# INSIGHT

## Oracle's X Factor: HP Oracle Exadata Storage Server and the HP Oracle Database Machine

Carl W. Olofson                    Dan Vesset
Jean S. Bozman

## IDC OPINION

Oracle's recently announced hardware products, HP Oracle Exadata Storage Server and HP Oracle Database Machine, stand to shake up the IT industry in several areas. If the product claims and initial disclosures about throughput are affirmed through further testing:

☑ Customers will be induced to use more Oracle Database for data warehousing by the attraction of a predefined and supported configuration.

☑ Database and storage vendors will be challenged to come up with something that delivers competitive responsiveness at competitive prices for database workloads.

☑ Database appliance vendors will find much of their competitive differentiators around performance through preconfigured deliverables being undermined if the price/performance assertions about this product are verified.

## IN THIS INSIGHT

This IDC Insight examines the initial implications of Oracle's recent announcements regarding the HP Oracle Exadata Storage Server and the HP Oracle Database Machine. This document includes some high-level facts about the products as announced, the original equipment manufacturer (OEM) relationship between Oracle and HP, and early support site customer claims about beta testing results. It also offers some thoughts regarding the implications of this development for the relational database management systems (RDBMS) market.

## SITUATION OVERVIEW

After years of assertion that it would never go there, Oracle is now in the hardware business. On September 24, 2008, Oracle announced two hardware-based packages: the HP Oracle Exadata Storage Server to act as intelligent relational database storage devices and the HP Oracle Database Machine to act as an optimized preinstalled and preconfigured cluster of Oracle Database with Real Application Clusters (RAC). The first is really an Intel-based system with internal storage that connects to an Oracle Database server and carries out low-level SQL requests, returning result sets. It is intended to be used instead of external storage, which

accepts block-level requests and returns whole disk blocks. The second is a rack that includes the HP Oracle Exadata Storage Server cluster of 14 nodes and a preconfigured cluster of 8 database servers linked together with a private InfiniBand network and designed to run Oracle Database with RAC.

Both the HP Oracle Exadata Storage Server and the HP Oracle Database Machine (which includes the HP Oracle Exadata Storage Server) are intended to improve system throughput for large data stores (e.g., hundreds of terabytes, ranging into petabytes) by reducing overall system latency, by dramatically reducing the amount of data returned by a network I/O request (because only result sets, and not disk blocks, are returned), and by reducing the number of "hops" between system components. Oracle said it selected HP in part because of the HP Factory Express capability to configure customized components in industry-standard rack, and to distribute the systems quickly, on a worldwide basis.

In truth, the HP Oracle Database Machine, which includes the Exadata Storage Server, is two products: the hardware and the software. This is because one can buy the hardware, but apply existing Oracle Database and RAC licenses to it rather than buy the software in addition to one's existing inventory of Oracle licenses.

The customer benefits that Oracle cites include very high levels of performance, especially for queries that involve large table scans; very simple database and system administration; and no associated network or storage administration. The administration benefits should be familiar to anyone who has looked into database appliances.

The performance benefit is claimed to result from the use of processors in systems that are designed to act as low-level database storage servers, running in parallel against internal storage. Most large data warehouses use SAN or NAS configurations, with storage systems connected to the database server or servers over a network.

Typically, when database servers interact with storage systems, they retrieve whole disk blocks, including all column values and anything else in the block, which may include rows of tables other than those being queried, as well as slack and overhead space. In contrast to storage systems, the Exadata storage servers return only SQL result sets (selected columns of selected rows of the table queried) to the database server, resulting in much less data clogging the network.

In the case of a table scan, the benefit is even more distinct because without intelligence close to the storage, the database server must request every single disk block that contains rows of the requested table (so that they may be examined for a match), whereas the Exadata-based systems only return rows that meet the conditions of the query. Because all the data is automatically striped across volumes by Oracle's Automatic Storage Manager (ASM), most requests can be satisfied by breaking them into smaller pieces and executing them in parallel, providing further performance enhancement.

Not only is the amount of data sent to the database servers greatly reduced, but in the case of the HP Oracle Database Machine, it is sent over a private network, further reducing the load on the Ethernet network. Because the storage servers interact through an InfiniBand network (with switches provided by HP, based on technology from Voltaire Inc.) and, in the case of the Database Machine, data transmissions back to the database server are also done on a high-performance private InfiniBand

#214634 ©2008 IDC

network, Oracle claims further performance acceleration, compared with previous execution of similar workloads. It should be noted that the storage server also supports block I/O to support queries processed using indexes and to support read/write requests to log files and other files that are not part of the database itself.

Customers at the announcement event shared experiences of query performance boosts for large data warehouses of 10–72 times their former Oracle data warehouse configurations. Oracle says that significant benefits can be realized by users of much more modestly sized data warehouses as well, so the Exadata Storage Server doesn't just benefit users of stratospherically large data warehouses. Oracle also claims that the Exadata Storage Server is more robust than a NAS or SAN solution because, since all the data is mirrored, if one node fails, another can immediately take over its workload.

Oracle will sell Exadata Storage Server and HP Oracle Database Machine (hardware and software). HP will deliver and service the hardware. Oracle asserted that these products can be used for online transaction processing (OLTP) databases as well, but the company is not currently promoting that direction. IDC notes, however, that Oracle is not discouraging it, either. Stay tuned for more developments.

# FUTURE OUTLOOK

Assuming that Oracle's product claims are borne out by benchmarking and further customer experience, this development could be an earthquake in the DBMS market space. That this solution is based on a close relationship with HP also suggests fundamental changes to the partnership relationships with other key system and storage vendors. Up to now, Oracle had supported separate, but equal, relationships with a wide range of server and storage vendors, but this deal raises the question of whether HP is gaining a favored status through this joint endeavor. Taking a longer view, this is most likely just the first in a series of innovative approaches by many vendors to optimizing database performance and management. This approach emphasizes throughput as the most important advantage to customers of scalable data warehouse systems, and the question of how to achieve that goal is open for reexamination by hardware and software vendors alike. In the near term, competing vendors will need to come up with a technical response that goes beyond the level of technical disclosures associated with this dramatic announcement:

☑ Storage vendors that specialize in network-based external storage systems and that depend on the database workload for a significant part of their business, such as EMC and Network Appliance, will need to look at creative approaches, possibly including embedding DBMS code in their systems, to respond to the Exadata Storage Server.

☑ System vendors and RDBMS vendors need to find ways to offer competing configurations of their hardware and software products. Vendors that already have appliances have the advantage here, such as Teradata and Netezza, but IBM has done a fair amount of related work in areas such as the Balanced Warehouse and the InfoSphere Information Server Blade. Sun also seems likely to be able to offer an answer, probably based in part on its MySQL software.

▱ It is worth noting that besides Teradata and Netezza, there are a dozen new innovative data warehouse vendors whose products have already set a high-performance bar in the market for large data warehouses. Microsoft's recent acquisition of Datallegro and the upcoming (expected in 2009) availability of an MPP deployment of SQL Server for large data warehouses gives that firm the basis for competing here as well.

▱ RDBMS software vendors that don't have a hardware dimension to their business other than OEM relationships with server and storage vendors will need to look at other possible avenues to extreme performance acceleration, perhaps using main memory DBMS technology to reduce dependency on disk storage.

▱ It is also not impossible that this development could motivate other hardware vendors to seek similar relationships with Oracle to sell their own versions of the Exadata-based products.