

# THE SUN ORACLE DATABASE MACHINE & EXADATA: DELIVERING BUSINESS VALUE

## EXECUTIVE SUMMARY

The Sun Oracle Database Machine has drawn tremendous interest for data warehousing, transaction processing and consolidation. The superior business value the platform delivers is sometimes described as driven by these three characteristics:

1. Completeness of the solution
2. Lower costs gained in deployment
3. Fast predictable "extreme" performance delivered

The Sun Oracle Database Machine is described as "complete" because it is comprised of hardware server, storage, interconnect, and Oracle database components. It provides the fastest time to value and the lowest risk. Instead of stepping through pre-implementation system sizing, acquisition of components, installation and configuration, and a testing and validation sequence, you simply order the Sun Oracle Database Machine from Oracle and, within weeks, you will have a system delivered with a working database. But a complete system is more than just a working database on a hardware platform. Oracle also offers a variety of transactional applications including ERP & CRM, business intelligence, and industry data models for Oracle Database 11g Release 2 Enterprise Edition.

Lower ongoing costs are typical in managing and maintaining the Sun Oracle Database Machine. Grid Control is deployed as the single management console. Oracle provides a single point of support for any software or hardware problems so there is no multi-vendor finger pointing. Other cost savings can come from reduced power and overall footprint in the Data Center when consolidating databases running on multiple servers and associated storage to a single Sun Oracle Database Machine. Unlike other "appliance-like" solutions, the Sun Oracle Database Machine provides a common platform for data warehousing and transaction processing. Since the database supported is Oracle Database 11g Release 2 Enterprise Edition, there are widely available skilled individuals to support it.

Fast and predictable performance is achieved because the platform is balanced "out-of-the-box" consisting of server nodes, storage cells, and a high-speed InfiniBand interconnect. The Oracle database is optimized for the Flash and Exadata storage (through the Oracle Exadata Storage Server Software). The system scales to larger sizes by growing the number of CPUs, system memory, interconnect throughput, and storage in a balanced fashion.

## Completeness of Solution

The Sun Oracle Database Machine footprint consists of Database Server nodes, Exadata Storage Server Cells, InfiniBand Interconnect / switches, and software. All of it is pre-installed for you in standard physical rack configurations. When ordering the platform configuration, there are choices of balanced configurations that come in Quarter Rack, Half Rack, or Full Rack varieties, or as multiple connected Full Racks.

A rack is comprised of standard Sun hardware components. Each Database Server node is a Sun Fire X4170 Server and each Exadata Storage Server Cell is a Sun Fire X4275 Server. Each InfiniBand Switch is a Sun Datacenter InfiniBand Switch 36. Because the Sun Oracle Database Machine is built using state-of-the-art building blocks from

Sun, it is both best of breed and complete. As technologies in the components advance, the nature of the configurations will lend themselves to continued balanced performance improvements.

Configurations contain a balanced mix of Database Server nodes, Exadata Storage Server cells, and InfiniBand Switches. A Quarter Rack has 2 Database Server nodes, 3 Exadata Storage Server Cells (each containing a dozen 600 GB or 2 Terabyte disks), and 2 InfiniBand Switches. The Quarter Rack is the minimal production configuration designed for both performance and high availability with no single point of failure. The Half Rack features 4 Database Server nodes, 7 Exadata Storage Server Cells, and additional connections to the 2 InfiniBand Switches. The Full Rack has 8 Database Server nodes, 14 Exadata Storage Server Cells, and adds a third InfiniBand Switch (and connections) enabling the addition of more Full Racks.

When a configuration ordered from Oracle is delivered, Oracle and Sun complete the configuration process on-site including set up of the internal networking for the Sun Oracle Database Machine. A working database is also installed as part of this process. You will need to provide Oracle with a desired Oracle Database name, what national language character set you want assigned, and whether you want database logging turned on. Set-up includes prescribed `init.ora` parameters for optimal database performance. The set-up also includes a fully mirrored layout on disk using ASM in which there is no single point of disk or Exadata Storage Server Cell failure. Additional services are available for variations to a standard installation, such as when deploying multiple databases to the Database Machine.

Of course, value from the platform is obtained by deploying business solutions to your database (or databases if you are deploying a consolidation configuration). Oracle offers a variety of transactional applications and data warehouse data models and applications that are certified for use with Oracle Database 11g Release 2 Enterprise Edition.

## Lower Costs

Oracle's database evolved to become increasingly self-tuning and self-managing through its last 3 major versions, reducing the time and cost associated with managing an enterprise class database. Enterprise Manager Grid Control provides a single point of management for each database deployed to the Sun Oracle Database Machine. Grid Control also features plug-ins specific to managing the Database Machine and Packs for tuning, diagnostics, and provisioning. Since the Sun Oracle Database Machine is a complete system and managed centrally, a Database Administrator can serve multiple roles or work much more quickly where Storage Architects and System Administrators also help manage the system.

The balanced hardware configuration eliminates much of the need for tuning common on platforms that are badly constrained in one or more dimensions (most often, due to inadequate throughput). One of the tuning mechanisms historically used with Oracle databases is indexing to avoid massive full table scans where large amounts of data are analyzed. The Oracle Exadata Storage Server Software constructs "smart scans" that can eliminate much of the need for indexes since query result sets are determined in the Exadata Storage Server Cells.

Another measurable cost where Oracle is deployed on custom hardware is coordination of hardware and software support. In comparison, Oracle provides a single point of support for the Sun Oracle Database Machine for hardware and software. Any hardware problems are coordinated by Oracle behind the scenes with Sun. As part of the purchase, the Sun Oracle Database Machine includes a 3-year 24x7x4 hour response time warranty.

Cost savings can also be gained by consolidating database servers and storage to the Sun Oracle Database Machine. These savings are usually due to reduced overall power required by consolidating to the Database Machine and / or reducing the footprint required in the data center. The capacity of data stored on the Sun Oracle Database Machine can increase significantly through usage of Oracle's Advanced Compression and / or Hybrid Columnar Compression (provided by the Exadata Storage Server Software). In some organizations, additional cost savings occur by migrating other databases to Oracle and leveraging Oracle skills already present or more widely available at lower price points than for competing platforms.

### **Fast Predictable "Extreme" Performance**

The balanced platform and self-tuning aspects of the Sun Oracle Database Machine and Oracle Exadata Storage Server Software lead to the fast predictable "extreme" performance commonly observed. As the Sun Oracle Database Machine configuration is grown, it is scaled for processing power and throughput in a balanced fashion enabling consistent response times even as workloads and data volumes grow.

The Oracle Database 11g Enterprise Edition Release 2 optimizer, in combination with the Oracle Exadata Storage Server Software, fully leverages advanced features in the hardware platform without a need for changes to the SQL generated by business analysts or their business intelligence tools or applications. The software transparently pushes database functionality to the Sun Exadata Storage Server Cells where the data resides, speeding performance by reducing traffic between the Exadata Storage Server Cells and Database Server nodes. The Sun Oracle Database Machine also features Flash Storage (5 Terabytes in a Full Rack) that the Oracle Database is aware of and uses as a cache. The ratio of performance speed-up on the Sun Oracle Database Machine versus another platform is dependent on performance characteristics of the current platform and gains from the optimization possible with Oracle Database 11g Release 2 and the Oracle Exadata Storage Server Software.

### **Business Justification**

Though there are clear business reasons for deploying the Sun Oracle Database Machine in IT as we just noted, there are also many reasons for deployment driven by line of business needs. Many business executives and business analysts face the need to analyze more data more frequently and share their business applications and data models with communities that extend outside of corporate boundaries. A need for increased data volume is often driven by the need to analyze longer history, include third party data sources, and / or consolidate data from multiple existing systems. The Sun Oracle Database Machine can be scaled to meet these most demanding needs, yet because the Database Machine is a complete system, it can be deployed much faster and at lower cost than custom solutions and deliver faster return on investment to the business.

The fast predictable "extreme" performance of the Sun Oracle Database Machine can also drive business value based on the ability to measure more business metrics more frequently than are possible on other platform solutions today. The nature of fact-based decision-making can fundamentally change for the better and drive business return on investment that is compelling. Deployment of transactional applications, data warehouses, and consolidated solutions can deliver on this promise, but can only be accomplished with enterprise class solutions that are flexible and complete such as the Sun Oracle Database Machine described in this paper.

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