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COVER FEATURE

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Launching Performance

By David Baum

BOOKMARK

Oracle Exadata delivers extreme computing power to the HP Oracle Database Machine and the HP Oracle Exadata Storage Server.

As IT professionals know only too well, the quantities of data that they must manage has been increasing exponentially. In many workplaces, databases triple in size every two years. And although disk storage systems and processor speeds have kept pace with new requirements, data bandwidth has not, which has created a bottleneck between storage and database servers that limits query performance. Companies just can't move data off the disks and into the database servers fast enough anymore.

Those IT pros just got some help: Oracle and HP announced the HP Oracle Database Machine and its key component, the HP Oracle Exadata Storage Server, at Oracle OpenWorld in September 2008.

The HP Oracle Database Machine consists of eight database servers featuring 64 Intel processor cores running Oracle Database 11*g* with Oracle Real Application Clusters (Oracle RAC) on Oracle Enterprise Linux. The new machine also includes a storage grid of 14 HP Oracle Exadata Storage Servers with 112 processor cores of its own. The storage grid provides up to 168 terabytes of raw storage and delivers 14GB-per-second data bandwidth between the storage servers and the database servers.

Oracle Exadata

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The HP Oracle Exadata Storage Server is a combination of smart software from Oracle and industry-standard hardware from HP. Each storage server includes an HP ProLiant DL180 G5 server with two Intel 2.66GHz quad-core processors, 12 disks, 8GB of memory, dual InfiniBand ports, and redundant power supplies. Each storage server adds up to 12TB of raw storage and 1GB per second of data bandwidth to the storage grid. The storage grid also forms a massively parallel query processing engine.

"When it comes to speed, Oracle Exadata technology has changed the game completely," says Grant Salmon, CEO of LGR Telecommunications (LGR), who appeared in a prerecorded segment during Oracle CEO Larry Ellison's announcement at Oracle OpenWorld. "And it's not

like we had an old, cluttered-up system before. We build some of the world's largest data warehouses on leading hardware and storage facilities—yet queries that used to take half an hour are now taking less than a minute with this new Oracle Exadata technology."

LGR is an information and communications technology solutions provider that is using Oracle technologies to meet the data-management and information-access needs of large telecommunications operators, including AT&T, Telstra, MTN, and Vodafone, among others. As a global telecommunications company with offices in Atlanta, Georgia; Melbourne, Australia; and Centurion, South Africa, LGR provides data warehousing, analysis, and reporting solutions for telecoms that use billions of call detail records (CDRs)—the computer records produced by a telephone exchange—to gather business information.

Call for Data

The telecom industry is experiencing a data explosion, Salmon says, partly as a result of the processing and storage of CDRs. CDR data plays a critical role in the telecom business because it's the most detailed and accurate record the network has from which to glean business intelligence, detect fraud, perform marketing and financial analysis, and monitor engineering performance, among other activities. "Given the highly competitive business environment, every subscriber is gold. The best way to determine how the subscribers are using the network is from the information in the CDR," says Salmon.

CDR volumes can number in the hundreds of millions or even billions of records per day. Keeping track of all this data for billing and auditing purposes is a costly task. Already, LGR's databases at various customer sites across the globe can be anywhere from 30 to 300 terabytes, and many of them are likely to reach a petabyte scale in the next 12 to 18 months, Salmon predicts.

"We see Oracle Exadata as a perfect platform to scale and absorb this growth," says Salmon. "It's a plug-and-play system: plug in more disks, and the system just uses those disks. You don't have to reconfigure anything."

Snapshots

LGR Telecommunications
Location: Atlanta, Georgia (headquarters)
Industry: Telecommunications
Employees: 100-plus
Oracle products: Oracle Database, HP Oracle Exadata Storage Server, HP Oracle Database Machine, Oracle Real Application Clusters

Mobiltel (M-Tel)
Location: Sofia, Bulgaria
Industry: Communications
Employees: 2,500
Revenue: US$6.2 billion
Oracle products: Oracle Database, HP Oracle Exadata Storage Server, HP Oracle Database Machine, Oracle Real Application Clusters, Oracle Enterprise Manager

That functionality is important. "This tremendous speed and capacity translates into money in the bank for our customers," Salmon says, "since it enables them to establish one source of CDR data to feed multiple business units."

When multiple servers process huge volumes of CDR data, the primary bottleneck is the I/O to and from the database servers. The HP Oracle Exadata Storage Server crunches all of the CDR information on one consistent platform and effortlessly integrates feeds from hundreds of other data points across the enterprise as well. That means that every user views the same data—whether it's for network analysis, handset analysis, or interconnect and revenue assurance.

"We haven't had to change our code at all to offer these new Oracle Exadata systems to our customers," says Salmon. "We literally hand the technology straight to the customer, and the customer gets the advantage. They are lining up for this product, and we are already working on a number of high-profile installations around the globe."

Boosting Bandwidth

"The data warehousing world wants simplicity, higher performance, and the ability to increase service-level agreements with customers," notes Richard Palmer, HP's director of technology and strategy for industry-standard servers. "Oracle and HP together are meeting customers' needs for simplicity, high performance, and data reliability in one box."

In the HP Oracle Database Machine, Oracle and HP achieved breakthroughs in database performance because the HP Oracle Exadata Storage Server software gives database intelligence to the storage and tightly integrates Oracle Exadata storage with Oracle Database, says Richard Winter, founder of the Winter Corporation, a consulting company specializing in very large databases and database scalability.

"The HP Oracle Exadata Storage Server can perform important database operations—such as filtering out rows and columns not needed to process the query at hand and performing joins where one table is small enough to cache—within the storage tier, which reduces the work to be performed in the database tier," Winter says. "Since an Oracle configuration can have more storage servers than Oracle Real Application Cluster nodes, Oracle Exadata also has the effect of increasing the degree of parallel processing for table scans and some common joins, which reduces query response time."

Another breakthrough involves Voltaire's InfiniBand technology, a high-performance 20Gb-per-second low-latency server and storage fabric that forms the I/O backbone of every HP Oracle Database Machine. An Oracle partner since 2001, Voltaire has supplied high-performance networking technology for Oracle RAC since that technology was first introduced with Oracle9*i* Database.

"Oracle and HP worked with Voltaire to implement a unified platform to handle both the storage and the clustering traffic between database nodes," says Asaf Somekh, Voltaire's vice president of strategic alliances. "They included four Voltaire InfiniBand switches in every database machine. This delivers up to 14GB-per-second data bandwidth, which has a tremendous impact on throughput."

It's this combination of greater data bandwidth and smart storage software that delivers extreme query performance, according to Oracle Senior Vice President Andy Mendelsohn. "By pushing SQL processing to the HP Oracle Exadata Storage Server, all the disks can operate in parallel and return a filtered query result set rather than all rows of tables," says Mendelsohn. "This reduces the amount of data sent to the database servers. In addition, each InfiniBand connection has a data transfer rate of 20Gb per second, which means we're widening network pipes as well."

Mendelsohn says an HP Oracle Database Machine with a grid of HP Oracle Exadata Storage Servers revolutionizes the way large volumes of data can be analyzed by Oracle Database. "For example, with previous data warehousing solutions, a retailer is limited in its ability to understand the sales-transaction-level behavior of individual customers," he says. "The retailer may be able

to analyze customer behavior only for a period of several months before the time it takes to run these queries becomes prohibitive. Now the HP Oracle Database Machine with HP Oracle Exadata Storage Servers can analyze 10 to 50 times more data to get a better understanding of customer behavior at the sales transaction level."

Question of Cost

LGR anticipates cost savings associated with purchasing an integrated database management platform, where the servers, storage devices, and database are optimized to work together. LGR's Salmon believes that the reduced IT staffing requirements for Oracle Exadata will play a significant role for companies, since they spend less time developing, deploying, and maintaining custom data warehouses and more time meeting critical business needs.

"In the past, [data warehousing] solutions required storage architects, storage support people, networking people, software developers, and OS experts," Salmon says. "By moving the processing power close to the memory, Oracle has automated much of what these people do. We estimate that automation can equate to as much as a 70 percent reduction in cost of ownership for installing this [Oracle Exadata] box and keeping it going."

Better still, because Oracle and HP have such broad market penetration, the labor resources that companies need to implement and maintain Oracle Exadata products are easy to come by. Analyst Winter believes this ready availability of IT talent will help drive acceptance for the solution.

"The computer industry has seen preconfigured database appliances before, but not based on a platform that is a standard for so many companies," Winter says. "The most important difference is that the Oracle Exadata products run with, or provide database storage for, a database management system that is widely used and has a mature, robust complement of database capabilities."

Voltaire's Somekh agrees that Oracle customers will benefit from a preintegrated solution. "All the setup and configuration is done by Oracle and HP, which saves customers a lot of trouble and expense," he says. "It's simpler for customers because they're just buying it by the rack."

LGR's Salmon concurs. "Oracle's already there. We just piggyback on their success," he says. "We literally put our CDR live application onto an Oracle Exadata box and drop it, shrink-wrapped, onto the customer's floor. It simplifies the whole sales cycle. The hardware, the software, the database—everything is bundled together as one single commercial off-the-shelf solution. It has changed us from being a software provider to being a solutions provider."

Rapid Rollout

The turnkey nature of Oracle Exadata was a motivating factor for Mobiltel (M-Tel), a telecommunications company that has relied on Oracle technology since 2001. Part of the Mobilkom Austria Group and the wireless segment of Telekom Austria, M-Tel is the GSM market leader in Bulgaria and one of the most successful mobile operators in Europe. Over the last 10 years, M-Tel has become an integral part of Bulgarian society by providing a portfolio of mobile, convergent, fixed, and location-based communications

Next Steps

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M-Tel was a beta test site for the HP Oracle Exadata Storage Server and is evaluating running the entire HP Oracle Database Machine to store CDR information. While testing the HP Oracle Exadata Storage Server, M-Tel achieved on average a 28 times performance improvement compared to an existing production system.

“Going with Oracle Exadata was a natural choice for us,” says Simeon Dimitrov, head of enterprise resources management for M-Tel. “Oracle provides rich functionality and addresses reliability, scalability, and performance. Our business runs on the information in the CDR database. Having fast access to a single source of information is critical.”

According to Plamen Zyumbyulev, M-Tel’s lead DBA, when M-Tel started building its CDR database in 2001, the company had 600,000 subscribers. Today M-Tel has 5 million subscribers and stores 65 billion records. Having a fast, scalable, and dependable database management system is essential to its business.

“The most important thing that Oracle offers us is performance,” Zyumbyulev says. “With the HP Oracle Exadata Storage Server, we’re getting tens of times better performance on queries. It’s a huge business advantage. We can react quickly to the market.”

Dimitrov sees the relationship with Oracle as mutually beneficial. “Working with Oracle has exposed us to state-of-the-art innovation, and the partnership brings Oracle closer to its clients,” he says. “This is just the beginning of our common journey.”

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