The Oracle Database Cloud - Exadata Service (Exadata Service) delivers the world’s best Cloud Database Platform by combining the world’s #1 database with Exadata, the most powerful database platform, and adding all the simplicity and cost effectiveness of the public cloud.

Customers can now run Oracle databases in the cloud with the same extreme performance and availability experienced by thousands of organizations deploying Exadata on-premises. Oracle databases deployed in the cloud as part of this service include all Oracle Database options and are 100% compatible with those deployed on-premises, ensuring a smooth transition to the cloud, and an efficient hybrid cloud strategy. With elastic, pay-as you-grow dedicated Exadata configurations, and infrastructure managed by Oracle experts, Exadata Service enables business agility and operational flexibility with zero CapEx.

Best Database on Best Cloud Platform

Oracle Database Cloud - Exadata Service (Exadata Service) uniquely combines the world’s #1 database technology and the most powerful database platform, with the agility and elasticity of a cloud-based deployment.

Best Database Technology

Oracle Database is the most popular and most versatile database technology for both OLTP and Analytics. With 30+ years of technology innovation, it has been proven at millions of mission-critical deployments around the world. Exadata Service makes this enterprise-proven, robust database technology available in the Cloud. All of Oracle’s industry leading capabilities are included in the Exadata Service, such as In-Memory Database, Real Application Clusters (RAC), Active Data Guard, Automatic Storage Management (ASM), Partitioning, Advanced Compression, Advanced Security, Database Vault, Real Application Testing, OLAP, Analytics, Spatial and Graph. Also available is Oracle Multitenant, which allows an Oracle container database to hold many pluggable databases, enabling high consolidation density, rapid provisioning and cloning, efficient patching and upgrades, and significantly simplified database management.

Most Powerful Database Platform

The platform that delivers Exadata Service is Oracle Exadata, which – now in its sixth generation, has been established as the highest performing, most cost effective and most available platform for running Oracle Database. Exadata was designed from the beginning as a cloud architecture featuring scale-out database servers and scale-out
Oracle Database Cloud – Exadata Service delivers the performance and availability of Exadata for running Oracle Database and mission-critical applications on the Oracle Public Cloud.

- Quick, simple provisioning of Oracle Databases with all features and options, with the agility of the Oracle Cloud and robustness of Exadata platform.
- Affordable with elastic configurations with pay as you grow expandability.
- Requires no Application changes.
- No IT management overhead with Oracle experts taking care of managing the backend infrastructure.
- Zero CapEx.

Intelligent storage servers connected by an ultra-fast InfiniBand network. Exadata includes state-of-the-art PCI flash storage to deliver the highest throughput and best response times along with high capacity disks and database-optimized compression to provide cost effective capacity for the largest databases.

Unique software algorithms in Exadata bring database intelligence to storage, PCI flash, and InfiniBand networking for higher performance and capacity at lower costs than other platforms. Deployed at thousands of sites around the world, Exadata delivers extreme performance for all types of database workloads including Online Transaction Processing (OLTP), Data Warehousing (DW), In-Memory Analytics and consolidation of mixed workloads.

For additional information on Exadata, please visit http://www.oracle.com/exadata.

Best Cloud Offering for an Enterprise Database

On top of the rock-solid Oracle Database and Exadata platform, Exadata Service adds the ease, simplicity and flexibility of Oracle Public Cloud. Organizations can now access Oracle Database on Oracle Exadata without capital investments for IT infrastructure such as data center space, power, cooling, compute servers, storage and networks. Oracle experts manage all backend infrastructure on behalf of customers, which means human resources and IT administration costs are significantly reduced, and IT can focus on improving business results. Full Oracle Database functionality with Exadata Service ensures that any existing application can be quickly migrated to the cloud without changes. Provisioning and expanding the Exadata Service is driven through simple web interfaces, providing customers rapid elasticity to meet changing business demands. An Exadata Service provisioned for one customer is completely isolated from other tenants, providing assured performance and security for business critical workloads.

Customer Benefits

Exadata Service is 100% compatible with on-premises Oracle databases and all existing applications. With Exadata Service, organizations can easily embark on a pure cloud or hybrid cloud strategy that spans on-premises databases as well as databases in the Cloud.

Exadata Service offers immediate business benefits to a broad range of customers:

- Exadata Service enables existing on-premises Exadata customers to easily embark on a journey to the cloud – without compromising the database performance and availability levels they enjoy with their on-premises Exadata deployments.
- Existing Oracle Database customers who have not yet experienced Exadata can easily start enjoying the performance, availability and scalability benefits of the world’s best database platform – without losing any of the database functionality they rely on.
- Organizations that have been forced to settle for public cloud databases with limited functionality and compromised data consistency can now benefit from the most sophisticated database functionality on the most powerful cloud database platform.

Service Overview

Exadata Service enables fully featured Oracle Databases to run on the Exadata platform in the Oracle Public Cloud. Exadata Service instances come pre-configured according to best-practices that have been proven at thousands of mission critical Exadata sites around the world.
KEY FEATURES

Exadata Service combines all the enterprise-proven Options and features of Oracle Database, engineered configurations of Oracle Exadata, with the simplicity of Oracle Cloud.

- Rapid provisioning in a few clicks
- Pay as you grow elastic configurations with monthly subscription price
- Isolation through the Oracle VM Xen-based hypervisor
- 100% compatibility with all on-premises applications and Oracle databases
- Comprehensive management through Oracle Enterprise Manager
- All backend infrastructure managed by Oracle experts
- Enterprise-Class Security, Availability and Performance

WORKLOADS

- Any combination or mix of OLTP, Data Warehousing, Reporting, OLAP, In-Memory Analytics, Spatial, Graph, JSON, XML, Objects, Large Objects
- Consolidate many physical databases or pluggable databases
- Disaster Recovery in Cloud with Query Offload
- Full ACID compliance (Atomicity, Consistency, Isolation, Durability) greatly simplifies application development and ensures data correctness

ORACLE DATABASE

- Oracle Database 12.1.0.2, or Oracle Database 11.2.0.4
- All Oracle Enterprise Manager Packs
- All Oracle Database Options including Oracle Real Application Clusters, Active Data Guard, Multitenant, Partitioning, Advanced Security, In-Memory

Databases provisioned on the Exadata Service include all the features of Oracle Database Enterprise Edition, plus all Oracle Enterprise Manager Packs and all Database Enterprise Edition Options, such as Oracle Multitenant, Oracle Database In-Memory, Oracle Real Application Clusters (RAC), Oracle Advanced Security and Oracle Active Data Guard. Customers can choose either Oracle Database 11g Release 2 (11.2.0.4) or Oracle Database 12c Release 1 (12.1.0.2) as their preferred database version. They connect to the configured database from their on-premises applications using standard Oracle Net Services clients such as JDBC and OCI. Customers also have full privileged OS level access to their compute nodes.

When customers activate their Exadata Service subscription through the Oracle Cloud Portal, they can choose an Exadata configuration starting with a Quarter Rack which has 2 database servers and 3 storage servers. The database servers have a minimum and maximum number of compute cores (OCPUs) that can be enabled for the chosen configuration, and customers can specify their desired number of compute cores within these limits. Customers subscribe to the Exadata service on a monthly basis, and this monthly pricing is based on the number of enabled compute cores. As business grows, customers can enable additional compute cores, thus paying only for the processing power that is required.

Customers with larger requirements may choose larger Exadata configurations, enabling higher compute, network and storage capacity. Detailed specifications for each Exadata Service configuration are provided in Table 1.

The Exadata Service features no over-provisioning of hardware to ensure that response times and throughput are predictable for critical business processes. This contrasts with other cloud providers that silently overprovision hardware and may not be able to deliver the expected resources during busy periods such as quarter-ending time.

Customers have complete access to all Oracle Database and OS features to ensure smooth and simple migration. Compute nodes are each configured with a single Virtual Machine (VM) owned by the customer. Customers have root privilege for the Exadata compute node VMs and DBA password on the Oracle Databases so they can configure the system as they like, and load additional agent software on the Exadata compute nodes to conform to business standards or security monitoring requirements. Customers perform familiar database administration and OS administration tasks aided by cloud automation for backups, patching, and upgrades.

All supporting infrastructure for Exadata Service is deployed, maintained and managed by Oracle, including datacenter networking, private Exadata InfiniBand networks, physical Exadata compute and storage servers, firmware, and Exadata storage software. This allows customers to focus on their business needs and application requirements, and not IT infrastructure management.

Database and OS patching is initiated by customers on their preferred schedule while infrastructure patching is performed automatically by Oracle.

Use Cases

Exadata Service fits a wide variety of business use cases that are governed primarily by two principles – the enterprise-proven reliability and functionality of Oracle databases, and the agility of Cloud to quickly meet business requirements. Business users don’t have to wait for long IT budgetary approvals and procurement cycles to deliver time-sensitive applications.
Exadata Service is an ideal fit for:

- Running business-critical production OLTP or analytic databases at almost any scale without incurring the capital expenditure and complexity of maintaining the underlying IT infrastructure. Oracle Database In-Memory enables ultra high-performance analytics to be run on dedicated analytic databases or directly on OLTP databases.
- Consolidating a variety of workloads using multiple Oracle Databases or Oracle Multitenant.
- Maintaining synchronized Oracle standby or replica databases for disaster recovery and/or query offloading using Oracle Active Data Guard or Oracle GoldenGate.
- Quickly provisioning high-performance Oracle databases for ad-hoc business reasons such as feature development, functionality testing, application certification, proof-of-concept, and try-before-buy.
- Executing time-sensitive large-scale business applications such as launching a web-based marketing campaign, running loyalty programs, and rolling out new business initiatives.

An attractive aspect of all these use cases for existing Oracle Database customers is that their applications and data models do not have to change. Their Data Center simply expands to include the elasticity and flexibility of the Oracle Cloud.

Access and Security

The Exadata Service provides secure high-performance access from both on-premises systems and from other Oracle Public Cloud services. To ensure consistent high-performance and isolation, multiple separate physical networks are provided on each Exadata Server.

- The Client Network provides 10Gb/sec connectivity for applications to send and receive data to/from databases.
- The Database Admin Network provides a separate physical network for customer administrators and Oracle Enterprise Manager.
- The Backup Network provides 10Gb/sec connectivity for high-bandwidth use cases such as Backup, Data Loading, and Data Guard disaster recovery.
- InfiniBand is used internally for ultra-high speed compute-to-compute and compute-to-storage networking.
- A secure isolated Cloud Management network is used by Oracle to manage the servers, storage and switches. This network is not accessible to customers.
Secure application connectivity is ensured by using Secure SQL*Net through an SSH tunnel or IPsec VPN. A firewall whitelist containing customer’s source IP addresses restricts network access to their allocated Exadata Service instances. InfiniBand security is enforced using InfiniBand partitioning which provides network isolation on the InfiniBand network. Customer databases run in a separate VM container on the Exadata servers to restrict access to hardware resources. Databases created on the Exadata Service are required to have their tablespaces encrypted (using Oracle Database’s Transparent Data Encryption (TDE) capability), in order to provide an extra layer of protection.

Provisioning

Exadata Service includes a simple easy-to-use web-based provisioning wizard through which customers can quickly choose their desired Exadata configuration and the associated database instances. This wizard is available through Oracle’s Cloud Portal, http://cloud.oracle.com. After purchasing and activating a subscription to Oracle Database Cloud Service, customers simply choose Oracle Database Cloud - Exadata Service as the desired service subscription type while provisioning a database.

During the service activation process, customers select the desired Exadata configuration, which in turn defines the number of database servers and storage servers in the environment. Customers also specify the number of database server CPU cores to enable, and whether or not to provision storage space for local backups. These selections fundamentally determine the capacity and performance characteristics of the system.
High Availability

Exadata Service comes with all the high availability (HA) capabilities that are an integral part of the Exadata platform. Exadata 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 failures. ASM provides data mirroring to protect against disk or storage server failures. Oracle RMAN provides extremely fast and efficient backups to disk or to cloud. Oracle’s Flashback technology allows backing out user errors at the database, table or row level.

Because of its industry leading availability, Exadata 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. The best practices guiding Exadata Service are largely derived from the deep experience that Oracle has developed as part of deploying Exadata in these highly available environments.

Backup & Recovery

Exadata Service provides automatic built-in database backup facilities, with weekly full backups and daily incremental backups. At the time of provisioning the service, customers can choose backups to be stored on either cloud storage or local storage.

Backups based on Cloud Storage leverage Oracle Database Backup Service, which is an RMAN-integrated solution to send Oracle Database backups directly to Oracle Storage Cloud. This presents the most affordable and elastic option to store backups for Exadata Service.

Customers also have the option to choose backing up to local storage, which is configured as the Fast Recovery Area (FRA) associated with the allocated Exadata instance. This delivers the fastest backup and recovery solution.
Migration to Exadata Service

Full compatibility between on-premises databases and databases in Exadata Service makes the migration to Exadata Service easy and low risk. Following established Oracle Database best practices, two types of migration methodologies are supported:

- Logical Migration – this methodology allows data reorganization as part of migration. Database solutions that can be used for this purpose are Oracle Data Pump and Oracle GoldenGate.
- Physical Migration – this methodology, which is a byte-to-byte copy of the data, offers the simplest way to migrate databases. Solutions that can be used for this purpose are RMAN backup, Transportable technologies, and Data Guard. Customers can also restore from a backup made on the Oracle Public Cloud through the Oracle Database Backup Service.

Scaling Exadata Service

With Exadata Service, customers can easily scale their business by expanding their allocated infrastructure. This can be done in two ways:

- Add compute processing power within the allocated configuration – this can be done by enabling additional CPU cores, within the limits for the allocated configuration (ref. Table 1).
- Migrate an Exadata Service instance to a more powerful configuration, e.g. from a Quarter Rack to a Half Rack. This is done when the processing power or storage capacity / bandwidth that is required exceeds the amount that is available with the allocated configuration.

Either of these operations can be initiated and completed by the customer directly through the Service Console.

Conclusion: Transform IT, Unleash Business Potential

Exadata Service includes the most versatile and functional database technology – Oracle Database, on the most powerful platform – Exadata, with the simplicity and cost effectiveness of Oracle Public Cloud.

Enterprise-proven database capabilities are now instantly available to maximize productivity, lower risk and speed time-to-value. To embrace the Cloud, customers now do not have to compromise their SQL functionality, performance, availability, data models, or transactional integrity. No changes to on-premises applications are required either, enabling rapid and easy migration to the cloud, or deployment of a hybrid cloud strategy.

With a database platform uniquely engineered for extreme performance, along with fast deployment, simplified management, low operating costs and reduced risks, Exadata Service is the best Cloud Database platform available today.
Table 1. EXADATA SERVICE: Technical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Quarter Rack</th>
<th>Half Rack</th>
<th>Full Rack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Database Servers</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Number of OCPUs</td>
<td>28 – 68</td>
<td>56 – 136</td>
<td>112 – 272</td>
</tr>
<tr>
<td>Total Memory</td>
<td>496 GB</td>
<td>992 GB</td>
<td>1,984 GB</td>
</tr>
<tr>
<td>Number of Storage Servers</td>
<td>3</td>
<td>6¹</td>
<td>12¹</td>
</tr>
<tr>
<td>Total Flash Capacity</td>
<td>19.2 TB</td>
<td>38.4 TB</td>
<td>76.8 TB</td>
</tr>
<tr>
<td>Total Usable Disk Capacity²</td>
<td>42 TB</td>
<td>84 TB</td>
<td>168 TB</td>
</tr>
<tr>
<td>Max SQL Flash Bandwidth³</td>
<td>30 GB/sec</td>
<td>60 GB/sec</td>
<td>120 GB/sec</td>
</tr>
<tr>
<td>Max SQL Flash Read IOPs⁴</td>
<td>900 K</td>
<td>1.8 M</td>
<td>3.6 M</td>
</tr>
<tr>
<td>Max SQL Flash Write IOPs⁵</td>
<td>500 K</td>
<td>1 M</td>
<td>2 M</td>
</tr>
<tr>
<td>Max SQL Disk Bandwidth⁶</td>
<td>4.5 GB/sec</td>
<td>9 GB/sec</td>
<td>20 GB/sec</td>
</tr>
<tr>
<td>Max SQL Disk IOPs⁷</td>
<td>7 K</td>
<td>14 K</td>
<td>28 K</td>
</tr>
<tr>
<td>Max Data Load Rate⁸</td>
<td>5 TB/hr</td>
<td>10 TB/hr</td>
<td>20 TB/hr</td>
</tr>
</tbody>
</table>

1. Note that Exadata Service Half Rack and Full Rack Configurations differ from on-premises half rack and full rack. The Exadata Service Half Rack is twice the size of a Quarter Rack and has six storage servers. The Exadata Service Full Rack is twice the size of the Half Rack and has twelve storage servers.

2. After high-redundancy mirroring, but before database compression.

3. Bandwidth is peak physical scan bandwidth achieved running SQL, assuming no database compression. Effective user data bandwidth is higher when database compression is used.

4. Based on 8K I/O requests running SQL.

5. Based on 8K I/O requests running SQL. Flash write I/Os measured at the storage servers after ASM mirroring, which issues multiple storage I/Os to maintain redundancy.

6. Load rates are typically limited by database server CPU, not I/O. Rates vary based on load method, indexes, data types, compression and partitioning.
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Hardware and Software, Engineered to Work Together

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