhere enforce CHECK constraints. Adaptive Server Anywhere allows subqueries in check constraints.

Sybase IQ supports user-defined data types which allow constraints to be encapsulated in the data type definition.

Referential integrity constraints

Sybase IQ enforces referential integrity as described in Chapter 9, “Ensuring Data Integrity” in the *Sybase IQ System Administration Guide*.

Actions for enforcing integrity are supported as follows:

- Adaptive Server Anywhere supports all ANSI actions: SET NULL, CASCADE, DEFAULT, RESTRICT
- Adaptive Server Enterprise supports two of these actions: SET NULL, DEFAULT.

Note You can achieve CASCADE in Adaptive Server Enterprise by using triggers instead of referential integrity.

- IQ supports the RESTRICT action only.
- IQ does not support NOT NULL FOREIGN KEY.
- IQ has the restriction that a column cannot be both a candidate key and a foreign key at the same time.

Default values in a column

Default value support differs as follows:

- Adaptive Server Enterprise and Adaptive Server Anywhere support specifying default values for a column.
- Only Adaptive Server Anywhere supports DEFAULT UTC TIMESTAMP.
- IQ does not support specifying default values.

Identity columns

Identity column support differs as follows:

- Sybase IQ supports IDENTITY or DEFAULT AUTOINCREMENT as a default value. Sybase IQ supports identity columns of any numeric type with any precision and scale 0, and the column may be NULL. Sybase IQ identity columns must be positive and are limited by the range of the data type. Sybase IQ supports a single identity column per table, and requires database option IDENTITY_INSERT set to ON for explicit inserts, drops, and updates. The table may contain data when adding an identity column. Tables derived using SELECT INTO do not have Identity/Autoincrement columns. Sybase IQ views cannot contain IDENTITY/DEFAULT AUTOINCREMENT columns.

- Adaptive Server Anywhere supports AUTOINCREMENT default value. Adaptive Server Anywhere supports identity columns of any numeric type with any allowable scale and precision. The identity column value may be positive, negative or zero, limited by the range of the data type. Adaptive Server Anywhere supports any number of identity columns per table, and does not require identity_insert for explicit inserts, drops, and updates. The table must be empty when adding identity column(s). ASA identity columns can be altered to be non-identity columns and vice versa. You can add or drop AUTOINCREMENT columns from ASA views.
- Adaptive Server Enterprise supports a single identity column per table. ASE identity columns are restricted to only numeric data type scale 0, maximum precision 38. They must be positive, are limited by the range of the data type, and cannot be null. Adaptive Server Enterprise requires identity_insert for explicit inserts and drops, but not for updates to the identity column. The table may contain data when adding an identity column. ASE users cannot explicitly set the next value chosen for an identity column. ASE views cannot contain IDENTITY/AUTOINCREMENT columns. When using SELECT INTO under certain conditions, ASE allows Identity/Autoincrement columns in the result table if they were in the table being selected from.

Computed columns

Computed column support differs as follows:

- Adaptive Server Anywhere supports computed columns that can be indexed
- Adaptive Server Enterprise and IQ do not.

Temporary tables

You can create a temporary table by placing a pound sign (#) without an owner specification in front of the table name in a CREATE TABLE statement. These temporary tables are Sybase IQ declared temporary tables, and are available only in the current connection. For information about declared temporary tables in Sybase IQ, see the DECLARE LOCAL TEMPORARY TABLE statement on page 456.

For information about creating tables, see the CREATE TABLE statement on page 435.

Locating tables

Physical placement of a table is carried out differently in Adaptive Server Enterprise and in Sybase IQ. Sybase IQ supports the ON *segment-name* clause, but *segment-name* refers to a Sybase IQ dbspace.

CREATE DEFAULT, CREATE RULE, and CREATE DOMAIN statements

IQ provides an alternative means of incorporating rules:

- Adaptive Server Enterprise supports the Create Default and Create Rule statements to create named defaults.
- Adaptive Server Anywhere and IQ support the CREATE DOMAIN statement to achieve the same objective.

CREATE TRIGGER statement

Support for triggers differs as follows:

- Adaptive Server Anywhere supports both row-level and statement-level triggers.
- Adaptive Server Enterprise supports only statement-level triggers.
- IQ does not support triggers.

Note A trigger is effectively a stored procedure that is run automatically either immediately before or immediately after an INSERT, UPDATE, or DELETE as part of the same transaction, that can be used to cause a dependent change (for example, to automatically update the name of an employee's manager when the employee is moved to a different department). It can also be used to write an audit trail to identify which modifications made which changes to the database, and at what time.

CREATE INDEX statement

CREATE INDEX syntax differs slightly among the three products:

- Adaptive Server Enterprise and Adaptive Server Anywhere support clustered or nonclustered indexes, using the following syntax:

  ```
  CREATE [UNIQUE] [CLUSTERED] INDEX name
  ON table (column,...)
  ON dbspace
  ```

  Adaptive Server Enterprise also allows the NONCLUSTERED keyword, but for both products the default is NONCLUSTERED.

- Adaptive Server Enterprise CREATE INDEX statements work in Adaptive Server Anywhere because it allows, but ignores, the keywords FILLFACTOR, IGNORE_DUP_KEY, SORTED_DATA, IGNORE_DUP_ROW, and ALLOW_DUP_ROW.
- Adaptive Server Anywhere CREATE INDEX syntax supports the VIRTUAL keyword for use by its Index Consultant, but not for actual execution of queries.
- IQ supports seven specialized index types: LF, HG, HNG, DATE, TIME, DTTM, and WD. IQ also supports a CMP index on the relationship between two columns of identical data type, precision, and scale. IQ defaults to creating an HG index unless the index type is specified in the CREATE INDEX statement:

```
CREATE [UNIQUE] [type] INDEX name
ON table (column,...)
```

Note IQ also supports CREATE JOIN INDEX, which lets you create a prejoined index on a certain set of columns that will be joined consistently and frequently in queries.

See Chapter 6, "Using Sybase IQ Indexes" in *Sybase IQ System Administration Guide* for more information on IQ indexes.

Users, groups, and permissions

There are some differences between the Adaptive Server Enterprise and Adaptive Server Anywhere and IQ models of users and groups.

How users connect

In Adaptive Server Enterprise users connect to a server, and each user requires a login ID and password to the server as well as a user ID for each database they want to access on that server.

In Adaptive Server Anywhere and IQ, users connect directly to a database and do not require a server login ID. Instead, each user receives a user ID and password on a database so they can use that database.

User groups

All three products support user groups, so you can grant permissions to many users at one time. However, there are differences in the specifics of groups:

- Adaptive Server Enterprise allows each user to be a member of only one group.

- Adaptive Server Anywhere and IQ allow users to be members of multiple groups, and group hierarchies are allowed.

All three products have a public group, for defining default permissions. Every user automatically becomes a member of the public group.

Database object permissions

GRANT and REVOKE statements for granting permissions on individual database objects are very similar in all three products.

- All three products allow SELECT, INSERT, DELETE, UPDATE, and REFERENCES permissions on database tables and views, and UPDATE permissions on selected columns of database tables.

  For example, the following statement is valid in all three products:

  ```
  GRANT INSERT, DELETE
  ON TITLES
  TO MARY, SALES
  ```

  This statement grants permission to use the INSERT and DELETE statements on the TITLES table to user MARY and to the SALES group.

- All three products allow EXECUTE permissions to be granted on stored procedures.
- Adaptive Server Enterprise also supports GRANT and REVOKE on additional items:
  - Objects: columns within tables, columns within views, and stored procedures
  - User abilities: Create Database, Create Default, Create Procedure, Create Rule, Create Table, Create View
- Adaptive Server Anywhere and IQ require a user to have RESOURCE authority to create database objects. (A closely corresponding Adaptive Server Enterprise permission is GRANT ALL, used by a Database Owner.)
- All three products support the WITH GRANT OPTION clause, allowing the recipient of permissions to grant them in turn, although IQ does not permit WITH GRANT OPTION to be used on a GRANT EXECUTE statement.

Database-wide permissions

Adaptive Server Enterprise uses a different model for database-wide user permissions.

- Adaptive Server Anywhere and IQ employ DBA permissions to allow a user full authority within a database.

- The System Administrator in Adaptive Server Enterprise enjoys this permission for all databases on a server. However, DBA authority on a Sybase IQ database is different from the permissions of an Adaptive Server Enterprise Database Owner, who must use the Adaptive Server Enterprise SETUSER statement to gain permissions on objects owned by other users.

Adding users

Adaptive Server Enterprise requires a two-step process to add a user: sp_addlogin followed by sp_add_user.

Adaptive Server Anywhere and IQ add users in a single step.

IQ User Administration stored procedures, while not required to add or drop users, allow DBAs to add or drop IQ user accounts. When IQ User Administration is enabled, these accounts let DBAs control user connections and password expirations.

For details on IQ User Administration, see Chapter 12, "Managing User IDs and Permissions" and Chapter 15, "Sybase IQ as a Data Server," in the *Sybase IQ System Administration Guide*.

While Adaptive Server Anywhere and IQ allow Adaptive Server Enterprise system procedures for managing users and groups, the exact syntax and function of these procedures differs in some cases. For more information see Chapter 9, "System Procedures," including "Adaptive Server Enterprise system procedures" on page 712.

Load formats

Load format support in the three products is as follows:

- IQ handles ASCII and BINARY load formats.
- Adaptive Server Anywhere, in addition to ASCII and BINARY, also lets you import Dbase, Excel, Foxpro, and Lotus file formats.
- Adaptive Server Enterprise handles ASCII and BINARY load formats via BCP.

Note The syntax of the IQ and Anywhere LOAD statement is based on BCP and designed to offer exactly the same functionality.

BCP support in loading

- Adaptive Server Enterprise and Adaptive Server Anywhere support BCP in.
- IQ supports BCP indirectly. You can perform a BCP into an Anywhere table and then transfer the contents to IQ; however, the transfer of rows from Anywhere to IQ is executed one row at a time. Both Sybase IQ and Adaptive Server Enterprise BCP format support a blank when 1 digit is in the date.

Setting options for Transact-SQL compatibility

You set Sybase IQ database options using the SET OPTION statement. See "Transact-SQL compatibility options" on page 26 for a list of option settings required for Transact-SQL compatible behavior.

Data manipulation language

This section provides some general guidelines for writing portable queries, and then discusses specific query requirements.

General guidelines for writing portable SQL

When writing SQL for use on more than one database management system, make your SQL statements as explicit as possible. Even if more than one server supports a given SQL statement, it may be a mistake to assume that default behavior is the same on each system. General guidelines applicable to writing compatible SQL include:

- Spell out all of the available options, rather than using default behavior.
- Use parentheses to make the order of execution within statements explicit, rather than assuming identical default order of precedence for operators.
- Use the Transact-SQL convention of an @ sign preceding variable names for Adaptive Server Enterprise portability.

- Declare variables and cursors in procedures and batches immediately following a BEGIN statement. Sybase IQ requires this, although Adaptive Server Enterprise allows declarations to be made anywhere in a procedure or batch.
- Do not use reserved words from either Adaptive Server Enterprise or Sybase IQ as identifiers in your databases.
- Set the Sybase IQ database option PERCENT_AS_COMMENT OFF and use -- (double dash) as a comment delimiter for SQL/92 compatibility. The percent character is the default comment delimiter in IQ. Adaptive Server Enterprise treats the % as a modulo operator and does not support the IQ mod function.

Writing compatible queries

There are two criteria for writing a query that runs on both Sybase IQ and Adaptive Server Enterprise databases:

- The data types, expressions, and search conditions in the query must be compatible.
- The syntax of the SELECT statement itself must be compatible.

Sybase IQ supports the following subset of the Transact-SQL SELECT statement.

Syntax

SELECT [**ALL** | **DISTINCT**] *select-list*
...[**INTO** *#temporary-table-name*]
...[**FROM** *table-spec*,
... *table-spec*, ...]
...[**WHERE** *search-condition*]
...[**GROUP BY** *column-name*, ...]
...[**HAVING** *search-condition*]
...| [**ORDER BY** *expression* [**ASC** | **DESC**], ...]|
| [**ORDER BY** *integer* [**ASC** | **DESC**], ...]|

Parameters

select-list:
{ *table-name.** }...
{ * }...
{ *expression* }...
{ *alias-name = expression* }...
{ *expression as identifier* }...
{ *expression as T_string* }...

table-spec:
[*owner*.]*table-name*

... [[**AS**] *correlation-name*]
...

alias-name:
identifier | '*string*' | "*string*"

For a full description of the SELECT statement, see SELECT statement on page 559.

The sections that follow provide details on several items to be aware of when writing compatible queries.

Subqueries

IQ currently provides somewhat different support for subqueries from Adaptive Server Enterprise and Adaptive Server Anywhere.

- Adaptive Server Enterprise and Adaptive Server Anywhere support subqueries in the ON clause; IQ does not currently support this.

UNION in subqueries is supported as follows:

- Adaptive Server Anywhere supports UNION in both correlated and uncorrelated subqueries.
- IQ only supports UNION in uncorrelated subqueries.
- Adaptive Server Enterprise does not support UNION in any subqueries.

Adaptive Server Anywhere supports subqueries in many additional places that a scalar value may appear in the grammar. Adaptive Server Enterprise and IQ follow the ANSI standard in where subqueries may be specified.

GROUP BY clause

GROUP BY ALL support is as follows:

- Adaptive Server Enterprise supports GROUP BY ALL which returns all possible groups including those eliminated by the WHERE clause and HAVING clause. These have the NULL value for all aggregates.
- Adaptive Server Anywhere does not support the GROUP BY ALL Transact-SQL extension.
- IQ supports the GROUP BY ALL Transact-SQL extension, on a single table only, not in a view.

ROLLUP and CUBE in the GROUP BY clause are supported as follows:

- IQ and Adaptive Server Anywhere support ROLLUP and CUBE in the GROUP BY clause.
- Adaptive Server Enterprise does not currently support ROLLUP and CUBE.

Adaptive Server Enterprise supports projecting non-grouped columns in the SELECT clause. This is known as extended group by semantics and returns a set of values. Sybase IQ supports extended group by semantics with some exceptions. For details, see "GROUP BY clause" on page 564. Adaptive Server Anywhere does not support extended group by semantics. Only Adaptive Server Anywhere supports the List() aggregate to return a list of values.

COMPUTE clause

COMPUTE clause support is as follows:

- Adaptive Server Enterprise supports the Transact-SQL COMPUTE clause.
- Adaptive Server Anywhere and IQ do not support the Transact-SQL COMPUTE clause since it is not in the ANSI standard and this functionality is provided by most third-party front-end tools.

WHERE clause

WHERE clause differs in support for the CONTAINS predicate, and treatment of trailing white space in the LIKE predicate.

- IQ supports the Contains() predicate for word searches in character data (similar to Contains in MS SQL Server and Verity). IQ uses WORD indexes to optimize these if possible.
- Adaptive Server Anywhere and Adaptive Server Enterprise do not support Contains().

Joins

This section discusses support for Transact-SQL outer joins and ANSI joins.

Transact-SQL outer joins

Supported syntax for outer joins can be summarized as follows:

- Adaptive Server Enterprise fully supports *= and =* T-SQL syntax for outer joins.
- Adaptive Server Anywhere and IQ support T-SQL outer joins but will reject some complex T-SQL outer joins that are potentially ambiguous.

Note T-SQL outer join syntax is deprecated in Adaptive Server Anywhere and IQ.

ANSI joins

Support for ANSI join syntax can be summarized as follows:

- IQ does not currently support subqueries in the ON clause.
- Adaptive Server Enterprise and Adaptive Server Anywhere do support them.

Full outer join support is as follows:

- Adaptive Server Anywhere and IQ support FULL OUTER JOIN.
- Adaptive Server Enterprise does not support FULL OUTER JOIN.

More information on outer joins

For detailed information on Transact-SQL outer joins, including ANSI syntax alternatives, refer to the white paper “Semantics and Compatibility of Transact-SQL Outer Joins,” which is available on the Sybase online support Web site MySybase at http://www.sybase.com/support/. Although written for Adaptive Server Anywhere, the information in this document also applies to Sybase IQ.

Null comparisons

Adaptive Server Enterprise has Transact-SQL extensions that permit predicates to compare the Null value. For example, `{col} = Null` means `{col} Is Null`.

Adaptive Server Anywhere and IQ use ANSI semantics for Null comparisons unless the ANSINULL option is set to OFF in which case such comparisons are Adaptive Server Enterprise-compatible.

Note Adaptive Server Anywhere 8.0 adds support for the TDS_EMPTY_STRING_AS_NULL to offer Adaptive Server Enterprise compatibility in mapping empty strings to the Null value.

Zero-length strings

Zero-length strings are treated as follows:

- Adaptive Server Enterprise treats zero-length strings as the Null value.

  Adaptive Server Enterprise users store a single space for blank strings.

- Adaptive Server Anywhere and IQ follow ANSI semantics for zero-length strings, that is, a zero-length string is a real value; it is not null.

HOLDLOCK, SHARED, and FOR BROWSE

Support for this syntax is as follows:

- Adaptive Server Enterprise supports HOLDLOCK, SHARED, FOR BROWSE syntax.
- Adaptive Server Anywhere supports HOLDLOCK but does not support SHARED or FOR BROWSE.
- IQ does not support any of these three keywords.

SQL functions

IQ supports most of the same functions as Adaptive Server Anywhere and Adaptive Server Enterprise, with these differences:

- Adaptive Server Enterprise supports the USING CHARACTERS|USING BYTES syntax in PatIndex(); Adaptive Server Anywhere and IQ do not.
- Adaptive Server Enterprise supports the Reverse() function; Adaptive Server Anywhere and IQ do not.
- Adaptive Server Enterprise supports Len() as alternative syntax for Length(); Adaptive Server Anywhere and IQ do not support this alternative.
- Adaptive Server Enterprise supports the Square() and Str_Replace() Microsoft compatibility functions; Adaptive Server Anywhere and IQ do not.
- Adaptive Server Enterprise and Adaptive Server Anywhere support TSEQUAL() to compare two timestamps for modification time; IQ does not support TSEQUAL(). (TSEQUAL is not relevant in the IQ table level versioning model.)
- IQ supports ROWID(); Adaptive Server Enterprise and Adaptive Server Anywhere do not.
- Adaptive Server Anywhere and IQ support Cast() in addition to Adaptive Server Enterprise's Convert() for data type conversions.

  Note Cast() is the ANSI-compliant name.

- Adaptive Server Anywhere and IQ support Lcase() and Ucase() as synonyms of Lower() and Upper(); Adaptive Server Enterprise does not.
- Adaptive Server Anywhere and IQ support the Locate() string function; Adaptive Server Enterprise does not.
- Adaptive Server Anywhere supports the IsDate() and IsNumeric() function to test the ability to convert a string to the respective data type; Adaptive Server Enterprise does not. IQ supports IsDate(). You can use IsNumeric in IQ, but CIS functional compensation performance considerations apply.

- Adaptive Server Anywhere supports the NEWID, STRTOUID, and UUIDTOSTR functions; Adaptive Server Enterprise does not. You use these functions in IQ, but CIS functional compensation performance considerations apply.

Note Some SQL functions, including SOUNDEX and DIFFERENCE string functions, some date functions, and INTTOHEX conversion function, operate differently in IQ and Anywhere.

OLAP functions

IQ currently supports these OLAP functions: Grouping(), Variance(), StdDev(), Rank(), Dense_Rank(), Percentile_Disc(), Percentile_Cont(), Ntile().

Adaptive Server Anywhere supports all of the IQ OLAP functions, plus Corr(), Covar_Pop(), Covar_Samp(), Cume_Dist, Percent_Rank(), Regr_Avgx(), Regr_Avgy(), Regr_Intercept(), Regr_Slope(), Regr_Sxx(), Regr_Sxy(), Regr_Syy(), Stddev_Pop, Stddev_Samp (Stddev is alias), Var_Pop, and Var_Samp (Variance is alias).

Currently Adaptive Server Enterprise does not support OLAP functions.

CIS functional compensation does not support OLAP functions.

Note Support for OLAP functions is a rapidly evolving area of Sybase product development.

System functions

Adaptive Server Anywhere and IQ do not support the following Adaptive Server Enterprise system functions as they are specific to Adaptive Server Enterprise administration:

- curunreservedpgs() - number of pages free on a dbspace
- data_pgs() - number of pages used by a table or index
- host_id() - UNIX pid of the server process
- hos_name() - name of the machine the server is running on

- lct_admin() - manages the “last chance threshold” for Transaction manager
- reserved_pgs() - number of pages allocated to a table or index
- rowcnt() - number of rows in the specified table
- valid_name() - whether a name would be a valid name if used, for example, for a table
- valid_user() - returns TRUE if that user has connect permissions
- ptn_data_pgs() - number of data pages in a partition
- index_colorder() - returns the column order in an index

User-defined functions

User-defined function support varies as follows:

- Adaptive Server Anywhere support UDFs in SQL, Java, and C
- Adaptive Server Enterprise supports UDFs written in Java only
- IQ offers support for UDFs via CIS query decomposition but there are performance implications

Arithmetic expressions on dates

Adaptive Server Anywhere and IQ interpret arithmetic expressions on dates as shorthand notation for various date functions. Adaptive Server Enterprise does not.

- Date +/- integer is equivalent to Dateadd()
- Date – date is equivalent to Datediff()
- Date + time creates a timestamp from the two

SELECT INTO

There are differences in the types of tables permitted in a statement like the following:

```
select into table1 from table2
```

- Adaptive Server Enterprise permits *table1* to be permanent, temporary or a proxy table. Adaptive Server Enterprise also supports SELECT INTO EXISTING TABLE.
- Adaptive Server Anywhere and IQ permit *table1* to be a permanent or a temporary table. A permanent table is created only when you select into *table* and specify more than one column. SELECT INTO *#table*, without an owner specification, always creates a temporary table, regardless of the number of columns specified. SELECT INTO table with just one column selects into a host variable.

Updatable views

Adaptive Server Enterprise and Adaptive Server Anywhere are more liberal than ANSI permits on which view definitions are updatable when the WITH CHECK option is not requested.

Adaptive Server Anywhere offers the ANSI_UPDATE_CONSTRAINTS option to control whether updates are restricted to those supported by SQL-92 or a more liberal set of rules.

IQ only permits UPDATE on single-table views that can be flattened. IQ does not support WITH CHECK

FROM clause in UPDATE and DELETE

All three products support the FROM clause with multiple tables in UPDATE and DELETE.

Transact-SQL procedure language overview

The **stored procedure language** is the part of SQL used in stored procedures and batches.

Adaptive Server Anywhere and IQ support a large part of the Transact-SQL stored procedure language in addition to the Watcom-SQL dialect based on SQL/92.

Transact-SQL stored procedure overview

Based on the ISO/ANSI draft standard, the Adaptive Server Anywhere and IQ stored procedure language differs from the Transact-SQL dialect in many ways. Many of the concepts and features are similar, but the syntax is different. Adaptive Server Anywhere and IQ support for Transact-SQL takes advantage of the similar concepts by providing automatic translation between dialects. However, a procedure must be written exclusively in one of the two dialects, not in a mixture of the two.

Adaptive Server Anywhere and IQ support for Transact-SQL stored procedures

There are a variety of aspects to Adaptive Server Anywhere and IQ support for Transact-SQL stored procedures, including:

- Passing parameters
- Returning result sets
- Returning status information
- Providing default values for parameters
- Control statements
- Error handling

Transact-SQL batch overview

In Transact-SQL, a batch is a set of SQL statements submitted together and executed as a group, one after the other. Batches can be stored in command files. The Interactive SQL utility in Adaptive Server Anywhere and IQ and the *isql* utility in Adaptive Server Enterprise provide similar capabilities for executing batches interactively.

The control statements used in procedures can also be used in batches. Adaptive Server Anywhere and IQ support the use of control statements in batches and the Transact-SQL-like use of non-delimited groups of statements terminated with a GO statement to signify the end of a batch.

For batches stored in command files, Adaptive Server Anywhere and IQ support the use of parameters in command files. Adaptive Server Enterprise does not support parameters.

For information on parameters, see PARAMETERS statement [DBISQL] on page 537.

SQL statements in procedures and batches

Some SQL statements supported by Sybase IQ are part of one dialect, but not the other. You cannot mix the two dialects within a procedure or batch. This means that:

- You can include Transact-SQL-only statements together with statements that are part of both dialects in a batch or procedure.
- You can include statements not supported by Adaptive Server Enterprise together with statements that are supported by both servers in a batch or procedure.
- You cannot include Transact-SQL-only statements together with Sybase IQ-only statements in a batch or procedure.

SQL statements *not* separated by semicolons are part of a Transact-SQL procedure or batch. See Chapter 6, "SQL Statements" for details of individual statements.

Expression subqueries in IF statements

Adaptive Server Enterprise and Adaptive Server Anywhere support comparisons between a variable and a scalar value returned by an expression subquery. For example:

```
create procedure testIf ()
             begin
             declare var4 int;
set var4 = 10;
             if var4 = (select MIN (a_i1) from a) then set var4 = 100;
end if;
end;
```

CASE statement

CASE statement permitted usage differs in IQ and Anywhere.

The CASE statement is not supported in Adaptive Server Enterprise.

Row-level cursor operations

All three products support the use of cursors with UPDATE and DELETE as follows:

```
UPDATE WHERE CURRENT OF {cursor}
```

```
DELETE WHERE CURRENT OF {cursor}
```

In IQ, updatable cursors are asensitive only, for one table only, and chained only. Updatable hold cursors are not permitted. Updatable cursors in IQ get a table lock.

Print command

The effect of the PRINT command depends on the client:

- Adaptive Server Enterprise PRINT always sends a message to the client
- In Adaptive Server Anywhere and IQ, PRINT sends a message to the client for Open Client and JDBC connections.
- Adaptive Server Enterprise stored procedures that rely on PRINT work in IQ using DBISQL.

Note IQ users may prefer dbisql with JDBC, rather than the iAnywhere JDBC driver (formerly called the JDBC-ODBC bridge).

Automatic translation of stored procedures

In addition to supporting Transact-SQL alternative syntax, Adaptive Server Anywhere and IQ provide aids for translating statements between the Watcom-SQL and Transact-SQL dialects. Functions returning information about SQL statements and enabling automatic translation of SQL statements include:

- **SQLDialect(statement)** Returns Watcom-SQL or Transact-SQL.
- **WatcomSQL(statement)** Returns the Watcom-SQL syntax for the statement.
- **TransactSQL(statement)** Returns the Transact-SQL syntax for the statement.

These are functions, and so can be accessed using a SELECT statement from Interactive SQL. For example, the following statement returns the value Watcom-SQL:

```
select SqlDialect('select * from employee')
```

Using Sybase Central to translate stored procedures

Sybase Central has facilities for creating, viewing, and altering procedures.

❖ **Translating a stored procedure using Sybase Central**

1. Connect to a database using Sybase Central, either as owner of the procedure you wish to change, or as a DBA user.
2. Double-click the Procedures folder to see a list of the stored procedures in the database.
3. Using the right mouse button, click the procedure you wish to translate, and choose the target dialect from the popup menu: either Watcom-SQL or Transact-SQL.

   The procedure appears in the selected dialect. If the selected dialect is not the one in which the procedure is stored, the server translates it to that dialect. Any untranslated lines appear as comments.
4. Rewrite any untranslated lines as needed, and click the Execute Script button to save the translated version to the database. You can also export the text to a file for editing outside Sybase Central.

Returning result sets from Transact-SQL procedures

Adaptive Server Anywhere and IQ use a RESULT clause to specify returned result sets. In Transact-SQL procedures, the column names or alias names of the first query are returned to the calling environment.

Example of Transact-SQL procedure

The following Transact-SQL procedure illustrates how Transact-SQL stored procedures returns result sets:

```
CREATE PROCEDURE showdept (@deptname varchar(30))
AS
    SELECT employee.emp_lname, employee.emp_fname
    FROM department, employee
    WHERE department.dept_name = @deptname
    AND department.dept_id = employee.dept_id
```

Example of Watcom-SQL procedure

The following is the corresponding Adaptive Server Anywhere or IQ procedure:

```
CREATE PROCEDURE showdept(in deptname varchar(30))
RESULT ( lastname char(20), firstname char(20))
```

```
BEGIN
    SELECT employee.emp_lname, employee.emp_fname
    FROM department, employee
    WHERE department.dept_name = deptname
    AND department.dept_id = employee.dept_id
END
```

Multiple result sets

There are minor differences in the way the three Sybase client tools present multiple results to the client:

- ISQL displays all results in a single stream.
- DBISQL presents each result set on a separate tab. The user must enable this functionality in the Option menu, make it a permanent change, and then restart or reconnect to DBISQL.
- DBISQLC provides the RESUME command to display each successive result set.

For more information about procedures and results, see Chapter 8, "Using Procedures and Batches" in the *Sybase IQ System Administration Guide*.

Variables in Transact-SQL procedures

Adaptive Server Anywhere and IQ use the SET statement to assign values to variables in a procedure. In Transact-SQL, values are assigned using the SELECT statement with an empty table-list. The following simple procedure illustrates how the Transact-SQL syntax works:

```
CREATE PROCEDURE multiply
                 @mult1 int,
                 @mult2 int,
                 @result int output
AS
SELECT @result = @mult1 * @mult2
```

This procedure can be called as follows:

```
CREATE VARIABLE @product int
go
EXECUTE multiply 5, 6, @product OUTPUT
go
```

The variable @product has a value of 30 after the procedure executes.

Order and persistence of variables

There are some differences in order and persistence of variable declarations:

- In Adaptive Server Enterprise, you can declare variables anywhere in the body of a stored procedure. Variables persist for the duration of the procedure.
- In Adaptive Server Anywhere and IQ, you must declare variables at the beginning of a compound statement (that is, immediately after BEGIN in a BEGIN...END pair). Variables persist only for the duration of the compound statement.

For more information on using the SELECT statement to assign variables, see "Writing compatible queries" on page 807. For more information on using the SET statement to assign variables, see the SET statement on page 573.

Error handling in Transact-SQL procedures

Default procedure error handling is different in the Watcom-SQL and Transact-SQL dialects. By default, Watcom-SQL dialect procedures exit when they encounter an error, returning SQLSTATE and SQLCODE values to the calling environment.

Explicit error handling can be built into Watcom-SQL stored procedures using the EXCEPTION statement, or you can instruct the procedure to continue execution at the next statement when it encounters an error, using the ON EXCEPTION RESUME statement.

When a Transact-SQL dialect procedure encounters an error, execution continues at the following statement. The global variable @@error holds the error status of the most recently executed statement. You can check this variable following a statement to force return from a procedure. For example, the following statement causes an exit if an error occurs.

```
IF @@error != 0 RETURN
```

When the procedure completes execution, a return value indicates the success or failure of the procedure. This return status is an integer, and can be accessed as follows:

```
DECLARE @status INT
EXECUTE @status = proc_sample
IF @status = 0
```

```
    PRINT 'procedure succeeded'
ELSE
    PRINT 'procedure failed'
```

The following table describes the built-in procedure return values and their meanings:

Table A-2: Built-in procedure return values

Value	Meaning
0	Procedure executed without error
-1	Missing object
-2	Data type error
-3	Process was chosen as deadlock victim
-4	Permission error
-5	Syntax error
-6	Miscellaneous user error
-7	Resource error, such as out of space
-8	Non-fatal internal problem
-9	System limit was reached
-10	Fatal internal inconsistency
-11	Fatal internal inconsistency
-12	Table or index is corrupt
-13	Database is corrupt
-14	Hardware error

The RETURN statement can be used to return other integers, with their own user-defined meanings.

Using the RAISERROR statement in procedures

The RAISERROR statement is a Transact-SQL statement for generating user-defined errors. It has a similar function to the SIGNAL statement.

For a description of the RAISERROR statement, see RAISERROR statement [T-SQL] on page 543.

By itself, the RAISERROR statement does not cause an exit from the procedure, but it can be combined with a RETURN statement or a test of the @@error global variable to control execution following a user-defined error.

If you set the ON_TSQL_ERROR database option to CONTINUE, the RAISERROR statement no longer signals an execution-ending error. Instead, the procedure completes and stores the RAISERROR status code and message, and returns the most recent RAISERROR. If the procedure causing the RAISERROR was called from another procedure, the RAISERROR returns after the outermost calling procedure terminates.

You lose intermediate RAISERROR statuses and codes after the procedure terminates. If, at return time, an error occurs along with the RAISERROR, then the error information is returned and you lose the RAISERROR information. The application can query intermediate RAISERROR statuses by examining @@error global variable at different execution points.

Transact-SQL-like error handling in the Watcom-SQL dialect

You can make a Watcom-SQL dialect procedure handle errors in a Transact-SQL-like manner by supplying the ON EXCEPTION RESUME clause to the CREATE PROCEDURE statement:

```
CREATE PROCEDURE sample_proc()
ON EXCEPTION RESUME
BEGIN
    ...
END
```

The presence of an ON EXCEPTION RESUME clause prevents explicit exception handling code from being executed, so avoid using these two clauses together.

Adaptive Server Anywhere and IQ

The preceding sections, while focused on compatibility with Transact-SQL, also clarify many of the distinctions between IQ and Adaptive Server Anywhere.

This section points out other differences between IQ and Anywhere.

For additional information, always refer to the IQ documentation set when using IQ. Refer to the Adaptive Server Anywhere documentation set when using Anywhere, or when the IQ documentation refers to Anywhere's for specific functionality only.

Server and database startup and administration

Note the following differences in starting and managing databases and servers:

- IQ uses the server startup command start_asiq, in place of the Anywhere network server startup command.
- IQ does not support personal servers.
- IQ supports many Anywhere server command-line options but not all. Other server options are supported for IQ but not for Anywhere.
- IQ provides the stop_asiq utility to shut down servers.
- Clauses permitted in the BACKUP and RESTORE statements differ in IQ and Anywhere.
- SQL Remote is supported in IQ for multiplex operations only.

IQ supports many Anywhere database administration utilities, but not all.

- The following Anywhere utilities are *not* supported by IQ: Backup, Compression, Console, Initialization, License, Log Transfer, Log Translation, Rebuild, Spawn, some Transaction Log options (-g, -il, -ir, -n, -x, -z), Uncompression, Unload, Upgrade, and Write File.
- IQ supports the Anywhere Validation utility on the Catalog Store only. To validate the IQ Store, use sp_iqcheckdb.

Database options

Some Anywhere database options are not supported by IQ, including: DEFAULT_TIMESTAMP_INCREMENT, JAVA_INPUT_OUTPUT.

Some database options only apply to the Catalog Store, including: FOR_XML_NULL_TREATMENT, ISOLATION_LEVEL, PREFETCH, PRECISION, SCALE, and TRUNCATE_WITH_AUTO_COMMIT.

Options with differences in behavior, default, or allowed values include DELAYED_COMMITS, JAVA_HEAP_SIZE, TIME_FORMAT, TIMESTAMP_FORMAT.

IQ also includes many options that Anywhere does not support. For details, see Chapter 2, "Database Options."

Data definition language (DDL)

In addition to the DDL differences discussed previously, note these:

- In a DELETE/DROP or PRIMARY KEY clause of an ALTER TABLE statement, IQ takes the RESTRICT action (reports an error if there are associated foreign keys). Anywhere always takes the CASCADE action.
- Similarly, DROP TABLE reports an error in IQ if there are associated foreign key constraints.
- IQ does not support these DDL statements: CREATE COMPRESSED DATABASE, CREATE TRIGGER, SETUSER.
- IQ supports referential integrity at the statement level, rather than the transaction-level integrity that Anywhere supports with the CHECK ON COMMIT clause of CREATE TABLE.
- An IQ table cannot have a foreign key that references an Anywhere (or Catalog) table, and an Anywhere table cannot have a foreign key that references an IQ table.
- In CREATE DATABASE, the defaults for case sensitivity and collation differ. The defaults for IQ are CASE RESPECT and the ISO_BINENG collation; for Anywhere, the defaults are CASE IGNORE, and collation inferred from the operating system's language and character set.

Data manipulation language (DML)

- IQ does not support these DML and procedural statements: EXPLAIN, GET DATA, INPUT, OUTPUT, PREPARE TO COMMIT, PUT, READTEXT, ROLLBACK TRIGGER, SYSTEM, UNLOAD TABLE, VALIDATE TABLE.

  Note A set of extraction options perform a role similar to UNLOAD TABLE; for details, see the section "Data extraction options" in Chapter 7, "Moving Data In and Out of Databases" in the *Sybase IQ System Administration Guide*.

- IQ supports the INSERT...LOCATION syntax; Anywhere does not.
- LOAD TABLE options differ in IQ and Anywhere.
- OPEN statement in IQ does not support BLOCK and ISOLATION LEVEL clauses.
- IQ does *not* support triggers.
- Use of transactions, isolation levels, checkpoints, and automatically generated COMMITs, as well as cursor support, is different in IQ and Anywhere. For details, see Chapter 10, "Transactions and Versioning" in the *Sybase IQ System Administration Guide*.
- When you SELECT from a stored procedure in IQ, CIS functional compensation performance considerations apply. For more information, see "Conditions that cause processing by Adaptive Server Anywhere" in *Sybase IQ Performance and Tuning Guide*.

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