emtec
Transforming IT

Banking on Clusters

Emtec's customized database solution pays dividends for financial services organization.

They may be a financial services company on the outside, but they are a technology company on the inside. Organizations that help businesses and individuals with loans, credit services, investments, insurance, asset management and more are heavily dependent upon databases and IT systems that can capture, store and retrieve massive volumes of transactional data.

Automated teller machines, electronic funds transfer, pointof- sale transactions and securities trading are all examples of mission-critical online transaction processing (OLTP) applications. Most financial services organizations today are so dependent on these applications that the loss of processing for any period of time is intolerable.

That's why one large financial services organization recently enlisted Emtec, Inc., to help ensure the reliability and availability of its databases and OLTP applications. In response, Emtec engineers crafted an elegantly streamlined clustering solution that has been demonstrated to dramatically improve performance and reduce downtime at a fraction of the cost of other clustering platforms.

Bundled Up

Purpose-built for the financial services industry, the Emtec solution is based upon next-generation Oracle databases running on a Sun Microsystems platform. Because the solution is bundled and pre-configured, it is rack-ready for fast implementation. "What we have created are fully defined racks that include all the components you needed for the cluster — all the servers, the systems, the various management software, the network switching and the fibre switch going to your storage area networks," said Colwyn Warner, Vice President of Enterprise Computing for Emtec, Inc. "We can go from order to implementation in under two weeks."

Like many of today's largest financial services organizations, Emtec's client had already adopted a clustering strategy in which databases can be hosted on multiple servers, or "nodes," connected to a shared disk array. If one of the servers or resources running on the server becomes unavailable as a result of failure or maintenance, another server starts up the failed service — a process known as failover. Users and dependent applications can continue to access the service unaware that it is now provided from a different physical server.

These clustering solutions typically have one significant hitch. Even when all the pieces of the cluster are functioning, failover is not immediate when a system goes down.

> *"With the automatic failover features of today's cluster technology, there is still usually a period of 15 to 30 minutes between the failure of one machine and another machine taking over," said Warner. "That's fine for some things, such as big batch processing jobs, but it can be a problem for credit-card transactions and customer service activities. The customers who are being served at the time of the outage are going to be impacted."*

In some instances, customers may have to reconnect or reauthenticate to continue with a transaction. That means there is a risk the customer will simply take his business elsewhere. Studies show that, in some industries, up to 20 percent of active customers will simply give up and go elsewhere during an outage.

Reducing Risk

Emtec's challenge was to develop a solution that would minimize the impact of the failover process. Key engineers set up shop at the client site for six months to evaluate the company's infrastructure and transaction processing applications, architect a solution and then verify its effectiveness in a test lab setting before going live. The Emtec team tested a few different approaches before settling on an architecture using the nextgeneration Oracle Database 10g in a four-node cluster of Sun Opteron servers running the Sun Solaris 10 operating system. Rigorous testing demonstrated that this architecture greatly improved data availability when the cluster was in failover mode.

"One of the first things we noticed was that the Sun Opteron servers gave us about a 40-percent performance advantage over similar-priced Intel boxes," said Warner.

"In addition, the Solaris 10 operating system allows us to tune the performance by an additional 15 to 20 percent over Linux, mainly through getting better input/out and also being able to tune the parameters to much greater degree."

Fine Tuning

With 10g, Oracle has added numerous tuning and manageability enhancements that make it easier to detect and alleviate bottlenecks in the database. One such enhancement is the automatic workload repository (AWR), which is essentially a job-based collection of statistics about the database that are gathered and stored in the database. In a clustered environment, the AWR can provide reports about the overall performance of the cluster, including workload characteristics and the average times of operations.

In addition, an automatic database diagnostic monitor (ADDM) is constantly running in the background, monitoring information that is collected in the workload repository. The ADDM automatically analyzes this information to provide proactive recommendations on tuning and performance issues. These and other enhancements contribute not only to the availability but also to the responsiveness of the database. That is a key distinction. If the database is up but a data bottleneck is slowing down operations, from the end-user perspective, uptime is affected.

"With our configuration, if you lose one server the user is automatically switched over to one of the other servers without any noticeable delay," said Warner. "The database may respond in a second and a half instead of half a second, but you would not be down for several minutes. Those users that are being served at the time of the outage are going to be much less impacted by an additional second of delay than if they had to go away and come back a half hour later."

Eliminating Complexity

Warner said tests in the lab setting have demonstrated that the Emtec solution will reduce downtime due Complexity to unplanned outages by more than 30 percent and downtime due to planned outages for maintenance by more than 90 percent. In addition, it will cut operating costs by as much as 40 percent through reduced costs of Oracle licenses, the elimination of expensive middleware, the use of lower-cost hardware and diminished installation costs. As a bonus, Emtec's bundled solution contributes to an organization's compliance with the Sarbanes-Oxley Act through the documentation of data protection features.

"With a bundled solution, we've taken next-generation technology and made it available in a way that takes the complexity out of the decision-making process," said Warner.

"We crafted an architecture that addresses the key pain points of mission critical OLTP and meets exactly what they need, and we've presented that to them as a complete solution. "It has been well received. The test labs have done extremely well, showing complete integration with all applications with no degradation of performance at a fraction of the cost. It is definitely a successful solution."

About Emtec: Established in 1964, Emtec, Inc. is a systems integrator that provides IT services and products to the federal, state, local, education and commercial markets. Our market leading value-based management methods, coupled with best-in-class IT technology, consulting and development services, address a wide range of specific client needs, as well as support broader IT transformation initiatives. Emtec's service capabilities span the United States, Canada and countries around the globe.