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Oracle Database Appliance X11-S / X11-L

Oracle Database Appliance is an Oracle Engineered System that saves time and money by simplifying deployment, management, and support of database solutions for organizations of every size. Optimized for the world's most popular database—Oracle AI Database—it integrates software, compute, storage, and network resources to deliver 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 database solutions, Oracle Database Appliance offers flexible database licensing options and reduces operational expenses associated with maintenance and support.

Fully Integrated System Optimized for Oracle Database

Oracle Database Appliance X11-S and Oracle Database Appliance X11-L are engineered as single 2U rack-mountable servers that provide the performance benefits associated with AMD EPYC™ CPUs and NVM Express (NVMe) flash storage. Oracle Database Appliance X11-S is powered by one 32-core x86 processor and 256 GB of main memory, expandable to 768 GB. Oracle Database Appliance X11-L increases the processor and memory resources by offering two 32-core x86 processors and 512 GB of main memory, expandable to 1.5 TB. Both systems come configured with 13.6 TB of high-bandwidth NVMe flash for data storage and Oracle Database Appliance X11-L provides an option to expand the raw storage capacity up to 54.4 TB of NVMe flash. Both systems offer a 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.

Oracle Database Appliance X11-S and Oracle Database Appliance X11-L have Oracle best practices built-in and are optimized for Oracle databases. The number of processor cores, amount of main memory, and NVMe flash storage capacity in each fully integrated system is balanced to provide optimal database performance for a wide range of enterprise applications. Oracle AI Database sizing templates ensure that the system resources are properly allocated for

Oracle Database Appliance X11-S / X11-L

Key Features

- Fully integrated and complete database appliance
- Single-instance Oracle databases
- Oracle Database Enterprise Edition and Standard Edition
- Oracle ASM and ACFS
- Oracle Appliance Manager
- Command Line Interface (CLI) and Browser User Interface (BUI)
- Software Development Kit (SDK) and REST API
- Integrated Backup and Data Guard
- Oracle Cloud Integration
- Hybrid Columnar Compression often delivers 10X-15X compression ratios
- Oracle Linux and Oracle Linux KVM
- NVM Express (NVMe) solid-state drives

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database workloads running on each system. Oracle Database Appliance X11-S and Oracle Database Appliance X11-L also incorporate NVMe flash storage to increase database performance and system reliability. Database workloads can realize a significant improvement in input/output operations per second (IOPS) and bandwidth while achieving extremely low latency   and CPU overhead with NVMe flash storage over similar systems configured with conventional SAS solid-state drives.

Ease of Deployment, Management, and Support

To help customers deploy and manage their databases, Oracle Database Appliance includes Appliance Manager software to simplify the administration and diagnosis of the system. The Appliance Manager feature greatly 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 engineered specifically 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 is integrated into the Appliance Manager with the option to backup locally, to external storage, or to Oracle Cloud directly through the browser user interface. Oracle Data Guard is also integrated with the appliance to simplify the configuration of standby databases for disaster recovery. The Appliance Manager 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-S and Oracle Database Appliance X11-L support 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 processor cores in the appliance and incrementally scale up to the maximum physical processor cores in each system. This enables customers to deliver the performance and reliability that enterprise business 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.

Key Benefits

- Oracle Engineered Systems for every organization
- World's #1 database
- Simple, optimized, and affordable
- Integrated hardware and software
- Built-in automation and best practices
- Ease of deployment, patching, management, and diagnostics
- Simplified backup and disaster recovery
- All flash NVMe storage to accelerate database performance
- Capacity-on-demand licensing
- Rapid provisioning of test and development environments with database snapshots
- Single-vendor support

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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 AI Database.

KVM database systems enable hard partitioning for Oracle AI 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.

Solution-In-A-Box Through Virtualization

Oracle Database Appliance X11-S and Oracle Database Appliance X11-L enable 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. 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-S, X11-L Specifications

ARCHITECTURE	
System	*One 2U server per system*
Processor	*X11-S: One AMD EPYC™ 9J15 processors per server, 2.95 GHz (up to 4.4 GHz)* *X11-L: Two AMD EPYC™ 9J15 processors per server, 2.95 GHz (up to 4.4 GHz)*

Main Memory	*X11-S: 256 GB (4 x 64 GB)*
	    – Optional memory expansion to 512 GB (8 x 64 GB) or 768 GB (12 x 64 GB)
	X11-L: 512 GB (8 x 64 GB)
	    – Optional memory expansion to 1.0 TB (16 x 64 GB) or 1.5 TB (24 x 64 GB)

Server Storage	*Two internal 480 GB M.2 NVMe SSDs (mirrored) per server for Operating System and Oracle Grid Infrastructure (GI) Software*

STORAGE (X11-S)

- *Oracle Database Appliance X11-S*
  - *Includes two NVMe SSDs (6.8 TB per drive) for data storage*
  - *X11-S is limited to two NVMe SSDs*

Data Storage	Quantity	Raw Capacity	Usable Capacity (Double Mirroring)	Usable Capacity (Triple Mirroring)
Base System	*2 x 6.8 TB NVMe*	*13.6 TB*	*6.2 TB*	*N/A*

- The raw storage capacity is based on storage industry conventions where 1 TB equals $1,000^4$ bytes.
- The usable storage capacity is based on operating system conventions where 1 TB equals $1,024^4$ bytes and accounts for 15% reserved space required to rebuild full redundancy in case of disk failure (not applicable to the two-drive configuration).

STORAGE (X11-L)

- *Oracle Database Appliance X11-L*
  - *Includes two NVMe SSDs (6.8 TB per drive) for data storage*
  - *Optional expansion up to eight total NVMe SSDs (6.8 TB per drive) for data storage*
    - *4 SFF (small form factor) on the front of the system*
    - *4 AIC (Add-In-Card) PCIe cards*

Data Storage	Quantity	Raw Capacity	Usable Capacity (Double Mirroring)	Usable Capacity (Triple Mirroring)
Base System	*2 x 6.8 TB NVMe*	*13.6 TB*	*6.2 TB*	*N/A*
Plus 2 NVMe SSDs	*4 x 6.8 TB NVMe*	*27.2 TB*	*10.5 TB*	*7.0 TB*
Plus 2 NVMe AIC SSDs	*6 x 6.8 TB NVMe*	*40.8 TB*	*15.8 TB*	*10.5 TB*
Plus 2 NVMe AIC SSDs (Full System)	*8 x 6.8 TB NVMe*	*54.4 TB*	*21.0 TB*	*14.0 TB*

- The raw storage capacity is based on storage industry conventions where 1 TB equals $1,000^4$ bytes.
- The usable storage capacity is based on operating system conventions where 1 TB equals $1,024^4$ bytes and accounts for 15% reserved space required to rebuild full redundancy in case of disk failure (not applicable to the two-drive configuration).

INTERFACES

Standard I/O	*One GbE port and one serial RJ45 port (management ports)* *One USB 3.0 ports (one rear)* ***Oracle Database Appliance X11-S:*** *PCIe slot 5: 1st NIC, choice of quad-port 10GBase-T card or dual-port 10/25 GbE (SFP28) card* *PCIe slot 6: Retimer PCIe 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: 2nd NIC, choice of quad-port 10GBase-T card or dual-port 10/25 GbE (SFP28) card (Optional)*

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- **Oracle Database Appliance X11-L:**
    - PCIe slot 1: 4th optional AIC (add in card) NVMe SSD PCIe card (Oracle Flash Accelerator 680 PCIe Card)
    - PCIe slot 2: 1st optional AIC (add in card) NVMe SSD PCIe card (Oracle Flash Accelerator 680 PCIe Card)
    - PCIe slot 3: 2nd optional AIC (add in card) NVMe SSD PCIe card (Oracle Flash Accelerator 680 PCIe Card)
    - 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 6: Retimer PCIe 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: 3rd optional AIC (add in card) NVMe SSD PCIe card (Oracle Flash Accelerator 680 PCIe Card)
- Note: No additional PCIe cards can be added in the non-mentioned slots

SYSTEMS MANAGEMENT

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, *Standard Edition 2*
	   – *Oracle Database 19c Enterprise Edition, Standard Edition 2*
	 ▪ *Support for:*
	   – *Oracle Database options*
	   – *Oracle Enterprise Manager Management Packs for Oracle Database Enterprise Edition*

Capacity-On-Demand Software Licensing for Oracle Database Enterprise Edition	▪ *X11-S: Enable and license from minimum of 2 cores, up to the maximum of 32 cores, in multiples of two* ▪ *X11-L: Enable and license from minimum of 2 cores, up to the maximum of 64 cores, in multiples of two*
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.

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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
DATA PROTECTION	
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 Configuration 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

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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 • Integrated Database Security Assessment Tool (DBSAT)
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 (personal information) 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) ▪ Acoustic noise (Sound Power, Bels): 8.4 Bels (at 50% fan speed)

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)
X11-S (Max Memory, 768 GB)	▪ Maximum power usage: 854W, 2,914 BTU/Hr ▪ Typical power usage: 494W, 1,685 BTU/Hr
X11-L (Max Memory, 1.5 TB)	▪ Maximum power usage: 1,259W, 4,296 BTU/Hr ▪ Typical power usage: 812W, 2,771 BTU/Hr

PHYSICAL SPECIFICATIONS

Dimensions and Weight	▪ Height: 86.9 mm (3.4 in.) ▪ Width: 445.0 mm (17.5 in.) ▪ Depth: 775.0 mm (30.5 in.) ▪ Weight (Small): 23.2 kg (51.2 lb.) ▪ Weight (Large): 27.2 kg (60 lb.), fully populated
Included Installation Kits	▪ Rack-mount Slide Rail Kit ▪ Cable Management Arm

REGULATIONS AND CERTIFICATIONS

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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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