DES
DATABASE EXCELLERATION SYSTEMS

Customer Application

DES and Merrill Lynch

Merrill Lynch Global Futures Systems has dramatically reduced the time required to download and insert a massive daily batch job of the firm's crucial trading information thanks in large part to a database accelerator from Database Excelleration Systems (DES).

As an added benefit, Merrill Lynch users, who are simultaneously performing OLTP, batch, and decision support operations on the production database, are experiencing a significant improvement in query performance as well.

Global Futures Systems Database

The Merrill Lynch Global Futures Systems database is an information delivery system for all of the global trades for the Merrill Lynch Futures and Options area. The database is managed by Sybase SQL Server Version 10.0.2/P running on a two-processor Sun SPARC 20 with 512 Megabytes of RAM.

The database stores the trades and account balances for all futures and options users of Merrill Lynch on a global basis. The information is available to both traders and Merrill Lynch clients. "This database allows you to access any information imaginable regarding your account with Merrill Lynch in the futures and options area," said Steven Moore, Merrill Lynch Project Manager.

"We have a daily database and a historical database that are mirror images of each other — that is they contain the same tables," explained Moore. "The only difference is one contains the data for a single day, after which it's flushed and refreshed. The other contains the historical data which is appended to.

We have two different types of data — one being the referential data, which is accounts, exchanges, firms products, and product prices; the second being our actual raw trades and underlying data, which basically represents the account balances," continued Moore.

The daily database consists of 350 Megabytes of crucial trading information, while the historical database — representing 60 days of trading data — comprises 6 Gigabytes.

Industry: Financial

RDBMS: Sybase

Application: OLTP, batch, decision support

Hardware: Sun SPARC Center 2000 and Sun SPARC 20

DES Products: Database Excellerator, Model 800D

Download Problems

Every night, Merrill Lynch downloads overnight the previous day's market data — normally 150 megabytes or more. "It is a massive batch job to download all of this data and insert it into our daily database," he said. "We have a very limited time window to download and insert the data; we have to have the data available first thing in the morning because traders will want to see how their trades turned out and clients will want to see how they fared as well. So you can see we have a big bump first thing in the morning when the system must be available.

"The first level of code took eight hours to perform the download and insert function, which was totally unacceptable," Moore said. Merrill Lynch embarked on a mission to dramatically reduce the download window. They upgraded to Sybase 10.0.2 to get cursors, which enabled them to go through the tables row by row and get the data conversions into the inserts, and developed a new set of indexes optimized for the data download. Both of these software changes helped, but the download time was still six hours, and still unacceptable.

"We got to the point where we did not see any other software changes that could be made that would further improve our system, so we started looking at various hardware solutions," Moore said. "Our initial hardware alternative was to buy a $150,000 multi-CPU SPARC Server 1000 or 2000, but we opted to try a solid state disk database accelerator from Database Excelleration Systems."

Merrill Lynch installed the DES system, and the results were immediate and dramatic. "The DES solid state system alone, without anything else, more than doubled the speed of our download and insert process," Moore said. "We have now brought this window down to two hours.

Performance Advantage

"Our entire daily database and the log

space now reside on the DES solid state system, which provides us a great performance advantage on the query side as well as the download side," Moore said. "A nice side effect of having the database reside on a solid state disk device is improved response time on queries. I/O speed is much greater with solid state disk technology than conventional disk technology.

"For example, we have a back up server which mimics our main server, the only difference being the backup database is stored on conventional disk. A recent query that took 15 seconds to retrieve from conventional disk took only three seconds to retrieve from the DES system.

"In a relational database, you not only have data tables, but also a set of look-up and reference tables which are linked together by keys," Moore explained. "Our insert depends on retrieving the matching ID, so in our case it makes a great deal of sense to have everything stored on one very fast device."

The Merrill Lynch information delivery system, when fully operational, will have more than 100 logins and support more than 50 simultaneous users. The system is capable of supporting up to 250 users.

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>
> *– Steven Moore*

Data Availability

Data availability is obviously crucial with a high profile database application such as this, and Merrill Lynch has experienced no reliability problems with the DES system. "We have used the DES system for nearly one year, and we have never had a problem. It has been one hundred percent reliable."

According to Moore, installing the DES system is very straightforward. "It's a fairly simple install. From the systems administrator's viewpoint, it's just like installing another disk drive. You simply define another device on your system and rebuild the kernel.

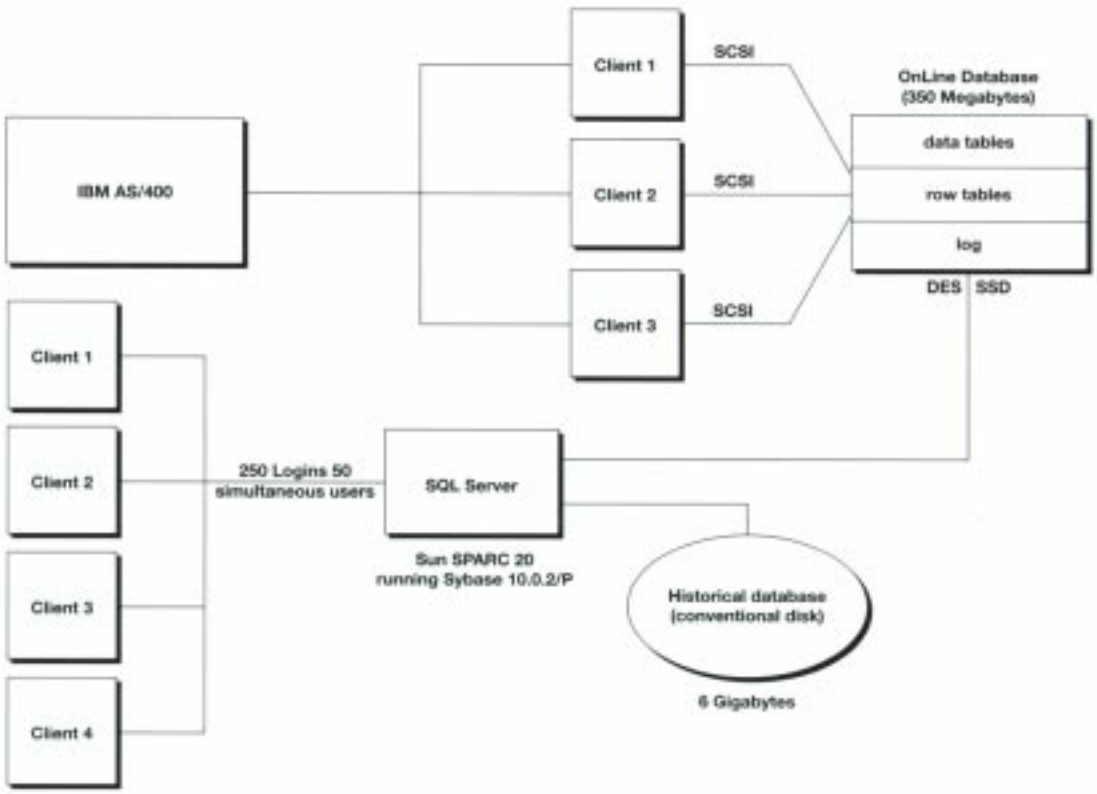
"At Merrill Lynch, we have business goals to meet, and one of our goals was to dramatically decrease the time required to download our daily database," Moore said "The DES system has been an effective tool that has enabled us to come within our performance window."

Query Examples

DECISION SUPPORT: The finance group might want to know how much money Merrill Lynch made on commissions last month. It's a simple example, but requires the summing up of millions and millions of rows from the database to come up with that simple result.

BATCH: Merrill Lynch has an application which extracts the data from the mainframe, FTPs it as files which are unpacked and run as a process that inserts them into the various tables in the daily database.

OLTP: A customer might log in and ask to see his or her trade confirmations for yesterday; what was bought and sold from the account.



Snapshot of Merrill Lynch's System Layout.

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