Disclaimer

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Introduction

The Oracle Exadata Database Machine is engineered to be the highest performing, most cost effective and most available platform for running Oracle Database. Exadata is a modern architecture featuring scale-out industry-standard database servers, scale-out intelligent storage servers, state-of-the-art PCI flash storage servers and an extremely high speed InfiniBand internal fabric that connects all servers and storage.

Exadata takes advantage of Oracle's 30+ years of database experience and builds on Oracle's leadership position as the #1 database for Online Transaction Processing (OLTP), Data Warehousing (DW), Database Consolidation, and In-Memory Analytics. Current Exadata offerings are the outcome of twelve years of dedicated development, and thousands of engineer years of effort.

With thousands of Exadata deployments globally, that include the top 5 banks, telecoms and retailers, one common question for customers invested and interested in Exadata is where the Exadata technology is headed in the near future. The following is intended to outline the general product direction for Oracle Exadata, so that customers can feel reassured that they will continue to get significant returns on their Exadata investment for the foreseeable future.

Exadata’s Scale-out Flexible Architecture

The Exadata architecture moves beyond the legacy idea that customers should assemble database systems from silos of compute and generic storage connected with legacy networks. Exadata was developed from the ground up, to seamlessly integrate modern scale-out principles at both the compute and storage layers, along with unified connectivity based on optimized network protocols, tightly integrated flash and in-memory technologies, as well as application-aware intelligence within storage. As business workload grows, database CPUs, storage, and networking can be added in a balanced fashion without scalability bottlenecks. This 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.

Key to the success of the Exadata architecture is software that makes many scale-out servers look like a single system to an application. Applications do not need to be changed to run on Exadata or take advantage of additional compute or storage servers after they are added.

Exadata’s Hardware Update Strategy

The Exadata Hardware Update Strategy is very easy to understand and logical. Oracle has successfully followed the same strategy for many generations and intends to continue to follow the same strategy going forward.

Exadata leverages state-of-the-art components to build the fastest, most highly available and cost-effective Oracle Database platform in the market. Each generation of Exadata adopts leading-edge processors, memory, flash, disk, and networking technologies. Because Exadata is built using industry standard servers for both compute and storage, it easily takes advantage of the rapid evolution of high volume hardware. Exadata offers superior database
performance today, and future versions will continue to track state-of-the-art processors, storage, memory, flash, and networking technologies, delivering the best performance and price-performance.

The following diagram outlines how successive Exadata generations have evolved, along with corresponding enhancements in leading-edge hardware components.

As can be seen from above, Exadata Database Machine generations closely follow processor update cycles. This model maintains an innovation cadence that ensures adoption of the latest microprocessor technologies, with new advancements approximately every year. In addition to adopting new processors, every new generation of Exadata adopts state-of-the-art memory, flash, disks and networking. New Exadata hardware generations follow new processor releases after approximately 3-6 months, allowing time for integration of all components and hardening and stabilization needed for mission critical applications. Exadata hardware updates bundle together as many new components as possible, eliminating cumbersome piecemeal changes. The goal is to be timely enough to maintain leading performance and price-performance, while being conservative enough to ensure the highest quality.

**Exadata’s Software Update Strategy**

Oracle will continue to develop unique new Exadata software capabilities to optimize compute, storage, and networking, enabling even higher levels of performance, availability and scalability for the Oracle Database. Exadata software is released in periodic intervals, with the latest software release incorporating customer feedback and additional enhancements since the previous releases. Exadata software is compatible with previous Exadata hardware platforms. Similarly, a major Database software release is followed by the release of a major Exadata software version that is fully compatible with that release of the Database software.

Exadata software is developed directly by Oracle’s core Database development team. Many of the new capabilities require algorithmic enhancements at several layers of the software stack, including core RDBMS, OS, and storage. All such necessary software enhancements are provided by various Oracle product development teams working together in a tightly integrated manner. Oracle is thus uniquely positioned in the industry to be able to innovate across all layers of the hierarchy for all types of database workloads, realizing immense value to customers.
The unique innovations that Oracle has created in Exadata software over the last several years have not only enabled unparalleled levels of performance, availability, scalability, and capacity for the Oracle Database when it is run on Exadata, they also differentiate Exadata from generic integrated infrastructure platforms available from other vendors. Many of these infrastructure platforms are also based on recent processors, network, flash, disk, and other hardware (though they trail Exadata in adoption of hardware advances such as NVMe PCI Flash, Unified InfiniBand Networking, etc). However, they lack the deep database integration and unique optimizations that are present between Exadata software and the Oracle Database, such as smart scan, storage indexes, hybrid columnar compression, database-aware flash, in-memory fault tolerance, etc. These innovative software features create a performance, capacity, price-performance, and availability gap between Oracle Database on Exadata vs. Oracle Database on generic integrated platforms that is extremely large today, and is growing at a very rapid pace, as shown in the diagram below.

Oracle will continue to develop unique software capabilities for the Exadata platform that will further increase the gap between Exadata and generic integrated platforms. Some of the new software capabilities will be tied to specific hardware advances, but the majority of these capabilities are pure software optimizations that will benefit both new Exadata systems and previous Exadata generations. Therefore, Exadata customers benefit from a constant stream of software improvements that increase the performance and ROI of their existing and new Exadata platforms.

![Diagram showing the performance gap between Exadata and generic platforms](image)

**Figure 2: Benefit Gap: Exadata vs. Generic Platforms**

**Investment Protection and Compatibility Guidelines**

Exadata’s hardware and software update methodology is consistent with the following compatibility guidelines that have been established over several generations of Exadata systems.

» Exadata protects customers’ investment by allowing newer generation (e.g. X5) servers to be deployed seamlessly into customers’ existing Exadata Database Machines (e.g. X3 or X4). Similarly, new Exadata software releases (e.g. Exadata Software 12.1.2.1) are compatible with previous generation Exadata Database Machines. All currently supported Exadata platforms can be combined in a single configuration and can run the latest Exadata software.

» Oracle will continue to support future versions of the Oracle Database on current Exadata Database Machines that are still under Premier Support.
To enable consolidated database environments on an Exadata Database Machine, multiple Oracle database versions can be deployed within a single Exadata Database Machine. Future Exadata Software releases will be compatible with supported database releases. Compatibility will be maintained across at least two major database releases (e.g. Oracle Database 11g and Oracle Database 12c) in one Exadata Database Machine.

Oracle supports co-existence and connection of the current and previous generation Exadata systems. For example, X2, X3, and X4 Database Machine hardware can be connected to X5 Database Machine hardware to form a single configuration.

Oracle allows incremental growth of hardware as the customer’s workload grows and/or changes. For example, customers can add X5-2 hardware (database servers and/or storage servers) to convert a half rack X4-2 Database Machine to a full rack Database Machine.

The following example highlights how it is possible to do highly flexible upgrades and expansions across generations of Exadata Database Machine, with no impact to existing production applications.

Exadata is based on x86-based servers and the Oracle Linux Operating System. While Oracle may add further options in the future, Oracle has no current plans to remove the currently offered options.

As customers’ workloads change, Oracle will continue to evolve Exadata architecture in the most non-disruptive manner to accommodate changing workload patterns. For example, with the advent of workloads such as In-Memory Data Analytics and all-flash OLTP, Oracle introduced the concept of Elastic Configurations with Exadata X5, enabling an Exadata Database Machine to be configured with a mix of database and storage servers beyond a base rack of 2 database servers and 3 storage servers, to meet any business use case. Exadata’s scale-out smart InfiniBand architecture and use of standard servers for both compute and storage is highly instrumental to this flexibility, allowing Exadata to evolve much more rapidly and effectively than traditional server + SAN + storage array architecture.

Conclusion

Exadata is Oracle’s highly strategic database platform and Oracle will continue investing heavily in the technology. It is a fundamental cornerstone of Oracle’s database strategy that addresses the ever increasing need to process large volumes of data in the most optimal manner, seeking to leverage the newest trends in proven hardware and software technology. Exadata will continue to assure full investment protection for existing Oracle Database customers while also evolving and innovating, with hardware and software engineered together, delivering a complete solution for enterprise data management.