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DATABASE APPLIANCE

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Oracle Database Appliance X4-2

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Introduction

The Oracle Database Appliance X4-2 is the 3rd generation of the Oracle Database Appliance. It is an Oracle Engineered System consisting of hardware and software that saves customers time and money by simplifying deployment, maintenance, and support of high availability database solutions. Built using the world's most popular database, Oracle Database, along with Oracle Real Applications Clusters (Oracle RAC), it offers customers a fully integrated system of software, servers, storage and networking that delivers high availability database services for a wide range of custom and packaged OLTP and Data Warehousing workloads.

The Oracle Database Appliance X4-2 offers customers capacity-on-demand database software licensing, allowing seamless scalability from 2 to 48 processor cores without any hardware upgrades. The appliance also offers the option of deploying a virtualized platform based on Oracle VM. Support for virtualization allows customers and ISVs to build a solution-in-a-box that efficiently utilizes resources and extends capacity-on-demand licensing to both database and application workloads by leveraging Oracle VM hard partitioning.

The Oracle Database Appliance X4-2 ships as a 4 rack unit (RU) system consisting of two x86 servers and one storage shelf. All hardware and software components are provided by Oracle, allowing customers to benefit from streamlined single vendor support. And, by integrating the hardware and software components to work together, the Oracle Database Appliance X4-2 is engineered to provide a high availability database and application solution that is:

- Simple

- Reliable

- Affordable

The Oracle Database Appliance X4-2 is ideal for customers who value simplicity and who seek to avoid the complexity, costs, and risks in deploying high availability solutions. Customers can now benefit from high availability (HA) solutions without having special skills or HA expertise.

Challenges to Deploy High Availability Systems

High availability databases running on a cluster of servers can be complex to implement and traditionally require specialized systems administration, database administration and storage management skills. For small to midsize IT organizations lacking these skills, the risk of implementing these HA solutions, without the necessary expertise, may outweigh the anticipated benefits. For larger IT organizations possessing these skills, high availability implementations may still be reserved for only the most mission critical applications, leaving less critical database applications unprotected.

The Oracle Database Appliance X4-2 offers the simplest way to take advantage of the latest generation of the world's most popular Database – Oracle Database – and the high availability capabilities it has to offer. A single database administrator (DBA) can deploy an Oracle database with the Oracle Database Appliance X4-2 in about one hour. And, with the industry's best high availability database solution – Oracle Real Application Clusters – running on the appliance, database or hardware failures can be handled in seconds, often with no perceptible impact to users. As a result, the Oracle Database Appliance X4-2 offers the highest availability of any system in its class.

Simple to Implement, Manage, and Support

Simple to Implement

The hallmark of the Oracle Database Appliance X4-2 is its simplicity: A single system, with servers, storage and networking — all engineered to work together. To deploy and use the Oracle Database Appliance X4-2, simply unpack it, cable the three components together, plug in the power cords, plug in the network cables, and run the Oracle Appliance Manager installation to provision the clustered, highly available system.

Simple to Manage and Maintain

Maintaining systems and keeping all the associated software elements current with the latest patches is often one of the most time consuming and error-prone tasks confronting administrators. The Oracle Database Appliance X4-2 and its specially engineered software streamlines patching for all the elements of the software stack — firmware, operating system, clusterware, storage manager, and database software.

Engineered Systems – Why they are better

An Engineered System ensures the hardware and software uniquely inter-operate and take advantage of what each knows about the other, to offer the best reliability and performance possible. Decisions about how to process work can be optimized because the database, storage management and clustering software can take advantage of certain features that may not exist with a "build-your-own" system of hardware and software components.

For example, since Oracle has unique knowledge of the system and is aware of the operating environment – down to the patch level of the operating system and database - Oracle can:

- Make installation, configuration and tuning decisions as well as automate the setup
- Enable customer support to diagnose and resolve issues very quickly
- Issue "system" patch bundles that combine OS, database, clusterware, and storage management updates
- Proactively provide patches once known issues, raised by other customers, are resolved and fixed
- Employ updates/patches at any element immediately when available — no cross-certification of multi-vendor technology to wait on, some of which can take more than a year to get tested and certified.

The Oracle Database Appliance X4-2 is part of the "Engineered Systems" family of products from Oracle and is able to deliver these significant advantages to customers, making it a superior high availability database system with its simplified installation and management, best-in-class performance, and single-vendor support.

The appliance simplifies storage management by automatically detecting performance and availability issues and performing corrective actions. Disks can be replaced without any administrative tasks. However, the appliance will attempt to address any issues first by taking disks offline and rebuilding the redundancy if they are predicted to fail or if they are impacting performance. In addition, the Auto Service Request (phone home) feature will generate support requests for replacement hardware components such as disks, power supplies, fans, etc. if they fail.

When a problem occurs, the Oracle Database Appliance X4-2 gathers and packages all the relevant logs to rapidly service the support request. Rather than requiring the DBA or System Administrator to manually search for and compile all the logs and system history when issuing a support request, the Appliance Manager automatically collects and compiles the relevant logs and history, allowing issues to be processed, analyzed and fixed much more quickly.

A Complete, Engineered High Availability Database Solution

The Oracle Database Appliance X4-2 is an integrated hardware and software database solution that offers many advantages over "build-your-own" implementations.

Hardware

Servers

The Oracle Database Appliance X4-2 is a 4 rack unit (RU) system that consists of two servers and one storage shelf. Each server contains two 12-core Intel Xeon E5-2697 v2 processors, providing up to 24 enabled-on-demand processor cores and 256 GB of memory per server for a total of 48 processor cores and 512 GB of memory per appliance.
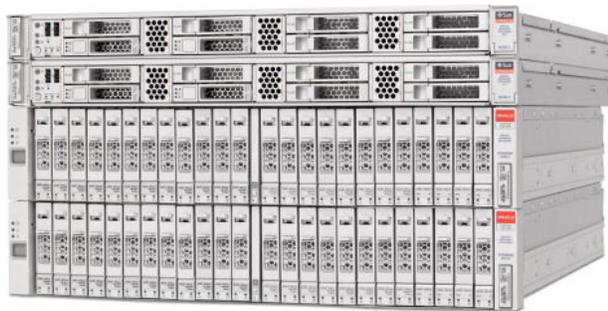

Figure 1: Oracle Database Appliance X4-2 with Optional Storage Expansion Shelf

Networking

The two server nodes are connected via a redundant 10GbE interconnect for cluster communication. Each server also provides the option for 10GbE SFP+ (fiber) or 10GBase-T (copper) external networking connectivity, ensuring the appliance will be compatible with any data center.

Storage

The Oracle Database Appliance X4-2 base configuration shares twenty 900 GB SAS Hard Disk Drives in a single storage shelf between the two servers, however, the appliance also supports optional storage expansion with an

"Oracle stays committed to their most affordable Engineered System with the Oracle Database Appliance X4-2. Enhancing the appliance with the latest x86 architecture allows us to provide a robust database solution for our clients that not only is simple to administer, but also performs well."

Krishnan Balasubramanian, Chief Technology Officer, Bias

additional storage shelf that doubles the storage capacity of the system. With the storage expansion shelf, the appliance contains 36 TB of raw storage that is double-mirrored or triple-mirrored, offering

18 TB or 12 TB, respectively, of resilient usable database storage. There are four triple-mirrored 200 GB solid-state disks per storage shelf for the database redo logs to boost performance and to protect the database in case of instance failure. To expand storage outside of the appliance, external NFS storage is supported for online backups, data staging, or extra database files. The Appliance Manager in conjunction with Oracle Automatic Storage Management (ASM) automatically configures, manages, and monitors disk performance and availability. The Appliance Manager also provides alerts on performance and availability events as well as automatically configures replacement drives in case of a hard disk failure.

Built-in High Availability

The Oracle Database Appliance X4-2 was developed collaboratively across hardware and software engineering teams to ensure that all high availability best practices were implemented throughout the design. Along with previously mentioned high availability features such as mirrored database and operating system drives, redundant servers, redundant 10GbE connectivity, redundant external SAS HBAs, and redundant storage IO modules, the appliance provides the highest level of resiliency with redundant power supplies and fans to eliminate single points of failure.

Software

The Oracle Database Appliance X4-2 supports the following database and operating system software:

Table 1. Database and OS Software Support for the Oracle Database Appliance X4-2
• Oracle Linux 5.9 (UEK2) – Pre-installed
• Oracle Appliance Manager – Pre-installed
• Oracle VM – Optional
Software Stack (installed using the Appliance Manager)
• Choice of Oracle Database Software:
• Oracle Database, Enterprise Edition 11g (11.2.0.2 or later)
• Oracle Real Application Clusters (RAC)
• Oracle Real Application Clusters (RAC) One Node
• Oracle Grid Infrastructure which includes:
• Oracle Clusterware
• Oracle Automatic Storage Management (ASM)
• Oracle Enterprise Manager Database Control
• Oracle Auto Service Request (ASR)

Oracle Database and Clustering Options

Organizations can choose to run a single database instance using Oracle Database, Enterprise Edition 11g, Release 2 or choose to deploy a high availability database solution using Oracle Real Applications Clusters (RAC) or Oracle Real Applications Clusters One Node (RAC One Node) for "active-active" or "active-passive" database server failover.

Virtualization

The Oracle Database Appliance X4-2 offers the option of deploying a virtualized platform based on Oracle VM. Support for virtualization adds additional flexibility to the already complete and fully integrated database solution. Customers can use the capabilities of Oracle VM to effectively allocate resources to databases and applications running on the same physical server. Rather than simply disabling unnecessary server cores, customers can use the excess capacity to host other workloads. This enables consolidation of both databases and applications, while retaining the ease of deployment and management associated with the Oracle Database Appliance X4-2. Therefore, only the server cores supporting the virtual machine hosting the database need to be licensed for the database. Customers and ISVs can create a solution-in-a-box, hosting both the database and application in the appliance, eliminating the rack-space, cooling, and power requirements associated with additional servers. Since virtualization on the Oracle Database Appliance X4-2 is based on Oracle VM, all applications, operating systems, and Oracle VM templates supported by Oracle VM are also supported on the appliance.

Cost Advantage

Single System Configuration – Capacity-On-Demand Licensing

The Oracle Database Appliance X4-2 is offered in a single system configuration – two servers each with two 12-core Intel Xeon processors and 256 GB of memory for a total of 48 processor cores and 512 GB of memory per appliance. Administrators may choose how many cores to activate and license when installing the database on the bare metal (non-virtualized) option. Organizations can minimize licensing costs while providing a capacity-on-demand platform for deploying databases by initially licensing as few as 4 cores for the bare metal option – additional cores can be activated at any time. Virtualization provides additional licensing flexibility by providing isolation between databases and other workloads by leveraging Oracle VM hard partitioning.

Capital and Operating Expenditure Savings

The Oracle Database Appliance X4-2 includes hardware and software components that, on first glance, may appear comparable to a "build-your-own" system. However, upon factoring in the time and resources required to design, acquire, deploy, and robustly test a "build-your-own" system, the advantage of the Oracle Database Appliance X4-2 quickly becomes apparent. With

> "Our company retains our market leadership through our commitment to delivering superior technologies and services that meet our clients' risk and insurance needs, wherever they might be in the world," **said Scott Wilson, Vice President Hosting & Technology Operations, Aon eSolutions**. "The Oracle Database Appliance plays a critical role in our scalability and efficiency, allowing us to easily create new solutions and practices globally, at a lower total cost of ownership."

the Oracle Database Appliance X4-2, customers save time they would ordinarily spend researching compatible components, creating and processing multiple orders across multiple vendors, and validating "build-your-own" configurations.

The savings can be realized in all three stages of the systems lifecycle: from initial deployment, on-going maintenance, and resolving support issues. Table 2 highlights the difference in tasks required for a "build-your-own" system versus the tasks required for the Oracle Database Appliance X4-2.

TABLE 2. COMPARATIVE SAVINGS WITH ORACLE DATABASE APPLIANCE X4-2

LIFECYCLE STAGE	BUILD YOUR OWN TASKS	ORACLE DATABASE APPLIANCE X4-2 TASKS
Initial Deployment	• Sizing • Order • Research best practices • Assemble • Install, patch, and configure • Test unique configuration • Resolve issues	• Order Oracle Database Appliance X4-2 • Run Oracle Appliance Manager
Maintenance	• Research patch dependencies • Download individual patches for firmware, operating system, grid infrastructure, database • Test unique configuration	• Download Patch Bundle for Oracle Database Appliance • Run Oracle Appliance Manager
Support	• Troubleshoot configuration with support • Locate log files • File SR	• Run Oracle Appliance Manager and Auto Service Request (ASR)

Common Use Cases

The Oracle Database Appliance X4-2 has a variety of common use cases:

- Simple, affordable, low risk, high availability database system
- Pay as you grow with Capacity-On-Demand licensing
- Consolidation platform for databases and other workloads
- Solution-in-a-box for remote branch office deployments

Simple, Reliable, Affordable, Low Risk, High Availability Database System

The Oracle Database Appliance X4-2 will appeal to customers looking for an affordable, high availability database system that is easy to implement and maintain. In the past, high availability database systems running in a cluster of database servers were viewed as complex to implement,

requiring specialized systems, database, and storage management administration skills. Many IT organizations, therefore, sacrificed failover capability, or relied upon expensive, redundant, underutilized active-passive cold failover systems to achieve the high availability they desired. These failover systems often took a long time to react to a primary system failure and consumed precious floor space, cooling and power.

With the Oracle Database Appliance X4-2, a single DBA can deploy a high availability clustered database system in about one hour. Small and midsize businesses and departments can now quickly and easily deploy the industry's best database high availability solution (Oracle RAC) on the Oracle Database Appliance X4-2 to transparently and seamlessly handle database or hardware failures in seconds, often with no perceptible impact on user response time.

Pay as you grow with Capacity-On-Demand licensing

New projects about to be put into production can take several years to ramp up to the expected workload levels. Hence, IT organizations are leery of purchasing and deploying excess capacity up front, prior to the point at which it is actually needed. With the affordability of the Oracle Database Appliance X4-2 hardware, customers can now deploy the fully provisioned system and grow into the software capacity they need over time by activating only the cores they need. And, optional storage expansion allows customers the flexibility to add additional storage capacity as needed.

Consolidation Platform for Databases and Other Workloads

Many IT shops are pursuing database consolidation by taking the databases running on standalone systems and co-locating them on a clustered database system. The Oracle Database Appliance X4-2 offers a great, low cost platform for this consolidation effort. By hosting multiple databases and other workloads on a

"We consolidated six servers onto one Oracle Database Appliance, reducing space requirements and power costs. With improved system performance and streamlined administration, we are getting important information into our business users' hands much faster," **said Charles Puma, Database Administrator, Export-Import Bank of the United States.**

single clustered and shared storage solution, significant operational efficiencies in terms of backups, system patching, and upgrades can be achieved. Administrators save time and money by managing a single cluster and shared storage solution, rather than a multitude of separate servers, operating systems and databases.

Solution-in-a-box for Remote Branch Office Deployments

Many organizations, even enterprises, have a need to deploy solutions for remote branch office locations where IT environments may reside in little more than closets. The Oracle Database Appliance X4-2 with virtualization can host a complete solution in a single appliance. Customers can configure the entire solution and quickly deploy it in a remote location, reducing or possibly eliminating the cost of on-site administrators. Similarly, maintenance and support can be easily performed remotely using the Appliance Manager and the Integrated Lights Out Manager (ILOM) tools built into every Oracle Database Appliance X4-2.

Hardware and Software Engineered to Work Together

The Oracle Database Appliance X4-2 is a simple, reliable, and affordable addition to the family of engineered systems offered by Oracle. The Oracle Database Appliance X4-2 offers engineered simplicity in a complete and affordable appliance. Figure 2 illustrates how the Oracle Database Appliance X4-2 provides the lowest entry into Oracle's portfolio of Engineered Systems.

Figure 2: Scaling Databases on Engineered Systems
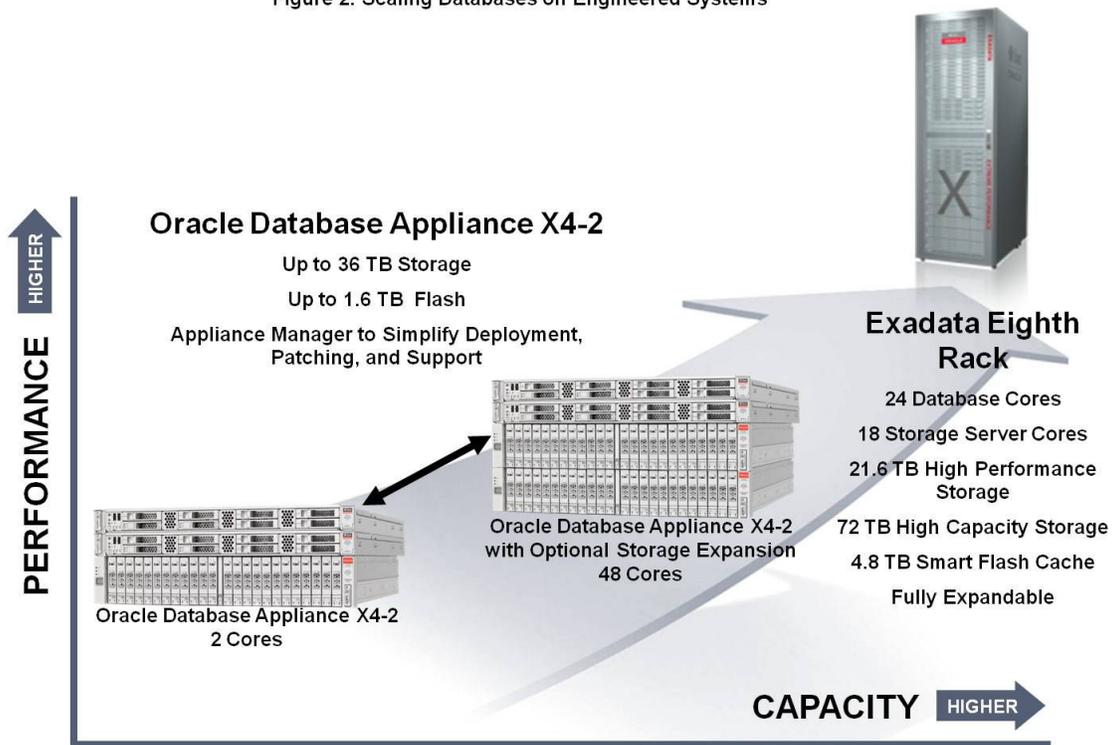
Conclusion

For customers seeking a simple, reliable, and affordable database solution, the Oracle Database Appliance X4-2 is the ideal choice. The Oracle Database Appliance X4-2 is the first enterprise-class highly available database solution that:

- Reduces complexity
- Reduces risk
- Reduces cost

To learn more about the Oracle Database Appliance X4-2, please visit:

www.oracle.com/goto/databaseappliance

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