ORACLE

SPARC T8-2 Server

Oracle's SPARC T8 servers are the world's most advanced systems for enterprise workloads. They deliver significantly faster performance for databases and Java applications compared with competitors' systems[1]. Oracle's Software in Silicon technology accelerates Oracle Database In-Memory queries and enables real-time analytics. Security in Silicon provides full-speed wide-key encryption, plus protection to data in memory. This is the foundation for building the best and most secure mission-critical cloud infrastructure.

PRODUCT OVERVIEW

Oracle's SPARC T8-2 server is a resilient, two-processor system that enables organizations to respond to IT demands with extreme security and performance, at a lower cost compared to alternatives. It is ideal for a wide range of enterprise-class workloads, including databases, applications, Java, and middleware, especially in a cloud environment. This system is based on the SPARC M8 processor, using the revolutionary Software in Silicon technology from Oracle.

Oracle's SPARC servers are coengineered with Oracle software for the best performance, efficiency, and security when running enterprise applications, OLTP, and analytics. With up to 2x better performance than competitor products[1], Oracle's SPARC servers allow IT organizations to make the most of their investment in Java applications and database software.

Software in Silicon technology is a breakthrough in microprocessor and server design, enabling databases and applications to run faster and with unprecedented security and reliability. Now in its second generation, this innovative Software in Silicon design includes Data Analytics Accelerator (DAX) engines designed directly into the SPARC M8 processor silicon to handle SQL primitives, such as those used by Oracle Database In-Memory starting in Oracle Database 12c. The DAX units can also be leveraged by Java applications operating on streams of data through the use of open APIs. The accelerators operate on data at full memory speeds, taking advantage of the very high memory bandwidth of the processor. This produces extreme

Key Benefits

- Up to 2x faster performance than competitor systems for Java software, databases, and enterprise applications[1]
- Extreme acceleration of Oracle Database In-Memory queries, especially for compressed databases
- Ability to accelerate analytics on OLTP databases and Java applications, enabling real-time insight on transactional data
- Unique protection of application data from memory attacks or exploits of software
- End-to-end encryption of data with near-zero performance impact
- Easy compliance management of application environments throughout their lifecycles, ensuring the security of cloud infrastructure
- Near-zero overhead virtualization for deploying more than 100 virtual machines per processor, lowering the cost per virtual machine
- Advanced design that enables this dual-processor system to outperform competitive four-processor systems, lowering IT cost.

acceleration of in-memory queries and analytics operations while processor cores are freed up to do other useful work. In addition, the ability of the DAX units to handle compressed data on the fly means that larger databases can be kept in memory, or that less server memory needs to be configured for a given database size. Lastly, the SPARC M8 processor introduces Oracle Numbers units, which greatly accelerate Oracle Database operations involving floating point data. Consider the result: you can run fast in-memory analytics on your database, using much less memory than the size of your data, without significantly increasing server utilization rates or affecting your OLTP operations.

The Silicon Secured Memory feature of the SPARC M8 processor provides the capability of detecting and preventing invalid operations on application data, through hardware monitoring of software access to memory. This can stop malware from exploiting software vulnerabilities, such as buffer overflows. The hardware approach of Silicon Secured Memory is much faster than traditional software-based detection tools, meaning that security checks can be done in production without significant impact to performance. In addition, each processor core contains the fastest cryptographic acceleration in the industry, allowing IT organizations to deliver end-to-end data encryption and secure transactions with near-zero performance impact. In summary: you can easily activate data protection and encryption security, by default, without additional hardware investment.

Software in Silicon features can be easily integrated with existing applications, during development, testing, and production. Developers can use and validate Software in Silicon features by using Oracle's Software in Silicon open APIs, which are supported by a community of collaboration among developers, engineers, and experts offering resources to help you understand and integrate this revolutionary open technology.

The record-breaking performance of the servers based on the SPARC M8 processor comes from its 32 cores, each of which handles up to 8 threads using unique dynamic threading technology. The processor can dynamically adapt to provide extreme single-thread performance, or it can enable massive throughput by running up to 256 threads. The processor cores are designed to accelerate Java workloads, especially Java 8 applications or later, as well as database operations. Using this efficient design, together with Oracle Solaris virtualization technology with near-zero overhead, a much larger number of virtual machines can be supported on Oracle's SPARC servers compared with Intel® Xeon®–based systems. This results in a significant decrease in the cost per virtual machine.

The technology breakthrough in SPARC servers is enabled by the Oracle Solaris operating system. Oracle Solaris 11 is a secure, integrated, and open platform engineered for large-scale enterprise cloud environments with unique optimization for Oracle Database, middleware, and application deployments. Security can be easily set up and enabled by default, while single-step patching and immutable zones allow compliance to be maintained with simplicity.

You can create complete application software stacks, lock them securely, deploy them in a cloud, and update them in a single step, all while maintaining compliance and easily generating audit reports. Oracle Solaris 11 combines unique management options with powerful application-driven software-defined networking for agile deployment of cloud infrastructure.

Built-in virtualization capabilities in Oracle's SPARC servers include both Oracle Solaris Zones and Oracle VM Server for SPARC. These allow enterprise workloads to be run within a virtual environment with near-zero performance impact. You can virtualize and consolidate many servers onto one, reducing the physical footprint of the data center as well as lowering the costs of operation, power, and cooling. Oracle Solaris Zones technology provides the capability to run legacy applications that require earlier versions of Oracle Solaris.

Key Features

- Based on the advanced SPARC M8 processor, with proven second-generation Software in Silicon technology for efficiency, performance, and security
- Scalability within the same family of servers from 32 to 256 cores with complete compatibility for applications and management
- Oracle Solaris 11 operating system for secure and compliant application deployment through single-step patching and immutable zones
- Built-in, no-cost virtualization technology with Oracle Solaris Zones and Oracle VM Server for SPARC
- Guaranteed binary compatibility and support for legacy applications that run under Oracle Solaris 10, 9, and 8
- Up to 53 TB of accelerated storage utilizing industry-standard NVMe technology in order to satisfy the most demanding I/O requirements
- Resilient server system with highest levels of reliability, availability, and serviceability (RAS) in a compact, energy-efficient footprint

Other advanced capabilities of the SPARC T8-2 server are large memory capacity, higher bandwidth, and minimal latency, which are achieved through four enhanced memory controllers per socket, faster and reduced-power DDR4 memory, and prefetch acceleration techniques. The I/O subsystem supports low-profile PCIe 3.0 adapters and industry-standard NVMe flash technology to provide high-capacity storage with minimal latency. Integrated controllers for networking, disks, and management reduce the cost of the system and provide greater expandability.

All Oracle servers ship with comprehensive server management tools at no additional cost. Oracle Integrated Lights Out Manager (Oracle ILOM) utilizes industry-standard protocols to provide secure and comprehensive local and remote management, including power management and monitoring, fault detection, and notification. Oracle Premier Support customers have access to My Oracle Support and multiserver management tools in Oracle Enterprise Manager Ops Center, a system management tool that, in conjunction with Oracle Enterprise Manager, coordinates servers, storage, and networking for a complete cloud infrastructure as a service (IaaS). Oracle Enterprise Manager Ops Center also features an automated service request capability, whereby potential issues are detected and reported to Oracle's support center without user intervention, ensuring the maximum service levels and simplified support.

SPARC T8-2 SERVER SPECIFICATIONS

ARCHITECTURE

Processor

- Thirty-two core, 5.0 GHz SPARC M8 processor
- Up to 256 threads per processor (up to 8 threads per core)
- Eight Data Analytics Accelerator units per processor, each supporting four concurrent in-memory analytics engines with decompression
- Thirty-two on-chip encryption instruction accelerators (one per core) with direct non-privileged support for 16 industry-standard cryptographic algorithms: AES, Camellia, CRC32c, DES, 3DES, DH, DSA, ECC, MD5, RSA, SHA-1, SHA-224, SHA-256, SHA-3, SHA-384, and SHA-512
- Thirty-two floating-point units and thirty-two Oracle Numbers units per processor (one per core)
- One random number generator (one per processor)

Cache per Processor

- Level 1: 32 KB instruction and 16 KB data per core
- Level 2: 256 KB L2 I$ per four cores, 128 KB L2 D$ per core
- Level 3: 64 MB L3$ on chip

System Configuration

- SPARC T8-2 servers are always configured with two SPARC M8 processors; not expandable
- Sixteen dual inline memory module (DIMM) slots per processor supporting half and fully populated memory configurations using 16, 32, 64 or 128 GB DDR4 DIMMs
  - 4 TB maximum memory configuration with 128 GB DIMMs

System Architecture

- SPARC V9 architecture, ECC protected

INTERFACES

- Network: Four 10 GbE (100 Mb/sec, 1 Gb/sec, 10 Gb/sec) ports, full duplex only, auto-negotiating
- Disks and internal storage: Two SAS-3 controllers providing hardware RAID 0, 1, and 1E/10 (ZFS file system provides higher levels of RAID)
- Expansion bus: Eight low-profile PCIe 3.0 (four x8 and four x16) slots
- Ports: Four external USB (two front USB 2.0 and two rear USB 3.0), one RJ45 serial management port, console 100 Mb/1 Gb network port, and two VGA ports (one front, one rear)

MASS STORAGE AND MEDIA

Internal storage:
- Up to six 2.5-inch drives
  - 1,200 GB SAS-3 hard disk drives (HDD), maximum of six
  - 800 GB SAS-3 solid state drive (SSD), maximum of six
  - 6.8 TB NVMe solid state drives, maximum of four
- Oracle flash accelerators NVMe PCIe 3.0 cards
  - Oracle Flash Accelerator F640 v2, maximum of four

External storage:
- External DVD drive available
- Oracle offers a complete line of best-in-class, innovative storage, hardware, and software solutions, along with renowned world-class service and support. For more information, please refer to **oracle.com/storage**

POWER SUPPLIES

- Two hot-swappable AC 2,000 W redundant (1 + 1) power supplies
- Voltage 200 to 240 VAC, frequency 50/60 Hz
- Maximum operating input current at 200 VAC: 10 A per cord
- Maximum operating input power at 200 VAC: 3,080 W

KEY RAS FEATURES

- Hot-pluggable disk drives
- Redundant, hot-swappable power supplies and fans
- Environmental monitoring
- Extended memory protection with error correction within single SDRAM, triple-bit detection across SDRAMs, page retirement, memory scrubbing, cyclic redundancy check (CRC), message retry, and lane retire in hardware
- DIMM sparing enabled with fully populated memory slots, increasing system reliability and uptime
- System Interconnect: message retry, link retrain, and lane failover
- Integrated dual disk controllers with RAID 0, 1, and 1E/10
- Fault Management Architecture and Predictive Self Healing
- Live operating system upgrades
- Firmware updates during system operation
- Multiple PCIe root complexes for isolated I/O virtualization

SOFTWARE

Operating System

Oracle recommends the latest version of Oracle Solaris 11.4 for enhanced performance and functionality, including features enabled by Software in Silicon technology

- Control domain: Oracle Solaris 11.3 SRU 24 or later
- The following versions are supported within guest domains:
    - Oracle Solaris 11.3 SRU 24 or later
    - Oracle Solaris 10 1/13*
      * Plus required patches

Applications certified for Oracle Solaris 9 or 8 only may run in an Oracle Solaris 9 or 8 branded zone running within an Oracle Solaris 10 guest domain.

Software Included

- Oracle Solaris 11.4 (latest version), which includes Oracle VM Server for SPARC
- Oracle Solaris ZFS (default file system)

Virtualization

Built-in, no-cost Oracle VM Server for SPARC provides the flexibility and power for running multiple logical domains in a single server. Multiple Oracle Solaris Zones may be run within a single Oracle VM Server for SPARC logical domain.

ENVIRONMENT

Operating temperature:
- 5° C to 35° C at 900 m (41° F to 95° F at 0 to 3,000 ft.)
- Decrease in maximum temperature: above 900 m (3,000 ft.) 1° C/300 m (1.8° F/1,000 ft.)

Nonoperating temperature:

- -40° C to 65° C at 900 m (-40° F to 149° F at 0 to 3,000 ft.)
- Decrease in maximum temperature: above 900 m (3,000 ft.) 1° C/300 m (1.8° F/1,000 ft.)

Operating relative humidity: 10% to 80% relative humidity, noncondensing, 27° C (81° F) wet bulb

Nonoperating relative humidity: Up to 85% relative humidity, noncondensing, 38° C (100° F) wet bulb

Operating altitude: 0 m to 3,000 m (0 ft. to 9,840 ft.) except in China markets where regulations may limit installations to a maximum altitude of 2,000 m

Nonoperating altitude: Up to 12,000 m (Up to 39,370 ft.)

Acoustic noise

DESCRIPTION	OPERATING AT 60%	OPERATING AT 100%
Sound power level — LwAd (1 B = 10 dB)	8.9 B	9.6 B

Sound pressure level — LpAm (energy average of four bystander positions)	72.5 dBA	80.1 dBA

Cooling: 10,512 BTU/hr., 343 cfm max.

REGULATIONS (MEETS OR EXCEEDS THE FOLLOWING REQUIREMENTS)

Safety:

- UL/CSA 60950-1, EN 60950-1, and IEC 60950-1 CB Scheme with all country differences

EMC:

- Emissions: FCC 47 CFR 15, ICES-003, EN55032, EN61000-3-2, and EN61000-3-3
- Immunity: EN 55024

Certifications:

- North America Safety (NRTL), European Union (EU), International CB Scheme, BIS (India), BSMI (Taiwan), RCM (Australia), MSIP (Korea), and VCCI (Japan)

European Union directives:

- Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU, Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU, and WEEE Directive 2012/19/EU

All standards and certifications referenced are to the latest official version. For additional detail, please contact your sales representative.

Other country regulations/certifications may apply.

DIMENSIONS AND WEIGHT

- Height: 130 mm (5.1 in.); 3U
- Width: 437 mm (17.2 in.)
- Depth: 753 mm (29.6 in.)
- Weight: approx. 37.2 kg (82 lb.) without rackmount kit

WARRANTY

The SPARC T8-2 server comes with a one-year warranty. Visit oracle.com/us/support/policies/ for more information about Oracle's hardware warranty.

COMPLETE SUPPORT

With Oracle Premier Support, you will get the services you need to maximize the return on your investment in Oracle's SPARC T8-2 server. Complete system support includes 24/7 hardware service, expert technical support, proactive tools, and updates to Oracle Solaris, Oracle VM, and integrated software (such as firmware)—all for a single price. Learn more at oracle.com/support

[1] For Java and database workloads, at product release time. See the performance blog

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