SYBASE®

User’s Guide

Risk Analytics Platform

1.0

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Contents

About This Book

Audience

User's Guide Risk Analytics Platform is intended for Sybase® Professional Services, Customer IT/Back Office engineers, and other technical personnel who need to set up and run Sybase Risk Analytics Platform. Familiarity with Sybase Adaptive Server® Enterprise, Sybase Replication Server®, Sybase IQ, data warehousing, and other related topics is assumed.

How to use this book

Before following the instructions in this book to set up and run Risk Analytics Platform, be sure to complete the installation and configuration instructions in the *Installation and Configuration Guide Risk Analytics Platform*.

Related documents

Refer to the following documents for more information:

- *Release Bulletin Risk Analytics Platform*
- *Installation and Configuration Guide Risk Analytics Platform*
- Sybase IQ 12.6 product documentation
- PowerDesigner 11.0 product documentation
- White paper Time Series in finance: the array database approach at http://cs.nyu.edu/shasha/papers/jagtalk.html
- White paper FinTime --- a financial time series benchmark at http://cs.nyu.edu/cd/faculty/shasha/fintime.html

Other sources of information

Use the Sybase Getting Started CD and the Sybase Infocenter Web site to learn more about your product:

- The Getting Started CD contains the release bulletin, installation guide, and user's guide in PDF format. 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 Sybase Infocenter Web site is an online version of the product manuals that you can access using a standard Web browser.

  To access the Infocenter Web site, go to Sybooks Online Help at http://infocenter.sybase.com/help/index.jsp

- 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.

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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.

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.

The Risk Analytics Platform 1.0 documentation complies 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 Chapter 1, "Introducing Sybase IQ" in *Introduction to Sybase IQ*. The online help for Sybase IQ, 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.

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If you need help

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CHAPTER 1

Sybase Risk Analytics Platform

About this Chapter

This chapter provides an overview of Sybase Risk Analytics Platform and its components.

Contents

Overview

The Sybase Risk Analytics Platform (RAP) is a consolidated trading and risk data repository for customers in the Capital Markets and Investment Management sectors. By consolidating market data from vendor feeds, historical time series data, real-time trades and quotes (TAQ) data and reference data in one repository RAP eliminates or reduces intra-day and overnight batch processing and supports model driven quantitative trading and real-time portfolio decisions.

Risk Analytics Infrastructure

The Risk Analytics Platform uses Sybase IQ to store large amounts of historical, reference and real-time data from corporate sources, market data vendors and securities exchanges for fast access by automated trading applications and various user communities in customer organizations. The RAP repository can be used in conjunction with Replication Server (not included in the RAP product) so that transactional updates can be applied to the RAP data. The real-time data stream and scheduled downloads from market data vendors can be loaded into the repository very fast using loading utilities at very frequent intervals (within minutes of delivery) to keep the data current.

RAP incorporates a data model designed for multi-asset portfolio trading applications and includes a tool for managing physical data models. The scripts for configuring the repository for high performance and test data and performance tuning procedures are also included.

Why Sybase IQ?

Due to the increase in TAQ data volume and data flow rates, conventional relational database management systems (RDBMS) cannot meet the real-time query requirements for automated securities trading and real-time market analysis. Sybase IQ can meet this challenge.

The core data management component of the Risk Analytics Platform, Sybase IQ, is a SQL database that uses vectorial representation of data (independently indexed columns) as opposed to relational tabular structures. The data stored column-wise is bit wise indexed and compressed. Consequently the query performance is much better than one would expect from relational databases and the data storage capacity is close to petabyte range.

The design is based on requirements of high performance, concurrent retrievals by a large user population as opposed to design needs of high rate of concurrent transactional updates as in the case of RDBMS. The internal data structure and the manner data is served to user applications renders Sybase IQ particularly suitable to store large amounts of time series data. The next generation automated trading infrastructure in institutional trading and prime brokerage firms is characterized by limited number of inbound data streams (that represent market data delivery channels) and high number of concurrent reader processes that access indexed columns to retrieve large data sets for analysis. The architecture of the Risk Analytics Platform meets these requirements.

Risk Analytics data model

The Risk Analytics Platform uses a data model designed to support institutional trading and prime brokerage business processes. The Risk Analytics data model includes two submodels, or *diagrams*, which focus on two specific business areas: **Instruments** and **Market Data**.

Instruments

The Instrument submodel represents data structures that describe financial instruments. The Instrument table stores information common to all financial instruments, including instrument name, trading symbol, issue date, issuer rating, trading currency, and exchange.

Corresponding tables store details about each type of instrument. The Stock (STOCK) table, for example, stores related information about stock transactions; the Bond (BOND) table stores information related to bond transactions, and so on.

Market Data

The Market Data submodel represents data structures that store historical and real-time data. The submodel includes several areas, including history, quotes and trades data, stock split events, dividends, and mutual funds.

For more information about the data model included with Sybase Risk Analytics Platform, see Chapter 2, “Data Model”.

Sample queries

Risk Analytics includes test scripts that allow you to run queries against the sample data. You can run the scripts against the sample data to test historical market data and real-time TAQ data retrieval performance.

The historical market data sets are built using end of day trading data files from market data vendors and represent several months/years of data. The real time TAQ data is the tick-by-tick bid/ask quoted and trade prices for each trading day. The historical time series queries analyze securities trades over long time periods to identify trends. Real time queries analyze the intra-day dynamics of securities trading and seek to identify arbitrage opportunities and optimal trading strategies.

Note
For more information about the sample queries included with Sybase Risk Analytics Platform, see Chapter 3, “Sample Queries”.

CHAPTER 2

Data Model

About this Chapter

This chapter describes the Risk Analytics Platform data model and the tables in the model.

Contents

Overview

The Risk Analytics Platform 1.0 data model supports the storage and fast retrieval of historical and real-time market data; reference information on financial instruments; and information on market indexes used as benchmarks in performance analysis.

Sybase distributes the RAP data model as a physical data model with Sybase IQ as the default database. Conceptually the model includes two submodels or diagrams, which represent specific business areas.

Model Description

- Submodels in PowerDesigner are called *diagrams*. The Risk Analytics model includes two submodels (diagrams): Instrument and Market Data. No packages are defined in the model.
- The entire model contains 48 tables and 261 columns; each table is shown in at least one submodel. All tables and columns have detail descriptions.
- The data types are assigned to table columns via domains; there are 16 domains in the model.
- All primary keys and foreign key constraints are named in accordance with standard naming conventions, that is, PK_<table name> and FKNN_<table name> for a primary key and foreign key constraint, respectively (where NN is the constraint number). Domain names are defined as SYB_<domain name>.

Instrument submodel

The Instrument submodel represents data structures that describe financial instruments. The Instrument (INSTRUMENT) table stores information common to all financial instruments.

Detail information on each type of instrument is stored in corresponding tables. Thus, stock-related information is stored in the Stock (STOCK) table, bond-related information is stored in the Bond (BOND) table, and so on.

Information on market indexes is stored in the Market Index (MARKET_INDEX) table. Index Composition (INDEX_CMPST) and Instrument Benchmark (INSTR_BENCHMK) store information on an index composition and define benchmark indexes for a particular instrument, respectively.

Market Data submodel

The Market Data submodel represents data structures that store historical and real-time data. The submodel contains several areas, including the historical data and quotes and trades data for different financial instruments.

Stock-related data is stored in the following five tables:

- Stock History (STOCK_HISTORY) stores a historical data (one record per trading date) including open/close price, high/low price, and trading volume.
- Stock Quote (STOCK_QUOTE) stores an intraday quote data including bid/ask price and size.
- Stock Trade (STOCK_TRADE) stores an intraday trade data including trade price and size.
- Split Event (SPLIT_EVENT) stores data on stock splits (event date and split factor).
- Dividend Event (DIVIDEND_EVENT) stores data on dividend payment events (event date and dividend amount).

Note that the stock-related tables listed above are also used to store the data of Exchange-Traded Funds. Separate tables with a similar structure are used to store historical and intraday data related to bonds and options and index-related data.

Mutual funds data contains only historical data stored in the Mutual Fund History (MUTL_FUND_HIST) table.

Data model tables

The following table contains a list of all data model tables, including the code names and descriptions.

Name	Code	Description
Bond	BOND	This table stores bond data (e.g., bond type, maturity date, interest rate, etc.). Bond attributes that are common to all types of financial instruments (trading symbol, name, currency, etc.) are stored in the Instrument (INSTRUMENT) table.
Bond History	BOND_HISTORY	This table stores historical data, one record per each trading date. The data includes bonds daily price and yield values (open/close, high/low), trade volume (number of bonds traded), etc.
Bond Quote	BOND_QUOTE	This table stores the real-time (intraday) quote data. Each quote record includes a yield, bid/ask price and size (i.e., a number of bonds offered at a bid/ask price).
Bond Subtype	BOND_SUBTYPE	This table stores a list of definitions that are used to categorize bonds of a particular type. Thus, US Treasury issues can be categorized as Treasury Bonds, Zero-Coupon Bonds, Treasury Notes, etc.
Bond Trade	BOND_TRADE	This table stores real-time (intraday) trade data. Each trade record includes a bonds price and yield and a transactions size (number of bonds traded).
Bond Type	BOND_TYPE	This table stores a list of definitions used to specify a type of a bond (e.g., US Treasury, Municipal, Corporate, etc.)
Capitalization	CAPITALIZATION	This table contains a list of definitions that are used to specify a type of a market capitalization of a financial instruments issuer (e.g., Small-Cap, Medium, Large).
Country	COUNTRY	This table contains a standard list of the world countries (e.g., USA, Japan, France, etc.)
Currency	CURRENCY	This table contains a list of world currencies based on International Organization for Standards (ISO) publication 4217 (e.g., US Dollar, Hong Kong Dollar, etc.)
Dividend Event	DIVIDEND_EVENT	This table stores information on a dividend payment event when a shareholder receives a certain payment for each share of stock in his/her possession. The dividend amount is commonly defined as a certain percentage of a share price but can be also specified as a monetary amount. Monetary or Percentage Indicator (MOP_INDICATOR) column indicates how the dividend amount is defined.

Name	Code	Description
Exchange	EXCHANGE	This table stores a list of exchanges where financial instruments are listed and traded (e.g., New York Stock Exchange, NASDAQ, etc.)
Exchange Traded Fund	EXCH_TRD_FUND	ETF This table stores the Exchange Traded Funds (ETF) data. ETF attributes that are common to all types of financial instruments (trading symbol, name, currency, etc.) are stored in the Instrument (INSTRUMENT) table.
Fund Category	FUND_CATEGORY	This table stores a list of definitions used to characterize an investment style of a mutual fund (e.g., Value, Sector, Growth, etc.).
Fund Family	FUND_FAMILIY	This table stores a list of mutual fund families (e.g., Fidelity, T. Rowe Price, Vanguard, etc.). A fund family is a company offering many mutual funds, for various objectives.
Fund Share	FUND_SHARE	This table stores the data on mutual fund shares of a particular series (class) including a sales load, fee (12-b fee), etc. Fund attributes that are common to all shares (fund type, family, investment objective type, etc.) are stored in the Mutual Fund (MUTUAL_FUND) table.
Fund Type	FUND_TYPE	This table stores a list of definitions used to characterize a mutual fund based on a type of its financial instruments - stock fund (stocks), bond fund (bonds), hybrid fund (stocks and bonds), etc.
Geographic Group	GEO_GROUP	This table contains a list of definitions used to group financial instruments by a geographical region of their issuers. Terms commonly used in US are: Domestic (US issuers), International (non-US issuers), Global (can include both domestic and international issuers), Europe (Europe-based issuers), etc.
Index Composition	INDEX_CMPSTN	This association table is used to specify all financial instruments that constitute a market index. Thus, Dow Jones Industrial Average index is based on a stock valuation of the thirty major US corporations that are included in this index.
Index History	INDEX_HISTORY	This table stores the indexes historical data, one record per each trading date. The data includes indexes daily values (open/close, high/low) and trade volume.
Index Intraday	INDEX_INTRADAY	This table stores the indexes real-time (intraday) data that shows its value movements during a trading day. Each data point includes an index value and trade volume.

Name	Code	Description
Instrument	INSTRUMENT	This table stores the financial instruments data that is common to all types of instruments (e.g., trading symbol, name, date of issue, etc.). Data that is specific to a particular type of instruments (stock, bond, option, mutual fund, etc.) is stored in separate data structures; e.g., stock-specific data is stored in the Stock (STOCK) table.
Instrument Benchmark	INSTR_BENCHMK	This association table specifies a market index that is used as a benchmark for a given financial instrument. More than one benchmark can be used for some instruments.
Instrument Exchange	INSTR_EXCHANGE	This association table is used to specify an exchange where a given financial instrument is listed and traded. Note that some instruments can be listed on more than one exchange.
Instrument Rating	INSTR_RATING	This association table is used to specify rating scores assigned to an issuer of a financial instrument by different rating agencies.
Instrument Type	INSTR_TYPE	This table stores a list of definitions used to specify a type of a financial instrument (e.g., stock, bond, option, mutual fund, ETF, etc.).
Investment Objective Type	INVST_OBJ_TYPE	This table stores a list of definitions used to characterize investment goals of a mutual fund (e.g., Capital Appreciation, Income, Income and Growth, etc.)
Major Industry Classification	MAJOR_IDST_CLS	This table contains a list of definitions used to characterize an industry of a company (e.g., Technology, Energy, Healthcare, etc.). Definitions are based on the Standard Industry Classification (SIC).
Market Index	MARKET_INDEX	This table stores a list of market indexes (e.g., Dow Jones Industrial Average, S&P 500, NASDAQ Composite, etc.) that are used in analysis of market trends, as benchmarks, etc.
Maturity Term Type	MTRTY_TERM_TYPE	This table stores a list of definitions used to specify a type of bond maturity terms (e.g., short-term, intermediate, long-term, etc.).
Mutual Fund	MUTUAL_FUND	This table stores the mutual funds data including a fund type (stocks, bonds, hybrid), fund family (e.g., Fidelity), investment objective (e.g., grows and income), expenses, sale load, etc. Fund attributes that are common to all types of financial instruments (trading symbol, name, currency, etc.) are stored in the Instrument (INSTRUMENT) table.
Mutual Fund History	MUTL_FUND_HIST	This table stores the historical data for a mutual fund, one record per each trading date. The data includes a trade date and price.

Name	Code	Description
Option History	OPTION_HISTORY	This table stores the options historical data, one record per each trading date. The data includes options daily price (open/close, high/low), trade volume (number of contracts traded), etc.
Option Instrument	OPTION_INSTR	This table stores the options data including an underlying instrument (stock, bond or market index), option type (put or call), strike price, etc. Option attributes that are common to all types of financial instruments (trading symbol, name, currency, etc.) are stored in the Instrument (INSTRUMENT) table.
Option Quote	OPTION_QUOTE	This table stores the options real-time (intraday) quote data. Each quote record includes a bid/ask price, size (number of contracts offered at a bid/ask price), etc.
Option Trade	OPTION_TRADE	This table stores the options real-time (intraday) trade data. Each trade record includes a trade's price, size (number of contracts traded), etc.
Option Type	OPTION_TYPE	This table stores a list of definitions used to specify a type of an option - put or call.
Payment Frequency Type	PYMT_FRQ_TYPE	This table stores a list of definitions used to specify a frequency of interest payments associated with a bond (annually, semi-annually, quarterly, etc.).
Rating Agency	RATING_AGENCY	This table stores a list of agencies that collect information about the creditworthiness of issuers of financial instruments and assign to them a corresponding rating (credit score). Three major rating agencies are Moody’s Investor Service, Standard & Poors Corporation and Fitch Ratings.
Rating Score	RATING_SCORE	This table stores a list of scores that are assigned by rating agencies to issuers of financial instruments to characterize their creditworthiness. Thus, rating scores assigned by Standard & Poors range from AAA (premium) to D (default).
Secondary Industry Classification	SCND_IDST_CLS	This table stores a list of definitions that are used together with major industry classifications (see Major Industry Classification table) to further categorize an industry of a company. Thus, a company with a major classification Technology can be further categorized as Software, Hardware, etc. Definitions are based on the Standard Industry Classification (SIC).

Name	Code	Description
Share Series	SHARE_SERIES	This table stores a list of definitions used to specify a series (class) of mutual fund shares. Shares series indicates whether they carry commissions (sales load) and when these commissions must be paid. Thus, A shares carry a front-end load that must be paid when shares are bought; B shares carry back-end load that must be paid when shares are sold; C shares have no commissions but carry an ongoing fee (12-b fee) that is paid annually in addition to other fund-related expenses; etc.
Split Event	SPLIT_EVENT	This table stores information on a stock split event when the number of outstanding shares of a company's stock is increased and the price per share is simultaneously decreased so that proportionate equity of each shareholder remains the same. The split is characterized by a split factor; a factor of 0.5 indicates that the number of shares is increased two times and that the share price is decreased two times. In a less common reverse split, the number of shares is decreased and the price per share is increased in a similar manner; a split factor of 2 indicates that the number of shares is decreased two times and that the share price is increased two times.
Stock	STOCK	This table stores the data on stocks, e.g., stock type (common stock, preferred stock, etc.), dividend amount, number of shares outstanding, etc. Stocks attributes that are common to all types of financial instruments (trading symbol, name, currency, etc.) are stored in the Instrument (INSTRUMENT) table.
Stock History	STOCK_HISTORY	This table stores the stocks historical data, one record per each trading date. The data includes stocks daily prices (open/close, high/low) and trade volume (number of shares traded).
Stock Quote	STOCK_QUOTE	This table stores the stocks real-time (intraday) quote data. Each quote record includes a bid/ask price and corresponding size values (i.e., a number of shares offered at bid/ask price).
Stock Subtype	STOCK_SUBTYPE	This table stores a list of definitions that are used to categorize stocks of a particular type. Thus, a preferred stock can be categorized as cumulative, non-cumulative, participating and convertible.
Stock Trade	STOCK_TRADE	This table stores the stocks real-time (intraday) trade data. Each trade record includes a transactions price and size (i.e., a number of shares traded).

Name	Code	Description
Stock Type	STOCK_TYPE	This table stores a list of definitions used to specify a type of a stock, e.g., common stock, preferred stock, etc.

CHAPTER 3

Sample Queries

About this Chapter

This chapter describes the Risk Analytics Platform sample historical data queries and TAQ data queries and provides examples of the query output.

Contents

Overview

Historical market data includes market data that does not change frequently. Updates to tables containing historical market data typically occur at the end of the trading day. Queries against these tables support the comparison of price histories over time.

Real-time price TAQ data includes price quotations and trade prices that are updated frequently during a trading day. Queries against tables containing tick information extract data about intra-day price fluctuations.

SQL scripts

The SQL scripts for the Risk Analytics sample historical market and TAQ data queries are in the folder *%Sybase%/Risk Analytics Platform 1.0\Scripts\RAP Queries*. You can run these queries on your Sybase IQ sample database in Interactive SQL Java (dbisql).

If you use Interactive SQL Classic (dbisqlc) to run the queries, the error `"When Force_No_Scroll_Cursors=ON, scrolling cursor operations are not supported by Sybase IQ."` may be returned when you are scrolling through the results. The Force_No_Scroll_Cursors option can make a significant difference in reducing query execution time and should be set ON. The error can be ignored.

For more information on running queries in a Sybase IQ database using Interactive SQL, see Chapter 2, "Using Interactive SQL (dbisql)" in the *Sybase IQ Utility Guide*.

Historical data queries

Historical market information includes price histories for different instruments. Updates to these tables typically occur once at the end of a trading day. Queries against these tables support the comparison of price histories over time.

Script name	Historical market query description
hist_qry1.sql	Get the closing price of a set of 10 stocks for a 10-year period and group into weekly, monthly, and yearly aggregates. For each aggregate period determine the low, high, and average closing price value. The output is sorted by id (INSTRUMENT_ID) and trade date.
hist_qry2.sql	Adjust all prices and volumes (prices are multiplied by the split factor and volumes are divided by the split factor) for a set of 1000 stocks to reflect the split events during a specified 300 day period, assuming that events occur before the first trade of the split date. These are called split-adjusted prices and volumes.
hist_qry3.sql	For each stock in a specified list of 1000 stocks, find the differences between the daily high and daily low on the day of each split event during a specified period.
hist_qry4.sql	Calculate the value of the S&P 500 and Russell 2000 index for a specified day using unadjusted prices and the index composition of the two indexes on the specified day.
hist_qry5.sql	Find the 21-day and 5-day moving average price for a specified list of 1000 stocks during a 6-month period. (Use split adjusted prices).
hist_qry6.sql	(Based on the previous query) Find the points (specific days) when the 5-day moving average intersects the 21-day moving average for these stocks. The output is sorted by id (INSTRUMENT_ID) and date.
hist_qry7.sql	Determine the value of $100,000 now if 1 year ago it was invested equally in 10 specified stocks (That is, allocation for each stock is $10,000). The trading strategy is: When the 20-day moving average crosses over the 5-month moving average the complete allocation for that stock is invested and when the 20-day moving average crosses below the 5-month moving average the entire position is sold. The trades happen on the closing price of the trading day.
hist_qry8.sql	Find the pair-wise coefficients of correlation in a set of 10 securities for a two year period. Sort the securities by the coefficient of correlation, indicating the pair of securities corresponding to that row.
hist_qry9.sql	Determine the yearly dividends and annual yield (dividends/average closing price) for the past 3 years for all the stocks in the Russell 2000 index that did not split during that period. Use unadjusted prices since there were no splits to adjust for.

Historical market query examples

Query description: hist_qry1 Get the closing price of a set of 10 stocks for a 10-year period and group into weekly, monthly and yearly aggregates. For each aggregate period determine the low, high and average closing price value. The output is sorted by id (INSTRUMENT_ID) and trade date.

INSTRUMENT_ID	YEAR	MON	WEEK	MAX_PRICE	MIN_PRICE	AVG_PRICE
1	2005	2	8	75.39	70.36	72.788000000000000000000000
1	2005	2	9	76.13	74.62	75.226000000000000000000000
1	2005	2	10	73.87	73.87	73.870000000000000000000000
1	2005	2	(NULL)	76.13	70.36	73.750000000000000000000000
1	2005	3	10	78.37	75.35	76.667500000000000000000000
1	2005	3	11	85.68	79.94	82.702000000000000000000000
1	2005	3	12	87.34	83.12	84.970000000000000000000000
1	2005	3	13	90.83	87.30	88.722000000000000000000000
1	2005	3	14	91.74	89.01	90.597500000000000000000000
1	2005	3	(NULL)	91.74	75.35	84.82739130434782608695652
1	2005	4	14	87.23	87.23	87.230000000000000000000000
1	2005	4	15	87.17	84.63	85.640000000000000000000000
1	2005	4	16	87.13	85.39	86.262000000000000000000000
1	2005	4	17	92.45	87.97	89.928000000000000000000000
1	2005	4	18	94.29	92.40	93.720000000000000000000000
1	2005	4	(NULL)	94.29	84.63	88.808571428571428571428571
1	2005	5	19	97.05	90.55	94.230000000000000000000000
1	2005	5	20	96.07	94.12	94.906000000000000000000000
1	2005	5	21	95.06	93.16	94.474000000000000000000000
1	2005	5	22	92.19	87.65	89.812000000000000000000000
1	2005	5	23	89.40	87.65	88.525000000000000000000000
1	2005	5	(NULL)	97.05	87.65	92.916363636363636363636363
1	2005	6	23	92.09	92.09	92.090000000000000000000000

...

Note The hist_qry1 query uses the ROLLUP operator. The NULL values for month and week are subtotals. A NULL value in the week column is a subtotal for the month. A NULL value in the month and week column is a subtotal for the year.

Query description: hist_qry4 Calculate the value of the S&P 500 and Russell 2000 index for a specified day using unadjusted prices and the index composition of the two indexes on the specified day.

INDEX_NAME	AVERAGE_CLOSE_PRICE
Russell 2000	49.47026052104208416833667
S&P 500	54.446440000000000000000000

Query description: hist_qry7 Determine the value of $100,000 now if 1 year ago it was invested equally in 10 specified stocks (that is, allocation for each stock is $10,000). The trading strategy is: When the 20-day moving average crosses over the 5-month moving average the complete allocation for that stock is invested and when the 20-day moving average crosses below the 5-month moving average the entire position is sold. The trades happen on the closing price of the trading day.

```
STOCK_VALUE
60299.133021
```

TAQ data queries

The real-time price TAQ data includes price quotations and trade prices that are updated frequently during a trading day. Queries against these tables require knowledge of intra-day price fluctuations.

Script name	TAQ query description
tick_qry1.sql	Get all ticks for a specified set of 100 securities for a specified three-hour time period on a specified trade date.
tick_qry2.sql	Determine the volume weighted price of a security considering only the ticks in a specified three hour interval.
tick_qry3.sql	Determine the top 10 percentage losers for the specified date on the specified exchanges sorted by percentage loss. The loss is calculated as a percentage of the last trade price of the previous day.
tick_qry4.sql	Determine the top 10 most active stocks for a specified date sorted by cumulative trade volume by considering all trades.
tick_qry5.sql	Find the most active stocks in the COMPUTER industry (use SIC code).
tick_qry6.sql	Find the 10 stocks with the highest percentage spreads. Spread is the difference between the last ask-price and the last bid-price. Percentage spread is calculated as a percentage of the bid-point price (average of ask and bid price).

Tick query examples

Query description: tick_qry4 Determine the top 10 most active stocks for a specified date sorted by cumulative trade volume by considering all trades.

TRADESIZE	INSTRUMENT_ID	RANKING
254800	386	1
242900	618	2
241800	919	3
239900	148	4
234700	239	5
234100	292	6
230000	358	7
225500	297	8
225300	732	9
223200	130	10

Query description: tick_qry6 Find the 10 stocks with the highest percentage spreads. Spread is the difference between the last ask-price and the last bid-price. Percentage spread is calculated as a percentage of the bid-point price (average of ask and bid price).

INSTRUMENT_ID	PER	PER_RANK
781	0.4000000	1
916	0.3333333	2
581	0.2168674	3
662	0.1739130	4
620	0.0582524	5
145	0.0535714	6
703	0.0505050	7
725	0.0458015	8
323	0.0442477	9
413	0.0388349	10

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