



## Debunking the FUD — Oracle Speaks (At Last!)

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### Management Summary

As we approach November and another election day, our radio airwaves, television programming, social networks, and water fountain gossip revolves around politics. Candidates for public office, both local and national, buy time to convince us to vote for them, or perhaps to just vote against the other guy. Some candidates will take the “high road” and tell us what they have done, how many schools have been built, how many highways have been paved, how many streets have been lit! Others, perhaps without a viable agenda of their own, will try to spread fear, uncertainty, and doubt (FUD) about the candidacy of their opponent. They try to brand their opponent with labels (“liberal” or “right-wing”) or perhaps associate them with an unsavory element of the current administration, you know, the unindicted co-conspirators in some bribery scandal. They try to convince you that you can’t “trust” their opponent. They will accuse them of prevarications, because everyone knows that it isn’t acceptable to call the *Honorable Mr. So-and-so* a liar! Ah, if we could only keep the FUD in the political arena where it is accepted as the norm, but we can’t. The FUD follows us in many ways, not the least of which is in the competition for your dollars in the enterprise data center.

We all know the old line: *How can you tell when the \_\_\_\_\_ salesman is lying?* The answer: *His (or her) lips are moving!* A “good” IT salesperson will try to sell you three things: himself, his company, and finally, *his* product. The competitor does not factor into the presentation, except in the quantitative sense, comparing products via industry-standard published benchmarks, such as those from TPC or SPEC, or application benchmarks, such as those from Oracle or SAP. However, in this day of mergers and acquisitions, questions continually arise about the continuing viability of products from the acquired party, especially when it is perceived that those products may not fit into the mainstream of the acquiring party’s business model. Furthermore, when the merged company is silent on the matter (usually because of legal restrictions), the field is wide open for rumors and misinformation to abound. In fact, that is exactly what has been happening in the enterprise data center where IT staffs have been drifting away from their Sun SPARC/Solaris roots, as a myriad of vendors come in to tell them what Oracle “is going to do” to their trusted platforms. Even after the acquisition of Sun by Oracle was official, there was a dearth of information flowing from Oracle as to the future viability of Sun’s SPARC architecture.

Well, it appears safe to say that Oracle has lifted the communications blackout and come out of stealth mode. They have now formally announced the next generation of SPARC processors, the T3, along with an entire family of rack-mounted and blade servers in support of the thousands of data centers with Sun SPARC servers installed. These new servers deliver extreme scalability and performance, with a first-on-the-planet 16 cores per SPARC processor, built-in encryption security, and improved virtualization capabilities, and that is no FUD! To learn more about Oracle’s new T3 systems, please read on.

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## Addressing the Needs of the Sun Data Center

Today's enterprise data center, deployed with multiple older SPARC servers, faces the same requirements as every other enterprise data center. It needs to simplify the IT infrastructure in order to accelerate the deployment of mission-critical business applications, along with other middleware and web-facing solutions, and also lower the TCO of that infrastructure.

These data center requirements can be lumped into four categories:

- **High Performance** – to ensure highly-concurrent and virtualized processing;
- **Affordable scalability** – to lower the TCO of the IT infrastructure;
- **Availability** – to provide continuous access in a 24x7x365 Internet-connected world; and
- **Security** – to protect critical data and services, and management.

In order to reduce the server sprawl that is manifest throughout most older data centers, today's IT staff is looking toward servers with high performance based upon multi-core processors, with multiple threads per core – in order to consolidate the sprawl of older, under-utilized servers, by virtualizing each core to achieve higher efficiency and better resource utilization. These servers also need to be scalable – in order to expand application deployment dynamically in response to a changing business climate. In order to parallelize the IT architecture, the IT staff must depend upon multi-threaded, multi-process applications to take advantage of the new hardware capabilities.

As the number of applications per server rises, along with the number of users per system, the reliability, and availability of the system becomes a major CIO concern. Mission-critical RAS<sup>1</sup> features become a necessity. When each server is connected to the Internet, the number of sales queries can rise dramatically, and if the response is not immediate, that potential customer could be lost to the competition. Furthermore, each deployment requires higher security in order to protect important corporate and customer data. The IT staff must have an efficient method of encryption in order to protect the data in their charge.

In order to reduce complexity and increase ease of use, the staff must be able to accelerate the deployment of new platforms through tight inte-

gration between the operating system and the myriad mission-critical, web, and business applications residing on their servers. It goes, without saying, that the enterprise must optimize valuable data center floor space and energy resources. New deployments must take advantage of the densest architectures possible with the lowest energy and cooling requirements. The enterprise must also be concerned with investment protection to ensure that today's purchase will not be obsolete tomorrow. The ability to upgrade to the next generation of server hardware is an essential requirement in any current procurement decision.

## Oracle's SPARC T3 Processor

At long last, Oracle has introduced the first new SPARC processor since their acquisition of Sun Microsystems, the *SPARC T3 Processor*. Oracle brings to the table Sun's reputation for binary compatibility and over 20 years of success with the deployment of hundreds of thousands of enterprise servers.

The SPARC T3 is the industry's first 16-core processor, running at 1.65 GHz, with eight threads per core, using Oracle's *CMT Technology*<sup>2</sup>, for a total of 128 processing threads. This doubles both the number of cores and threads from the T2 implementation and includes 16 embedded floating-point processors. Oracle has implemented zero-cycle thread switching in the SPARC T3<sup>3</sup>.

SPARC T3 integrates all of the key functions of a system, *computing, networking, security, and I/O*, onto a single piece of silicon, using a 40nm process technology. The T3 rapidly scales for delivery of network service and employs extensive power saving features, down to the transistor level. It drives high capacity network-intensive content and eliminates database bottlenecks with dual, multi-threaded, on-chip 10GbE ports. The SPARC T3 improves security with enterprise-level, data center security, using 16 built-in chip-level encryption accelerators, providing wire speed security capabilities.

With built-in virtualization technology, the SPARC T3 can manage up to 128 domains on a

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<sup>1</sup> Reliability, Availability, and Serviceability.

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<sup>2</sup> Chip Multithreading Technology maximizes computational throughput and performance by implementing hardware multithreaded processor cores on a single chip.

<sup>3</sup> On every clock cycle, a thread switch occurs. An instruction is selected from a thread that is ready and available on every clock cycle, independent of any event other than a clock tick, keeping the pipeline full of meaningful instructions, ready to be executed.

single processor, enabling dynamic scaling and resource utilization for simpler operations. With twice the cores, SPARC T3 continues a history of improving throughput performance, this time by a factor of two, and improves I/O bandwidth by a factor of four. It is an ideal processor for providing next generation computing requirements for Web services and cloud computing infrastructures. In addition, as always, T3 enables binary compatibility from any *UltraSPARC*-based platform.

## SPARC T-Series Systems

Oracle's SPARC T3 systems, from single socket blade (*SPARC T3-1B*) to four-socket, 64-core server (*SPARC T3-4*), have been designed to take advantage of the outstanding performance characteristics of the SPARC T3 CPU and deliver enterprise-level scalability to meet the explosive data growth demands of high-end data centers. With multiple levels of encryption<sup>4</sup> and built-in virtualization, T3 servers provide enterprise applications with a secure environment for enhanced performance and advanced resource management for space and energy efficiency, to increase asset utilization while reducing operating costs. Designed with mission-critical RAS features, they have improved power management for greater flexibility and higher availability. With an integrated stack for simplified deployment and management, SPARC T3 servers provide more than simply double the performance of the previous generation of SPARC T servers. T3 servers eliminate complexity with one SPARC architecture across all platforms, one operating system, one systems management solution, and one virtualization solution. SPARC T platforms are the only servers with virtualization, cryptography, and the operating system bundled together at no additional charge.

With *Oracle Enterprise Manager* on SPARC T3, the IT staff can manage the entire Oracle stack using a single console, eliminating unnecessary tools to deliver application to disk integration with comprehensive systems management to improve efficiency and lower IT management costs. IT organizations can proactively manage many technologies, ranging from service-oriented architecture (SOA) to cloud computing, all while maintaining a consistent standard of service for business users and customers. Enterprise Manager provides comprehensive top-down applica-

<sup>4</sup> The cryptography in the SPARC-T3 is basically the same as the UltraSPARC T2, with a few enhancements.

### Exhibit 1 — Optimized Solutions for Oracle Servers

- *Siebel CRM*
- *WebCenter 11g*
- *E-Business Suite*
- *WebLogic Suite*
- *PeopleSoft HCM*
- *Oracle Solaris 10*
- *Oracle Database*

Source: Oracle

tion management, including application performance management, configuration management, bare metal provisioning, and IT compliance.

All T3 systems are optimized and tested with Oracle *Solaris 10 9/10*, and come with Oracle *VM for SPARC 2.0* to enable enterprises to consolidate workloads and maximize the utilization of their compute platforms. Oracle VM enables the IT staff to reduce costs by simplifying management and shifting resources according to changing demands. T3 servers are tightly integrated with *Oracle Database*, *Oracle Fusion* middleware, and Oracle applications (see Exhibit 1, above), resulting in world-record benchmark results with a wide variety of solutions. Oracle VM offers scalability from one VM per core to 128 VMs on a single T3 server. Oracle also provides an *Integrated Lights Out Manager (ILOM)* with an integrated service processor for power management and with power capping capabilities.

Most significantly, in view of what has transpired over the past year, is the recently released SPARC 5-year roadmap showing a growth path to systems with 64 sockets and ever-increasing throughput capacity. This path shows processor innovation leading to a 4x increase in cores, 32x increase in threads, and a 16x increase in memory capacity (moving toward 1TB per socket), leading to a 40x improvement in database TPM and a 10x increase in Java Ops per second. In addition, Oracle has identified the availability of the next version of the operating system, *Solaris 11*, in 2011.

### SPARC T3-1

With a single socket in a compact 2U rack-mounted chassis, the *SPARC T3-1 Server* helps to drive up utilization, lower IT costs, and reduce server sprawl by providing an ideal, general-purpose platform for the consolidation of up to 128 VMs or to support web services and Java

applications. This is essential for existing Oracle Sun data centers where the SPARC T3-1 is binary compatible with older SPARC systems. It performs as a key element in network infrastructures, delivering encryption requirements for security applications.

With the industry's first 16-core processor, the T3-1 has 128 threads of processing power with up to 256GB of memory, twice that of the previous generation. Six I/O slots, along with four 1GbE and two 10GbE interfaces, empower the system with a 4x improvement in I/O bandwidth. Combined with the integrated SPARC T3 cryptography, up to 16 hot-swappable 300GB SAS HDDs provide critical applications with expansion up to 4.8TB of secure storage with integrated drive mirroring. The T3-1 also has multiple RAS features, including redundant hot-swappable power supplies and fans, error correction and parity checking, and environmental monitoring. The SPARC T3-1 provides support for up to 128 Oracle VMs, although 16 VMs are a recommended best practice.

### ***SPARC T3-2***

Designed with a dual-socket configuration in a compact 3U rack-mountable chassis, the *SPARC T3-2* Server provides an ideal, general-purpose platform for the virtualization and consolidation of up to 128VMs, along with support for OLTP database workloads, back-office applications, and other demanding business operations. It enables the IT staff to address existing issues of poor space utilization and inefficient power and cooling costs in an overcrowded data center. It can also provide resources for decision support applications and analytics. Like the T3-1, it delivers encryption processing for applications demanding a secure environment.

With a dual-socket chassis, the T3-2 can be configured with 32 cores, 256 threads, and up to 512GB of memory in 32 DDR3 DIMM slots, doubling the throughput of the previous generation. This makes it an ideal platform for compute-, data-, and transaction intensive applications such as those required for web, network, and security servers.

The T3-2 has ten PCI-e I/O slots with four 1GbE and four 10GbE interfaces. It can deliver up to 4x the I/O performance of previous models. It provides bays for six HDDs, with 1.8TB of hot-swappable, secure data storage. The T3-2 also has multiple RAS features, including redundant hot-swappable power supplies and fans, error correction and parity checking, and environmental

monitoring. The SPARC T3-2 provides support for up to 128 Oracle VMs, although 32 VMs are a recommended best practice.

### ***SPARC T3-4***

Configured in a 5U rack-mountable chassis, the *SPARC T3-4* is designed for maximum scalability in support of enterprise consolidation and virtualization. It is a quad-socket chassis with 64 cores, 512 threads and up to 512GB of memory using 8GB DIMMs, making it an ideal platform for the deployment of mission-critical enterprise applications, such as ERP, CRM, and SCM. With 16 I/O slots along with four 1GbE and eight 10GbE interfaces, the T3-4 provides the high throughput and scalability required for mission-critical computing. It has up to eight internal, hot-swappable SAS HDDs with a capacity of up to 2.4TB. The T3-4 also has multiple RAS features, including redundant hot-swappable power supplies and fans, error correction and parity checking, and environmental monitoring. It provides support for up to 128 Oracle VMs, although 64 VMs are a recommended best practice.

### ***SPARC T3-1B***

In addition to three rack-mounted servers, Oracle provides the new SPARC T3 processor in the form of a compact blade, the *SPARC T3-1B* server, for configuration in an enterprise-ready 10U *Sun Blade 6000* chassis, supporting up to ten blades. It provides the high scalability, extreme density, and deployment flexibility required by secure, data center applications, such as web services and Java. It is an ideal vehicle for the consolidation and virtualization of data-intensive and security applications.

It is a single socket blade with either 8 or 16 SPARC cores and 128 threads, running at 1.65 GHz. The blade supports up to 16 DIMM slots (128GB of memory), with two to four I/O slots, along with two 1GbE and two 10GbE I/O interfaces, delivering twice the throughput, twice the memory, and four times the bandwidth over the previous generation. The T3-1B supports up to four small form factor, hot-pluggable SAS HDDs (10K RPM) with a total capacity of 1.2TB. The new SPARC blade has been optimized with Oracle Solaris 10 9/10 and Oracle VM Server for SPARC 2.0 – to provide support for up to 128 Oracle VMs, although 16 VMs are a recommended best practice.

### ***SPARC Performance***

With the availability of SPARC T3, Oracle has released an outstanding set of benchmark

results, quantifying the capabilities of SPARC T3 systems in a wide range of categories. If your data center is concerned with applications written to the Java Platform, the SPARC T3 may be just the platform that you need. Using the multi-tier *SPECjEnterprise2010* benchmark<sup>5</sup>, Oracle's *WebLogic* server on a SPARC T3-4 platform scored a record 9,456.28 EjOPS<sup>6</sup> for single-node platforms. This compares quite favorably with IBM's *WebSphere Application Server* on *Power 750 Express* with *DB2 9.7* at 7,172.93 or the IBM *WebSphere Application Server* on a *System x3850 X5* with *DB2 9.7* at 5,140.53, the next highest single-node systems. Using the *SPECjvm2008* benchmark<sup>7</sup>, Oracle scored the highest rating with a 320.52 SPECjvm2008 peak ops/min.

As one might expect, the SPARC T3 servers also scored high-water marks on a series of Oracle applications, such as the Oracle *E-Business Suite R12.12* benchmark, the Oracle *Communications Order and Service Management* benchmark, and the *PeopleSoft Enterprise Financials 9.0* benchmark. The SPARC T3-2 and Sun SPARC Enterprise M5000 were the first to top 4,000 users on the on-line component of the Oracle E-Business Human Resources Self-Service business flow.

In addition, using the *x86 to SPARC Virtualization* Benchmark, Oracle consolidated up to 30 x86 servers running Oracle Database 11g on a single SPARC T3-2, demonstrating a 10x footprint reduction, 6.7x better power consumption, and reduced management costs.

## Conclusion

Contrary to popular belief, or perhaps urban legend in Silicon Valley, Oracle has not pulled the plug on Sun Microsystems. **With the announcement of the availability of the SPARC T3 with 16 cores, and 8 threads per core, Oracle has**

**ignited a new spark in the SPARC architecture, and, even more importantly, opened the kimono on a five-year roadmap for both the SPARC processor and the Solaris operating system. You cannot underestimate the importance to the CIO of knowing that the enterprise is not investing in an obsolete architecture.**

With 512 threads today and even more in the foreseeable future, Oracle has delivered a highly scalable system capable of supporting the growing user and application demands prevalent in today's enterprise data center. With T3, Oracle has delivered a family of systems binary compatible with SPARC and UltraSPARC systems already deployed throughout the enterprise, protecting the investment in hardware, software, and personnel.

With features that bring both space and energy efficiencies to the data center through enhanced consolidation and virtualization, T3 systems help to lower the TCO of the IT infrastructure, with up to 75% lower energy consumption per thread. Enhanced, integrated on-chip cryptography improves response time and secures the data so integral to data center operations. Integrated on-chip 10GbE interfaces deliver improved network performance for mission-critical applications.

If you have been considering upgrading your existing SPARC systems, or migrating to a SPARC architecture, forget the FUD, base your decision on the ability of the T3 to improve the efficiency of, and lower the TCO of, your enterprise data center. The facts will speak for themselves.



<sup>5</sup> SPECjEnterprise2010 is an end-to-end, industry-standard benchmark that exercises all parts of the underlying infrastructure that make up the Java Platform, Enterprise Edition, (Java EE) technology-based application environment, including server hardware, Java Virtual Machine (JVM), database, operating system, and storage and network subsystems.

<sup>6</sup> Enterprise Java Operations per Second.

<sup>7</sup> SPECjvm2008 (Java Virtual Machine Benchmark) is a benchmark suite for measuring the performance of a Java Runtime Environment (JRE), containing several real life applications and benchmarks focusing on core java functionality. The suite focuses on the performance of the JRE executing a single application; it reflects the performance of the hardware processor and memory subsystem, but has low dependence on file I/O and includes no network I/O across machines.

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