The Oracle Exadata Database Machine is engineered to be the highest performance and most available platform for running the Oracle Database. Built using industry-standard hardware from Sun, and intelligent database and storage software from Oracle, the Exadata Database Machine delivers extreme performance for all types of database workloads including Online Transaction Processing (OLTP), Data Warehousing (DW) and consolidation of mixed workloads. Simple and fast to implement, the Exadata Database Machine is ready to tackle your largest and most important database applications — and often run them 10x faster, or more.

Engineered System For Fast Deployment of All Your Databases

The Exadata Database Machine is an easy to deploy system that includes all the hardware needed for running the Oracle Database. The database servers, storage servers and network are pre-configured, pre-tuned, and pre-tested by Oracle experts, eliminating the weeks of effort that is typically required to deploy a high performance system. Extensive end-to-end testing ensures all components work seamlessly together and there are no performance bottlenecks or single points of failure that can affect the complete system.

Because all Exadata Database Machines are identically configured, customers benefit from the experience of thousands of other users that have deployed the Exadata Database Machine for their mission critical applications. Customer machines are also identical to the machines Oracle Support has for problem identification and resolution and machines Oracle Engineering has for development of the Oracle Database.

The Oracle Exadata Database Machine runs the standard Oracle Database. Therefore, any application that runs with the Oracle Database today can be seamlessly migrated to the Exadata Database Machine with no changes to the application.

Extreme System Scalability and Growth

The Exadata Database Machine uses a scale-out architecture for both database servers and storage servers. Scale-out means that, as an Exadata Database Machine grows, more database CPUs, storage, and networking are added in a balanced
fashion, ensuring scalability without bottlenecks.

The scale-out architecture accommodates any size workload and allows seamless expansion from small to extremely large configurations while avoiding performance bottlenecks and single points of failure.

A high-bandwidth low-latency 40 Gb/second InfiniBand network running specialized database networking protocols connects all the components inside an Exadata Database Machine. External connectivity to the Exadata Database Machine is provided through standard 1 Gigabit and 10 Gigabit Ethernet.

Four sizes of the Exadata Database Machine X3-2 are available, from the Eighth Rack system with 2 database servers and 3 Exadata Storage Servers, to the Full Rack system with 8 database servers and 14 Exadata Storage Servers. One size can be upgraded to another online ensuring a smooth upgrade path as database requirements grow. All four sizes are available with either 600 GB High Performance disks or 3 TB High Capacity disks.

In addition to upgrading within a rack, multiple racks can be connected using the integrated InfiniBand fabric to form even larger configurations. For example, a system composed of four Full Racks is simply four times as powerful as a single rack system — providing quadruple the I/O throughput, quadruple the storage capacity, and quadruple the processors. It can be configured as a large single system or logically partitioned for consolidation of multiple databases. Scaling out is easy with Exadata Database Machine. Oracle Real Application Clusters (RAC) can dynamically add more processing power, and Automatic Storage Management (ASM) can dynamically add more storage.

When even larger storage capacity is required the Exadata Storage Expansion Rack is available. The Exadata Storage Expansion Rack enables you to grow the Exadata storage capacity and bandwidth of any Exadata Database Machine. It is designed for database deployments that require very large amounts of data including: historical or archive data, backups, documents, images, XML, LOBs, etc. Available in Full Rack, Half Rack and Quarter Rack sizes, it connects to the Exadata Database Machine using the integrated InfiniBand fabric. The expansion rack is extremely simple to configure as there are no LUNs or mount points to set up. Storage is configured and added to a database online with a few simple commands, completed in minutes.

Exadata Database Machines protect your investment by allowing newer generation
processors and storage to be deployed seamlessly into existing Exadata Database Machines. Similarly, new software releases are compatible with older Exadata Database Machines.

**Extreme Performance by Offloading Data Intensive Processing**

As data volumes grow exponentially, conventional storage arrays struggle to efficiently access terabytes of data and push that data through storage networks.

The scale-out architecture of the Exadata Database Machine not only provides high performance and scalability, it also includes a unique technology that offloads data intensive SQL operations into the Oracle Exadata Storage Servers. By pushing SQL processing to the Exadata Storage Servers, data filtering and processing occurs immediately and in parallel across all storage servers as data is read from disk. Exadata storage offload reduces database server CPU consumption and greatly reduces the amount of data moved between storage and database servers.

Each Exadata Storage Server includes two 6-core Intel® Xeon® processors that are used for database offload. A Full Rack Exadata Database Machine has a total of 168 storage processing cores. The CPUs in Exadata Storage Servers do not replace database CPUs. Instead they accelerate data intensive workloads similar to how graphics cards accelerate image intensive workloads.

**Extreme Performance from Exadata Smart Flash Cache**

Exadata systems use the latest PCI flash technology rather than flash disks. PCI flash greatly accelerates performance by placing flash directly on the high speed PCI bus rather than behind slow disk controllers and directors. Each Exadata Storage Server includes 4 PCI flash cards with a total capacity of 1.6 TB of flash memory. A Full Rack Exadata Database Machine includes 56 PCI flash cards providing 22.4 TB of flash memory.

The Exadata Smart Flash Cache automatically caches frequently accessed data in PCI flash while keeping infrequently accessed data on disk drives. This provides the performance of flash with the capacity and cost of disk. The Exadata Smart Flash Cache understands database workloads and knows when to avoid caching data that will never be reused or will not fit in the cache. The Oracle Database and Exadata storage optionally allow the user to provide directives at the database table, index and segment level to ensure that specific data is retained in flash. Tables can be retained in flash without the need to move the table to different tablespaces, files or LUNs like you would have to do with traditional storage and flash disks.

The combination of scale-out storage, InfiniBand networking, database offload, and PCI flash allows a single rack Exadata Database Machine rack to deliver up to 100
GB per second of I/O bandwidth and up to 1,500,000 random 8K I/O operations per second (IOPS) to database workloads. This performance is orders of magnitude faster than traditional storage arrays.

The Exadata Smart Flash Cache also implements unique algorithms to reduce the latency of log write I/O. The time to commit user transactions or perform critical updates is very sensitive to the latency of log writes. Smart Flash Logging takes advantage of the flash memory in Exadata storage to speed up log writes while implementing special algorithms that bypass the latency spikes that are seen in other flash solutions.

**Optimizing Storage Use and I/O Through Compression**

Compressing data can provide dramatic reduction in the storage consumed for large databases. The Exadata Storage Server provides a very advanced compression capability called Hybrid Columnar Compression (HCC). Hybrid Columnar Compression enables the highest levels of data compression and provides tremendous cost-savings and performance improvements due to reduced I/O. Typical storage savings range from 10x to 15x. On conventional systems, enabling high data compression has the drawback of reducing performance. Because the Exadata Database Machine is able to offload compression overhead into large numbers of processors in Exadata storage, most workloads run faster using Hybrid Columnar Compression than they do without it. Hybrid Columnar Compression combines the compression and analytic performance benefits of column storage while avoiding the dramatic slowdown that pure columnar stores experience for drilldown operations.

**Enterprise-Class Security with Extreme Performance**

Exadata Database Machine is the world's most secure database machine. Building on the high security capabilities in the Oracle Database, Exadata Database Machine provides the ability to fully encrypt all database data and run queries against fully encrypted databases with near zero overhead. This is done by moving decryption processing from software into the Exadata Storage Server hardware.

**Mission Critical High Availability**

The Exadata Database Machine X3-2 is engineered to provide the highest levels of availability. All types of failures are protected against including simple failures such as disk, server, or network, as well as complex site failures and human errors. Each Exadata Database Machine has completely redundant hardware including redundant InfiniBand networking, redundant Power Distribution Units (PDU), redundant power supplies, and redundant database and storage servers. Oracle RAC protects against database server failure. ASM provides data mirroring to protect against disk or storage server failures. Oracle RMAN provides extremely fast and efficient backups to disk or tape. Oracle’s Flashback technology allows backing out user errors at the database, table or even row level. Using Oracle Data Guard, a second Exadata Database Machine can be configured to maintain a real-time copy of the database at a remote site to provide full protection against site failures and disasters.

Because of its industry leading availability, the Exadata Database Machine has been deployed by leading companies for their most critical applications including
interbank fund transfers, online securities trading, real-time call tracking, and web-based retailing. Mission Critical availability is not restricted to OLTP workloads; it also applies to warehousing and analytics workloads.

**Database Cloud**

The Exadata Database Machine can host many databases, enabling the creation of a Database Cloud. Consolidated environments inherently have complex workloads mixing sequential and random access patterns. Exadata’s industry leading scalability and performance make it an ideal platform for these demanding workloads. Further, Exadata Database Machine implements unique CPU to disk prioritization of workloads at the database, application, user, or even job level.

**Comprehensive System Management**

Oracle Enterprise Manager Cloud Control 12c uses a holistic approach to manage the Exadata Database Machine and provides comprehensive lifecycle management from monitoring to management and ongoing maintenance for the entire system. It provides a unified view of hardware and software where you can view components such as database servers, Exadata storage and InfiniBand switches and monitor the operations running on them and their resource utilization. DBAs can also drill down from the database to the storage layer of the Exadata Database Machine to identify and diagnose problems such as performance bottlenecks or hardware faults. Lights-out monitoring within Enterprise Manager is optimized for the Exadata Database Machine with predefined metrics and thresholds so that administrators receive timely notifications when issues arise. In addition, hardware incidents are automatically detected and service requests logged to reduce problem resolution time. Administrators can use Consolidation Planner in Oracle Enterprise Manager to determine optimal consolidation strategies for different Exadata Database Machine configurations. In an Oracle Exadata Database Machine, system management is engineered together with hardware and software to provide not just high performance and availability but also ease of management and consolidation.

**Highest Level of Service**

Oracle offers a complete set of support services for the Exadata family of products including: 24x7 hardware service, system monitoring, software installation and configuration among other standard and custom offerings.

Of particular value and importance is Oracle Platinum Services which is available exclusively for Oracle’s Engineered Systems. Platinum Services provides remote fault monitoring and, should an issue occur, provides faster response times and expedited escalation to development. With Platinum Services, software maintenance and patching is performed remotely by Oracle engineers. Platinum Services provides a higher level of support than has ever been available before for all software and hardware within an Engineered System including the Oracle Database. Platinum Services is provided free of charge.
### Exadata Database Machine X3-2 Key Capabilities

<table>
<thead>
<tr>
<th>Metric</th>
<th>Full Rack HP Disks</th>
<th>Full Rack HC Disks</th>
<th>Half Rack HP Disks</th>
<th>Half Rack HC Disks</th>
<th>Quarter Rack HP Disks</th>
<th>Quarter Rack HC Disks</th>
<th>Eighth Rack HP Disks</th>
<th>Eighth Rack HC Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum disk bandwidth ²</td>
<td>25 GB/s</td>
<td>18 GB/s</td>
<td>12.5 GB/s</td>
<td>9 GB/s</td>
<td>5.4 GB/s</td>
<td>4 GB/s</td>
<td>2.7 GB/s</td>
<td>2 GB/s</td>
</tr>
<tr>
<td>Maximum disk IOPS ³</td>
<td>50,000</td>
<td>28,000</td>
<td>25,000</td>
<td>14,000</td>
<td>10,800</td>
<td>6,000</td>
<td>5,400</td>
<td>3,000</td>
</tr>
<tr>
<td>Disk data capacity (raw) ⁴</td>
<td>100 TB</td>
<td>504 TB</td>
<td>50 TB</td>
<td>252 TB</td>
<td>21.6 TB</td>
<td>108 TB</td>
<td>10.8 TB</td>
<td>54 TB</td>
</tr>
<tr>
<td>Disk data capacity (usable) ⁶</td>
<td>45 TB</td>
<td>224 TB</td>
<td>22.5 TB</td>
<td>112 TB</td>
<td>9.5 TB</td>
<td>48 TB</td>
<td>4.5 TB</td>
<td>23 TB</td>
</tr>
<tr>
<td>Maximum flash bandwidth ⁵</td>
<td>100 GB/s</td>
<td>93 GB/s</td>
<td>50 GB/s</td>
<td>46.5 GB/s</td>
<td>21.5 GB/s</td>
<td>20 GB/s</td>
<td>10.7 GB/s</td>
<td>10 GB/s</td>
</tr>
<tr>
<td>Maximum flash read IOPS ³</td>
<td>1,500,000</td>
<td>750,000</td>
<td>375,000</td>
<td>187,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum flash write IOPS ⁴</td>
<td>1,000,000</td>
<td>500,000</td>
<td>250,000</td>
<td>125,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash data capacity (raw) ⁵</td>
<td>22.4 TB</td>
<td>11.2 TB</td>
<td>4.8 TB</td>
<td>2.4 TB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum data load rate ⁷</td>
<td>16 TB/hour</td>
<td>8 TB/hour</td>
<td>4 TB/hour</td>
<td>2 TB/hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual system performance varies by application.

1. HP = High Performance; HC = High Capacity
2. Bandwidth is peak physical scan bandwidth achieved running SQL, assuming no data compression. Effective user data bandwidth is higher when compression is used.
3. Disk data capacity is measured in standard disk drive terminology with 1 GB = 1 billion bytes. Capacity is measured using normal powers of 2 space terminology with 1 TB = 1024 * 1024 * 1024 * 1024 bytes. Actual formatted capacity is less.
4. IOPS is measured at the storage servers after ASM mirroring.
5. Load rates are typically limited by database server CPU, not IO. Rates vary based on load method, indexes, data types, compression, and partitioning.

### Exadata Database Machine X3-2 Support Services

- Hardware Warranty: 1 year with a 4 hour web/phone response during normal business hours (Mon-Fri 8AM-5PM), with 2 business day on-site response/Parts Exchange
- Oracle Premier Support for Systems includes Oracle Linux and Solaris support and 24x7 with 2 hour on-site hardware service response (subject to proximity to service center)
- Oracle Premier Support for Operating Systems
- Oracle Customer Data and Device Retention
- System Installation Services
- Software Configuration Services
- Oracle Platinum Services
- Oracle Exadata Start-Up Pack
- System Upgrade Support Services including hardware installation and software configuration
- Oracle Auto Service Request (ASR)
## Exadata Database Machine X3-2 Hardware

<table>
<thead>
<tr>
<th></th>
<th>Full Rack</th>
<th>Half Rack</th>
<th>Quarter Rack</th>
<th>Eighth Rack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Servers</td>
<td>8 x</td>
<td>4 x</td>
<td>2 x</td>
<td>2 x</td>
</tr>
<tr>
<td>w/ CPU Cores</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Rack</td>
<td>128 CPU</td>
<td>64 CPU</td>
<td>32 CPU</td>
<td>16 CPU</td>
</tr>
<tr>
<td>Half Rack</td>
<td>64 CPU</td>
<td>32 CPU</td>
<td>16 CPU</td>
<td></td>
</tr>
<tr>
<td>Quarter Rack</td>
<td>32 CPU</td>
<td>16 CPU</td>
<td>8 CPU</td>
<td></td>
</tr>
<tr>
<td>Eighth Rack</td>
<td>16 CPU</td>
<td>8 CPU</td>
<td>4 CPU</td>
<td></td>
</tr>
</tbody>
</table>

- **2 x Eight-Core Intel® Xeon® E5-2690 Processors (2.9 GHz)**
- **128 GB Memory (expandable to 256GB)**
- **Disk Controller HBA with 512MB Battery Backed Write Cache**
- **4 x 300 GB 10,000 RPM Disks**
- **2 x QDR (40Gb/s) Ports**

### Spares Kit Included:
- 2 x 600 GB High Performance disks or 2 x 3 TB High Capacity disk
- 2 x 400 GB Exadata Smart Flash Cache cards
- InfiniBand cables

### Additional Hardware Components Included:
- Ethernet switch for administration of the Database Machine
- 2 x Redundant Power Distributions Units (PDU's)
- 42U rack packaging
### Exadata Database Machine X3-2 Upgrades

<table>
<thead>
<tr>
<th>Multi-Rack Connection</th>
<th>Half Rack to Full Rack Upgrade</th>
<th>Quarter Rack to Half Rack Upgrade</th>
<th>Eighth Rack to Quarter Rack Upgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect any combination of Exadata Database Machine X3-2 or Exadata Storage Expansion Racks via the included InfiniBand fabric with at most 1 Quarter Rack in the configuration</td>
<td>Upgradability: Field upgrade from Half Rack to Full Rack</td>
<td>Upgradability: Field upgrade from Quarter Rack to Half Rack</td>
<td>Upgradability: Field upgrade from Eighth Rack to Quarter Rack</td>
</tr>
</tbody>
</table>
| Connect a maximum of 2 Quarter Rack Exadata systems via included InfiniBand fabric | Additional Hardware Components Included With The Upgrade:  
  - 4 x Database Servers  
  - 7 x Exadata Storage Servers X3-2 with 12 x 600 GB 15,000 RPM High Performance disks or 12 x 3 TB 7,200 RPM High Capacity disks  
  - InfiniBand and Ethernet cables to connect all the components  
  - Upgrade to Full Rack Spares Kit | Additional Hardware Components Included With The Upgrade:  
  - 2 x Database Servers  
  - 4 x Exadata Storage Servers X3-2 with 12 x 600 GB 15,000 RPM High Performance disks or 12 x 3 TB 7,200 RPM High Capacity disks  
  - 1 x 36 port QDR (40 Gb/sec) InfiniBand switch  
  - InfiniBand and Ethernet cables to connect all the components  
  - Upgrade to Half Rack Spares Kit | Additional Hardware Components Present In The Eighth Rack Are Enabled With The Upgrade:  
  - Eight additional cores of the Intel® Xeon® E5-2690 Processors (2.9 GHz), in each Database Server, are enabled  
  - Six disks and two Flash Cache cards, in each Exadata Storage Server, are enabled |
| Other configuration considerations:  
  - Up to 8 racks can be connected without requiring additional InfiniBand switches  
  - InfiniBand cables to connect 3 racks are included in the rack Spares Kit  
  - Additional optical InfiniBand cables required when connecting 4 or more racks | | | |

### Memory Upgrade

For Exadata Database Machine X3-2 systems with 128 GB per Database Server
- Upgrade Database Servers from 128 GB to 256 GB

Upgrade Support Services:
- Hardware installation of memory upgrade kit

### Optional Customer Supplied Ethernet Switch Installation in Exadata Database Machine X3-2

Each Exadata Database Machine X3-2 rack has 2U available at the top of the rack which can be used by customers to optionally install their own client network Ethernet switches in the Exadata rack instead of in some other rack. Some restrictions apply.
## Exadata Database Machine X3-2 Environmental Specifications

<table>
<thead>
<tr>
<th></th>
<th>Full Rack</th>
<th>Half Rack</th>
<th>Quarter Rack</th>
<th>Eighth Rack</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td>78.66” - 1998 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>23.62” – 600 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>47.24” – 1200 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>1,921 lbs. (871.4 kg)</td>
<td>1,199 lbs. (543.9 kg)</td>
<td>813 lbs. (368.8 kg)</td>
<td>813 lbs. (368.8 kg)</td>
</tr>
<tr>
<td><strong>Acoustic noise (operating)</strong></td>
<td>8.7 B</td>
<td>8.4 B</td>
<td>8.1 B</td>
<td>8.1 B</td>
</tr>
</tbody>
</table>

### Environments With High Performance Disk

<table>
<thead>
<tr>
<th></th>
<th>Maximum power usage</th>
<th>Typical power usage</th>
<th>Cooling at maximum usage</th>
<th>Cooling at typical usage</th>
<th>Airflow at maximum usage</th>
<th>Airflow at typical usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.9 kW (12.1 kVA)</td>
<td>8.4 kW (8.6 kVA)</td>
<td>40,600 BTU/hour (42,800 kJ/hour)</td>
<td>28,700 BTU/hour (30,300 kJ/hour)</td>
<td>1,900 CFM</td>
<td>1,350 CFM</td>
</tr>
<tr>
<td></td>
<td>6.5 kW (6.6 kVA)</td>
<td>4.6 kW (4.7 kVA)</td>
<td>22,200 BTU/hour (23,400 kJ/hour)</td>
<td>15,700 BTU/hour (16,600 kJ/hour)</td>
<td>1,050 CFM</td>
<td>750 CFM</td>
</tr>
<tr>
<td></td>
<td>3.2 kW (3.3 kVA)</td>
<td>2.3 kW (2.4 kVA)</td>
<td>10,900 BTU/hour (11,500 kJ/hour)</td>
<td>7,850 BTU/hour (8,300 kJ/hour)</td>
<td>500 CFM</td>
<td>375 CFM</td>
</tr>
<tr>
<td></td>
<td>2.9 kW (3.0 kVA)</td>
<td>2.0 kW (2.1 kVA)</td>
<td>9,900 BTU/hour (10,500 kJ/hour)</td>
<td>6,800 BTU/hour (7,200 kJ/hour)</td>
<td>400 CFM</td>
<td>325 CFM</td>
</tr>
</tbody>
</table>

### Environments With High Capacity Disk

<table>
<thead>
<tr>
<th></th>
<th>Maximum power usage</th>
<th>Typical power usage</th>
<th>Cooling at maximum usage</th>
<th>Cooling at typical usage</th>
<th>Airflow at maximum usage</th>
<th>Airflow at typical usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10.9 kW (11.1 kVA)</td>
<td>7.6 kW (7.8 kVA)</td>
<td>37,200 BTU/hour (39,250 kJ/hour)</td>
<td>26,000 BTU/hour (27,400 kJ/hour)</td>
<td>1,700 CFM</td>
<td>1,200 CFM</td>
</tr>
<tr>
<td></td>
<td>6.0 kW (6.1 kVA)</td>
<td>4.2 kW (4.3 kVA)</td>
<td>20,500 BTU/hour (21,600 kJ/hour)</td>
<td>14,300 BTU/hour (15,100 kJ/hour)</td>
<td>950 CFM</td>
<td>670 CFM</td>
</tr>
<tr>
<td></td>
<td>3.0 kW (3.1 kVA)</td>
<td>2.1 kW (2.2 kVA)</td>
<td>10,200 BTU/hour (10,800 kJ/hour)</td>
<td>7,200 BTU/hour (7,600 kJ/hour)</td>
<td>470 CFM</td>
<td>330 CFM</td>
</tr>
<tr>
<td></td>
<td>2.7 kW (2.8 kVA)</td>
<td>1.9 kW (2.0 kVA)</td>
<td>9,200 BTU/hour (9,700 kJ/hour)</td>
<td>6,500 BTU/hour (6,850 kJ/hour)</td>
<td>425 CFM</td>
<td>300 CFM</td>
</tr>
</tbody>
</table>

- **Operating temperature/humidity**: 5 ºC to 32 ºC (41 ºF to 89.6 ºF), 10% to 90% relative humidity, non-condensing
- **Altitude Operating**: Up to 3,048 m, max. ambient temperature is de-rated by 1° C per 300 m above 900 m

### Regulations

- Safety: UL 60950-1 2nd Ed, EN60950-1:2006 2nd Ed, CB Scheme with all country differences

### Certifications

- Safety: UL/cUL, CE, BSMI, GOST R, S-Mark, CSA C22.2 No. 60950-1-07 2nd Ed, CCC
- EMC: CE, FCC, VCCI, ICES, KCC, GOST R, BSMI Class A, AS/NZ 3548, CCC

1 Typical power usage varies by application load.
2 Airflow must be front-to-back.
3 In some cases, as applicable, regulatory and certification compliance were obtained at the component level.
## Oracle Database Software (sold separately)

<table>
<thead>
<tr>
<th>For database servers</th>
<th>Oracle Database 11g Release 2 Enterprise Edition, Oracle Real Application Clusters, Oracle Partitioning, and other Oracle Database options</th>
</tr>
</thead>
<tbody>
<tr>
<td>For storage servers</td>
<td>Oracle Exadata Storage Server Software</td>
</tr>
<tr>
<td></td>
<td>Licenses are transferable from one system to another.</td>
</tr>
</tbody>
</table>

## Oracle Software (included)

<table>
<thead>
<tr>
<th>For database servers</th>
<th>Oracle Linux 5 Update 8 with the Unbreakable Enterprise Kernel or Red Hat Compatible Kernel; or Solaris 11: selectable at install time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zero-loss Zero-copy Datagram Protocol (ZDP) InfiniBand protocol used to communicate between the Exadata Storage Servers and the Oracle Database which is based on the Reliable Datagram Sockets (RDS) OpenFabrics Enterprise Distribution (OFED)</td>
</tr>
</tbody>
</table>

## Exadata Storage Software Features

- Smart Scan Technology
- Smart Flash Cache
- Smart Flash Logging
- IO Resource Manager
- Storage Index Technology
- Hybrid Columnar Compression
- Smart Scans of Data Mining model scoring

## High-Availability Features

- Redundant power supplies for all servers
- Redundant InfiniBand switches
- Redundant Power Distribution Units
- Oracle Automatic Storage Management: All database files mirrored; disk failures do not interrupt query processing
- Oracle Real Application Clusters: database server failures are tolerated
- Oracle Exadata Storage Server Software: storage server failures are tolerated
- Backup is performed using Oracle Recovery Manager
- Point in time restores are performed using Oracle Flashback Technologies
- Oracle Data Guard for protection against disasters

## Manageability Features

- Oracle Embedded Integrated Lights Out Manager (ILOM)
- Oracle Enterprise Manager Cloud Control 12c: Oracle Quality of Service Management

## Contact Us

For more information about the Oracle Database Machine, please visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.