



White Paper

Fujitsu Develops New Enterprise Server with the Most Powerful SPARC Chip Yet

Sponsored by: Fujitsu

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EXECUTIVE SUMMARY

Fujitsu is rolling out its latest generation of M-class servers for the enterprise sector, the Fujitsu SPARC M12, using its newest, and most capable, generation of Fujitsu-developed SPARC processors, the SPARC64 XII. The M12 series server is targeted to deliver the best mission critical platforms in the world for a wide range of enterprise customers. With this new server, long-time enterprise software partners Oracle and SAP SE will be well positioned to offer a full suite of solutions closely linked to and optimized for operations on the Fujitsu M series server, which is specifically designed for enterprise applications including large database, an option generally unavailable to most enterprise solutions providers.

The M12 line offers significant hardware and software improvements over the currently available Fujitsu M10 with a variety of new features such as a faster, more powerful 4.25 GHz SPARC processor, faster memory capability, increased on-board LAN bandwidth and more and better options for PCI connections.

- Additional features on the M12 include lower software licensing fees, pay as you go computational granularity, an advanced vapor/liquid cooling scheme, enhanced security and RSA features, and the ability to run customer applications as-is on native Solaris 10/11 operating systems.

For the M12, Fujitsu designed and manufactured a new SPARC64 XII processor, which is claimed to have the world's number one SPECint_rate and world-class core performance 2.5 faster than the predecessor SPARC64 X+ chip.

- The Fujitsu SPARC64 processors sport an innovative "Software on Chip" feature to achieve faster results by taking processes previously handled by software and implementing them directly in hardware on the processor. For example, the Fujitsu SPARC64 XII directly processes in hardware decimal numbers – a common operation in data base applications – without the software having to perform the conversion to-and-from binary representation.
- Fujitsu states that the SPARC64 XII has a 2% better SPECint_rate per core and an 8% better SPECfp_rate per core compared with IBM's best results in the latest measurements.

Fujitsu can benefit greatly from its partnerships with leading enterprise software developers that are well positioned to successfully market Fujitsu technology worldwide while seeking out new use cases and markets. Areas that offer the most promise include:

- Existing enterprise data centers looking to consolidate their computing requirements for issues of cost, reliability, and performance.
- Hyperscale data centers, as well as public, private, and hybrid cloud centers, that place high value on scalability, energy efficiency, and virtualization options.
- Business intelligence users who are facing increasing computational requirements to support big data analysis, often with real time response capability.

Despite the key performance advantages of Fujitsu latest enterprise servers, the firm faces some challenges as the result of emerging clear trends in the commercial IT sector writ large that include differentiating their product line from the spate of COTS-based counterparts, adjusting to the global migration to cloud and/or hyperdata centers for enterprise solutions, and dealing with new demands for business analytics engendered by new requirements for IoT and deep learning. Fujitsu has a history of meeting market place challenges.

CURRENT STATUS OF FUJITSU IN THE WORLDWIDE SERVER MARKET

Overall Market Trends

IDC expects the worldwide server market to grow over the forecast horizon, achieving customer revenue of \$73.0 billion by 2020, which represents a five-year compound annual growth rate (CAGR) of 4.2%. However, within this sector, most growth will be concentrated in density and rack optimized systems that have projected CAGRs of 11.5% and 5.9%, respectively, out to 2020, worth over \$54 billion in revenues.

- The two main drivers of this growth will come from new and growing demands for better enterprise database performance, and big data analytics especially in the area of real-time data analytics. In addition, new technologies such as deep learning and IoT processing will drive demand for more centralized, efficient, albeit powerful enterprise-class systems.
- However, this suite of workloads will not only be carried out in the traditional enterprise-owned and managed data centers, but increasingly as services running in a myriad of cloud-based data center configurations including public, private, private, hybrid and colocation.

Fujitsu's Storied Expertise in Unix Enterprise Servers ...

Fujitsu has a long history of developing high quality, top of the line enterprise servers available around the world, and some of their most impressive offerings revolves around their Unix-based servers. Fujitsu's history of UNIX started with mainframes in 1985 with the UNIX OS called UTS/M that ran on Fujitsu's M-700 series mainframes, which at the time were some of the fastest enterprise-class systems in the world, and the world's first computer to incorporate a single board CPU. Six years later, Fujitsu launched the DS/90 7000. the first Fujitsu UNIX machines to feature a RISC-based SPARC processor.

- At the time this series was announced, UNIX systems, which had previously been almost exclusively used in the engineering field, were starting to appear in the business domain. Because of the increase in business applications, Fujitsu created the DS/90 7000 series as a uniform line of UNIX systems from workstations to servers.

Since that time, Fujitsu has been a world-class developer in creating innovative technologies for UNIX servers. Fujitsu's current Unix server offering is the Fujitsu M10 SPARC server product line, which targets business applications, especially those handling a wide range of big data requirements. The line consists of three major offerings that range from a 1U rackmount system equipped with one Fujitsu SPARC64 X+ with up to 16 cores, a main memory capacity of 1 TB, and an internal HDD storage capacity of 7.2 TB up to a dedicated pair of 4U rackmount systems equipped with up to 64 Fujitsu SPARC64 X+ processors with up to 1024 cores, a main memory capacity of 64 TB, and an internal HDD storage capacity of 115.2 TB.

- All of Fujitsu M10 systems run Oracle Solaris, one of the most used UNIX operating systems today, and the systems run all SPARC Oracle Solaris applications. The Fujitsu M10 series systems are targeted for both traditional enterprise class workloads such as on-line transaction processing, cloud computing applications, and emerging workloads in the big data analytics field.

... and in SPARC Processors

Fujitsu has had a long-standing commitment to developing leading-edge SPARC processors to power their UNIX systems. The Scalable Processor Architecture (SPARC) is a reduced instruction set computing instruction set architecture originally developed by Sun Microsystems, which forms the architectural underpinnings of every SPARC processor.

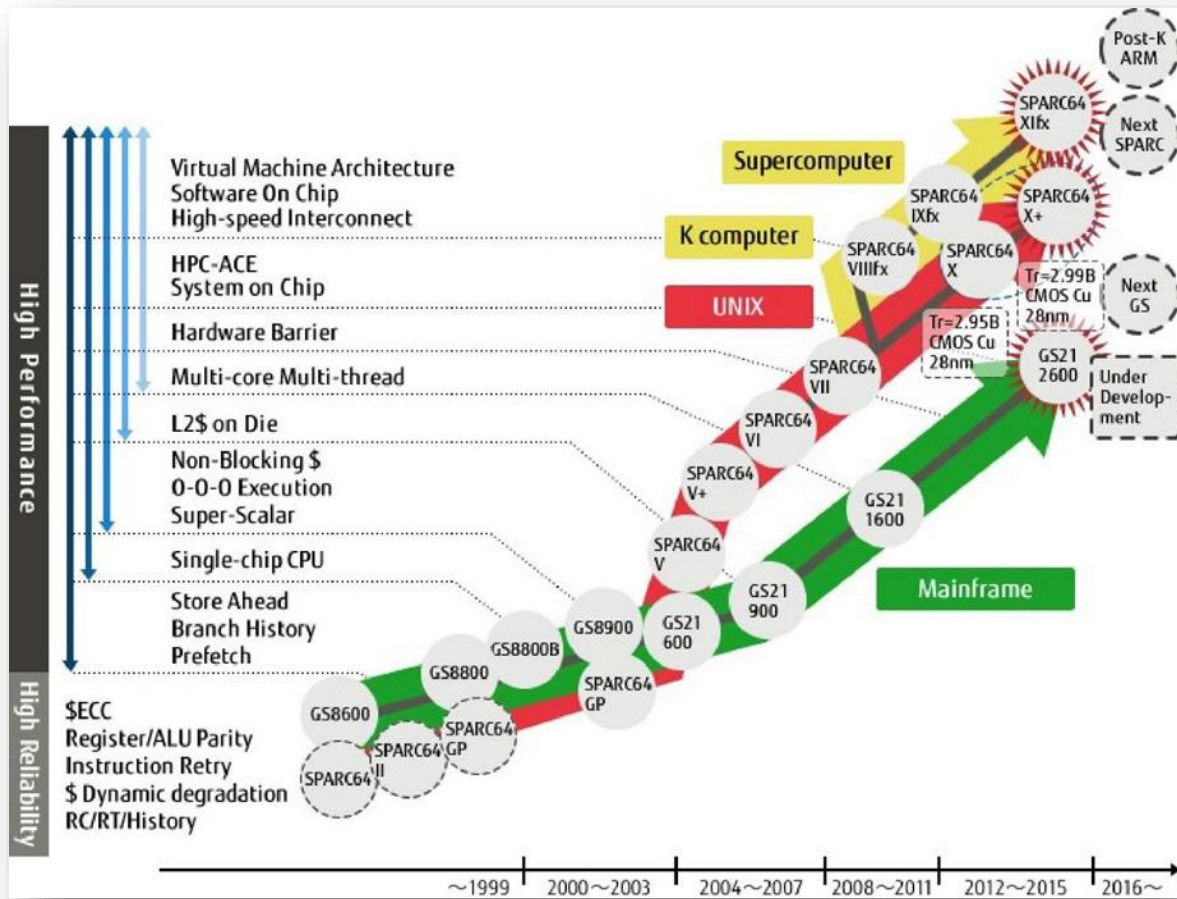
- Unlike proprietary chip architectures such as the Intel x86, the SPARC architecture is fully open, non-proprietary, and royalty-free, creating a larger common processor ecosystem. Over its history, SPARC has been licensed to several manufacturers, including, Cypress Semiconductor, Fujitsu, and Texas Instruments.
- Along with Fujitsu, Oracle is currently one of the other major SPARC developers as a result of its 2010 acquisition of Sun Microsystems.

Fujitsu developed its first SPARC64 processors in 1998 that was used its GP7000F servers. However, over time, Fujitsu has developed a number of different variations of its SPARC processor, each possessing custom features and performance enhancements designed for a specific product line and market. To make this possible, Fujitsu has centered its SPARC development on the use of a common microarchitecture that allows designers to use a common base processor architecture that can be customized for different systems.

- Fujitsu is the only vendor in the world that currently employs such a powerful common microarchitecture design philosophy to help drive its processor development, allowing the firm to continuously roll out an impressive array of computing products, each uniquely designed to address key and often distinct user requirements.
- As a result, Fujitsu is able to leverage its SPARC design skills to make, in essence, custom versions of SPARC chip for its mainframe, Unix server, and supercomputer product line, each uniquely configured to meet the specific technical and related user requirements within each segment (see Figure 1).

FIGURE 1

Fujitsu SPARC Development: Different Versions for Different Uses



Source: IDC and Fujitsu, 2017

To power its current high-end Unix-based Fujitsu M10 product line, Fujitsu designed the SPARC64 X and SPARC64 X+ processors, drawing on Fujitsu's common processor microarchitecture and including optimizations to meet the specific requirements of enterprise business workloads.

- In essence, the SPARC64 X processor was the result of a convergence of two processor lines created by Fujitsu: the SPARC64 VII+ built for the commercial Solaris servers sold by Sun Microsystems, Oracle, and Fujitsu and the SPARC64 VIIIfx processor developed specifically for the 10.5 petaflops K computer built by the company for the RIKEN Advanced Institute for Computational Science.
- Each SPARC64 X and SPARC64 X+ processor can support 32 simultaneous multithreads and has up to 24MB of on-chip L2 cache implemented in two segments, four DDR3 memory controllers, two PCI Express 3.0 root complexes, and system interconnects on the die.

- New SWoC functionality was added to SPARC64 X processors, and enhanced on SPARC64 X+ processors, as instruction set extensions in the areas of SIMD vector processing, extended floating-point registers, decimal floating-point processing, and cryptographic processing. These features were integrated in both Oracle Solaris 11 and Oracle Database 12c, allowing for easy access by software developers and users.

Fujitsu: Expanding Its Global Reach Through Partnerships with Enterprise Software Developers

With their Unix server product lines, Fujitsu has adopted a successful philosophy of providing key technical and marketing support through partnerships with developers and suppliers of enterprise software, particularly in the area of enterprise database applications. An enterprise database must be robust enough to successfully handle the queries of many users simultaneously and be capable of handling a range of 100 to 10,000 users at a time.

Fujitsu has been in a strategic collaboration effort for more than 20 years with Oracle, one of the world's largest and most successful enterprise database, middleware, and applications suppliers. Fujitsu is an Oracle Partner Network Diamond level partner due to its extensive expertise and success in delivering Oracle solutions across the entire stack including hardware, software, and services – and its ability to bring innovative and differentiated services to joint customers worldwide.

- One of the firm's most significant collaborations has been the tightly coupled development of the SPARC architecture and the Oracle Solaris OS, delivered in multiple generations of Fujitsu SPARC Servers, including the current Fujitsu M10 server line.
- More recently, Fujitsu and Oracle Corporation have formed a new strategic alliance to deliver enterprise-grade, world-class cloud services to customers in Japan and via their subsidiaries around the world.

Further expanding its reach into the global enterprise software sector, Fujitsu and the European-based software supplier, SAP, have a similar long-standing partnership, covering technology, hosting, and services. Fujitsu delivers SAP-based products, solutions, and services that meet a wide variety of business needs and is an SAP-certified provider of hosting and cloud services. As an SAP channel partner, Fujitsu is authorized to resell SAP solutions such as supply chain management-based software, CRM solutions, and hosted services in the United States, as well as countries in Asia and Europe.

- Fujitsu's relationship with SAP SE one of the world's leaders in enterprise applications in terms of software and software-related service revenue, stretches back over 40 years to the days of SAP AG and its global technology alliance with Fujitsu Siemens Computers.

INTRODUCING FUJITSU'S NEWEST TECHNOLOGY FOR THE UNIX SERVER SECTOR

For its latest offerings to the Unix-based server sector, Fujitsu is rolling out its M-class servers, the Fujitsu SPARC M12 – using its newest and most capable generation of SPARC processors, the SPARC64 XII.

The New Server Fujitsu SPARC M12

The Fujitsu SPARC M12 server is targeted to deliver the best mission critical platforms in the world for a wide range of enterprise customers. It offers significant hardware and software improvements over the currently available Fujitsu M10 with a variety of new features – centered on

a new generation SPARC chip – that promises significant advantages over leading enterprise server competitors.

- Improvements include a faster, more powerful 4.25 GHz SPARC processor, faster memory capability, increased on-board LAN bandwidth and more and better options for PCI connections.
- Additional features on the M12 include the world's highest SPECint_rate per core performance, an advanced vapor/liquid cooling scheme, enhanced security and RSA features and the ability to run customer applications as-is on native Solaris 10/11 operating systems (see Table 1).

Three different M12 models will become available in 2017 in stages:

- The M12-2S, 2 socket 4U Building Block (BB) model with up to 16 BBs, will be available in April 2017.
- The M12-2, 2 socket 4U Non-BB, will be available in April 2017.

TABLE 1

Comparison of Features of the Fujitsu M10 and New M12 Servers

	Fujitsu M10	Fujitsu SPARC M12
Processor	SPARC64 X+ M10-1: 2.8, 3.2 GHz M10-4: 3.4 GHz M10-4S: 3.7 GHz	SPARC64 XII M12-2: 3.9 GHz M12-2S: 4.25 GHz
Memory	DDR3 (RDIMM/LRDIMM)	DDR4 (RDIMM/LRDIMM)
Onboard LAN	1 GbE x 4	10 GbE x 4
PCI-Box	M10-1: x2 M10-4: x6 M10-4S: x5	M12-2: x6 M12-2S: x5
Support OS	Solaris10, 11, and later	
Form Factor: RU	1RU (M10-1) 4RU (M10-4/M10-4S)	4RU (M12-2/M12-2S)
Maximum Number of Building Blocks	16	
Maximum Physical Partitions	16/system	
HDD/SDD (SAS)	8 disks/BB	
PCI Slots	PCI Gen3: M10-1: x3 M10-4: x11 M10-4S: x8	PCI Gen3: M12-2: x11 M12-2S: x8
System Extension	Crossbar-Box	

Source: IDC and Fujitsu, 2017

Key Features of the M12 Server

A Powerful New SPARC64 XII Processor

For the M12, Fujitsu designed and manufactured a new SPARC64 XII processor, which claims the world's number one SPECint_rate and world-class core performance 2.5 faster than of the predecessor SPARC64 X+ chip.

- In addition, the new chip has a 2.0 times increase in memory bandwidth per core and a 2.5 times increase in I/O throughput over the SPARC X+ (see Table 2).
- Fujitsu states that the SPARC64 XII has a 2% better SPECint_rate per core and an 8% better SPECfp_rate per core compared with IBM's best results in the latest measurements.

TABLE 2

Comparison of Key Features of the SPARC64 X and the New SPARC64 XII

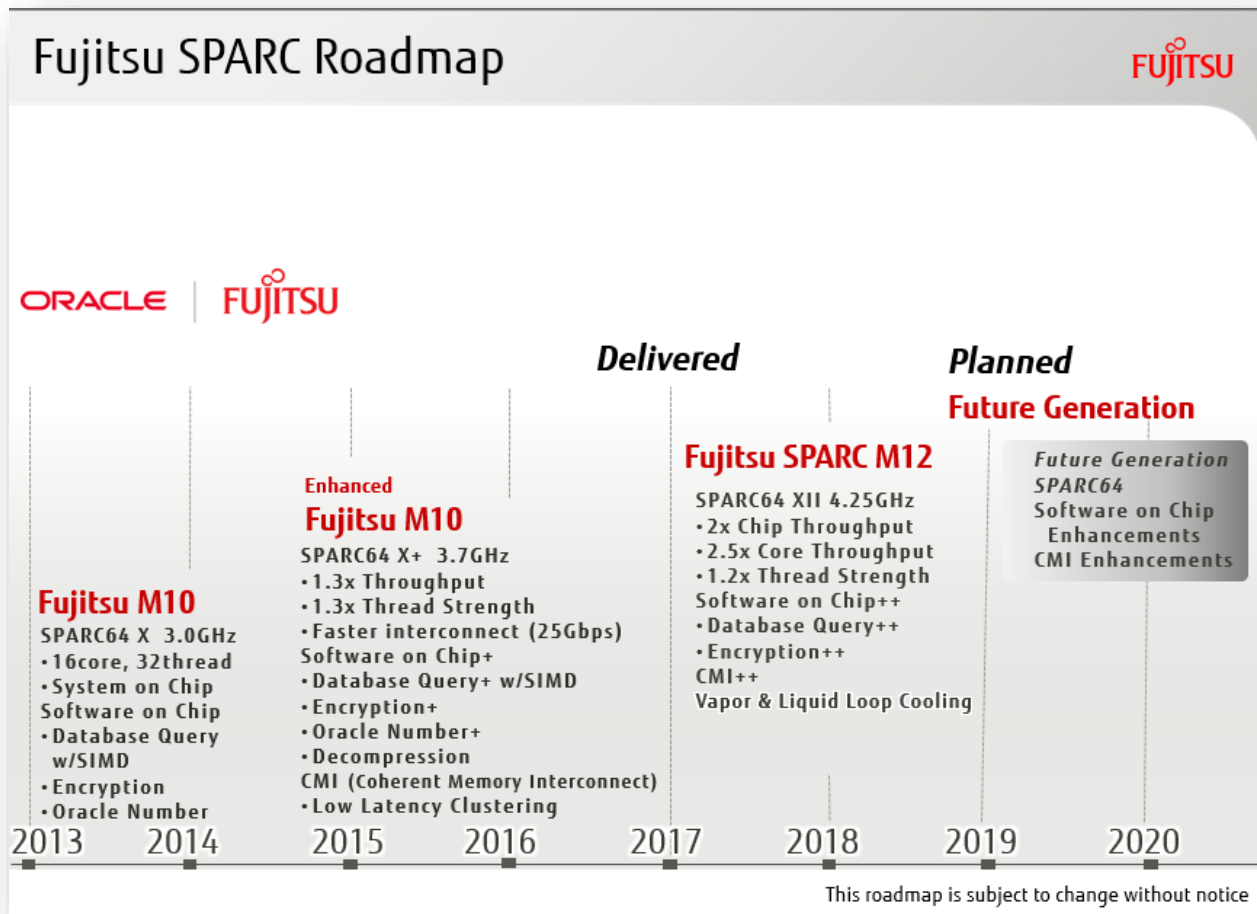
	SPARC64 X	SPARC64 XII
Technology	28nm	20nm
Frequency	3.7 GHz	4.25 GHz
# of Cores	16	12
# of Threads per Core	2	8
Last Level Cache	24 MB	32 MB
Memory Bandwidth	102 GB/s	153.6 GB/s
Memory Capacity	1 TB	1 TB

Source: IDC and Fujitsu, 2017

The new Fujitsu's SPARC64 XII – and indeed the entire new Fujitsu SPARC M12 Server line – represents only the latest example of the strong commitment by Fujitsu to support SPARC development, and the firm has plans already under way for new UNIX servers powered by Fujitsu SPARC processor for delivery in 2020 and beyond (see Figure 2).

FIGURE 2

Fujitsu SPARC Development Road Map for Its Unix Servers



Source: IDC and Fujitsu, 2017

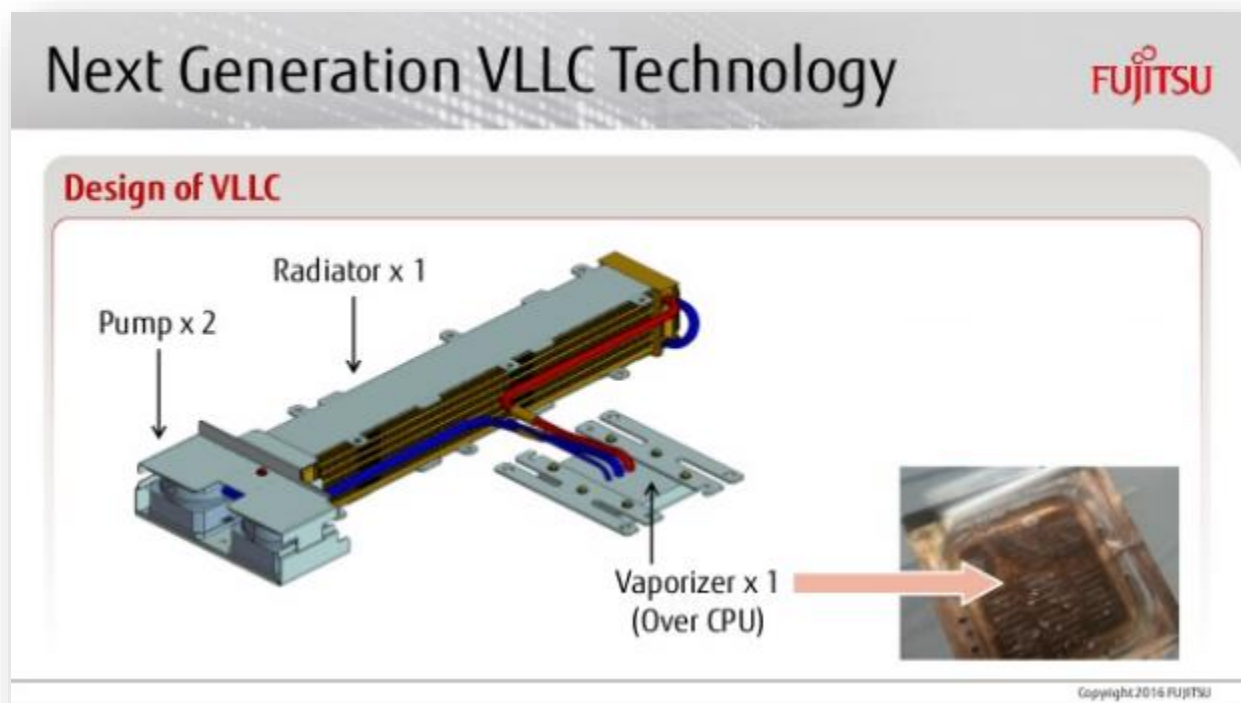
A High Performance Hybrid Vapor and Liquid Loop Cooling (VLLC) System

Fujitsu has created a new indirect hybrid vapor/liquid cooling scheme that takes advantage of the superior heat removal capabilities of a water to vapor conversion, which has a heat transfer capability five times greater than water and 150 times greater than simple forced air. The system uses a combination of radiators, vaporizers, and pumps to cycle coolant across each processor in a closed loop (see Figure 3).

- Fujitsu reports that the new VLLC cooling scheme has a 2x cooling performance over current Liquid Loop Cooling Loop.

FIGURE 3

New Fujitsu Vapor and Liquid Cooling Scheme



Source: IDC and Fujitsu, 2017

SWoC Features Accelerate Database Performance

The Fujitsu SPARC64 processors sport an innovative "Software on Chip" feature to achieve faster results by taking processes previously handled by software and implementing them directly in hardware on the processor. This capability, to IDC's knowledge, is not available from any other mainstream server maker – it is made possible by Fujitsu's use of their common microkernel architecture that allows Fujitsu SPARC designers to add custom hardware features as needed on a specific version of a SPARC chip without having to make changes on any other version of Fujitsu SPARC processors.

- For example, select Fujitsu SPARC chips achieve a speed up in processing by directly performing arithmetic processing of decimal numbers – a common operation in data base applications – without the software having to perform the conversion to-and-from binary representation.
- Additional software functionality that Fujitsu has directly implanted in SPARC processor hardware includes encryption/decryption, hashing function, compare and copy, and decompression.
- Many of these hardware features are supported already by Oracle operating systems and Solaris compilers, and Oracle software products are uniquely configured to take optimal advantage of SWoC features.

Lower Software License Fees

Much of the enterprise software used today is priced on a per core basis, and Fujitsu has designed its new system to help drive down the cost per core for most enterprise applications.

- The new SPARC64 XII chip actually has fewer cores per processor than its predecessors, but can manage eight threads per core – a four times improvement over the previous generation SPARC processor.
- Fujitsu indicates that upgrading to the M12 will allow users to run existing applications at the same or even higher levels of performance on fewer cores in this more thread rich environment. Fujitsu indicates that the annual saving on software licensing and maintenance costs in such a situation could be considerable.

Benefits from Running Both Native and Virtualized Solaris

Because of their unique relationship – and the history of Oracle and Sun, the original developer of the SPARC architecture – Oracle has worked with Fujitsu to ensure that the various versions of the Solaris operating systems can be run both natively and virtualized on Fujitsu M series servers.

- The option to run Solaris in native mode allows Fujitsu and Oracle to provide the most efficient and customizable performance for Oracle applications running on the M12 systems. For example, Oracle Database In-Memory – which in native mode has direct access to key Fujitsu SWoC functionality – not only speeds up analytical workloads, enabling real-time analytics, but also provides the potential for significant improvements in online transaction processing.
- By also offering a virtualized option for Oracle's OS, users are well positioned to take full advantage of the Fujitsu's M series' flexibility in configuration and provisioning to maximize overall system utilization. For example, the M series virtualization scheme allows for efficient hardware partitioning that can reduce risk for failure by isolating failed partitions of the database system from remaining operational partitions. Likewise, fine-grain virtualization using Oracle VM for SPARC Server helps improve server utilization.

Better Pay as You Go Flexibility and Reliability Through Core Activation Granularity

The Fujitsu M series server offers a highly granular core-based CPU activation feature called "capacity on demand." This feature allows users to pay only for the processor cores that they need while adding additional capability on the fly to meet new demands. For example, the Fujitsu SPARC M12 server can be configured with as few as one processor core out of a maximum of 12, and activation licenses can be purchased later to activate idle cores as compute requirements grow.

- Processor core activation licenses – that can bring on line cores that are already installed but not yet operational – can be purchased in pairs and be activated without stopping the system.
- Core activation licenses can be moved from one Fujitsu M series to other Fujitsu M servers, and in the case of a CPU core failure, unlicensed cores will automatically take the place of the failed core.

Enhanced ECC Encryption

In addition to the traditional cryptographic algorithms that include AES, DES, 3DES, DH, DSA, RSA and SHA that can be run on the SPARC SWoC dedicated cryptographic processors, Fujitsu has also added a new elliptic curve cryptography (ECC) capability that provides the same level of security as a counterpart RSA coding scheme but that uses a smaller key size, reducing storage and transmission requirements.

- Elliptic curve cryptography is now used in a wide variety of applications including U.S. government internal secure communications networks, Bitcoin's method to prove ownership of bitcoins, Apple's iMessage service signature verification process, and as the preferred method for authentication for secure web browsing over SSL/TLS.

Strong RAS Features

In order to ensure the best possible performance for a wide range of mission-critical enterprise services, the Fujitsu M10 and the follow-on M12 Unix server contain considerable RAS features.

At the hardware level, the SPARC processors, memory, and system interconnect are protected by ECC (error correction code) and CRC (cyclic redundancy check) circuits. In addition:

- The SPARC64 XII provides error detection and recovery functions for all circuits: cache memories, arithmetical logic units, and registers, which are corrected by data correction or instruction retries. In addition, following detection of an unrecoverable CPU error, the faulty core is isolated and the remaining normal cores maintain processing availability. A history circuit mechanism in the SPARC64 XII automatically records all processor operations that can be used for processor fault investigation and processor reliability improvement.
- The main memory is protected by Extended ECC in addition to the standard SECDED ECC, and data is protected even when a multi-bit error occurs due to the failure of a memory chip. Memory mirroring is another high-availability feature appropriate when running applications with the most stringent availability requirements. When enabled, the memory subsystem duplicates the data on write and compares the data on read to each side of the memory mirror. In the event that errors occur at the bus or DIMM level, normal data processing continues through the other memory bus and alternate DIMM set.
- When a multi-bit data error is detected by CRC on a bus which is connected via Fujitsu's high-speed interconnect technology (all crossbar-crossbar, crossbar-processor, and processor-processor busses), the hardware automatically resends the data. In the rare event of a hardware failure within the system interconnect, the system uses the surviving bus route on restart, isolating the faulty crossbar bus and facilitating the resumption of operation.

Architecturally, the Fujitsu M series servers are built as group of autonomous compute units called physical partitions (PPARs) that not only provide a scalable growth path for users but that also support RAS features through the use of dynamic reconfiguration of those PPARs to effectively handle both hardware and software issues.

- Physical Partitions are hardware partitions with complete resource, security, and fault and service isolation capabilities. Physical Partitions are dynamic and have a granularity of one Building Block and all of the CPUs and core licenses in that Building Block.
- Building Blocks (BB) within the Fujitsu M series are individual computational units on a common chassis (blocks) containing CPUs, memory and I/O expansion slots to be connected as if stacking up children's blocks.
- High speed transmission between BBs is supported by the Fujitsu custom-built crossbar switch that supports low-latency and high-throughput data transfers and is degradable – it can be taken off line on the case of uncorrectable hardware errors, that provide redundancy within the system bus.
- The M12 series servers can support a maximum of 16 BBs (and hence 16 PPARs) per system.
- BBs can be dynamically reconfigured to support zero downtime on hardware expansion, system maintenance, and perhaps most importantly, on BBs that are experiencing either hardware or software failures.
- Fujitsu also offers a lower-cost non-building block option for applications that do not need the strong performance capabilities of a BB-based architecture.

Key Value Propositions for Oracle DB and SAP

The world-class performance capabilities of the M12 series servers offer some powerful competitive advantages to Fujitsu partners, Oracle and SAP, that use these system as the computational platform for their base of enterprise applications software.

These partnerships put Oracle and SAP in an advantageous position within the commercial enterprise software sector as they can offer a full suite of products that are closely linked to and optimized for operations on the Fujitsu M server lines and its SPARC processor line, which is specifically designed for those applications.

- Oracle and SAP software stand to realize a significant leg up over competitors by having unique access to special hardware implementations found in Fujitsu SPARC processors that support key enterprise database instructions such as decimal calculations, hashing functions and compression/decompressions capabilities. These features reduce the complexity new application software development and follow-on upgrades and patches.
- These software vendors also can benefit significantly from many of the many of the special architectural features that Fujitsu uses in its M series servers that are specifically designed for the unique performance, scalability, reliability and cost characteristics of the enterprise software sector.
- These advantages simply are not available to enterprise software vendors that must use, in essence, whatever commercial COTs servers are currently available, including those that are not specifically designed deigned to meet the unique requirements exclusive to the enterprise application software sector.

Finally, though these partnerships, Fujitsu, Oracle, and SAP are well positioned to accurately access future demands within the enterprise software sector and effectively translate those requirements into a coordinated development plan for upcoming hardware and software.

- Other server vendors, including those for both the on-prem and cloud-based server markets, are often forced to address more diffuse requirements for a wider base of customers with one-size fits all server offerings.

Customer Success Stories: Example Fujitsu Enterprise Server and Partner Use Cases

There are a number of successful use cases that demonstrate the strong capabilities of Fujitsu and its software partners to supply integrated leading-edge solutions capabilities to enterprise users around the world.

- In 2016, the Korea Local Information Research & Development Institute (KLID) replaced their entire x86 legacy server infrastructure with the Fujitsu M10 platform because of the high performance architecture and the availability features built into Fujitsu M10 servers. KLID reports that it is now benefitting from lower TCO through the use of Capacity on Demand (COD), Oracle VM for SPARC features and improved price-performance delivered with Oracle Database running on Fujitsu M10 servers.
- The North Carolina Community College System – a network of 58 institutions throughout the state – selected several colleges to install compact, powerful Fujitsu M10-1 servers and Fujitsu M10-4 servers from Oracle that school officials indicated were not only more energy efficient and offered higher performance than previous systems, but that take up to 75 percent less space. University officials stated that they found M10's price point and throughput capabilities for scalable growth particularly attractive.
- Gislaved Folie, located in Sweden, is a manufacturer of plastic foils used in various forms and settings all over the world, and in 2014 the firm realized that its Oracle database environment needed to be upgraded. After working with Fujitsu, they installed M10 servers running a full suite of Oracle enterprise software. The firm realized a 65 percent improvement in application response times, server energy consumption and heat generation reductions of 30 percent, and a 50 percent reduction in hardware and operating system service costs.
- LANXESS of France is a leading producer of specialty chemicals and has nearly 15,500 employees in 30 different countries working at 46 production facilities. The firm was redirecting its IT operations and seeking a service provider for its SAP Business Warehouse system. Key IT requirement included technology that was fit for the future, greater flexibility, and lower operating costs, while users were interested primarily in enhanced performance. Fujitsu developed and implemented an expandable platform for the SAP NetWeaver Business Warehouse as a managed service. Reported benefits of these efforts included response times cut by two thirds (on average), time-critical data-loading processes run three times faster, and greatly increased user satisfaction.

FUTURE OUTLOOK

Opportunities

Fujitsu's newest line of M-class servers embody a number of new features designed to significantly advance the state of the art in performance, energy efficiency, reliability, pricing, and scalability for servers bound for the enterprise solutions sector. Underwriting these gains at the system level is yet another Fujitsu-developed world-class SPARC processor that was specifically designed for the unique

computational requirements of a wide range of enterprise applications. With these new developments, Fujitsu, working in concert with its long established cadre of leading enterprise-class software partners, has a strong opportunity to expand its own customer base while seeking new opportunities with customers currently using competitors' systems.

- Fujitsu M series servers have unique hardware and architectural specifically targeted for the enterprise software sector, a capability that few if any other major systems suppliers can claim.
- Likewise, Fujitsu has designed its own specialized processor for the segment while its competitors are bound to the use of processor bases designed for a much wider, more diverse, and for some key enterprise applications a less appropriate solution set.

Fujitsu can benefit greatly from its partnerships with leading enterprise software developers that are well positioned to successfully market Fujitsu technology worldwide while seeking out new use cases and markets. Areas that offer the most promise include:

- Existing enterprise data centers looking to consolidate their computing requirements for issues of cost, reliability, and performance
- Hyperscale data centers, as well as public, private and hybrid cloud centers, that place high value on scalability, energy efficiency, and virtualization options
- Business intelligence users who are facing increasing computational requirements to support big data analysis, often with real time response capability

Challenges

Despite the key performance advantages of Fujitsu latest enterprise servers, the firm faces a few challenges as the result of emerging clear trends in the commercial IT sector writ large.

- With increasing level of commodization becoming the order of the day in the server sector, many manufacturers are increasingly engaged in a race to the bottom on pricing. As such, their systems may have much more general-purpose designs that seek to maximize economies of scale to support a lower price point. Fujitsu needs to be sure that they make a strong case for the advantages of their server capabilities from a price/performance vantage.
- As more and more enterprise computing shifts to cloud-based platforms, Fujitsu and its software partners will need to be able to demonstrate strong capabilities for both on-prem and cloud-based enterprise platforms. Many businesses will be using some form of hybrid on-prem/cloud infrastructure for the foreseeable future, Fujitsu could benefit significantly from being able to support the seamless transfer of on-prem and cloud workloads within a single enterprise IT infrastructure.
- Given the expanding presence of IoT and related edge computing devices, Fujitsu will need to be able to demonstrate the ability to effectively handle a growing set of the data input and output devices supporting the range of enterprise applications. Complicating this will be the increasing set of data necessary for many enterprise functions that are stored and processed in standard digital as well as new variants in video, voice, and other non-traditional business analytics formats.
- Finally, as more firms increasingly entrust critical business data to their IT ecosystems – both in on-prem or cloud platforms – Fujitsu data security capabilities at every level must be at the state of the art and consistently evolving to meet new threats while maintaining the capability for a full range of business mission requirements. Fujitsu seems well aware of this requirement and is actively working to address it.

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