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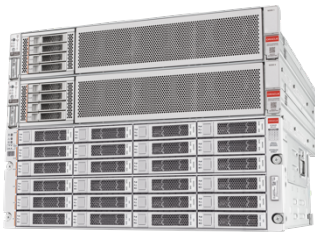
Oracle Database Appliance X11-HA



Oracle Database Appliance X11-HA

Oracle Database Appliance X11-HA is an Oracle Engineered System that saves time and money by simplifying deployment, management, and support of high availability database solutions. Optimized for the world's most popular database— Oracle Database—it integrates software, compute, storage, and network resources to deliver high availability database services for a wide range of custom and packaged online transaction processing (OLTP), in-memory database, analytics and data warehousing, and Artificial Intelligence (AI) applications. All hardware and software components are engineered and supported by Oracle, offering customers a reliable and secure system with built-in automation and best practices. In addition to accelerating the time to value when deploying high availability database solutions, Oracle Database Appliance X11-HA offers flexible Oracle Database licensing options and reduces operational expenses associated with maintenance and support.

Fully Redundant Integrated System

Providing access to information 24/7 and protecting databases from unforeseen and planned downtime can be challenging for many organizations. Indeed, manually building redundancy into database systems can be risky and error-prone if the right skills and resources are not available in-house. Oracle Database Appliance X11-HA is designed for simplicity and reduces that element of risk and uncertainty to help customers deliver higher availability for their databases.

The Oracle Database Appliance X11-HA hardware is an 8U rack-mountable system containing two Oracle Linux servers and one storage shelf. Each server features two 32-core x86 processors, 512 GB of memory, and choice of either a dual-port 25-Gigabit Ethernet (GbE) SFP28 or a quad-port 10GBase-T PCIe network adapter for external networking connectivity with the option to add up to two additional dual-port 25GbE SFP28 or quad-port 10GBase-T PCIe network adapters. The two servers are connected via a 25GbE interconnect for cluster communication and share direct-attached high-performance SAS storage. The base system's storage shelf is partially populated with six 7.68 TB solid-state drives (SSDs) for data storage, totaling 46 TB of raw storage capacity.

Key Features

- Fully integrated and complete database and application appliance
- Oracle Database Enterprise Edition and Standard Edition
- Oracle Real Application Clusters or Oracle Real Application Clusters One Node
- Oracle ASM and ACFS
- Oracle Appliance Manager
- Browser User Interface (BUI)
- Integrated Backup and Data Guard
- Software Development Kit (SDK) and REST API
- Oracle Cloud Integration
- Oracle Linux and Oracle Linux KVM
- Hybrid Columnar Compression often delivers 10X-15X compression ratios
- Two servers with up to two storage shelves
- Solid-state drives (SSDs) and hard disk drives (HDDs)

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Oracle Database Appliance X11-HA runs Oracle Database Enterprise Edition or Oracle Database Standard Edition. It offers customers the option of running single-instance databases or clustered databases utilizing Oracle Real Application Clusters (Oracle RAC) or Oracle RAC One Node for "active-active" or "active-passive" database server failover. Oracle Data Guard is integrated with the appliance to simplify standby databases' configuration for disaster recovery.

Optional Storage Expansion

Oracle Database Appliance X11-HA offers the flexibility to expand the storage shelf that comes with the base system by adding up to eighteen additional SSDs or hard disk drives (HDDs) for data storage. A fully populated storage shelf contains either twenty-four SSDs or six SSDs and eighteen HDDs for data storage, for a total of 184 TB SSD or 46 TB SSD and 396 TB HDD raw storage capacity, respectively. Customers can also optionally add a second storage shelf to double the storage capacity of the system. Also, external NFS storage is supported for online backups, data staging, or other database files.

Ease of Deployment, Management, and Support

To help customers quickly deploy and manage their databases, Oracle Database Appliance comes with Appliance Manager software to simplify the system's administration and diagnosis. The Appliance Manager feature dramatically simplifies the deployment process and ensures that the system and database configuration adhere to Oracle's best practices. The browser user interface quickly gathers all the configuration parameters to streamline both system and database provisioning with a few easy steps. The Appliance Manager also drastically simplifies maintenance by patching the entire appliance, including all firmware and software, using an Oracle-tested patch bundle explicitly engineered for the appliance. Simply select the appropriate patch bundle in the browser user interface to validate it and update the entire system. Database backup and recovery are integrated into the Appliance Manager to backup locally, external storage, or the Oracle Cloud directly through the browser user interface. The Appliance Manager also tracks system and database information and displays the information in the browser user interface. Built-in diagnostics continually monitor the appliance and detect component failures, configuration issues, and deviations from best practices. In addition, Oracle Database Appliance Auto Service Request (ASR) feature can automatically log service requests with Oracle Support to help speed resolution of issues.

Flexible Oracle Database Software Licensing

Oracle Database Appliance X11-HA supports both Oracle Database Enterprise Edition and Standard Edition. Enterprise deployments that require the enhanced feature set of Oracle Database Enterprise Edition can take advantage of a unique capacity-on-demand database software licensing model to quickly scale utilized processor cores without any hardware upgrades. Customers can deploy the system and license as few as 2 processors cores to run their database servers, and incrementally scale up to the maximum of 128 processor cores. This enables customers to deliver the performance and reliability that enterprise business

Key Benefits

- World's #1 database
- Simple, optimized, and affordable
- High availability database solutions for a wide range of applications
- Ease of deployment, patching, management, and diagnostics
- Simplified backup and disaster recovery
- Reduced planned and unplanned downtime
- Cost-effective consolidation platform
- Capacity-on-demand licensing
- Rapid provisioning of test and development environments with database snapshots
- Single-vendor support

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users demand, and align software spend with business growth. Small enterprises, line-of-business departments, and branch office deployments that don't require enterprise class features can license Oracle Database Standard Edition, allowing them to realize the benefits of Oracle Database Appliance to reduce costs and improve productivity.

Integrated Virtualization Support

Virtualization provides IT cost savings and better resource utilization through consolidation of multiple physical servers as Virtual Machines in an Oracle Database Appliance. It helps reduce space, power, and cooling for data centers and provides isolation for workloads to improve service quality for applications and databases. Oracle Database Appliance supports two types of Kernel-based Virtual Machines (KVM) that can be quickly deployed using built-in user interfaces: Application KVM and Database KVM (a.k.a. database system). In an application KVM, customers manage the installation and maintenance of the application, while in the Database KVM, the Oracle Database Appliance manages the installation and maintenance of the Oracle Database.

KVM database systems enable hard partitioning for Oracle Database licensing, where each KVM database system can have its own CPU pool that is automatically assigned during KVM database system creation, or share a CPU pool. Oracle Database Appliance simplifies the management of KVM database systems with built-in user interfaces. Oracle Database Appliance X11-HA also offers built-in high availability features, auto-restart, and failover for application KVMs.

Solution-In-A-Box Through Virtualization

Oracle Database Appliance X11-HA enables customers and ISVs to quickly deploy database and application workloads on a single Oracle Database Appliance. Support for virtualization adds additional flexibility to the already complete and fully integrated database solution by providing isolation between database and application instances.

Customers and ISVs benefit from a complete solution that efficiently utilizes resources and takes advantage of capacity-on-demand licensing for multiple workloads by leveraging Oracle KVM hard partitioning.

Conclusion

For customers seeking a simple, optimized, and affordable database solution, the Oracle Database Appliance X11 model family offers optimized purpose-built hardware and software choices for every organization. The Oracle Database Appliance is engineered across every technology stack level, resulting in easier deployment and upgrades and more efficient management. With the Oracle Database Appliance X11 model family, customers can quickly bring new services to the market while improving their service levels – adding business value to their company.

To learn more about the Oracle Database Appliance X11 model family, visit: www.oracle.com/oda

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Oracle Database Appliance X11-HA Specifications

ARCHITECTURE	
System	▪ Two 2U servers and one 4U DE3-24C storage shelf per system ▪ Optional second storage shelf may be added for storage expansion
Processor	▪ Two 32-core AMD EPYC 9J15 processors per server, 2.95 GHz (up to 4.4 GHz)
Main Memory	▪ 512 GB (8 x 64 GB) per server ▪ Optional memory expansion to 1 TB (16 x64 GB) or 1.5 TB (24 x 64 GB) per server ▪ Both servers must contain the same amount of memory
Server Storage	▪ Two internal 480 GB M.2 NVMe SSDs (mirrored) per server for Operating System and Oracle Grid Infrastructure (GI) Software

STORAGE CAPACITY (STORAGE SHELF DE3-24C)				
HIGH PERFORMANCE				
Data Storage	**Quantity**	**Raw Capacity**	**Usable Capacity (Double Mirroring)**	**Usable Capacity (Triple Mirroring)**
Base System	6 x 7.68 TB SSD	46 TB	17.8 TB	11.9 TB
Plus 6 SSDs	12 x 7.68 TB SSD	92 TB	35.6 TB	23.7 TB
Plus 6 SSDs	18 x 7.68 TB SSD	138 TB	53.4 TB	35.6 TB
Full Shelf	24 x 7.68 TB SSD	184 TB	71.2 TB	47.5 TB
Double Shelf	48 x 7.68 TB SSD	368 TB	142.5 TB	95.0 TB
HIGH CAPACITY				
Full Shelf (SSDs Plus HDDs)	6 x 7.68 TB SSD	46 TB	17.8 TB	11.9 TB
	18 x 22 TB HDD	396 TB	153.1 TB	102 TB
Double Shelf (SSDs Plus HDDs)	12 x 7.68 TB SSD	92 TB	35.6 TB	23.7 TB
	36 x 22 TB HDD	792 TB	306.1 TB	204.1 TB

- *Base system storage shelf contains six solid-state drives (SSDs)*
- *Additional SSDs must be added in groups of six*
- *Hard-disk drives (HDDs) must be added in groups of eighteen to fully populate the entire storage shelf*
- *Optional second storage shelf for storage expansion must be fully populated.*
- *The raw storage capacity is based on storage industry conventions where 1 TB equals 1,000 GB.*
- *The usable storage capacity is based on operating system conventions where 1 TB equals 1,024 GB; It is the actual space available after taking into account space needed for ASM high-redundancy, recovering from a disk failure*

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PERFORMANCE *(for ODA X11-HA Performance configuration, all SSDs)*				
Number of SSDs	**Six**	**Twelve**	**Eighteen**	**Twenty-four**
Maximum Read IOPS[1,3]	1,100,000	1,500,000	1,500,000	1,500,000
Maximum Write IOPS[2,3]	900,000	1,100,000	1,100,000	1,100,000
Maximum Throughput (GB/s)[3]	11	16	16	16
Lowest Measured Read Latency (µs)	150			

1. *Based on 8K I/O requests*
2. *Based on 8K I/O requests; write I/Os measured after ASM mirroring, which issues multiple storage I/Os to maintain redundancy*
3. *Measured on DB Systems running on both servers, with each DB System provisioned with 16 cores and 256 GB of memory*

Note: All measurements were collected using an ASM high-redundancy storage configuration

INTERFACES	
Standard I/O	• One 100Mb/1Gb ethernet port and one serial RJ45 port per server • One USB 3.0 ports (one rear) per server (not used) **PCIe Slots:** • PCIe slot 1: dual-port 25 GbE (SFP28) card (Interconnect) • PCIe slot 2: dual-port external SAS HBA • PCIe slot 4: 2nd NIC, choice of quad-port 10GBase-T card or dual-port 10/25 GbE (SFP28) card (Optional) • PCIe slot 5: 1st NIC, choice of quad-port 10GBase-T card or dual-port 10/25 GbE (SFP28) card • PCIe slot 8: 3rd NIC, choice of quad-port 10GBase-T card or dual-port 10/25 GbE (SFP28) card (Optional) • PCIe slot 9: dual-port external SAS HBA • Note: No additional PCIe cards can be added in the non-mentioned slots

SYSTEMS MANAGEMENT	
Interfaces	▪ Dedicated 10/100/1000 M Base-T network management port ▪ In-band, out-of-band, and side-band network management access ▪ RJ45 serial management port
Service Processor	Oracle Integrated Lights Out Manager (Oracle ILOM) provides: ▪ Remote keyboard, video, and mouse redirection ▪ Full remote management through command-line, IPMI, and browser interfaces ▪ Remote media capability (USB, DVD, CD, and ISO image) ▪ Advanced power management and monitoring ▪ Active Directory, LDAP, and RADIUS support ▪ Dual Oracle ILOM flash ▪ Direct virtual media redirection
Monitoring	▪ Comprehensive fault detection and notification ▪ In-band, out-of-band, and side-band SNMP monitoring v3 ▪ Syslog and SMTP alerts ▪ Automatic creation of a service request for key hardware faults with Oracle auto service request (ASR)

SOFTWARE	
Oracle Software	▪ Oracle Linux (Pre-Installed) ▪ Oracle Linux KVM (Pre-Installed and optional to use) ▪ Appliance Manager (Pre-Installed)
Oracle Database Software (Licensed Separately)	▪ Choice of Oracle Database software, depending on the desired level of availability: – Oracle AI Database 26ai Enterprise Edition and Standard Edition 2 – Oracle Database 19c Enterprise Edition and Standard Edition 2 – Oracle Real Application Clusters One Node – Oracle Real Application Clusters ▪ Support for: – Oracle Database options – Oracle Enterprise Manager Management Packs for Oracle Database Enterprise Edition

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Capacity-On-Demand Software Licensing for Oracle Database Enterprise Edition	▪ Enable and license from minimum of 2 cores, up to the maximum of 128 cores, in multiples of two ▪ Note: Both servers must have the same number of cores enabled, however, it is possible to license software for only one of the servers or both servers, depending on the high availability requirement
Capacity-On-Demand Software Licensing for Oracle Database Standard Edition 2	▪ Oracle Database Standard Edition 2 requires one processor license for every 8 enabled cores on Oracle Database Appliance X11. Refer to the Oracle Database Appliance Licensing Guide for details.

ORACLE DATABASE APPLIANCE SOFTWARE FEATURES	
MANAGEABILITY	
Appliance Manager	The software interface for the Oracle Database Appliance simplifies the deployment, management, and support of your Oracle Database Appliance.
Management Interfaces	Command Line interface (CLI), Web Browser Interface (BUI), and REST/API.
Database Templates	Pre-defined (based on Oracle best practices database parameters) database templates sized for best performance to satisfy various workloads for OLTP, DSS, and In-Memory.
Capacity-on-Demand Licensing	A database licensing capability to enable only the processor cores (two minimum) required and to easily scale to a higher number as business needs change.
Single Patch for Entire Stack	Provides a single patch for the entire stack that includes the latest Oracle Database RU, Oracle GI, Oracle Linux, Hardware firmware updates, etc. Applying Out-of-Cycle Database Patches is also supported.
Integrated KVM Virtualization	Linux kernel-based virtual machine (KVM) enables virtualization for Oracle Database or Applications. Supports Hard Partitioning for Oracle Database licensing.
CPU Pools	Enable management of CPU resources, providing QoS (Quality of Service) by guaranteeing dedicated CPU resources for Databases and VMs. (note: *CPU pools cannot be used for Oracle Database licensing)*
Automated Serviceability	Through Oracle Auto Service Request (ASR), problems are resolved faster with ASR, which automatically opens service requests for your Oracle Database Appliance when specific faults occur.
Automated Monitoring	The ODA Hardware Monitoring Tool displays the status of different hardware components in Oracle Database Appliance server. It reports information only for the node on which you run the command.
Automated Diagnostics	Oracle Database Appliance uses Oracle Autonomous Health Framework, which collects and analyzes diagnostic data, and proactively identifies issues before they affect the health of your system.
ODA Software Development Kit (SDK)	The ODA SDK publicly exposes the ODA REST and Java API to invoke ODA database services programmatically.
Oracle Enterprise Manager (OEM) Plug-In	The ODA EM Plug-In supports detailed monitoring of one or multiple Oracle Database Appliances and provides actionable component level analytics across an ODA group
HIGH AVAILABILITY	
Automated Deployment RAC	Integrated Oracle RAC (Real Application Cluster) configuration to deploy a RAC system in 90 minutes or less
Integrated Enterprise Edition High Availability (EEHA)	Enterprise Edition High Availability (EEHA) uses Oracle Grid Infrastructure to provide cluster-based failover for Oracle AI Database 26ai and Oracle Database 19c Enterprise Edition single-instance databases (ODA HA model only)
Integrated Standard Edition High Availability (SEHA)	Standard Edition High Availability (SEHA) uses Oracle Grid Infrastructure to provide cluster-based failover for Oracle AI Database 26ai and Oracle Database 19c Standard Edition 2 databases (ODA HA model only)
DATA PROTECTION	

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Automated Database Backup (including to Cloud)	Integrated RMAN for simple backup operation of Oracle Databases to Oracle Cloud Infrastructure Object Storage or Internal FRA/ External FRA. Restore can be done to different levels (latest, PITR, SCN, etc.)
Integrated Data Guard Configuration	Oracle Database Appliance provides client interface through ODACLI commands for easy configuration and management of Oracle Data Guard for high availability, data protection, and disaster recovery.
Integrated Database Security Assessment Tool (DBSAT)	Run DBSAT reports directly from the Browser User Interface (BUI). The Oracle Database Security Assessment Tool (DBSAT) helps identify areas where your database configuration, operation, or implementation introduces risks and recommends changes and controls to mitigate those risks.
System Disk Backup	Use Oracle Database Appliance Backup and Recovery (ODABR) to back up the system disks to ensure easy restore if the patching operation fails. ODABR restores the system disk to pre-patching state.
Other Data Protection Features	• Prioritize Recovery of Critical Database Files • Automatic Repair of Corrupt Disk Data
DATA MANAGEMENT	
Built-in Storage Management	Integrated ASM for simplified storage management, where the user only selects a few options, and the Appliance Manager automatically configures ASM
Integrated Database Clones	Rapid and efficient database copies using integrated ACFS Snapshots to provision database environments for development and testing of applications.
Hybrid Columnar Compression (HCC) Support	Enables the highest levels of data compression possible with Oracle databases, often delivering 10X-15X compression ratios. It provides substantial cost-savings and performance improvements due to reduced I/O, especially for analytic workloads. *Included with the Oracle Database EE license.*
SECURITY AND COMPLIANCE	
Hardening	• Installed packages are trimmed to a minimum, so that unnecessary packages are not installed • Only essential services are enabled on the Oracle Database Appliance nodes • Operating system users are audited • Secure configurations for NTP, SSH, and other services
Security Capabilities	• Isolation policies • Controlled access to data • Cryptographic services • Monitoring and auditing • Unified Auditing for Oracle database • Oracle Integrated Lights Out Manager (ILOM) for secure management
Encryption	Integrated TDE support for database lifecycle management. *(Oracle Database Transparent Data Encryption [TDE] requires Advanced Security Option license)*
Multi-User Access	Create multiple users with different roles that restrict them from accessing resources created by other users and restrict the set of operations they can perform.
Compliance	• FIPS 140-2 Level one compliant • STIG (Security Technical Guide) security audit script • Secure erase drives
Adaptive Classification and Redaction (ACR)	Enables the sanitization of sensitive diagnostic data, such as Host names, IP and MAC addresses, Oracle Database names, tablespace names, user data that may leak into redo and block dumps in trace files, etc.

Some features are specific to Oracle Database Enterprise Edition (Data Guard, TDE, etc.) and need to be licensed appropriately. Others are included with either the Oracle Database Enterprise Edition (i.e., HCC) or Standard Edition (i.e., SEHA) licensing. Talk to your Oracle Database sales representative for details.

ENVIRONMENTAL	
Environmental Temperature, Humidity, Altitude	▪ Operating temperature: 5°C to 35°C (41°F to 95°F). Optimal: 21°C to 23°C (69.8°F to 73.4°F). *Maximum ambient operating temperature is derated by 1 degree C per 300 meters of elevation above 900 meters, to a maximum altitude of 3,000 meters.* ▪ Non-operating temperature: -40°C to 68°C (-40°F to 154°F) ▪ Operating relative humidity: 10% to 90%, noncondensing ▪ Non-operating relative humidity: Up to 93%, noncondensing ▪ Operating altitude: Up to 3,000 meters (9,840 feet). *In China markets, regulations might limit installations to a maximum altitude of 2,000 meters (6,562 feet).* ▪ Nonoperating altitude: up to 12,000 m (39,370 feet)

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	▪ Acoustic noise (Sound Power, Bels): *8.9 Bels (8.5 Bels per server; 8.1 Bels per storage shelf)* *Check your local regulations for noise level exposure limits in the workplace that apply to your installation of Oracle equipment and appropriate use of personal protection equipment.*

POWER AND THERMAL	
Power	▪ Two 1,400 watt hot-swappable and redundant power supplies - Voltage (nominal) 200 to 240 VAC - Input current (maximum) 10.0A at 200-240 VAC - Frequency (nominal) 50/60 Hz (47-63 Hz range) ▪ Two 580 Watt hot-swappable, redundant power supplies per storage shelf – Rated line voltage: 100 to 240 VAC – Rated input current: 100 VAC 8A and 240 VAC 3A
Two Servers in HA config (Max Memory)	▪ Maximum power usage: 1,654, 5,744 BTU/Hr ▪ Typical power usage: 1,534W, 3,952 BTU/Hr
Storage Shelf (DE3-24C: 24 x 7.68 TB SSDs)	▪ Maximum power usage: 449W, 1,529 BTU/Hr ▪ Typical power usage: 276W, 940 BTU/Hr
Storage Shelf (DE3-24C: 6 x 7.68 TB SSDs, 18 x 22 TB HDDs)	▪ Maximum power usage: 441W, 1,505 BTU/Hr ▪ Typical power usage: 256W, 874 BTU/Hr

PHYSICAL SPECIFICATIONS	
Dimensions and Weight	▪ Height: 86.9 mm (3.4 in.) per server; 175 mm (6.9 in.) per storage shelf ▪ Width: 445.0 mm (17.5 in.) per server; 483 mm (19.0 in.) per storage shelf ▪ Depth: 775.0 mm (30.5 in.) per server; 630 mm (24.8 in.) per storage shelf ▪ Weight: 23.8 kg (52.5 lb.) per server; 38 kg (84 lbs) per storage shelf
Included Installation Kits	▪ Tool-less rack mounting slide rail kit ▪ Cable management arm

REGULATIONS AND CERTIFICATIONS		
Regulations [1,2,3]	**Product Safety:**	UL/CSA 60950-1, EN 60950-1, IEC 60950-1 CB Scheme with all country differences UL/CSA 62368-1, EN 62368-1, IEC 62368-1 CB Scheme with all country differences
	Emissions:	FCC CFR 47 Part 15, ICES-003, EN55032, KS C 9832, EN61000-3-2, EN61000-3-3
	Immunity:	EN55024, KS C 9835
Certifications [2,3]	North America (NRTL), CE (European Union), International CB Scheme, BIS (India), BSMI (Taiwan), KC (Korea), RCM (Australia), VCCI (Japan), UKCA (United Kingdom)	
European Union Directives [3]	2014/35/EU Low Voltage Directive. 2014/30/EU EMC Directive, 2011/65/EU RoHS Directive, 2012/19/EU WEEE Directive, 2009/125/EC ErP Directive	

[1] All standards and certifications referenced are to the latest official version. For additional detail, please contact your sales representative.
[2] Other country regulations/certifications may apply.
[3] Regulatory and certification compliance were obtained for the shelf-level systems only.

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