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Oracle Improves Security and Simplicity for Scale-Out and Cloud Architectures with New SPARC S7 Servers

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Management Summary

Anyone who has studied human biology can tell you that the brain is the ideal integrated infrastructure. It is efficient, but definitely is not simplistic. The brain is much like the CPU of the modern computer, extremely complex and difficult to maintain and manage. Everyone has a brain, but that does not imply that everyone know how it works. You may not have to be a rocket scientist to understand the brain, but being a neurosurgeon certainly does help put that complexity under control. Keeping the brain in good working order is one thing; improving upon it is quite another; but that is exactly what we see every year coming from the drawing boards of the processor designers from companies such as Intel (*Xeon*), IBM (*Power*), and Oracle (*SPARC*) – well, almost every year.

Today's IT enterprise data center infrastructure continues to evolve with the new functionality required to meet the challenges presented by the latest environmental innovations, such as cloud computing; challenges both good and bad. With thousands of hackers roaming around the Internet, as well as on both local and wide area networks, it has become a bigger challenge than ever before to have a secure infrastructure to protect enterprise assets, and an efficient one so that enterprises both large and small can take advantage of the benefits of improved performance. Securing the critical information within an enterprise's cloud has become more and more difficult as the value of that data increases collectively into the billions of Dollars or Euros, thus becoming a much more attractive target to the hacker community. The physician may have to worry about the effects of debilitating brain diseases on the memory of their patients, but s/he does not have to worry about improving the performance of the central processor as a processor designer must, or protecting the internal and external connections that can be accessed to steal or destroy that data.

One company that remains dedicated to improving the performance, functionality, and security of its enterprise platforms is Oracle. Oracle has responded to the requests from its customer base to deliver higher performing servers, meeting the needs to drive the speed of business to a higher level, and providing real-time data to enable faster business decisions. In November 2015, Clipper reviewed the introduction of the new Oracle *SPARC M7* microprocessor – including integrating software functionality and accelerators on the CPU itself, providing branch office support via the Oracle *SPARC T7* Servers, and enterprise level support via the Oracle *SPARC M7* Server family.[1] Now, Oracle is delivering servers based upon a new microprocessor the Oracle *SPARC S7*, designed to support both scale-out and cloud environments. To learn more about the Oracle S7 server family, please read on.

IN THIS ISSUE

[1] See the issue of **The Clipper Group Navigator** dated November 16, 2015, entitled *Oracle Unleashes Line-up of Enterprise Servers – New SPARC M7 Microprocessor Leads the Way*, and available at http://www.clipper.com/research/TCG2015010.pdf.

A Scale-Out Data Center Environment

The IT staff at every enterprise faces new challenges every day to ensure that their systems are fully utilized and protected from attack, both internally and externally. These servers must be configured, provisioned, and deployed differently than they have in the past, due largely to the volume of information being created daily. Today's enterprise most likely is deploying a cloud environment – both on-premises and off and both private and public – to run, among other things, distributed *Java* and database applications plus data analytics applications to improve the decision-making processes within their enterprise.

As a result of deploying systems from a variety of vendors acquired over a series of years, the IT staff runs a high risk of having or creating a complex, hard-to-manage, heterogeneous mix of server and storage platforms. Adding complex cloud infrastructure to the mix does not help the situation; it merely makes the environment more difficult and expensive to maintain, exactly when that IT staff is under the most pressure to increase operating efficiencies, reduce the total cost of ownership, and deliver new, innovative solutions. The enterprise data center, therefore, is looking for a cloud-ready solution to simplify deployment.

In addition to meeting these needs, the data centers of all enterprises, large and small, must be able to manage and secure an increasing volume of sensitive data that tends to be growing substantially on a daily basis, while at the same time facing the need to capture, analyze, and act upon this data in real-time. Unfortunately, in order to secure access to an ever-increasing volume of critical business data being delivered over heterogeneous networks, increased protection must be designed into the data center systems to restrict those who might try to gain unauthorized access to privileged data or worse, to corrupt servers and/or damage the enterprise's reputation. Keeping data and applications safe is a continuing need that is becoming increasingly critical, especially in light of the deployment of mission- and business-critical applications throughout that cloud environment.

It is evident from recent headlines that many of the largest cloud providers have been having a difficult time, at best, keeping their cloud infrastructures operational and secure. Companies such as Amazon, Google, and Microsoft have found themselves trying to resolve unexpected data outages, data breaches, and shutdowns.

It is very evident that in addition to the standard functionality providing high performance and reliability, availability, and serviceability (RAS), the modern data center requires the highest levels of protection, including deployment of intrusion and fraud detection, as well as encryption capabilities for data both at rest and in motion supporting all of the leading cryptographic algorithms.

In order to satisfy all of these needs and challenges, last year Oracle announced the availability of the Oracle M7 microprocessor to address these concerns, and provided the enterprise data center with two families of servers, the *Oracle SPARC T7* server for the smaller office and the *Oracle SPARC M7* server for the larger enterprise environment. Recently, Oracle once again has raised the processor bar with the announcement of the *Oracle SPARC S7* microprocessor with a reduced core count to lower cost and delivered in a family of servers that includes the *Oracle SPARC S7-2*, the *Oracle SPARC S7-2L*, and the *Oracle Mini-Cluster S7-2*. To learn more about how the SPARC S7 family can improve the security and productivity of your data center, please read on.

The Oracle S7 Microprocessor

The Oracle SPARC S7 microprocessor continues the commitment made by Oracle upon the acquisition of Sun Microsystems a decade ago to continue the development of the SPARC technology, and thus to continue to raise the bar for the enterprise data center environment. In addition, SPARC S7 continues the Oracle themes of effortless security, improved efficiencies, and straightforward simplicity. Oracle continues to deploy the innovative technologies of its SPARC M7 processor into both scale-out and cloud applications, tailoring the S7-based servers into the most efficient and secure systems for scale-out environments. SPARC S7 is ideal for Java, Oracle database, and cloud-based applications.

The SPARC S7 with Oracle *Solaris* delivers an open platform that developers can utilize to create new, secure applications and to deploy data analytics efficiently. With eight *SPARC* cores grouped into two core clusters[2], the S7 can support up to 64 threads with a maximum frequency of 4.27 GHz. SPARC S7 also supports 16KB of L1 cache, 512KB of L2 cache, and 16MB of L3 cache, fully shared and portioned by core cluster. All of this reduces processor latencies and contributes to the outstanding performance available in Oracle's S7 server family.

The SPARC S7 uses on-chip, integrated DDR4 memory controllers, along with an

[2] As compared to 32 cores in the SPARC M7 processor.

integrated PCIe 3.0 controller to deliver the performance and efficiency required by the most demanding enterprise data center. Software in Silicon features include *Silicon Secured Memory*, which delivers the capability to detect and prevent invalid operations through hardware monitoring of software access to memory and provides real-time data integrity checking to guard against software errors and malware. In addition, each processor core contains the fastest cryptographic instruction accelerators in the industry[3], eliminating the unnecessary performance and cost inhibitors typically associated with secure computing. As a result, with SPARC S7 servers data center staff can deploy end-to-end data encryption and secure transactions with near-zero performance impact. The security features of the SPARC S7 are designed in, as opposed to tacked on, as they are with some other vendors' solutions. This provides the security required to protect mission- and business-critical business investments via a lower-cost server.[4]

The SPARC S7 also provides the data center with on-chip database query accelerators and integrated data decompression capabilities to deliver additional integrated performance without extra hardware. The S7 processor is designed to provide the best integration with Oracle's enterprise applications.

The Oracle S7 Server Family

Oracle has taken the SPARC S7 processor and integrated it into some of the most powerful, yet compact, low-cost servers available for the cloud. Along with *Oracle Solaris 11*, S7 servers deliver a secure, integrated, and open platform engineered for scale-out enterprise cloud environments. They are designed with unique optimization for Oracle database, middleware, and application deployments and feature integrated, no-cost virtualization technology with *Oracle Solaris Zones*[5] *and Oracle VM Server for SPARC*[6]. This family includes the *SPARC S7-2*, the *SPARC S7-2L*, and the *Oracle MiniCluster S7-2*. These servers are designed to address the requirements of scale-out and cloud infrastructure, eliminating the tradeoff between security and performance found in many competitive systems; thus delivering the best of both worlds.

Exhibit 1 —
SPARC S7 Server's RAS Features

- Hot-pluggable disk drives
- Redundant, hot-swappable power supplies and fans
- Environmental monitoring
- Message retry, cache, and memory error correction
- Oracle Solaris *ZFS* storage RAID
- *Fault Management Architecture* including *Predictive Self-Healing* (from Solaris)

Source: Oracle

All Oracle servers are delivered with comprehensive server management tools at no additional cost. *Oracle Integrated Lights Out Manager* has been developed with industry-standard protocols to deliver secure local and remote management, including power management and monitoring, fault detection, and notification.

The SPARC S7-2 server is a 1U system providing compute density, while the SPARC S7-2L server is a 2U system, offering versatile storage options. Based upon the SPARC S7 microprocessor, these servers deliver unmatched efficiency and high reliability as a result of the reduced component count and improved performance, which is due to the reduced latencies of the S7 microprocessor. (See Exhibit 1, above.)

The Oracle MiniCluster S7-2, on the other hand, has been designed to provide out-of-the-box simplicity, performance, and reliability for the remote office, small office, or agile software development environment. It is a simple, efficiently engineered system that can be deployed to run enterprise databases and applications with uncompromising security.

The Oracle SPARC S7-2

The Oracle SPARC S7-2 server can be configured with one or two SPARC S7 processors, with up to 1TB of memory. It has three low profile PCIe 3.0 x8 slots with four 10GBase-T full duplex and auto-negotiating Ethernet ports. It also has two management ports, a RJ45 serial port, a 1000Base-T port, and two front USB 2.0 ports. The S7-2 server comes with one 12 Gb/second

[3] According to Oracle.

[4] As a result of a reduced core count, because extra cores are not needed to do the encryption, etc.

[5] Oracle Solaris Zones, are an integral part of the Oracle Solaris operating system. Zones isolate software applications and services using flexible software-defined boundaries. Zones can be used to create private execution environments within a single instance of Solaris. Each environment has its own identity that is separate from the underlying hardware. Each environment behaves independently as if running on its own system, making consolidation simple, safe, and secure.

[6] Oracle VM Server for SPARC enables the data center to create up to 128 virtual servers on one system, taking advantage of the massive thread scale offered by SPARC servers and the Solaris operating system, at no additional cost.

SAS-3 controller and an eight-disk chassis with 2.5" drive bays, four of which can support NVMe drives. The data center has a choice of 600 GB or 1200 GB hard disk drives, or 400 GB SAS-3 solid state drives, or 3.2 TB NVMe solid state drives.

The Oracle SPARC S7-2L

The Oracle SPARC S7-2L server is configured with two SPARC S7 processors, with up to 1TB of memory. It has six low-profile PCIe 3.0 x8 slots along with along with the same network and management ports as the SPARC S7-2.

The S7-2L server also is deployed with one 12 Gb/second SAS-3 controller and four optional disk configurations:

- An eight-disk chassis with 2.5" SAS-3 drive bays, four of which can support NVMe drives;
- A 26-disk chassis with 24 front and 2 rear 2.5" drive bays, with four bays supporting NVMe drives;
- A 12-disk chassis for 2.5" NVMe drives; or
- A 14-disk chassis with 12 3.5" SAS-3 bays and 2 rear 2.5" bays.

The SPARC S7-2L server has the same drive options as the SPARC S7-2 server (listed above).

The Oracle MiniCluster S7-2

The Oracle MiniCluster S7-2 is anything but a "mini". Designed in a small form factor specifically for the smaller IT environment that is often found in a branch or remote office, the MiniCluster packs the same wallop, security, and reliability found in the S7-2 and S7-2L building blocks that have been designed for the enterprise data center and cloud environments. It is an efficient, yet simple, engineered system, designed to run the same enterprise databases and applications found in the data center, but now being deployed in the field on a smaller scale. The location of the platform does not lessen the requirements for security, especially when dealing with mission- and business-critical applications.

The MiniCluster S7-2 is designed to ease the burden on an overly taxed IT staff, making it easy for non-IT staff and remote users to install, configure, patch, tune, and secure the system with no special training. In addition to the same unique security technologies described above on S7 servers, MiniCluster S7-2 configures hundreds of integrated security technologies and controls with the push of a button, at no additional cost. It comes as a pre-integrated system, complete with everything that the smaller office needs from compute and storage to virtualization, operating system, and management. It will be able to run virtually any Oracle workload, database, and application at optimal performance, right out of the box.

In terms of configurability, the MiniCluster has just what is needed. It has been designed with two integrated SPARC S7-2 servers and one storage shelf per MiniCluster. Each of the S7-2 servers has two eight-core SPARC S7 processors with 512 GB of memory. The standard I/O consists of one quad-port 10 Gb Ethernet adapter, four onboard 100/1000/10000 Mb/second Base-T ports, and two 12Gb SAS PCIe HBAs. It also has two 1.2TB disk drives for the operating system and four 2.5"1.2TB disk drives per server for local storage. MiniCluster S7-2 also comes with a storage enclosure (*DE3-24C*) that supports 14 3.5" 1.6TB SSDs, partitioned as 1.2TB per SSD. This provides 16.8TB raw storage, or 7.2TB if storage is configured for a double mirror, or 4.5TB in the case of a triple mirror. The DE3-24C also supports four 2.5" 200GB SSDs for database logs, six 3.5" 8TB disk drives for shared application and database storage, and remote *NFS* storage management.

Conclusion

With the announcement of the SPARC S7 processor and server family, Oracle has continued to uphold the commitment to accelerate hardware development and integrate that hardware with an already integrated software stack from operating system to database to applications. Each member of the Oracle SPARC S7 server family delivers a complete suite of enterprise cloud services and on-premises compute solutions needed to support a wide variety of requirements.

By reducing the core count of the SPARC S7 from that of its predecessor, the SPARC M7, Oracle now can deliver lower-cost solutions to the enterprise data center, one that can deliver integrated data protection and encryption security by default, without any additional hardware investment, as might be required with competitive servers. Whether your requirement is for an extension to your enterprise data center, a cloud deployment, or, perhaps, an upgrade to a remote office, Oracle has a server solution to fit both your performance and security requirements and your budget. If your data center is in need of a performance makeover and an upgrade to the security to protect mission-critical data, take a closer look at the Oracle SPARC S7 family. This may be the solution that you have been seeking.

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