Oracle Database Appliance X5-2

Complete, Simple, Reliable, Affordable

ORACLE WHITE PAPER | JANUARY 2015
Introduction

The Oracle Database Appliance X5-2 is the fourth 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 Application 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, Data Warehousing, and In-Memory Database workloads.

The Oracle Database Appliance X5-2 offers customers capacity-on-demand database software licensing, allowing seamless scalability from 2 to 72 processor cores without any hardware upgrades. With the Oracle Database Appliance X5-2, a database cache capability is provided using four 400GB solid-state disks to dramatically improve performance of frequently accessed data. 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 uses resources and extends capacity-on-demand licensing to both database and application workloads by leveraging Oracle VM hard partitioning.

The Oracle Database Appliance X5-2 ships as a 6 rack unit (RU) system consisting of two x86 servers and one storage shelf supporting 64 TB raw storage capacity. All hardware and software components are provided by Oracle enabling customers to benefit from streamlined single vendor support. By integrating the hardware and software components to work together, the Oracle Database Appliance X5-2 is engineered to provide a high availability database and application solution that is:

» Complete  
» Simple  
» Reliable  
» Affordable

The Oracle Database Appliance X5-2 is ideal for customers who value simplicity and who seek to avoid the complexity, costs, and risks of deploying high availability solutions. Customers can now benefit from high availability (HA) solutions without having special skills or HA expertise.
Challenges to Deploying 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 X5-2 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 X5-2 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 X5-2 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 X5-2 is its simplicity: A complete system, with servers, storage and networking — all engineered to work together. To deploy and use the Oracle Database Appliance X5-2, 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 Support

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 X5-2 and its specially engineered software streamlines patching for all the elements of the software stack — firmware, operating system, clustering, storage management, and database software.

The appliance simplifies storage management by automatically detecting performance and availability issues and performing corrective actions. Disks can be replaced without any administrative tasks. The appliance will proactively 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 X5-2 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 X5-2 is an integrated hardware and software database solution that offers many advantages over “build-your-own” implementations.

Hardware

Servers
The Oracle Database Appliance X5-2 is a 6 rack unit (RU) system that consists of two servers and one storage shelf. Each server contains two 18-core Intel Xeon E5-2699 v3 processors, providing up to 36 enabled-on-demand processor cores and 256 GB of memory per server for a total of 72 processor cores and 512 GB of memory (expandable up to 1.5 TB) per appliance.

![Figure 1: Oracle Database Appliance X5-2](Image)

Networking
The two server nodes are connected via a redundant Infiniband interconnect for cluster communication enabling 40 Gb/second server-to-server 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 X5-2 base configuration shares sixteen 4 TB SAS Hard Disk Drives in a single storage shelf between the two servers offering 64 TB of raw storage that is double-mirrored or triple-mirrored offering 32 TB or 21.3 TB, respectively of resilient usable database storage. The storage shelf also contains four triple-mirrored 200 GB solid-state disks for the database redo logs to boost performance and to protect the database in case of instance failure. The Oracle Database Appliance X5-2 generation of the appliance introduces additional solid-state storage to further enhance performance by adding four double-mirrored 400 GB solid-state disks per storage shelf to the configuration for frequently accessed data.

The appliance also supports optional storage expansion with an additional storage shelf that doubles the storage capacity of the system. With the storage expansion shelf, the appliance contains 128 TB of raw storage that is double-mirrored or triple-mirrored, offering 64 TB or 42.6 TB, respectively, of resilient usable database storage. 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. It provides alerts on performance and availability events as well as automatically configures replacement drives in case of a hard disk failure. The Appliance Manager also automatically manages the database cache that is stored on the four 400 GB solid-state disks to provide optimal database performance.
Built-in High Availability

The Oracle Database Appliance X5-2 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 networking 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 X5-2 supports the following database and operating system software:

**TABLE 1. DATABASE AND OS SOFTWARE FOR ORACLE DATABASE APPLIANCE X5-2**

<table>
<thead>
<tr>
<th>Oracle Operating System and Appliance Manager Software</th>
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<tbody>
<tr>
<td>• Oracle Linux – Pre-installed</td>
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<td>• Oracle Appliance Manager – Pre-installed</td>
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<tr>
<td>• Oracle VM – Optional</td>
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<tr>
<th>Software Stack (installed using the Appliance Manager)</th>
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<tbody>
<tr>
<td>• Choice of Oracle Database Software:</td>
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<tr>
<td>• Oracle Database Enterprise Edition 11g Release 2 and/or</td>
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<tr>
<td>• Oracle Database Enterprise Edition 12c</td>
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<tr>
<td>• Oracle Real Application Clusters (RAC)</td>
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<tr>
<td>• Oracle Real Application Clusters (RAC) One Node</td>
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<tr>
<td>• Oracle Grid Infrastructure which includes:</td>
</tr>
<tr>
<td>• Oracle Clusterware</td>
</tr>
<tr>
<td>• Oracle Automatic Storage Management (ASM)</td>
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<tr>
<td>• Oracle Auto Service Request (ASR)</td>
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**Oracle Database and Clustering Options**

Organizations can choose to run a single database instance using Oracle Database Enterprise Edition 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 X5-2 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 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 X5-2.
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 X5-2 is based on Oracle VM, all 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 X5-2 is offered in a single system configuration – two servers each with two 18-core Intel Xeon processors and 256 GB of memory for a total of 72 processor cores and 512 GB of memory per appliance. Administrators have the option to deploy the Oracle Database Appliance X5-2 as a bare metal or virtualized platform. Organizations can reduce the database licensing cost and benefit from a capacity-on-demand bare metal platform by initially enabling and licensing as few as 2 processor cores and then activating additional processor cores at any time. Virtualization provides additional licensing flexibility for other workloads, enabling customers to take advantage of capacity-on-demand licensing for both databases and applications by leveraging Oracle VM hard partitioning. With the Oracle Database Appliance Virtualized Platform only the server cores supporting the virtual machine hosting the database need to be licensed for the database and only the server cores supporting the virtual machines hosting applications need to be licensed for those applications.

Capital and Operating Expenditure Savings

The Oracle Database Appliance X5-2 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 X5-2 quickly becomes apparent. With the Oracle Database Appliance X5-2, customers save time they would ordinarily spend researching compatible components, creating and processing multiple orders across multiple vendors, waiting for all the various elements to arrive, and then assembling and validating the “build-your-own” system.

Savings can be realized in all three stages of the system’s 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 X5-2.

TABLE 2. COMPARATIVE SAVINGS WITH ORACLE DATABASE APPLIANCE X5-2

<table>
<thead>
<tr>
<th>Lifecycle stage</th>
<th>“Build-your-own” Tasks</th>
<th>Oracle Database Appliance X5-2 Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Deployment</td>
<td>• Sizing</td>
<td>• Order Oracle Database Appliance X5-2</td>
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<tr>
<td></td>
<td>• Order</td>
<td>• Run Oracle Appliance Manager</td>
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<tr>
<td></td>
<td>• Research best practices</td>
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<tr>
<td></td>
<td>• Assemble</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Install, patch, and configure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Test unique configuration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Resolve issues</td>
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</table>

"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.” —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.”
Common Use Cases

The Oracle Database Appliance X5-2 has a variety of common use cases:

» Simple, Reliable, Affordable, Low Risk, High Availability Database System
» Pay As You Grow with Capacity-On-Demand Licensing
» Consolidation Platform for Database and Application Workloads
» Solution-in-a-box for Remote Branch Office Deployments
» Rapid Provisioning of Test and Development Environments

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

The Oracle Database Appliance X5-2 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 on a cluster of database servers were viewed as complex to implement, requiring specialized systems, database, and storage management and 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 X5-2, 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 Real Application Clusters (RAC), on the Oracle Database Appliance X5-2 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 X5-2 hardware, customers can now pay for additional capacity only as needed.

“Oracle Database Appliance includes database and systems software, server, storage, and networking—all in a single box. It took less than an hour to install, and it saves us significant time and effort throughout the database administration lifecycle.”—Guido van de Zweerde, Team Leader, Database, Information, and Communications Technology Service Centre, Universiteit Twente
deploy the fully provisioned system and grow into the software capacity they need over time by activating only the cores they need when they need them. And, optional storage expansion allows customers the flexibility to add additional storage capacity as needed.

Consolidation Platform for Database and Application 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 X5-2 offers a great, low cost platform for this consolidation effort. By hosting multiple databases and application workloads on a 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 X5-2 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 X5-2.

There are a number of “Solution-in-a-Box” offerings for the Oracle Database Appliance that take advantage of the integrated hardware and software offering. For example, the JD Edwards EnterpriseOne deployment on the appliance is a popular, tested and supported solution.

There are also many Java-based applications that rely on an application server such as Oracle WebLogic Server. The Oracle Database Appliance, when virtualized, supports rapid deployment and configuration of the non-database VMs for WebLogic server instances all using a wizard-based tool similar to the Appliance Manager for the database deployment. This makes deploying the appliance as an integrated database and application server appliance easier and faster than configuring and deploying two separate systems.

Rapid Provisioning of Test and Development Environments

Developers require access to entire database and application environments for development and testing. The Oracle Database Appliance X5-2 enables quick and space-efficient creation of database copies with ASM Cluster File System (ACFS) snapshots and rapid cloning of virtual machines. Combining these features together, administrators can quickly provision each developer with complete test and development environments that improve productivity and efficiency.

Hardware and Software Engineered to Work Together

The Oracle Database Appliance X5-2 is a simple, reliable, and affordable addition to the family of engineered systems offered by Oracle. The Oracle Database Appliance X5-2 offers engineered simplicity in a complete and affordable appliance. Figure 2 illustrates how the Oracle Database Appliance X5-2 provides a simple, reliable, and affordable offering that supports both database and application workloads as part of Oracle’s portfolio of Engineered Systems.
Figure 2: Oracle Database Appliance positioning as part of Oracle’s Engineered Systems

Conclusion

For customers seeking a simple, reliable, and affordable database solution, the Oracle Database Appliance X5-2 is the ideal choice. The Oracle Database Appliance X5-2 is the first enterprise-class highly available database solution that:

» Reduces complexity
» Reduces risk
» Reduces cost

To learn more about the Oracle Database Appliance X5-2, please visit:

www.oracle.com/goto/databaseappliance