Mellon Financial Corporation

Remote Mirroring Technology Ensures Data Availability for E-Business Trading

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Mellon Employs Remote Mirroring Technology to Ensure Data Availability for Dreyfus E-Business Trading

Mellon Financial Corporation places a high priority on data backup and recovery for its Dreyfus Brokerage Services subsidiary. Providing real-time data replication to ensure 100% data availability is essential for this e-business stock trading division of The Dreyfus Corporation, for which losing even one of the 13,000 daily executions is unacceptable. Developing and executing a business continuance and recovery plan that guarantees Internet transactions are protected against natural disasters is critical.

E-Business

The Dreyfus Corporation is one of the nation's largest mutual fund companies and Mellon's principal U.S.-based mutual fund business. Dreyfus Brokerage Services (DBS) is headquartered in Beverly Hills, CA. At Dreyfus, orders for the purchase or sale of securities or options are entered and executed on all major exchanges via a direct computer-to-computer link. The company's electronic brokerage web site, www.edreyfus.com, includes market indices and statistics, quotations, order entry, account status, account activity, stock-watch, and trade history. It is the availability of this particular application that Mellon's information systems group was concerned about.

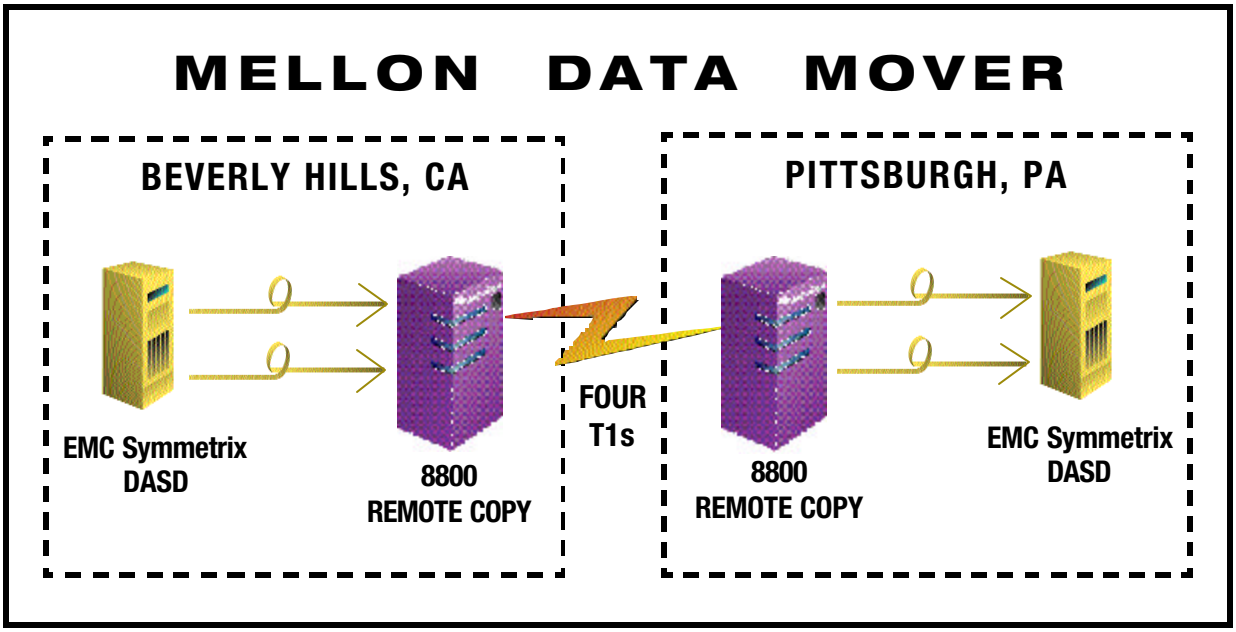
The Challenge

The technology team needed to find a solution to provide real-time data replication and recovery for the online trading application so that no trades would be lost if a natural disaster would occur. Since Mellon maintains its own back office, there were existing resources to draw upon. Mellon had the facilities to house the replicated data. Beverly Hills would serve as the source site for the data and the replicated data would be stored in Pittsburgh. The data center in Pittsburgh was equipped with hardware resources and the technical expertise to handle the new project. The technology team began to explore possible options.

In many data centers, electronic tape backup can be used to send data to an off-site location. However, in this scenario, the last tape would only hold the data from the time of the last backup, which means that if a business interruption occurred, hours of trading could be lost. "Mellon has set high standards for computer processing to protect its customers and the Corporation from loss of business," stated Dan Sullivan, vice president and manager of configuration management and performance. "Losing trades would not be acceptable in this e-commerce environment. I can't imagine telling our brokers that because of a power failure, an earthquake or something out of our control that we lost all of their trades made that morning." In addition, physical handling of the tapes and relocating them off-site could result in tapes being mislabeled, misplaced or even lost. Tape vaulting was clearly not the answer for Mellon. It would not provide a satisfactory level of protection for this fast-paced Internet business or the quality of service that Mellon must deliver to online customers.

The Solution

Because the Corporation already used EMC DASD, Mellon chose a data mirroring tool from EMC Corporation. The EMC Symmetrix™ Remote Data Facility (SRDF) with Farpoint



would allow the Corporation to send a duplicate copy of the data from one location to another. The next piece of the puzzle would be to select a channel extension technology that could extend the SRDF application over a wide area network across the country. In typical mirroring configurations, data is copied to another site located within a few miles. However, Mellon's long-distance configuration proposed several challenges: Would spreading the distance from west to east coast affect the broker's response time? How much bandwidth would the new application require? These questions had to be answered before Mellon could move ahead with the plan.

Performance Hurdle

In evaluations provided by Keynote, a Silicon Valley firm that measures the speed of leading online brokers, Dreyfus had received top rankings. Keynote measures the elapsed time it takes to get from a broker's home page to the point where a trader confirms an order. It calculates the download times of all the pages from the moment a user enters the Web site after typing in the URL, to getting a quote, to the point just before the trade enters the broker's system.

Does Response Time Matter?

Borzou Daragahi, editor of Money Magazine says it does. "If you are an investor trying to fight your way through Internet traffic to place a trade, a delay can cost you money."[1] Dreyfus was a winner during the first week of Keynote testing, with a 7.47-second wait to get to the order-confirmation screen. Mellon's concern was how much time would the data mirroring application add to the equation. Mellon was willing to incur some delay to increase data protection, but wanted to maintain its competitive edge.

From West to East

Mellon's information systems group already had experience with channel extension technology, using it for check sorters and remote printers. This time Mellon needed to find out how performance would be impacted with the channel extension of disk mirroring. SRDF does not permit channel extension to use emulation techniques to compensate for the propagation delay of the communication link. The key in the upcoming extender evaluation would be to find out how fast the extender can move data over the wide area network, and whether its impact on performance would fall within acceptable performance standards.

The Search

With EMC's SRDF data mirroring already selected, it was time for the Mellon technology team to evaluate channel extension systems. The 8800 RemoteCopy system from INRANGE Technologies was chosen. "We were impressed with the way the 8800 was architected to maximize performance over distance in an EMC configuration," stated Jim Fox, vice president and Systems Programming for Mellon.

Testing the Configuration

Before the decision was made, Mellon decided to test the configuration by setting up the source and target EMC units and the 8800 RemoteCopy units in the Pittsburgh data center. Data communication simulators were used to recreate the wide area network. There is a 74-millisecond round-trip propagation delay between Beverly Hills and Pittsburgh.

The EMC Symmetrix was configured for semi-synchronous and adaptive copy data mirroring. The log file is mirrored in semi-synchronous mode because the Corporation has determined that this is the most critical data. "Regardless of the distance between the locations, we need the log file data to be current. The synchronization of the data is more important than the performance," Fox said. This means that the source mainframe, a HP server (model K580, with four processors), sends data to the local DASD. Then, the data is scheduled to synchronize with the target DASD. The I/O is completed prior to synchronizing data with the target system providing an added performance advantage. A second write will not be accepted on a volume until the target has been synchronized.

The remaining data is sent in adaptive copy mode, which transfers the data from the source volumes to the remote volumes without waiting for an acknowledgment.

"We were very pleased with the performance of the test. With EMC data mirroring and 8800 RemoteCopy, we found that the data sets are either completely in synch or only one I/O behind. The distance did not cause a major impact to response time," stated Karen Borden, assistant vice president and project manager for Mellon. One of the benefits of the 8800 system is that it has been designed specifically for SRDF applications to minimize latency, increasing the distance between source and target.

Compression Saves Recurring Communication Costs

In original calculations, the Corporation had estimated eight T1 communication links would be required between Beverly Hills and Pittsburgh. Mellon needed to replicate about 10-15 gigabytes of data daily. The data represents 1,000 to 2,000 executions per hour during

trading hours, off-hour trade executions, as well as the nightly batch database application (called Universe by Informix). Then, Mellon learned that the 8800 system used technology called On-Channel Compression™, which maximizes bandwidth efficiency and increases compression ratios. As a result, the Corporation allocated four T1 communication links to provide extra capacity for peak trading periods such as lunch time when the trades seems to be higher, as well as providing redundancy in case of link outage. During peak production of trading hours and nightly batch processing, the data mirroring application uses a little more than two T1 links of bandwidth. The 8800 RemoteCopy product provides a multiplexing function that allows the data to route over any available communication link, minimizing the impact of communication failures.

The Transition

After testing verification, Mellon was ready to transition the system. Equipment was shipped and installed at Beverly Hills. The systems were connected to the wide area network at both locations. The Corporation chose a weekend to freeze the system and to execute the mirroring of the source volume to the target volume. After an initial 10-hour period to copy the data, Dreyfus was ready for the opening of Monday trading.

Transaction Time Maintained

Brokerage trading is very competitive and response time is important to the business. One of the goals of edreyfus.com is to achieve and keep the best response time possible. After the solution was implemented, Dreyfus was able to maintain one of the highest rankings on Keynote while mirroring the data from one coast to another. Mission accomplished!

Phase Two: Adding Another Level of Security

The next phase of the business contingency plan will be to mirror the data to a third location, which will be another Mellon site that is currently under construction in the Pittsburgh area. The data will be mirrored through the EMC units. The new facility will backup the data from the downtown Pittsburgh location providing another level of data security.

Mellon Financial Corporation

With $2.8 trillion in assets under management, administration or custody, including $540 billion under management, Mellon provides a full range of banking, investment and trust products and services to individuals and small, midsize and large businesses and institutions. Dreyfus is a wholly-owned subsidiary of Mellon Financial Corporation, a global financial services company.

Editor's Notes:

1 Source: Daragahi, Borzou. "Does Speed Matter?" *Money Magazine* 15 June 1999.

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