

Oracle SuperCluster M7

ORACLE[®] SUPERCLUSTER



Oracle SuperCluster M7 is a ready-to-deploy secure cloud infrastructure for both databases and applications. It is an engineered system that combines compute, networking, and storage hardware with virtualization, operating system, and management software into a single system that is extremely easy to deploy, secure, manage and maintain. Oracle SuperCluster M7 features the **industry's most advanced security**, incorporating a number of unique runtime security technologies, documented and tested system-wide security controls and best practices, and integrated automated compliance verification tools. Oracle SuperCluster M7 is the **world's fastest engineered system**, delivering incredible performance under a wide range of workloads ranging from traditional enterprise resource planning, to customer relationship management and data warehouses, to e-commerce, mobile applications, and real-time analytics. Equally importantly, it is **extremely cost effective** because of its low purchase price; the ease with which the system can be deployed, scaled, managed, and maintained; and its incredibly efficient use of space, power, compute resources, storage, memory, and software licenses.

KEY BENEFITS

- Built-in hardware encryption to provide end-to-end data security
- Unique protection of application data from memory attacks or exploits of software vulnerabilities
- Fast path to security compliance and ability to remain compliant easily with out-of-the-box security controls
- Coengineered Oracle Exadata storage technology and Oracle Database 12c to deliver unbeatable performance and efficiency
- Ability to start small and grow, flexibly and easily

The Industry's Most Advanced Security

Oracle SuperCluster integrates a range of unique technologies and approaches in order to provide a highly secure cloud infrastructure with minimal effort or risk.

- **Silicon Secured Memory**, also a feature of Oracle's SPARC M7 processor, protects data in memory from unauthorized access. In modern computing systems, data that is in memory is not encrypted, making it vulnerable to attacks that take advantage of memory management defects that are pervasive in modern software programs. SPARC M7 processors provide the unique and revolutionary ability to ensure that no software programs may access physical system memory that they are not explicitly intended or authorized to access, eliminating the risk that data held in memory can be compromised through well-known exploits, even when the software programs have defects that would be easy to exploit on other platforms.

KEY FEATURES

- Up to 512 CPU cores and 8 TB of memory per rack for database and application processing
- Up to 11 Oracle Exadata Storage Servers per rack
- Integrated ZFS application storage including 160 TB of storage capacity
- Up to 282 TB of flash storage per rack
- 40 Gb/sec (QDR) InfiniBand Network
- Hybrid Columnar Compression, which often delivers 10x to 15x compression ratios
- Built-in, near-zero-overhead virtualization using Oracle VM Server for SPARC and Oracle Solaris Zones
- Support for Oracle Solaris 11 and Oracle Solaris 10
- **Cryptographic Acceleration**, a feature of the SPARC M7 processor, provides near-zero-overhead end-to-end data encryption with no performance compromise. By adding a broad range of enhanced cryptographic acceleration capabilities to the design of the SPARC M7 microprocessor, it is possible to fully secure data that is stored on disks or transmitted over networks with virtually no perceptible impact on application or database performance and efficiency.
- **Read-only virtual machines** (known as Oracle Solaris Immutable Zones) ensure that application administrators and compromised applications are unable to accidentally alter the configuration of virtual machines in ways that would expose systems to attack.
- **End-to-end audit trails** allow who is responsible for potentially dangerous administrative actions and changes to be quickly determined so that corrective action can be taken immediately, without lengthy and error-prone forensic analysis.
- **Automated compliance reporting** allows security experts and system administrators to quickly and easily verify that IT systems are secure and compliant with mandated standards and best practices. Oracle SuperCluster supports both the Center for Internet Security (CIS) and Security Technical Information Guide (STIG) security benchmarks and it is compliant with the Payment Card Industry Data Security Standard (PCI DSS).
- **Administrative access controls** allow fine-grained control over the rights and activities available to individual system administrators, including the ability to restrict certain administrative access to specific times and to restrict remote auditing and logging to prevent credential misuse.
- **Out-of-the-box security controls** and detailed best-practices guidance ensure that Oracle SuperCluster systems are delivered in a secure state, by default, and can be easily adapted to the particular deployment environment with minimal complexity and low risk of accidental security compromises.

The World's Fastest Engineered System

Oracle SuperCluster M7 is built on the fastest and most advanced server with the world's fastest microprocessor, the fastest database storage, a fast networking and operating system combination, and unique capabilities for securing application data, accelerating databases, and running Java applications.

- The **SPARC M7 high-performance microprocessor** is the world's fastest microprocessor for general-purpose computing and integrates additional performance enhancements for cryptographic acceleration and Oracle Database 12c directly into the processor design.
- **SPARC M7 In-Line Decompression** allows **Oracle Database 12c** to store databases many times larger than the physical memory in the system entirely in memory in a highly compressed format using dedicated functions in the microprocessor itself and frees valuable general-purpose compute cores for SQL processing.

RELATED PRODUCTS

- Oracle SuperCluster M6-32
- Oracle MiniCluster S7-2
- Oracle's SPARC M7-8 server
- Oracle Solaris
- Oracle Exadata Storage Server
- Oracle's Exadata Storage Expansion Rack
- Oracle ZFS Storage ZS3-ES appliance
- Oracle's Sun Datacenter InfiniBand Switch 36
- Oracle Database 11g and 12c
- Oracle Real Application Clusters (Oracle RAC)
- Oracle Exalogic Elastic Cloud
- Oracle Enterprise Manager Ops Center
- Oracle Solaris Cluster
- Oracle Optimized Solutions

RELATED SERVICES

- Oracle Advanced Customer Support Services
- Oracle Premier Support for Systems
- Oracle Platinum Services
- Oracle PlatinumPlus Services
- Oracle Consulting services
- Oracle University courses

- **SPARC M7 In-Memory Query Acceleration for Oracle Database In-Memory in Oracle Database 12c** drives simultaneous real-time analytics and transaction processing performance up to 9x better than x86 or IBM Power systems.
- **Oracle Exadata Storage Server**, coengineered with Oracle Database, delivers the optimal balance of scalability, transaction processing, and batch performance for all Oracle Database workloads.
- **Oracle's InfiniBand fabric** is the low-latency, high throughput I/O fabric that ties all of the Oracle SuperCluster system components together, making it possible to horizontally scale the Oracle SuperCluster system.

Most Cost-Effective Secure Cloud Infrastructure

Oracle SuperCluster M7 provides a secure and cost-effective cloud infrastructure:

- The system is **extremely efficient and provides secure multitenancy**. Seamlessly integrated scale-up virtualization and a scale-out InfiniBand fabric provide maximum performance and scalability with no wasted compute, memory or software resources.
- The **low-cost, elastic, capacity-on-demand** configuration of Oracle SuperCluster M7 allows even small and midsize enterprises to deploy right-sized systems and seamlessly add capacity as business needs change over time.
- **Fine-grained software licensing** allows the partitioning of cores per server to be turned off and licensed only when needed. As the workload grows and more cores are needed, hard partitioning can be used to assign cores and license software.
- The system provides easy-to-use **infrastructure as a service (IaaS) and database as a service (DBaaS) self-provisioning** for users.

Conclusion

Oracle SuperCluster M7 is a secure cloud infrastructure for databases and applications. It is the most-advanced security platform, the most cost-effective secure cloud infrastructure, and the world's fast engineered system. Oracle SuperCluster is an engineered system featuring fast, secure, and scalable servers; scale-out intelligent storage servers; state-of-the-art PCI-based flash storage servers; efficient application storage; and an extremely high-bandwidth InfiniBand internal fabric that connects all servers and storage. Oracle SuperCluster runs all types of database workloads including online transaction processing (OLTP), data warehousing (DW), and in-memory analytics; as well as Oracle, independent software vendor (ISV), and custom applications.

ORACLE SUPERCLUSTER M7 HARDWARE SPECIFICATIONS

Rack Configuration	Minimum Rack	Maximum Storage Rack	Maximum Compute Rack
SPARC M7-8 Compute Chassis	1	1	2
<ul style="list-style-type: none"> Redundant Oracle Integrated Lights Out Manager (Oracle ILOM) service processors 6 x 3,000 watt AC power supplies (N+N) 8 x redundant hot-swappable fan modules 			
SPARC M7-8 Compute Node	2	2	4
Each compute node (physical domain) configured with:	<ul style="list-style-type: none"> 1 x 32-core SPARC M7 processor (4.1 GHz) 16 x 32 GB of memory 1 x dual-port QDR InfiniBand adapter 1 x dual-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables 1 x GbE adapter 	<ul style="list-style-type: none"> 4 x 32-core SPARC M7 processors (4.1 GHz) 64 x 32 GB of memory 4 x dual-port QDR InfiniBand adapters 4 x dual-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables 4 x GbE adapters 	<ul style="list-style-type: none"> 4 x 32-core SPARC M7 processors (4.1 GHz) 64 x 32 GB of memory 4 x dual-port QDR InfiniBand adapters 4 x dual-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables 4 x GbE adapters
Oracle Exadata Storage Server	3	11	6

Each Oracle Exadata Storage Server X6-2 is configured with:

- 2 x 10-core Intel Xeon E5-2630 v4 processor for SQL processing
- 12 x 8 TB 7,200 RPM high-capacity disks and 4 x 3.2 TB NVMe PCIe 3.0 flash cards, or 8 x 3.2 TB NVMe PCIe 3.0 flash drives

	Minimum Rack	Maximum Storage Rack	Maximum Compute Rack			
Flash Metrics						
Maximum SQL Flash Bandwidth ²	64 GB/sec	231 GB/sec	128 GB/sec			
Maximum SQL Flash Read IOPS ³	1,125,000	4,125,000	2,250,000			
Maximum SQL Flash Write IOPS ⁴	1,036,000	3,800,000	2,072,000			
Disk Metrics						
Maximum SQL Disk Bandwidth	5.4 GB/sec	19.8 GB/sec	10.8 GB/sec			
Maximum SQL Disk IOPS	7,800	28,600	15,600			
Data Capacity (Raw)	288 TB	1,056 TB	576 TB			
	HC ⁷	EF ⁷	HC	EF	HC	EF
Flash Capacity (Raw) ⁵	38.4 TB	76.8 TB	140.8 TB	281.6 TB	76.8 TB	153.6 TB
Data Capacity (Usable) ⁶	109 TB	28 TB	399 TB	102 TB	218 TB	56 TB

Actual system performance varies by application.

¹ HC = High Capacity, EF = Extreme Flash

² Bandwidth is peak physical scan bandwidth achieved running SQL, assuming no data compression. Effective user data bandwidth is higher when compression is used.

³ Based on 8K I/O requests running SQL. Note that the I/O size greatly affects flash IOPS. Other products quote IOPS based on smaller I/O operations that are not relevant for databases.

⁴ Based on 8K I/O requests running SQL. Flash write I/O operations measured at the storage servers after Oracle Automatic Storage Management mirroring, which usually issues multiple storage I/O operations to maintain redundancy.

⁵ Raw capacity is measured in standard disk drive terminology with 1 GB = 1 billion bytes.

⁶ Usable capacity is measured using normal powers-of-2 space terminology with 1 TB = 1024 * 1024 * 1024 * 1024 bytes. It is the actual space available to create a database after taking into account Oracle Automatic Storage Management redundancy, recovering from a drive failure, the Oracle Database File System (DBFS) disk group, and OS images and binaries.

Shared Storage Subsystem	1	1	1
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The Oracle ZFS Storage ZS3-ES provides iSCSI LUNs for infrastructure storage including domain boot disks, zone root file systems, and application binaries and logs.

Oracle ZFS Storage ZS3-ES dual controller, each with:

- 2 x 8-core 2.1G Hz Intel Xeon E5-2658 processors
- 16 x 16 GB of memory
- 1 x dual-port InfiniBand HCA
- 2 x 900 GB SATA disks
- 2 x 1.6 TB read-optimized solid-state disks (SSDs)

Disk shelf:

- 20 x 8 TB high capacity 7,200 RPM disks
- 4 x 200 GB write-optimized SSDs

InfiniBand Switches	2	3	3
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- 36 port QDR (40 Gb/sec) InfiniBand switches

Additional Hardware Components

Additional hardware components included:

- 42U rack
- Ethernet management switch that provides 48 Ethernet ports; each port has a wire speed of 10/100/1000 Base-T
- 2 x redundant power distribution units (PDUs)
- InfiniBand and Ethernet cables

Spares included:

- 1 x 8 TB high-capacity disk and 1 x 3.2 TB NVMe PCIe 3.0 flash card, or
- 1 x 3.2 TB NVMe PCIe 3.0 flash drive
- InfiniBand cables to multitrack three racks

Software

- Operating System
- Oracle Solaris 11.3 for enhanced performance and functionality, including features enabled by SPARC M7 processor's Software in Silicon technology

Virtualization

Built-in, low-overhead, Oracle VM Server for SPARC and Oracle Solaris Zones provide the flexibility to power virtual systems and thousands of zones, at no additional cost.

Applications certified for Oracle Solaris 10 may run in an Oracle Solaris 10 Branded Zone.

ORACLE SUPERCLUSTER M7 ELASTIC CONFIGURATION OPTIONS

Compute Chassis	Storage Server	Multitrack Connection
SPARC M7-8 chassis and 2 compute nodes (physical domain), each with: <ul style="list-style-type: none"> • 1, 2, 3, or 4 x 32-core SPARC M7 processors (4.1 GHz) • 16, 32, 48, or 64 x 32 GB of memory • 1, 2, 3, or 4 x dual-port QDR InfiniBand adapters • 1, 2, 3 or 4 x dual-port 10 GbE adapters Additional four-processor option with two physical domains and all four processors configured in one physical domain.	Expand up to 6 storage servers in a rack with two SPARC M7-8 compute chassis. Expand up to 11 storage servers in a rack with one SPARC M7-8 compute chassis.	Connect any combination of up to 18 Oracle SuperCluster racks, Exadata Storage Expansion Racks, Oracle Exadata, Oracle Exalogic, or Oracle Big Data via the InfiniBand fabric. Larger configurations can be built with external InfiniBand switches. Additional optical InfiniBand cables are required when connecting four or more racks.

ORACLE SUPERCLUSTER M7 UPGRADE OPTIONS

Hardware field upgrades:

- SPARC M7-8 compute chassis, each with 1 x SPARC M7 processor, 16 x 32 GB of memory, 1 x dual-port QDR InfiniBand adapter, and 1 x dual-port 10 GbE adapter
- Compute node upgrade includes 1 x SPARC M7 processor, 16 x 32 GB of memory, 1 x dual-port QDR InfiniBand adapter, and 1 x dual-port 10 GbE adapter
- Storage servers
- InfiniBand switch (for small configuration)

ORACLE SUPERCLUSTER SERVICES AND SUPPORT

Hardware Warranty	One year with four-hour web/phone response during normal business hours (Monday–Friday 8 a.m. to 5 p.m.), with two-business-day onsite response/parts exchange
Oracle Support	<ul style="list-style-type: none"> Oracle Platinum Services <ul style="list-style-type: none"> Remote fault monitoring with faster response times and patch deployment services to qualified Oracle Premier Support customers at no additional cost Oracle Premier Support for Systems <ul style="list-style-type: none"> Essential support services including 24x7 support with two-hour onsite hardware service response (subject to proximity to service center), proactive tools, and online resources Oracle Customer Data and Device Retention Oracle Auto Service Request Oracle Business Critical Assistance
Oracle SuperCluster Start-Up Pack	<ul style="list-style-type: none"> Oracle SuperCluster Start-Up Advisory Service Oracle SuperCluster Installation Service Oracle SuperCluster Configuration Service Oracle SuperCluster Production Support Readiness Service Oracle SuperCluster Quarterly Patch Deployment Service
Services from Oracle Advanced Customer Support Services	<ul style="list-style-type: none"> Oracle Supportability Planning and Design Oracle Standard System Installation Oracle Standard Software Configuration Oracle Preproduction Readiness Oracle Go-Live Support Oracle Advanced Support Knowledge Workshop Oracle Solution Support Center Oracle Advanced Support Assistance Oracle Priority Support Oracle Engineered System Quarterly Patch Deployment Oracle Consolidation Planning Service for Database and Systems Oracle Migration Service for Database and Systems Oracle Advanced Support Engineer for Engineered Systems
Services from Oracle Consulting	<ul style="list-style-type: none"> Oracle Migration Factory Consolidation services Architecture services

ORACLE SUPERCLUSTER M7 ENVIRONMENTAL SPECIFICATIONS

	Minimum Rack	Maximum Storage Rack	Maximum Compute Rack
Dimensions	<ul style="list-style-type: none"> Height: 78.66 inches, 1998 mm Width: 23.62 inches, 600 mm Depth: 47.24 inches, 1200 mm 		
	Weight: 1,410 lb.	Weight: 1,886 lb.	Weight: 1,971 lb.
Power	Maximum: 12.09 kW (12.72 kVA) Typical: 7.84 kW (8.86 kVA)	Maximum: 15.5 kW (16.7 kVA) Typical: 12.8 kW (13.5 kVA)	Maximum: 21.6 kW (22.8 kVA) Typical: 18.1 kW (19.0 kVA)
Cooling	Maximum: 43,416 BTU/hour (45.76 kJ/hour) Typical: 30,238 BTU/hour (31.87 kJ/hour)	Maximum: 57,064 BTU/hour (60.1 kJ/hour) Typical: 46,241 BTU/hour (48.7 kJ/hour)	Maximum: 65,103 BTU/hour (68.6 kJ/hour) Typical: 45,422 BTU/hour (47.8 kJ/hour)
Airflow	Maximum: 2,010 CFM Typical: 1,400 CFM	Maximum: 3,605 CFM Typical: 3,014 CFM	Maximum: 3,605 CFM Typical: 3,014 CFM
Operating Temperature/Humidity	5° C to 32° C (41° F to 89.6° F), 10% to 90% relative humidity, noncondensing		
Altitude Operation	Up to 9,840 feet (3,048 m) ² , maximum ambient temperature is derated by 1° C per 300 m above 900 m		
Regulations ^{1,2,3}	<ul style="list-style-type: none"> Safety: UL/CSA 60950-1, EN 60950-1, IEC 60950-1 CB Scheme with all country differences EMC: Emissions – FCC CFR 47 Part 15, ICES-003, EN55022, EN61000-3-11, EN61000-3-12; Immunity – EN55024 Emissions and Immunity: EN300 386 		
Certifications ²	<ul style="list-style-type: none"> NRTL, EU, International CB Scheme, BIS HSE Exemption, BSMI, RCM, MSIP, VCCI 		
Other ³	Complies with Low Voltage Directive (2006/85/EC), WEEE Directive (2004/108/EC), RoHS Directive (2011/65/EU), and WEEE Directive (2012/19/EU)		

¹ All standards and certification referenced are to the latest official version.

² Other county regulations/certifications may apply.

³ In some cases, as applicable, regulatory and certification compliance were obtained at the component level.

OPTIONAL CUSTOMER-SUPPLIED ETHERNET SWITCH INSTALLATION IN ORACLE SUPERCLUSTER

The Oracle SuperCluster M7 rack might have extra rack space available that can optionally be used by customers to install their own client network Ethernet switches in the Oracle SuperCluster rack instead of in a separate rack. The location and amount of available space will be dependent on actual configuration. Other space, power, cooling, and upgrade restrictions will apply.

OPTIONAL FIBRE CHANNEL CARDS IN ORACLE SUPERCLUSTER

Optional Fibre Channel cards can be installed in the available PCIe slots in the Oracle SuperCluster M7 compute nodes and support connectivity to existing SAN infrastructure. Quantities will be dependent on the actual configuration.

STORAGE SERVER ELASTIC KEY CAPACITY AND PERFORMANCE METRICS

Metrics	High-Capacity Storage Server	Extreme-Flash Storage Server
Flash Data Capacity (Raw) ¹	12.8 TB	25.6 TB
Disk Data Capacity (Raw) ¹	96 TB	NA

Actual system performance varies by application.

¹ Raw capacity is measured in standard disk drive terminology with 1 GB = 1 billion bytes. Usable capacity is measured using normal powers-of-2 space terminology with 1 TB = 1024 * 1024 * 1024 * 1024 bytes.

ORACLE SUPERCLUSTER M7 ELASTIC COMPONENT ENVIRONMENTAL SPECIFICATIONS

Metric	SPARC M7-8 Compute Chassis	High-Capacity Storage Server	Extreme-Flash Storage Server
Height	17.2 in. (87.6 mm)	3.5 in. (87.6 mm)	
Width	19.0 in. (483.0 mm)	17.5 in. (445.0 mm)	
Depth	32.0 in. (813.0 mm)	29.0 in. (737.0 mm)	
Acoustic Noise (Operating)	85.7 dBA	7.8 B	7.8 B
Weight	405 lb. (184 kg)	73.0 lb. (33.1 kg)	62.0 lb. (28.1 kg)
Maximum Power Usage	9.8 kW (10.4 kVA)	0.6 kW (0.6 kVA)	0.6 kW (0.6 kVA)
Typical Power Usage ¹	6.4 kW (6.8 kVA)	0.4 kW (0.4 kVA)	0.4 kW (0.4 kVA)
Cooling at Maximum Usage	35,486 BTU/hour (37,402 kJ/hour)	2,000 BTU/hour (2,109 kJ/hour)	2,037 BTU/hour (2,149 kJ/hour)
Cooling at Typical Usage	23,202 BTU/hour (24,455 kJ/hour)	1,400 BTU/hour (1,477 kJ/hour)	1,426 BTU/hour (1,504 kJ/hour)
Airflow at Maximum Usage ²	860 CFM	93 CFM	94 CFM
Airflow at Typical Usage ²	590 CFM	65 CFM	66 CFM

Operating temperature/humidity 5° C to 32° C (41° F to 89.6° F), 10% to 90% relative humidity, noncondensing.

Altitude operating: Up to 3,048 m; max. ambient temperature is derated by 1° C per 300 m above 900 m.

¹ Typical power usage varies by application load.

² Airflow must be front-to-back.

ORACLE SOFTWARE (INCLUDED)

- Oracle Solaris 11.3
- Oracle Solaris Branded Zones
- Oracle VM Server for SPARC
- Oracle Solaris Zones
- Oracle Enterprise Manager Ops Center 12c Release 3 (12.3)
- Oracle ZFS Storage Appliance Replication; Oracle ZFS Storage Appliance Cloning

ORACLE SOFTWARE (SOLD SEPARATELY)





- Oracle Database 11g Release 2; Oracle Database 12c
- Oracle's Exadata Storage Server Software
- Oracle's Exalogic Elastic Cloud Software
- Oracle Solaris Cluster 4.3 (Oracle Solaris 11.3)



CONTACT US

For more information about Oracle SuperCluster M7, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.

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Integrated Cloud Applications & Platform Services

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