panasas®

Accelerating Time to Results™ in Financial Markets

Select Customer: Credit Risk at a Large Global Bank

The benefits of Panasas parallel storage have been demonstrated at a variety of financial services customers, including a large international bank headquartered in Northern Europe with requirements for intra-day credit risk analysis. Capital markets thrive on financial instrument complexity, and sell-side institutions such as banks rely on high-volume, complex trades to generate profits that require a good understanding of profit-to-risk relationships. This bank's credit risk operations rely daily upon data-intensive, business-critical applications that require high-performance, scalable and reliable Panasas storage to support their growing HPC infrastructure.

The bank's motivation for deployment of a Panasas storage solution was to provide traders with faster and more accurate risk figures throughout the trading day. An in-house VaR application has been developed that predicts the risk of credit transactions that can involve up to 500,000 counter parties. As a proposal is made to conduct a transaction with a particular counter party, many scenarios must be simulated that predict the risk impact on the bank and the other participating counter parties, requiring various

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Breaking I/O Bottlenecks and Managing Risk in Financial Markets Modeling

The combination of scalable HPC clusters with Panasas parallel storage has demonstrated new and significant performance advantages for applications in financial modeling and simulation. The benefits range from dramatic cost performance improvements to the enabling of faster-to-market risk measurement and derivatives valuation.

HPC Clusters and Growing I/O Bottlenecks

Today, as financial organizations rapidly expand cluster deployments as a cost-effective way to grow HPC resources for data-intensive modeling, many encounter I/O bottlenecks when using legacy network attached storage (NAS) architectures. Initially these NAS systems offered advantages such as shared storage and simplified IT administration which further reduced costs, but today few provide the scalability required for effective I/O performance of multi-scenario parallel Monte Carlo (MC) simulations driven by large databases of historical financial data. Scalable HPC clusters and parallel application software have advanced over recent years, while NAS scalability has not.

Recently a new class of shared parallel storage technology was developed to resolve serial NAS bottlenecks and scale I/O performance, therefore extending the overall scalability of simulations on HPC clusters. Panasas parallel storage is the leading provider of this new generation of parallel NAS systems. Panasas enables the most advanced I/O for demanding financial models to deliver practical results with minimal trade-offs. Examples include intra-day response on Value-at-Risk (VaR) calculations, the combination of risk classes for enterprise risk management, back-testing of existing and new models based on 100's TB historical data files, and the pricing of credit derivatives such as CDOs or other MBS products whose simulation can include complex interest rate sensitivities.

Financial modeling and analysis workflows are overburdened with lost opportunities and productivity that degrades when quantitative analysts and risk managers must wait for serial I/O operations to complete. Further, as workflow performance degrades, so does an organization's market competitiveness and confidence in managing the relationship between risk and profits. Panasas resolves costly I/O bottlenecks with a solution that restores performance and productivity that ensures an accurate, fast-to-market decision process.

Panasas Parallel Storage

Panasas has developed a parallel storage architecture that combines the simplicity and manageability advantages of legacy NAS, yet eliminates the drawbacks that have made them unsuitable for scalable HPC clusters. Panasas parallel NAS offers the high-performance of parallel access to disk and the convenience of shared files and metadata, with additional benefits of high-availability and data reliability. Just as HPC clusters are designed to

distribute computational work evenly across servers, Panasas storage is designed to distribute data evenly and reliably across storage devices for shared parallel data access directly between cluster nodes and the Panasas parallel file system. Parallel access is enabled by the Panasas DirectFLOW® client software, a Panasas-developed protocol that is available for Linux clients, which is also the foundation for the emerging Parallel NFS (pNFS) standard that will release as a feature of NFS version 4.1 during 2010. Panasas also supports clustered NFS and CIFS to ensure a heterogeneous platform environment can share a single Panasas file system.

As quantitative analysts and risk managers continue to dramatically increase the amounts of historical data that drives a growing number of MC scenarios, I/O operations must aggregate in parallel to realize the benefits of overall simulation scalability. With Panasas storage systems, each server node of a cluster has direct access to the shared file system for concurrent data reads and writes during computation. Once a simulation is complete, desktop clients have direct access to results data on the same shared file system and storage, to enable rapid risk analysis and pricing decisions.

Panasas Technology Alliances

Panasas success as a storage technology company is driven by an understanding of customer objectives and requirements, and matching those with innovative and competitive products and solutions that integrate with existing customer infrastructure. Since the company's launch in 1999, Panasas has invested in business-critical technology alliances with industry leaders in high-performance networking, microprocessors, server platforms, and a variety of independent software vendors. Panasas is an experienced partner to the financial services industry providing high-performance storage solutions for increased simulation accuracy with faster response, data reliability, and ease in management to ensure that competitive business objectives are met.

FEATURES AND BENEFITS

PanFS™ Parallel File System:

- Scale-out Parallel Performance

  Enables 600 MB/s per 4U shelf in parallel reads and writes from large databases, for large-scale Monte Carlo simulations that drive risk and pricing models.

Object-Based Storage Appliance:

- Reliability and Manageability

  Large capacity storage managed with an object RAID-per-file basis for maximum data reliability and ease in management

combinations of transactions over a fixed interval of time.

A large, in-house database drives the MC scenarios, and contains financial simulation attributes of each counter party. The risk for each potential transaction is calculated from N number of MC simulation paths. The larger the N, the more accurate the risk prediction. During their legacy SAN deployment, N was limited (and therefore accuracy) to a level 100 times less than their capability with Panasas, in order to meet intra-day processing times for a transaction decision. In some cases, risk figures that were critical to traders were often unavailable even at the start of the trading day because of I/O bottlenecks.

The bank's migration from a legacy SAN to Panasas parallel storage increased bandwidth performance by 6 GB/s , which enabled 100 times more scenarios per entity in the same amount of processing time as the SAN, and at a lower cost. Total cost-performance of the Panasas solution provided even greater benefit by allowing the bank to eliminate the need for an expensive ISV database solution, given the alternative of the faster Panasas system. The scalability and I/O issues with large databases were resolved enabling the bank to boost its competitiveness with ever more simulations that minimizes their risk in credit markets.

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