

# Oracle SuperCluster M8

## ORACLE® SuperCluster



Oracle SuperCluster M8 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 M8 features the **industry's most advanced security features**, 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 M8 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 ecommerce, 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 address security compliance with out-of-the-box security controls
- Coengineered Oracle Exadata storage technology and Oracle Database 18c to deliver unbeatable performance and efficiency

### The Industry's Most Advanced Security Features

Oracle SuperCluster integrates a range of unique technologies and approaches in order to provide a highly secure cloud infrastructure, for example:

- **Silicon Secured Memory**, also a feature of Oracle's SPARC M8 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 M8 processors provide the unique and revolutionary protections that help prevent software programs from accessing physical system memory that such programs are not explicitly intended or authorized to access, thus helping to mitigate the risk that data held in memory can be compromised through well-known exploits,

- Ability to start small and grow, flexibly and easily

#### KEY FEATURES

- Up to 512 CPU cores and 16 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
  - 40 Gb/sec (QDR) InfiniBand network
  - 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
- even when the software programs have defects that would be easy to exploit on other platforms.
- **Cryptographic acceleration**, a feature of the SPARC M8 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 M8 processor, it is possible to encrypt 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) help ensure that application administrators and compromised applications are prevented from accidentally altering the configuration of virtual machines in ways that would expose systems to attack.
  - **End-to-end audit trails** allow quick identification of who is responsible for potentially dangerous administrative actions and changes, 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 aligned 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 help ensure that Oracle SuperCluster systems are delivered with enhanced security features turned on, by default, and can be easily adapted to the particular deployment environment with minimal complexity

## The World's Fastest Engineered System

Oracle SuperCluster M8 is built on the fastest and most advanced server with the world's fastest processor, 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 M8 high-performance processor** is the world's fastest processor for general-purpose computing and integrates additional performance enhancements for cryptographic acceleration and Oracle Database 12c and Oracle Database 18c directly into the processor design.
- The SPARC M8 processor's **In-Line Decompression** feature allows **Oracle Database 12c and Oracle Database 18c** databases that are many times larger than the physical memory in the system entirely in memory in a highly compressed format using dedicated functions in the processor itself, and it frees valuable general-purpose compute cores for SQL processing.
- The SPARC M8 processor's **In-Memory Query Acceleration** feature for **Oracle Database In-Memory** provides simultaneous real-time analytics and transaction processing performance that is up to 9x better than with 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.

#### RELATED PRODUCTS

- Oracle MiniCluster S7-2
- Oracle's SPARC M8-8 server
- Oracle Solaris
- Oracle Exadata Storage Server
- Oracle's Exadata Storage Expansion Rack
- Oracle ZFS Storage ZS5-ES appliance
- Oracle's Sun Datacenter InfiniBand Switch 36
- Oracle Database 11g, 12c and 18c
- Oracle Real Application Clusters (Oracle RAC)
- 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

## Cost-Effective Fully-Featured Cloud Infrastructure

Oracle SuperCluster M8 provides a cost-effective cloud infrastructure with the following characteristics:

- The system is **extremely efficient and provides seamless 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 M8 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 M8 is a secure cloud infrastructure for databases and applications. It offers the most-advanced security features, the most cost-effective fully-featured cloud infrastructure, and the world's fastest 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 M8 HARDWARE SPECIFICATIONS

Rack Configuration	Minimum Rack	Maximum Storage Rack	Maximum Compute Rack
SPARC M8-8 Compute Chassis	1	1	2
<ul style="list-style-type: none"> <li>• Redundant Oracle Integrated Lights Out Manager (Oracle iLOM) service processors</li> <li>• 6 x 3,000 watt AC power supplies (N+N)</li> <li>• 8 x redundant hot-swappable fan modules</li> </ul>			
SPARC M8-8 Compute Node	2	2	4

Each compute node (physical domain) configured with:	<ul style="list-style-type: none"> <li>1 x 32-core SPARC M8 processor (5.1 GHz)</li> <li>16 x 64 GB of memory</li> <li>1 x dual-port QDR InfiniBand adapter</li> <li>1 x quad-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables</li> <li>1 x GbE adapter</li> </ul>	<ul style="list-style-type: none"> <li>4 x 32-core SPARC M8 processors (5.1 GHz)</li> <li>64 x 64 GB of memory</li> <li>4 x dual-port QDR InfiniBand adapters</li> <li>4 x quad-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables</li> <li>1 x GbE adapter</li> </ul>	<ul style="list-style-type: none"> <li>4 x 32-core SPARC M8 processors (5.1 GHz)</li> <li>64 x 64 GB of memory</li> <li>4 x dual-port QDR InfiniBand adapters</li> <li>4 x quad-port 10 GbE HCA with pluggable transceivers (2 port) and optical cables</li> <li>1 x GbE adapter</li> </ul>
Oracle Exadata Storage Server	3	11	6

Each Oracle Exadata Storage Server is configured with:

- 2 x 10-core Intel® Xeon® Silver 4114 processor for SQL processing
- 12 x 10 TB 7,200 RPM high-capacity disks and 4 x 6.4 TB NVMe PCIe 3.0 flash cards, or 8 x 6.4 TB NVMe PCIe 3.0 flash drives

**EXADATA CAPACITY AND PERFORMANCE METRICS: INDIVIDUAL SERVERS**

Server Type	Maximum SQL Flash Bandwidth <sup>2</sup>	Maximum SQL Read IOPS <sup>3</sup>	Maximum SQL Write IOPS <sup>4</sup>	PCI Flash Capacity(raw) <sup>5</sup>	Disk Data Capacity(raw)
Storage Server HC <sup>1</sup>	25 GB/s	475,000	420,000	25.6 TB	120 TB
Storage Server EF <sup>1</sup>	25 GB/s	498,000	450,000	51.2 TB	N/A

**EXADATA TYPICAL RACK CONFIGURATIONS: FLASH CAPACITY AND PERFORMANCE METRICS (HC & EF)**

FLASH METRICS		Maximum SQL Flash Bandwidth <sup>2</sup>	Maximum SQL Read IOPS <sup>3</sup>	Maximum SQL Write IOPS <sup>4</sup>	PCI Flash Capacity(raw) <sup>5</sup>
Maximum Storage Rack	HC	275 GB/s	3,753,000	3,419,000	281.6 TB
	EF	275 GB/s	3,753,000	3,419,000	563.2 TB
Maximum Compute Rack	HC	150 GB/s	2,047,000	1,865,000	153.6 TB
	EF	150 GB/s	2,047,000	1,865,000	307.2 TB
Base Rack	HC	75 GB/s	1,194,000	1,088,000	76.8 TB
	EF	75 GB/s	1,194,000	1,088,000	153.6 TB

**EXADATA TYPICAL RACK CONFIGURATIONS: DISK CAPACITY AND PERFORMANCE METRICS (HC)**

Combined Metrics		Data Capacity (Usable) – Normal Redundancy <sup>6</sup>	Data Capacity (Usable) – High Redundancy <sup>6</sup>	Maximum Data Load Rate <sup>7</sup>
Maximum Storage Rack	HC	499 TB	392 TB	27.5 TB/hour
	EF	205 TB	161 TB	27.5 TB/hour
Maximum Compute Rack	HC	272 TB	214 TB	15 TB/hour
	EF	112 TB	88 TB	15 TB/hour
Base Rack	HC	136 TB	107 TB	7.5 TB/hour
	EF	56 TB	44 TB	7.5 TB/hour

<sup>1</sup> HC = High Capacity. EF = Extreme Flash. Actual system performance varies by application.

2 Bandwidth is peak physical scan bandwidth achieved running SQL, assuming no database compression. Effective user data bandwidth is higher when database 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 IOs that are not relevant for databases.

4 Based on 8K I/O requests running SQL. Flash write I/Os are measured at the storage servers after ASM mirroring, which usually issues multiple storage IOs 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 bytes. It is the actual space available to create a database after taking into account space needed for ASM redundancy, recovering from a drive failure. Normal redundancy calculations reflect the use of Grid Infrastructure version 12.2.0.1 or later.

7 Load rates are typically limited by database server CPU, not IO. Rates vary based on load method, indexes, data types, compression, and partitioning.

Shared Storage Subsystem	1	1	1
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The Oracle ZFS Storage ZS5-ES appliance provides iSCSI LUNs for infrastructure storage including domain boot disks, zone root file systems, and application binaries and logs.

Each Oracle ZFS Storage ZS5-ES dual controller has:

- 2 x 18-core 2.3G Hz Intel® Xeon® E5-2699 v3 processors
- 24 x 32 GB of memory
- 1 x dual-port InfiniBand HCA
- 2 x 1.2 TB hard disk drives
- 2 x 3.2 TB read-optimized solid-state disks (SSDs)

Disk shelf:

- 20 x 8 TB high-capacity SAS-3 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 10 TB high-capacity disk and 1 x 6.4 TB NVMe PCIe 3.0 flash card, or 1 x 6.4 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 the SPARC M8 processor's Software in Silicon technology
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**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 M8 ELASTIC CONFIGURATION OPTIONS**

Compute Chassis	Storage Server	Multitrack Connection
SPARC M8-8 chassis and two compute nodes (physical domain), each with: <ul style="list-style-type: none"> <li>• 1, 2, 3, or 4 x 32-core SPARC M8 processors (5.1 GHz)</li> <li>• 16, 32, 48, or 64 x 64 GB of memory</li> <li>• 1, 2, 3, or 4 x dual-port QDR InfiniBand adapters</li> <li>• 1, 2, 3, or 4 x quad-port 10 GbE adapters</li> </ul> An additional four-processor option with two physical domains and all four processors configured in one physical domain is available.	Expand up to 6 storage servers in a rack with two SPARC M8-8 compute chassis.  Expand up to 11 storage servers in a rack with one SPARC M8-8 compute chassis.	Connect any combination of up to 18 Oracle SuperCluster racks, Exadata Storage Expansion Racks, Oracle Exadata, Oracle Exalogic, or Oracle Big Data Appliance 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 M8 UPGRADE OPTIONS**

Hardware field upgrades:

- SPARC M8-8 compute chassis, each with 1 x SPARC M8 processor, 16 x 64 GB of memory, 1 x dual-port QDR InfiniBand adapter, and 1 x quad-port 10 GbE adapter
- Compute node upgrade includes 1 x SPARC M8 processor, 16 x 64 GB of memory, 1 x dual-port QDR InfiniBand adapter, and 1 x quad-port 10 GbE adapter
- Storage servers
- InfiniBand switch

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"> <li>• Oracle Platinum Services: Remote fault monitoring with faster response times and patch deployment services to qualified Oracle Premier Support customers at no additional cost</li> <li>• Oracle Premier Support for Systems: Essential support services including 24x7 support with two-hour onsite hardware service response (subject to proximity to service center), proactive tools, and online resources</li> <li>• Oracle Customer Data and Device Retention</li> <li>• Oracle Auto Service Request</li> <li>• Oracle Business Critical Assistance</li> </ul>
Oracle SuperCluster Start-Up Pack	<ul style="list-style-type: none"> <li>• Oracle SuperCluster Start-Up Advisory Service</li> <li>• Oracle SuperCluster Installation Service</li> <li>• Oracle SuperCluster Configuration Service</li> <li>• Oracle SuperCluster Production Support Readiness</li> <li>• Oracle SuperCluster Quarterly Patch Deployment Service</li> </ul>
Services from Oracle Advanced Customer Support Services	<ul style="list-style-type: none"> <li>• Oracle Supportability Planning and Design</li> <li>• Oracle Standard System Installation</li> <li>• Oracle Standard Software Installation and Configuration</li> <li>• Oracle Preproduction Readiness Review</li> <li>• Oracle Go-Live Support</li> <li>• Oracle Advanced Support Knowledge Workshop</li> <li>• Oracle Solution Support Center</li> <li>• Oracle Advanced Support Assistance</li> <li>• Oracle Priority Support</li> <li>• Oracle SuperCluster Quarterly Patch Deployment Service</li> <li>• Oracle Consolidation Planning Service</li> <li>• Oracle Migration Service</li> <li>• Oracle Advanced Support Engineer for Engineered Systems</li> </ul>
Services from Oracle Consulting	<ul style="list-style-type: none"> <li>• Oracle Migration Factory</li> <li>• Consolidation services</li> <li>• Architecture services</li> </ul>

ORACLE SUPERCLUSTER M8 ENVIRONMENTAL SPECIFICATIONS

	Minimum Rack	Maximum Storage Rack	Maximum Compute Rack
Dimensions	<ul style="list-style-type: none"> <li>• Height: 78.74 inches, 2,000 mm</li> <li>• Width: 23.66 inches, 610 mm</li> <li>• Depth: 47.17 inches, 1,197 mm</li> </ul>		
	Weight: 1,410 lb.	Weight: 1,886 lb.	Weight: 1,971 lb.
Power	Maximum: 12,523 W (13,182 VA) Typical: 9,969 W (10,494 VA)	Maximum: 17,153 W (18,056 VA) Typical: 13,542 W (14,255 VA)	Maximum: 22,693 W (23,887 VA) Typical: 17,828 W (18,767 VA)
	Maximum: 44,978 BTU/hour (47,407 kJ/hour) Typical: 35,807 BTU/hour (37,740 kJ/hour)	Maximum: 61,609 BTU/hour (64,936 kJ/hour) Typical: 48,639 BTU/hour (51,265 kJ/hour)	Maximum: 81,505 BTU/hour (85,906 kJ/hour) Typical: 64,034 BTU/hour (67,492 kJ/hour)
Airflow	Maximum: 2,082 CFM Typical: 1,658 CFM	Maximum: 2,852 CFM Typical: 2,252 CFM	Maximum: 3,773 CFM Typical: 2,965 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) <sup>2</sup> , maximum ambient temperature is derated by 1° C per 300 m above 900 m		
Regulations <sup>1,2,3</sup>	<ul style="list-style-type: none"> <li>• Safety: UL/CSA 60950-1, IEC 60950-1, IEC 60950-1 CB Scheme with all country differences</li> <li>• EMC: Emissions – FCC CFR 47 Part 15, ICES-003, EN55032, EN61000-3-11, EN61000-3-12; Immunity – EN55024</li> <li>• NRTL, EU, International CB Scheme, BIS HSE Exemption, BSMI, EAC, MSIP, VCCI, VNTA</li> </ul>		
Certifications <sup>2</sup>	NRTL, EU, International CB Scheme, BIS HSE Exemption, BSMI, RCM, MSIP, VCCI		



Other <sup>3</sup>	Complies with 2014/35/EU (2006/85/EC) Low Voltage Directive, 2014/30/EU (2004/108/EC EMC Directive, 2012/19/EU (2002/96/EC)WEEE Directive, 2011/65/EU (2002/96/EC) RoHS Directive
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<sup>1</sup> All standards and certification referenced are to the latest official version.

<sup>2</sup> Other county regulations/certifications may apply.

<sup>3</sup> 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 M8 rack may 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 M8 compute nodes and support connectivity to existing SAN infrastructure. Quantities will be dependent on the actual configuration.

#### ORACLE SOFTWARE (INCLUDED)

- Oracle Solaris 11.3
- Oracle VM Server for SPARC
- Oracle Solaris Zones
- Oracle Enterprise Manager 13c Release 2.2 (13.2.2)
- Oracle ZFS Storage Appliance Replication; Oracle ZFS Storage Appliance Cloning

#### ORACLE SOFTWARE (SOLD SEPARATELY)

- Oracle Database 18c, Oracle Database 12c; Oracle Database 11g Release 2
- Oracle's Exadata Storage Server Software
- Oracle Solaris Cluster 4.3 (Oracle Solaris 11.3)

#### CONTACT US

For more information about Oracle SuperCluster M8, visit [oracle.com](http://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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