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Migrate SPARC workloads to Oracle Cloud Infrastructure

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Abstract

This document describes the information required to migrate on-premise SPARC workloads to [Oracle Cloud Infrastructure](#) (OCI). Customers who wish to move SPARC workloads to cloud will find relevant information required to do the migration.

A SPARC (**S**calable **P**rocessor **ARC**hitecture) solution is a reduced instruction set computer (RISC) instruction set architecture originally developed by Sun Microsystems and owned by Oracle. SPARC runs Solaris operating environment. Solaris is a UNIX operating system and is optimized to run on [Oracle hardware](#) such as Oracle SPARC M5, M7, M8, T4, T5, T8 as well as Fujitsu SPARC servers.

This document shows a comparison between SPARC, Intel, and AMD EPYC processing architecture that explains equivalent processing power required, compared to SPARC.

Furthermore, this document also explains support for Solaris on Oracle Cloud Infrastructure (OCI), and other technologies available to simulate SPARC on OCI.

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Why migrate to Oracle Cloud Infrastructure?

There are several [advantages](#) for moving SPARC workloads from on-premise to Oracle Cloud Infrastructure:

- Capital expenditure of hardware refresh is eminent.
- No hardware capacity available to upgrade existing applications.
- Existing infrastructure is getting old and cannot perform.
- Scaling - the ability to increase or decrease IT resources such as CPU cores and memory, as needed to meet changing demand.
- Quick deployments: Oracle cloud allows for quick setup of workloads and increase innovation.
- Reduce risk by running workloads on secure environments.
- Reduce operational expenditure: Pay for what you need. No need to build a data center, Oracle has done it for you.

SPARC processor versus AMD versus Intel CPUs

The SPARC processor is a powerful processor using multi-threaded technologies. To ensure comparable workload sizes between on-premise SPARC workloads and proposed OCI environments, the following tables are provided:

This table shows a comparison between SPARC processors and the following two CPU architectures hosted on [Oracle Cloud Infrastructure](#)

- Intel X9-2 (Intel Xeon Platinum 8358 with 64 cores @ 2.6GHz, and total 128 vcpus)
- AMD E5 (AMD EPYC 9J14 with 192 cores @ 2.4GHz, and total 384 vcpus)

Table 1: Equivalent cores required from **AMD E5 compared to SPARC systems.**

SPARC System	OCI AMD E5 % performance increase compared to SPARC System	Equivalent SPARC cores required compared to one AMD E5 core
SPARC T4-4 with 4 CPUs and 8 cores @ 3.0 GHz and 4MB cache each	14 %	3
SPARC M8000-8 with 16 cores @ 3.0 GHz and 12MB cache each	15 %	6
SPARC M7-8 with 8 cores @ 4.13 GHz and 64MB cache each	1.1 %	2
SPARC M5000 with 8 x SPARC64 VII+cores @ 2660 MHz and 11MB cache each	34 %	6
SPARC M4000 with 4 x SPARC64 VII+cores @ 2660 MHz and 11MB cache each	67 %	6
SPARC M3000 with one SPARC64 VII+ and 4 cores at 2.86 GHz and 11 MB cache	260 %	6

Note: OCI Compute: Standard.E5 (AMD EPYC 9J14, 2CPU and 96Cores, 2.60GHz). The performance metrics were tested and provided by Oracle.
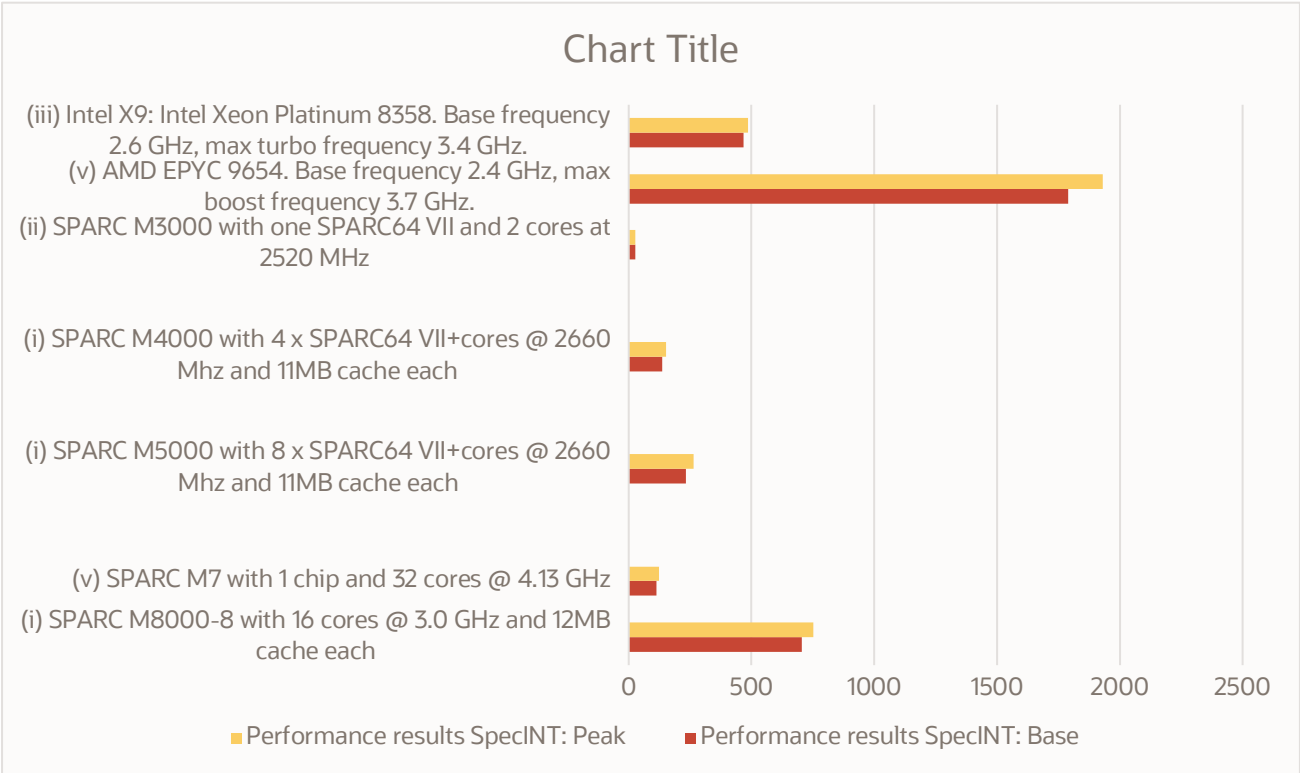
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Table 2: Equivalent cores required from **Intel X9-2 compared to SPARC systems.**

SPARC System	Intel X9-2 % performance increase compared to SPARC System	Equivalent SPARC cores required compared to one Intel X9-2
SPARC T4-4 with 4 CPUs and 8 cores @ 3.0 GHz and 4MB cache each	4 %	3
SPARC M8000-8 with 16 cores @ 3.0 GHz and 12MB cache each	4 %	5
SPARC M7-8 with 8 cores @ 4.13 GHz and 64MB cache each	0.3 %	2
SPARC M5000 with 8 x SPARC64 VII+cores @ 2660 MHz and 11MB cache each	10 %	5
SPARC M4000 with 4 x SPARC64 VII+cores @ 2660 MHz and 11MB cache each	19 %	5
SPARC M3000 with one SPARC64 VII+ and 4 cores at 2.86 GHz and 11 MB cache	75 %	5

Note: OCI Compute: Oracle Server X9-2 (Intel Xeon Platinum 8358, 2CPU x 32Cores, 2.60GHz). The performance metrics were tested and provided by Oracle.

The chart below shows SpecINT Integer values for both SPARC, AMD E4, and Intel systems. This table shows additional information to underline the processing power of the Oracle Cloud infrastructure systems.

Chart1: Spec CPU Integer Rate Result table with base and peak values for SPARC and OCI systems.

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SpecInt Sources:

(i) SpecInt for SPARC: https://blogs.oracle.com/oracle-systems/post/speccpu2006-results-on-mseries-servers-with-updated-sparc64-vii-processors
(ii) SpecInt for SPARC M3000: https://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081203-06155.html
(iii) SpecInt for Intel X9: https://www.spec.org/cpu2017/results/res2021q2/cpu2017-20210426-25722.html
(iv) Specint for AMD EPYC 9654: https://www.spec.org/cpu2017/results/res2022q4/cpu2017-20221024-32607.html
(v) Specint for SPARC M7 with 1 chip and 32 cores @ 4133 Mhz.
https://www.spec.org/cpu2017/results/res2017q2/cpu2017-20161026-00035.html

Migration recommendations

Oracle Cloud Infrastructure provide several migration targets to migrate SPARC environments successfully to cloud. Oracle provides several pre-tested reference architecture solutions for migration. Migration targets can be the following and not limited to:

- Virtual Machine and Bare Metal Servers on OCI
- Platform services such as Oracle Base Database Service and Autonomous database on OCI

The section below explains migration target environments:

a) SPARC Solaris Operating system migrations to Oracle Cloud Infrastructure

The Solaris operating system is a UNIX operating system. Oracle Cloud Infrastructure provides Oracle Solaris X86 (Intel) UNIX environment. Migration from SPARC Solaris to SPARC Solaris on OCI is not possible because Oracle do not provide a SPARC system. The target migration for Solaris SPARC will be Oracle Linux or Windows Server on OCI.

b) SPARC Solaris Database layer migration to Oracle Cloud Infrastructure

Migration of Oracle database from SPARC M8000-8 with 16 cores running Solaris to Oracle Cloud Infrastructure virtual machine or bare metal server.

The following tools can be used for the migration

- Recovery Manager (RMAN) on-premise SPARC Solaris data and restore to OCI virtual machine or bare metal running either Linux or Windows server
- Zero Downtime migration blog with detail
- Ansible Database Migration Tool (ADMT)
- GolgenGate software

The target environment on OCI can be the one of the following:

- 1 x VM.Standard.E5.Flex (AMD) with 3 cores running Oracle Linux. Ratio 6 SPARC:1 AMD. Refer to Table 1.
- 1 x VM.Standard3.Flex (Intel X9) with 4 cores running Oracle Linux. Ratio 5 SPARC: 1 Intel X9-2. Refer to Table 2.

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c) SPARC Solaris application layer migration to Oracle Cloud Infrastructure

Migration of Weblogic from SPARC Solaris T4 with 8 cores running Solaris to Oracle Cloud Infrastructure virtual machine or bare metal server.

Detail target reference architecture is explained in:
https://www.oracle.com/mx/a/ocom/docs/cloud/migrating-custom-wls-to-oci.pdf

The target environment on OCI can be one of the following:

- 1 x VM.Standard.E5.Flex (AMD) with 3 cores running Oracle Linux. Ratio 3 SPARC:1 AMD. Refer to Table 1.
- 1 x VM.Standard3.Flex (Intel X9) with 3 cores running Oracle Linux Ratio 3 SPARC: 1 Intel X9-2. Refer to Table 2.

d) Migrate Forms and Reports to OCI

Migration of Forms and Reports from SPARC M7-8 with 8 cores @ 4.13 GHz Solaris to Oracle Cloud Infrastructure virtual machine or bare metal server.

Reference architecture for migrating to APEX: https://docs.oracle.com/en/solutions/migrate-apps-to-apex-dbcs/index.html#GUID-5CB1D553-25F3-4B18-BC19-136DB5BBE7F3

The target environment on OCI can be one of the following:

- 1 x VM.Standard.E5.Flex (AMD) with 2 cores running Oracle Linux. Ratio 3 SPARC:1 AMD. Refer to Table 1.
- 1 x VM.Standard3.Flex (Intel X9) with 2 cores running Oracle Linux Ratio 3 SPARC: 1 Intel X9-2. Refer to Table 2.

e) Gathering information of SPARC system

These utilities will assist to gain a holistic understanding of and provide a basis for configuring OCI resources. The following information is required: Hardware allocation & configuration, System performance metrics and statistics, Logical Domain (LDoM) configurations, Containers and branded containers (zone) configuration and resource limits, Disk storage profile and configuration, Networking profile

- Run Oracle Explorer Data Collector (SUNWexplo). Explorer is part of the Oracle Service Bundle and can be downloaded using Doc ID 1153444.1

- OraChk Health Check utility from AHF (Autonomous Health Framework) Doc ID 2550798.1

- OSWatcher (This version of OSWatcher is not to be confused with the Exadata version of OSWatcher) Doc ID 301137.1

- Oracle Solaris StatsStore and System Web Interface (https://docs.oracle.com/en/operating-systems/solaris/oracle-solaris/11.4/use-statsstore/features-oracle-solaris-statsstore-and-system-web-interface.html)

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Licensing

Bring your own license (BYOL) allows Oracle customers to apply licenses they currently own for on-premises software for equivalent Oracle Cloud Infrastructure (OCI) licenses. At a high level, one Oracle Processor License maps to two OCPUs. Refer to the following documentation:

- Oracle PaaS and IaaS Universal Credits Service Description document (PDF)
- Bring your own license FAQ: https://www.oracle.com/cloud/bring-your-own-license/faq/
- Core factor table: https://www.oracle.com/contracts/docs/processor-core-factor-table-070634.pdf

Support for Solaris on Oracle Cloud Infrastructure

Solaris 11.4 on X86 is supported on Oracle Cloud Infrastructure. See https://www.oracle.com/support

There is no support for Solaris SPARC on OCI.

What about Solaris x86 on Intel?

Solaris X86

Customer who wants to run Solaris on OCI can do so by using Solaris 11.4 X86 (Intel) on OCI. To run Solaris 11 x86 on OCI, use this link for detail: See https://github.com/oracle/oraclesolaris-contrib/tree/master/OracleSolaris_OCI

Stromasys SPARC Emulator on OCI

Stromasys' Charon SSP is a SPARC Emulator that runs on Oracle Cloud Infrastructure. Charon SSP emulates SPARC and is available with Oracle cloud subscription. The SPARC hardware is eliminated, and the applications run as usual on the Oracle cloud with a lift and shift solution.

See this blog:
https://blogs.oracle.com/cloudmarketplace/post/re-hosting-legacy-solaris-workloads-onto-oci

Use case: Disaster Recovery of on-premise SPARC system to Oracle Cloud Infrastructure.
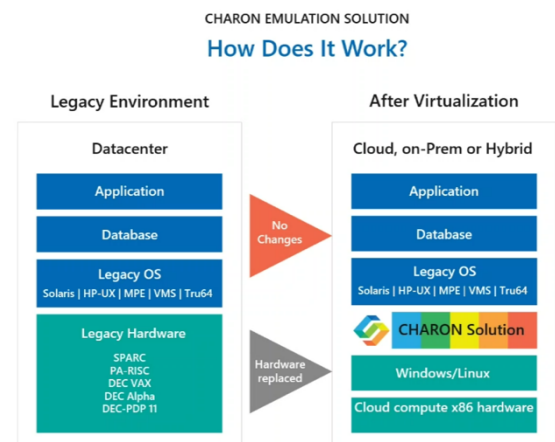
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Summary

Moving from on-premise SPARC to cloud hosted system has some advantages for businesses. The process may be cumbersome to migrate SPARC to cloud, but yields long term advantages such as scaling, only pay for the resources being used, having access to more services such as developer services, AI and Machine learning.

Running workloads on Oracle Cloud Infrastructure using AMD EPYC and Intel X9 processing architecture delivers increased performance for SPARC workloads.

During the production of this paper, there is no SPARC solution on Oracle Cloud Infrastructure (OCI), but Oracle do provide best practices and methods for migrating workloads to cloud. A SPARC emulator is available on OCI.

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