



# SPARC S7 Processor

Oracle's SPARC S7 processor extends the revolutionary capabilities of the SPARC M7 systems into scale-out and cloud applications. Oracle's Software in Silicon features, unique on-chip interface integration, and outstanding per core and overall performance make the SPARC S7 processor ideal for Java, Oracle Database, and cloud-based applications. The combination of breakthrough Software in Silicon features and the highest performance is the foundation for building the most secure and efficient enterprise clouds.

## PRODUCT OVERVIEW

Oracle's SPARC S7 processor is the most efficient and secure system for cloud environments. It delivers outstanding per core efficiency under a broad range of workloads, maximizing the processor's utilization rate. Key integrated technology on the chip allows the SPARC S7 processor to deliver unmatched performance<sup>1</sup>, on a secure platform that scales effortlessly.

On-chip interface integration of memory controllers and I/O adapters minimizes interconnection latencies, drastically increasing the processing speed. In addition, Software in Silicon accelerators offload resources on computing-dense software processes, improving the overall performance without compromise. Thus, systems based on the SPARC S7 processor can optimally address very complex workloads, like the ones found in big data, machine learning, and cloud applications.

The Software in Silicon features in the SPARC S7 processor include Silicon Secured Memory, which provides real-time data integrity checking to guard against pointer-related software errors and malware. It also encompasses the cryptographic instruction accelerators, which enable high-speed encryption for more than a dozen industry-standard ciphers, eliminating the performance and cost barriers typically associated with secure computing. Software analytics are optimized by running the Data Analytics Accelerator (DAX) engines that are specifically designed to speed up analytic queries. The accelerators offload query processing on Oracle Database or specific user applications and perform real-time data decompression (SQL in Silicon).



### Key Benefits

- Outstanding per-core efficiency, maximizing the processor's utilization rate
- Cost-effective and effortless scalability for cloud infrastructures
- Increased performance by integrating hardware interfaces on the processor
- Improved security by defending infrastructures against data breaches and memory bugs
- End-to-end encryption with near-zero performance impact
- Extreme acceleration of Oracle Database in-memory queries
- Open Software in Silicon features for Oracle and third-party software
- Guaranteed compatibility with previous SPARC systems

The SPARC S7 processor combines eight powerful fourth-generation cores, the same cores introduced with the SPARC M7 processor. Each core handles up to eight hardware threads using dynamic threading technology. The processor integrates on-chip memory channels supporting up to 1 TB of low-latency memory per socket, PCIe interfaces, and hardware accelerators.

The cache hierarchy increases efficiency by balancing cache requirements for individual core performance (private L1 cache, core pair shared L2 cache), and fully accessible L3 cache, which can be allocated by cores, integrated memory channels, PCIe, and data accelerators.

The processor integrates power estimators per core and in L3 cache, and a power management controller, in order to constantly regulate temperature and power, optimizing the system's power/performance under variable workloads.

### Key Features

- Eight highly efficient multithreaded cores and up to 64 hardware threads
- On-chip integrated DDR4 memory controllers and memory channels
- On-chip integrated PCIe 3.0 controller
- Silicon Secured Memory
- Cryptographic instruction accelerators integrated in the pipeline
- On-chip database query accelerators
- Integrated data decompression with query acceleration

## SPARC S7 PROCESSOR SPECIFICATIONS

- Eight SPARC V9 cores, grouped into two core clusters.
- Each core supports 8 hardware threads; up to 64 threads per processor.
- Maximum frequency: 4.27 GHz.
- Total of 16 MB L3 cache per processor. The L3 cache is fully shared and partitioned by core clusters. Each partition is eight-way associative, inclusive of all inner caches.
- Total of 512 KB L2 instruction cache and 1 MB L2 data cache per processor. Each core cluster contains four cores sharing a single 256 KB L2 instruction cache. Each pair of two cores shares a single 256 KB L2 data cache.
- 16 KB L1 instruction cache and 16 KB L1 data cache per-core.
- Dual-issue, out-of-order integer execution pipelines, one graphic/floating-point unit and integrated cryptographic stream processing per core.
- Sophisticated branch predictor and hardware data prefetcher per core.
- One on-chip encryption instruction accelerator in each core with direct support for 15 industrystandard cryptographic algorithms plus random number generation: AES, Camellia, CRC32c, DES, 3DES, DH, DSA, ECC, MD5, RSA, SHA-1, SHA-224, SHA-256, SHA-384, SHA-512.
- Fine-grain power estimator and power management controller to optimize power/performance.
- Two integrated DDR4 memory controllers per processor. Two memory channels per controller with up to two dual inline memory modules (DIMMs) per channel.
- On-chip PCIe 3.0 controller, one root complex (single x16/dual x8/four x4).
- Sixteen DAX engines per processor; four instances of DAX with four pipelines per DAX.
- 20 nm process technology, 13 metal layers.
- Open Oracle Solaris APIs available for software developers to leverage Silicon Secured Memory and DAX feature technologies in the SPARC S7 processor

### Related Products

The following Oracle systems are based on the SPARC S7 processor:

- SPARC S7-2 server
- SPARC S7-2L server
- Netra SPARC S7-2 server

<sup>1</sup>For Java and database workloads, at product release time. See the [performance blog](#)



## CONNECT WITH US

Call +1.800.ORACLE1 or visit [oracle.com](http://oracle.com).  
Outside North America, find your local office at [oracle.com/contact](http://oracle.com/contact).

 [blogs.oracle.com](http://blogs.oracle.com)

 [facebook.com/oracle](https://facebook.com/oracle)

 [twitter.com/oracle](https://twitter.com/oracle)

Copyright © 2020, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only, and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group. 0120

Disclaimer: This document is for informational purposes. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described in this document may change and remains at the sole discretion of Oracle Corporation.

