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Die neuen SPARC M10 Server von Fujitsu

Schöneiche, den 24. April 2013

FUJITSU

Ingo Gering, Principal Solution Design Architect

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Fujitsu and Oracle's Collaboration - One Big Result -

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- SPARC64 processor
- Supercomputer technologies
- Mission-critical technologies

New SPARC Servers

FUJITSU M10

Extreme performance increase with **Software on Chip** developed via Fujitsu and Oracle's collaboration

ORACLE®

- No. 1 UNIX OS Oracle Solaris
- No. 1 Database software
- Innovative technologies

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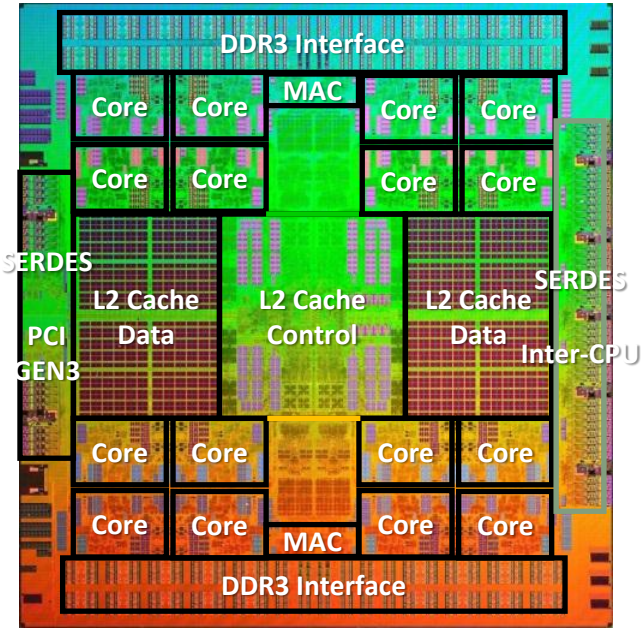
New Processor SPARC64 X



- Drastic performance improvement by the latest supercomputing and semiconductor technology
- 16 core, 32 thread (Max 2,048 threads/system)
- Large on-chip cache memory
  - ✓ L1$ per core: 64 KB (I) + 64 KB (D)
  - ✓ L2$ per CPU chip: up to 24 MB
- 28 nm Process
- Rich Software on Chip Features
- System on Chip: integrated controllers
- Further improved RAS features
- Software on Chip

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SPARC64 Processor Comparisons

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		SPARC64 X	SPARC64 VII+
Supported models		FUJITSU M10-1, M10-4, M10-4S	SPARC Enterprise M3000, M4000, M5000, M8000, M9000
Semiconductor technology		28nm	65nm
Frequency		Up to 3.0 GHz	Up to 3.0 GHz
Number of cores per CPU chip		Up to 16	Up to 4
Number of threads per core		2	2
Cache memory	L1 (per core)	64 KB + 64 KB	64 KB + 64 KB
	L2 (per CPU chip)	Up to 24MB	Up to 12MB
Software on Chip		Ready	None
Number of error checkers		53,000	3,400

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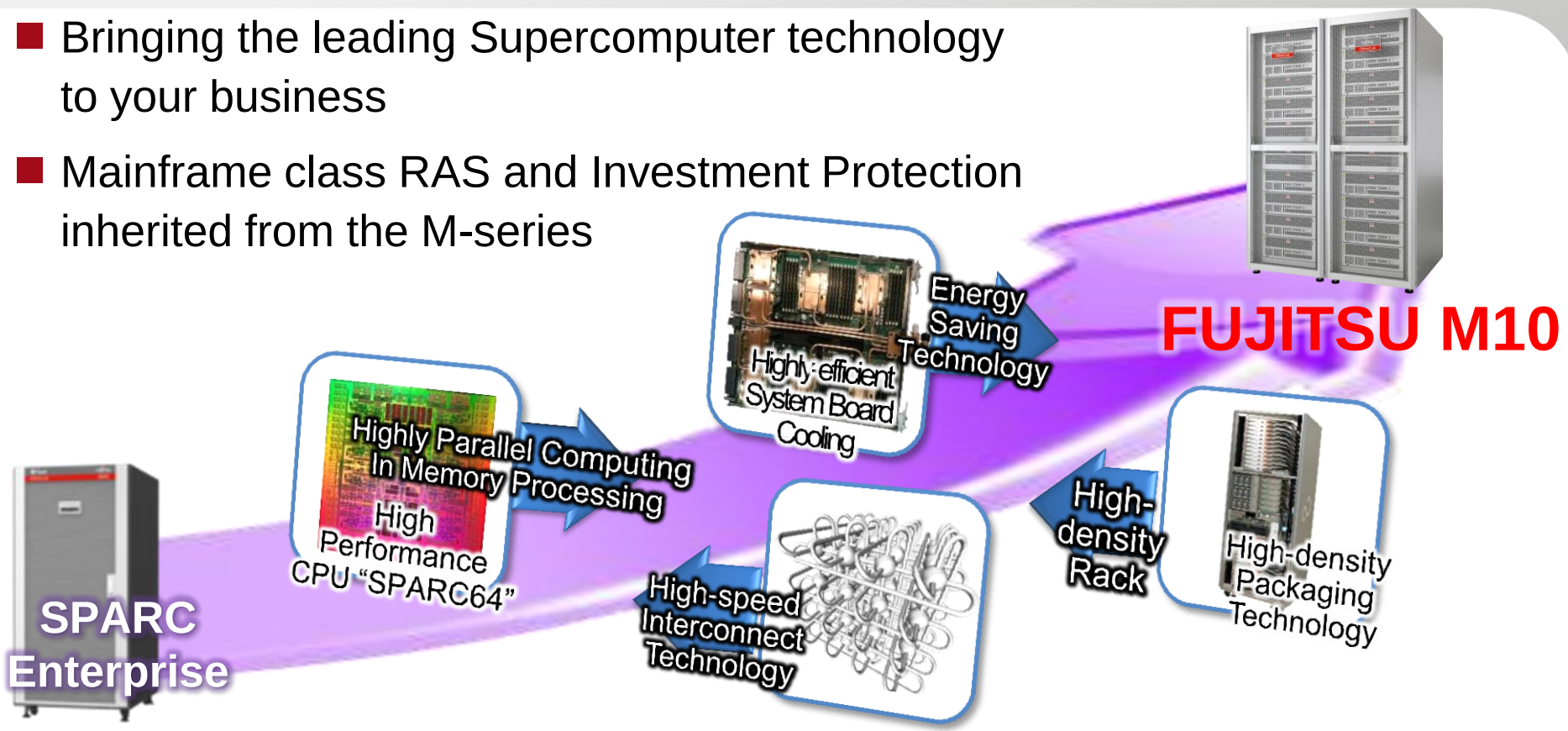
Innovation Changes the Game

- Bringing the leading Supercomputer technology to your business
- Mainframe class RAS and Investment Protection inherited from the M-series



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New Server Lineup

- Product lineup that meets any business needs

All models support
Oracle Solaris 11 and 10

FUJITSU M10-1	FUJITSU M10-4	FUJITSU M10-4S
1 socket (Max: 16 cores)	4 sockets (Max: 64 cores)	4-socket Building Block can scale up to 64 sockets (Max: 1,024 cores)

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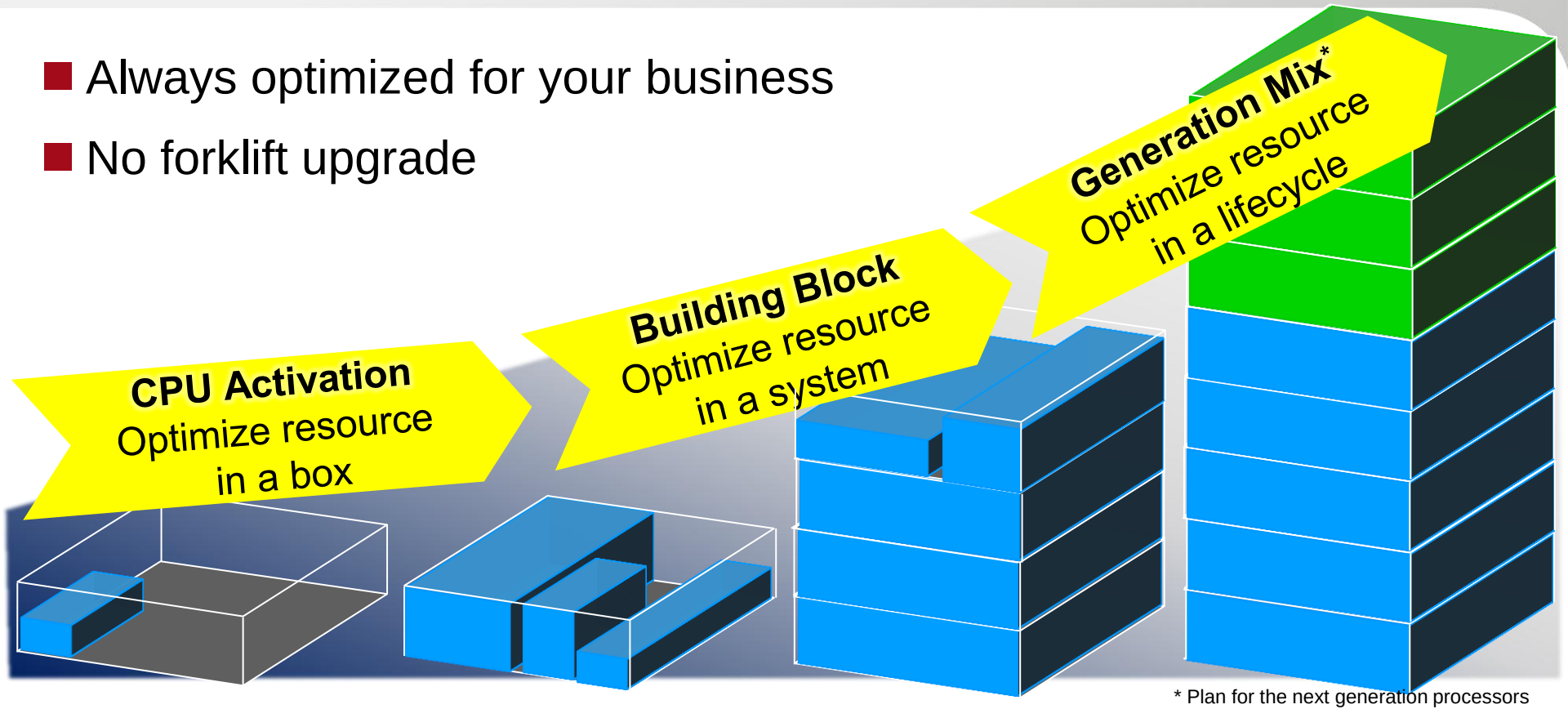
Dynamic Scaling

- Always optimized for your business
- No forklift upgrade



* Plan for the next generation processors

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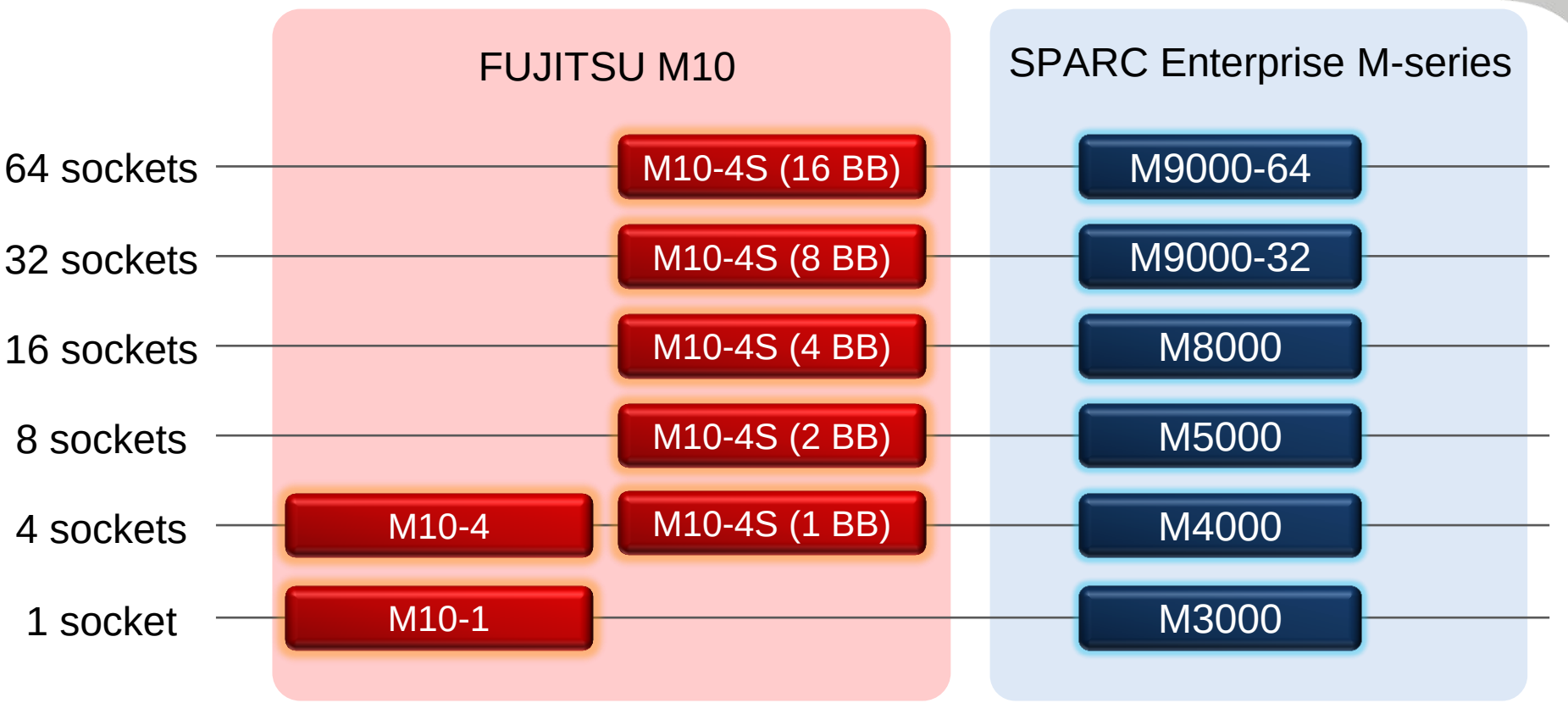
M10 Comparison with M-Series (socket based), but Factor 4 for cores and >> Factor 4 for performance



BB: Building Block

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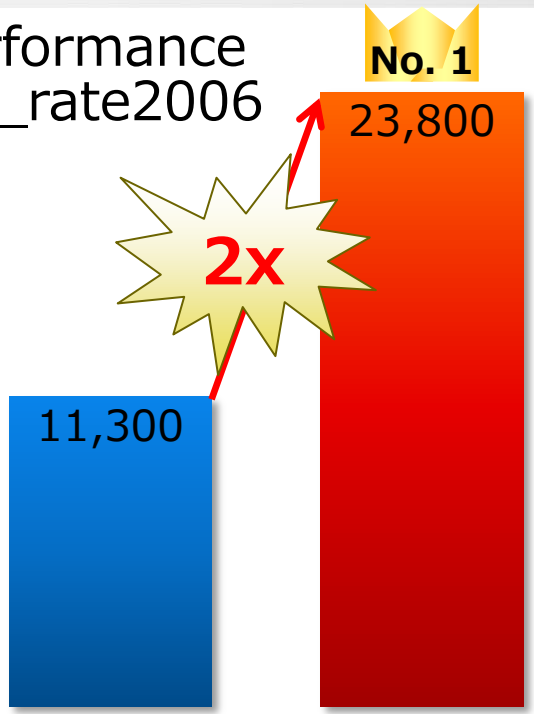
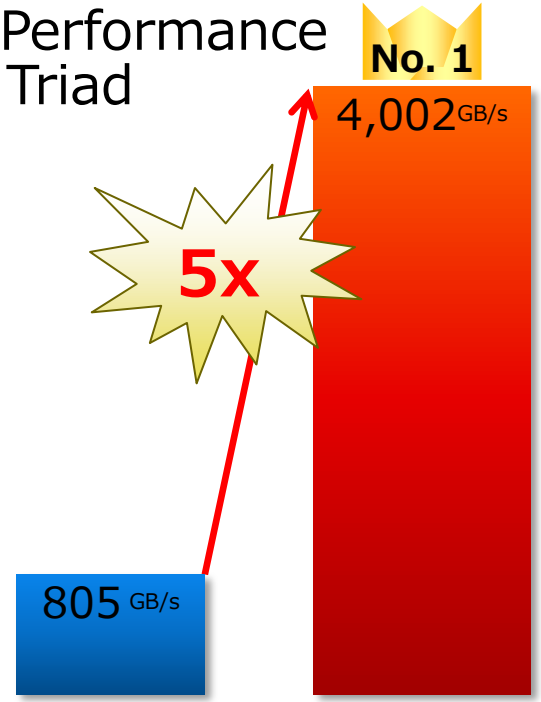
World's No.1 Performance

- CPU Performance
  SPECint_rate2006



SPEC (The Standard Performance Evaluation Corporation) and SPECint are registered trademarks of Standard Performance Evaluation Corporation(SPEC) in the US and other countries.
Details and the latest information of this benchmark can be found at http://www.spec.org.
The performance value of FUJITSU M10 has been submitted to SPEC on Jan 18th, 2013.

- Memory Performance
  STREAM Triad



STREAM is one of the widely used benchmarks. This benchmark measures memory bandwidth when the processor accesses the memory.
Details of the STREAM benchmark can be found at http://www.cs.virginia.edu/stream/.
The performance value of FUJITSU M10 has been submitted on Jan 18th, 2013.

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Innovation in The Processor: Software on Chip

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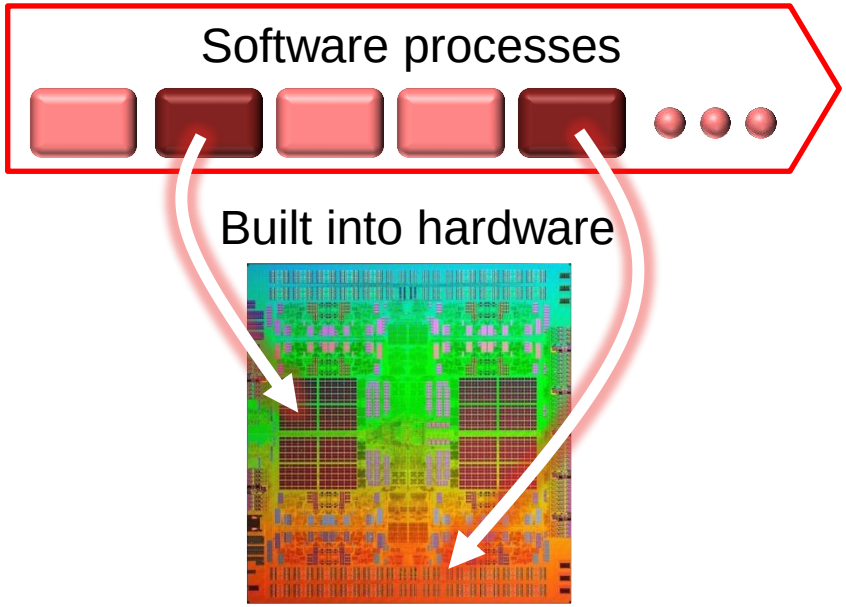
- Software on Chip, a concept that came from supercomputer development, accelerates future Oracle database performance



The new processor “SPARC64 X”

430X in NUMBER
163X in Crypto
15X in Compare
12X in Copy
7X in HASH

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Reliability for Mission-critical Applications

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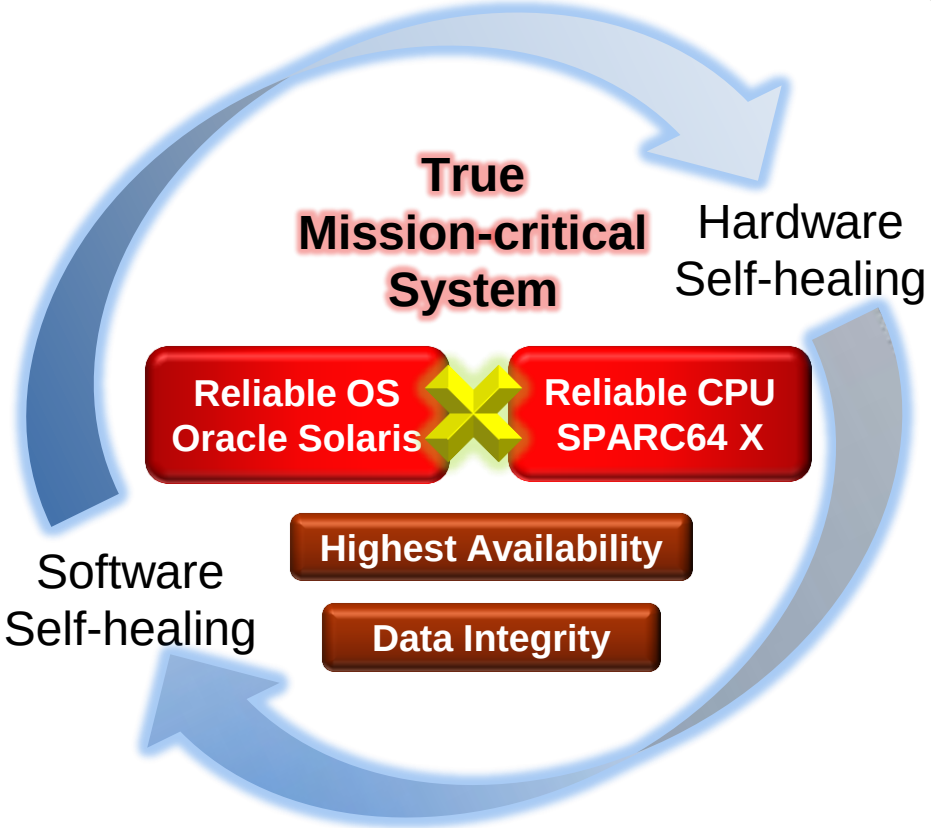
- Highly reliable processor "SPARC64 X"
  - ✓ Hardware self-detection and self-recovery
- Enhanced RAS features
  - ✓ Redundant Building Blocks eliminates single points of failure
  - ✓ Reserved processor
- Robust Oracle Solaris
  - ✓ Predictive Self-healing



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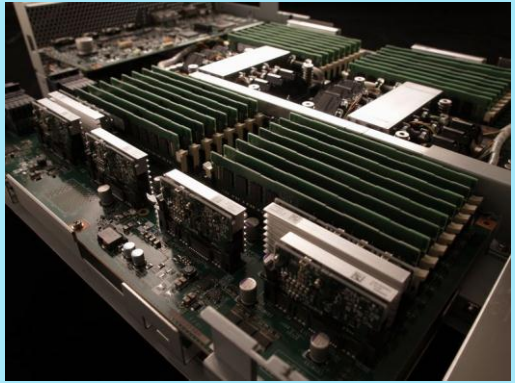
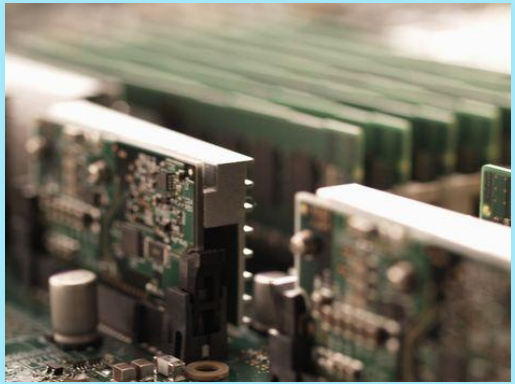
Benefits of the New FUJITSU M10 Server

- Increased performance
  - ✓ Faster time to deal with Big Data
- Increased capacity
  - ✓ Start small and grow up to 64 processors without penalty
- Increased flexibility
  - ✓ Faster time to grasp new business opportunities
- Mainframe level reliability
  - ✓ High availability for mission-critical applications
- Smaller energy consumption and foot print
  - ✓ Reduced data center infrastructure costs
- Investment protection
  - ✓ Solaris binary compatibility and mixed CPU generations





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Summary

- The FUJITSU M10 server is the jewel of Fujitsu and Oracle partnership
  - ✓ Software on Chip will boost Database systems
- FUJITSU M10 customers will enjoy supercomputer technology
- FUJITSU M10 Customer Benefits:
  - ✓ Increased performance
  - ✓ Optimized compute capacity
  - ✓ Increased reliability
  - ✓ Investment protection

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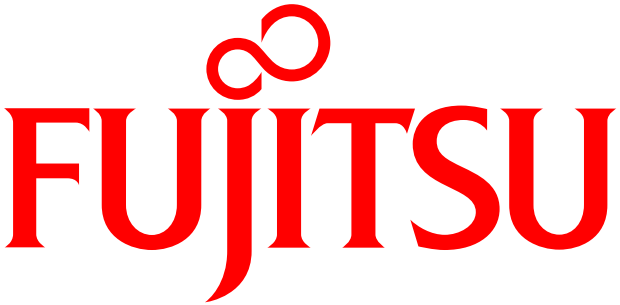

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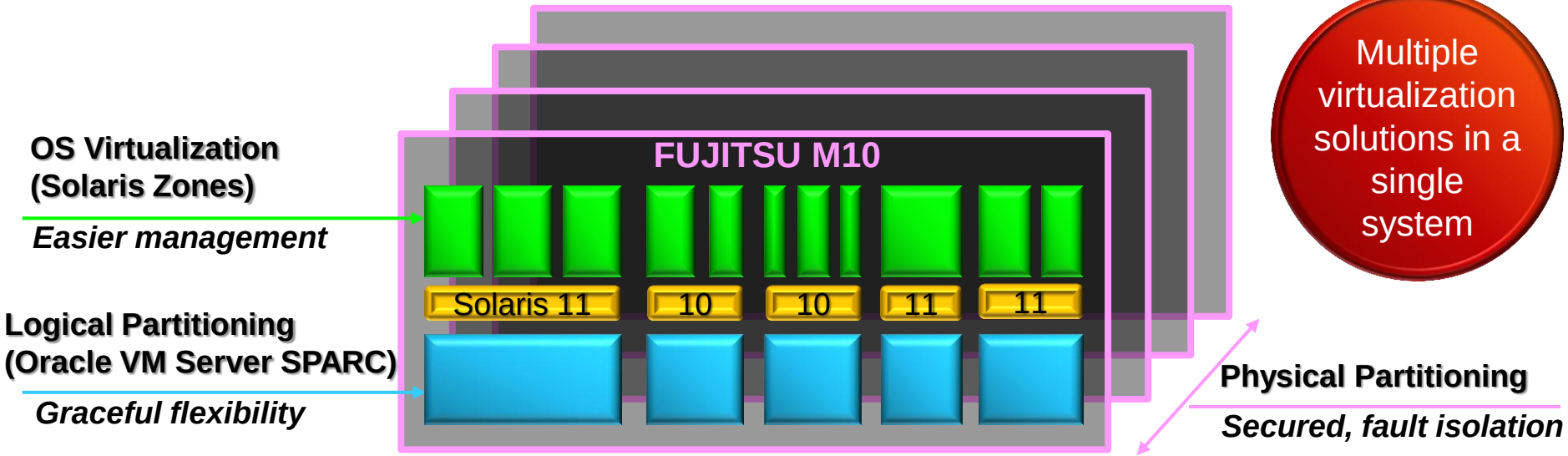
Built-in, No Cost Virtualization

- Maximized utilization efficiency to allocate resource where and when needed at no additional cost



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Innovation in Cooling: Liquid Loop Cooling

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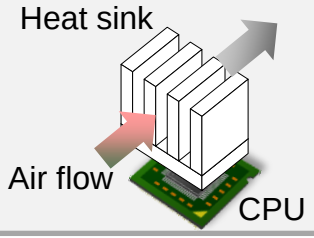
Existing Technologies

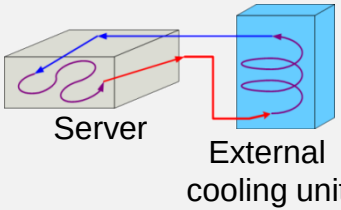
Air Cooling: Blowing air over heat sink(s)

(Technical challenges)
- ✓ Larger server size due to larger heat sink
- ✓ Louder fan noise



Liquid Cooling: Circulate heat externally through coolant piping installed in the server

(Technical challenges)
- ✓ Requires large-scale construction for external cooling unit



New Technology: Liquid Loop Cooling

Hybrid Cooling

(Air Cooling + Liquid Cooling)

Coolant will circulate the heat to the heat sink to be air-cooled. The heat sink is positioned inside the server at the most efficient place for cooling

(Benefits)
- ✓ Smaller heat sink and fan: Compact chassis and reduction of fan noise
- ✓ Improved flexibility of system design: Minimized CPU-memory distance
- ✓ CPU temperature suppression: parts life extension

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Minimized distance among LSIs by Liquid Loop Cooling

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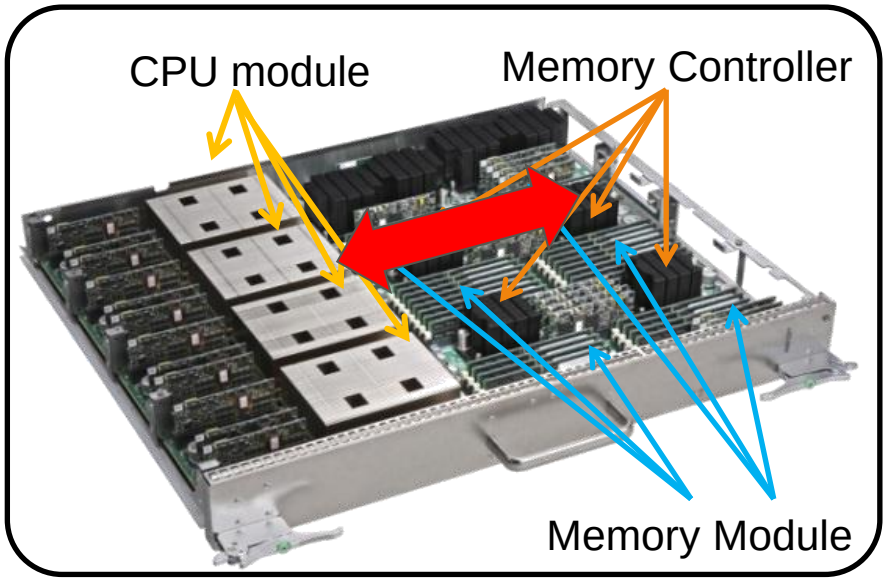
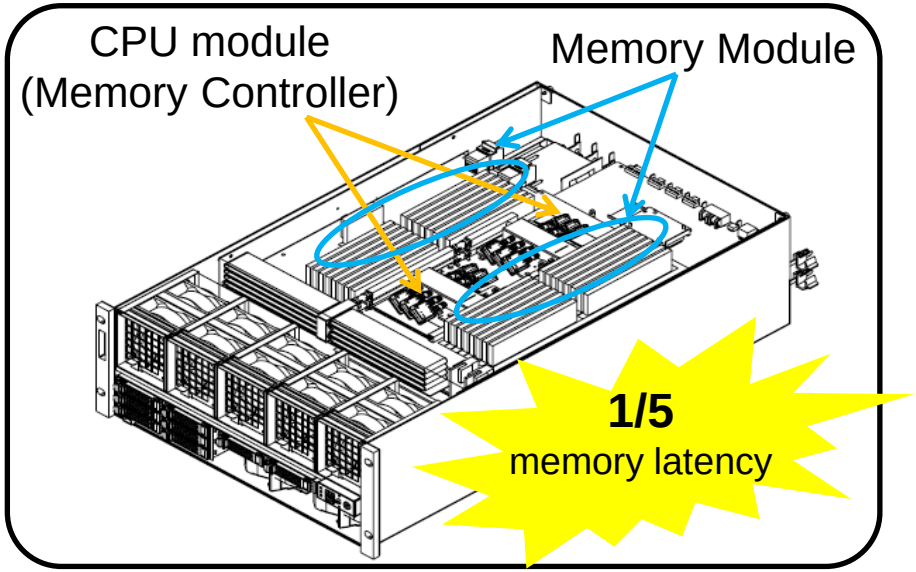
- Centrally mounted CPUs minimize CPU-memory distance and enable fast memory access

Existing model



FUJITSU M10



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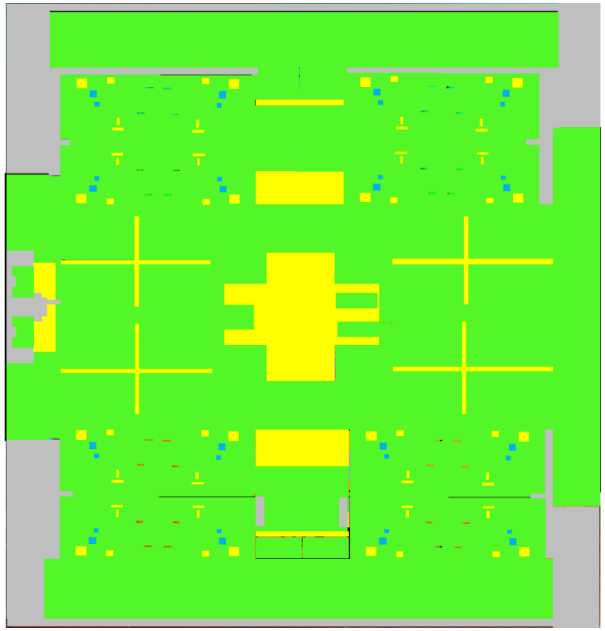
Reliability, Availability, Serviceability

Units	Error detection and correction scheme
Cache (Tag)	ECC Duplicate & Parity
Cache (Data)	ECC Parity
Register	ECC (INT/FP) Parity (Others)
ALU	Parity Predictive/Residue
Cache dynamic degradation	Yes
HW Instruction Retry	Yes
History	Yes

- New RAS features from SPARC64™ VII/VII+
  - ✓ Floating-point registers are ECC protected
  - ✓ #checkers increased to ~53,000 to identify a failure point more precisely

➡ Guarantees Data Integrity

SPARC64™ X RAS diagram



Green: 1bit error Correctable
Yellow: 1bit error Detectable
Gray: 1bit error harmless

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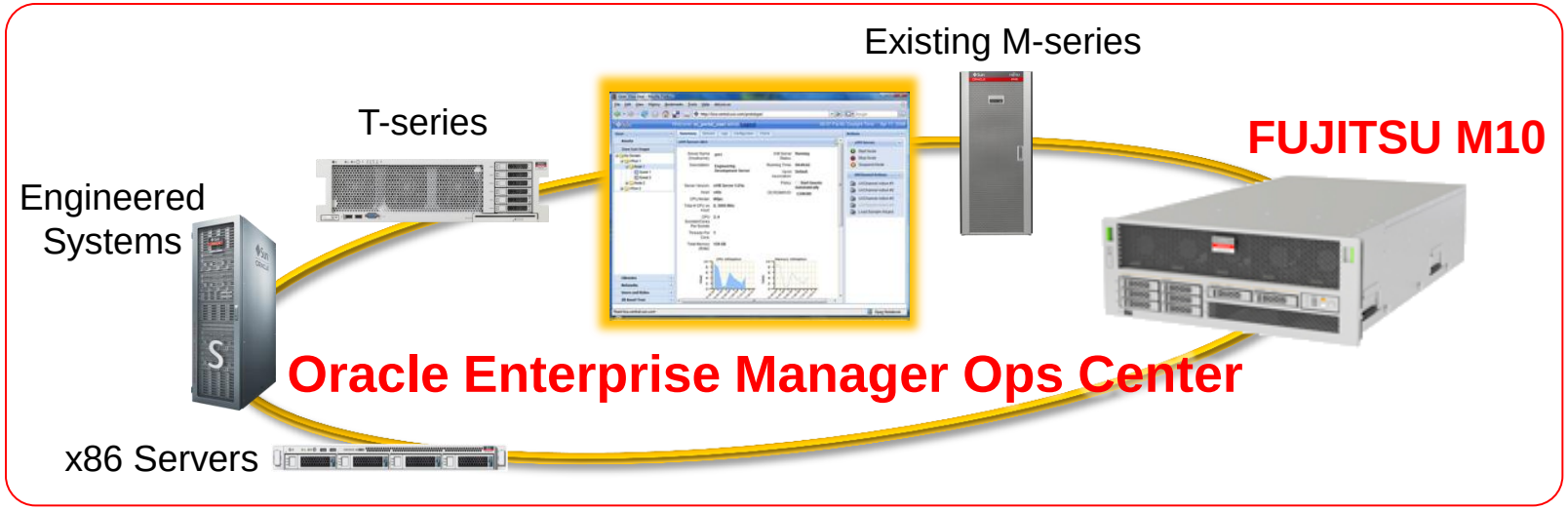
Easy Management

- Oracle Enterprise Manager Ops center -

- Single management tool for Oracle Systems will support FUJITSU M10 servers
- Simplify and reduce the cost of system management



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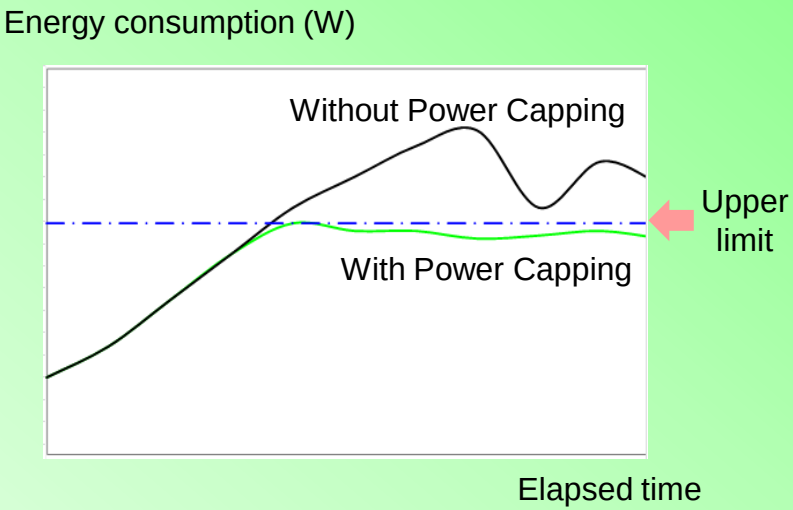
Green Technology

Power Capping

- Possible to set the upper limit of energy consumption



Power Saving

- Possible to set low-power level mode per hardware partition
- Reduce power of low-utilized hardware: FUJITSU M10 automatically identifies hardware in idle status and reduces power
  - ✓ Adjust energy consumption
  - ✓ Suppress clock event
  - ✓ Low-voltage operation

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Investment Protection (Both Hardware and Software)

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- Protect chassis investment
  - ✓ Add additional Building Blocks to increase capacity
  - ✓ Mix different processor speeds (plan for the next processor)
- Oracle Solaris 8 and 9 run on FUJITSU M10 with Legacy Oracle Solaris Containers
- Binary Compatibility (Solaris Binary Application Guarantee)
- Easy migration with P2V tool of Oracle Solaris Zones

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Best for Mission-critical Applications

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- Built to grow with customers' business
  - ✓ CPU Activation, Building Block architecture
- Business always run because protected by graceful RAS
  - ✓ Goal of no downtime
  - ✓ Hardware self-healing
  - ✓ Fault isolation by partitioning and Building Blocks
- Designed for high capacity and complex workload
  - ✓ World No.1 performance and scalability (Up to 1,024 cores)
- Maximize ROI, Minimize investment risk
  - ✓ Investment protection

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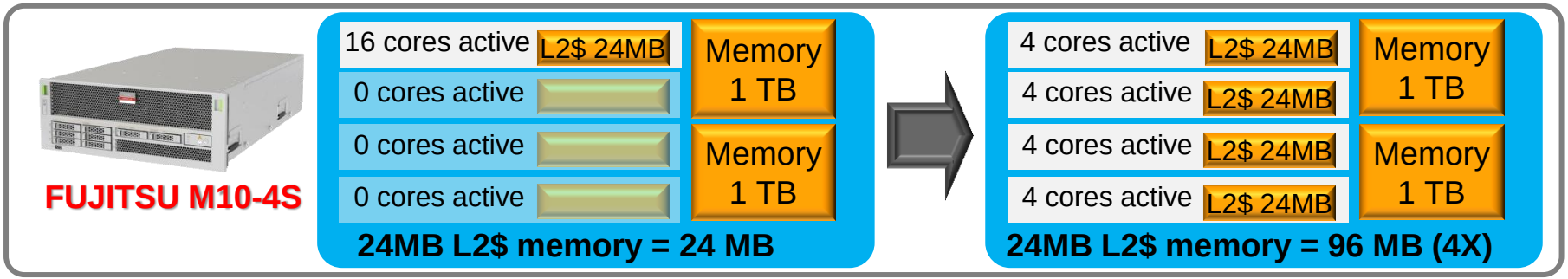
Best for Database, BA, BI Applications

- Software on Chip to accelerate Database applications
- Massive memory capacity
  - ✓ Up to 32 TB per system, 32 GB per CPU core
  - ✓ CPU allocation by CPU Activation can further increase memory/cache memory capacity per CPU core
- Extreme scalability suitable for Big Data
  - ✓ Ready for unpredictable increase of data and workload



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Development of High performance Processors

SPARC technology for both business and HPC workloads

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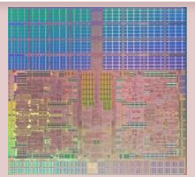
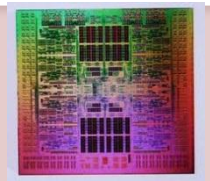
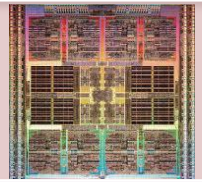
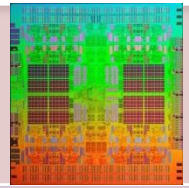
	2010	2011	2012	2013
	SPARC Enterprise	Supercomputer “K Computer”	PRIMEHPC FX10	Fujitsu M10 server
Die				
Processor	SPARC64 VII+	SPARC64 VIIIfx	SPARC64 IXfx	**SPARC64 X**
Frequency	3.0GHz	2.0GHz	1.85GHz	3.0GHz
Number of cores	4 cores/CPU	8 cores/CPU	16 cores/CPU	16 cores/CPU
Process	65nm	45nm	40nm	28nm

(*1) “K computer”: The nickname of “the next generation supercomputer” that RIKEN announced in July 2010.

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Product Images

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M10-1

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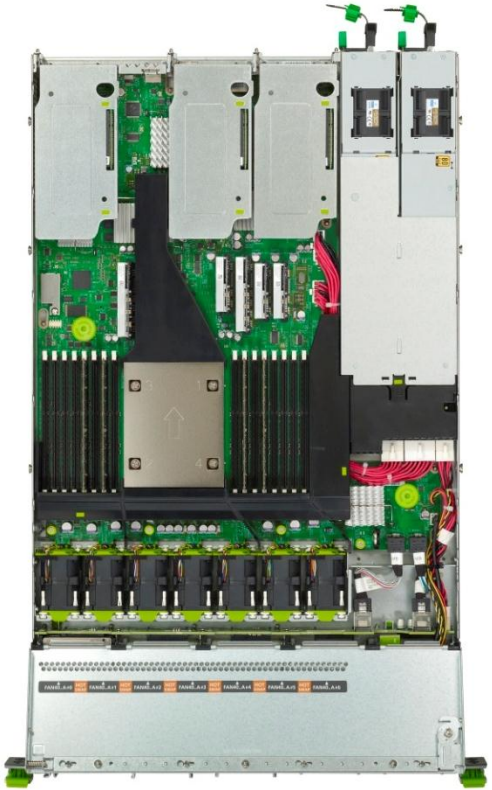
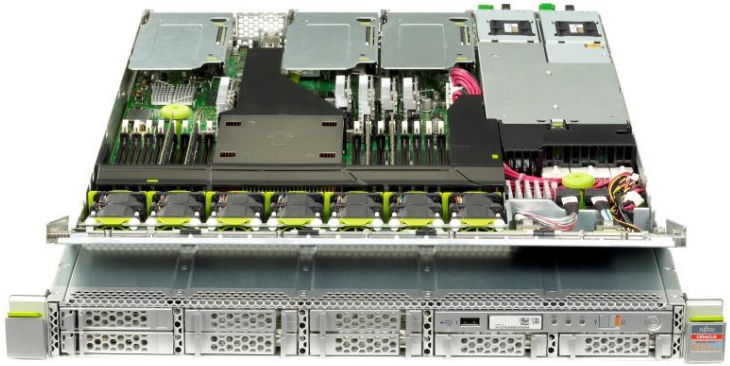
M10-1





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M10-4

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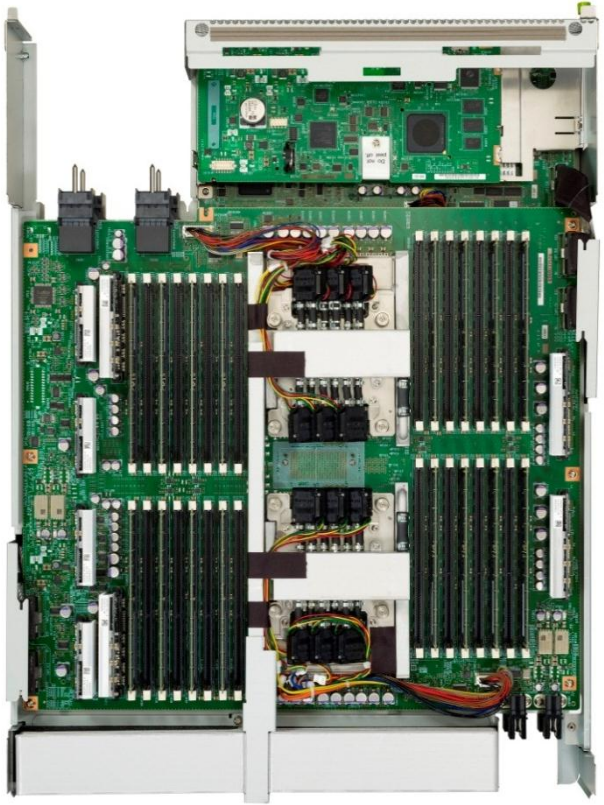
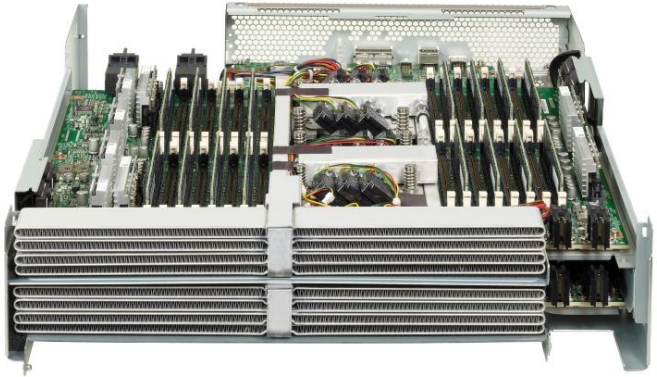
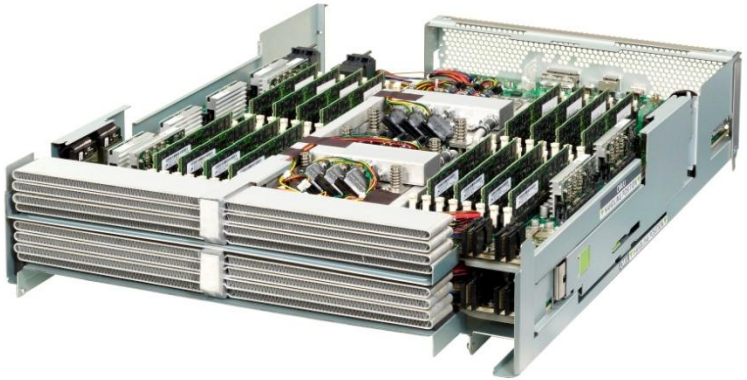
M10-4 System Board







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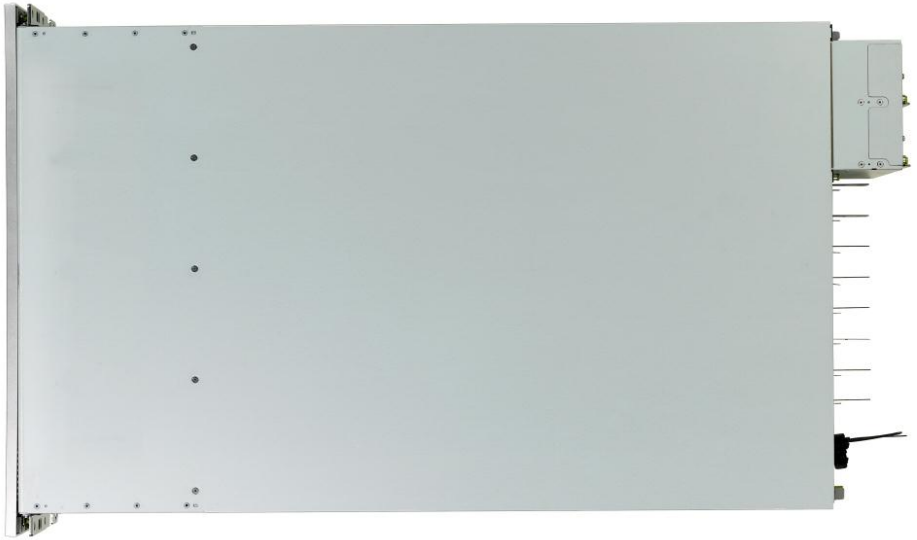
M10-4S



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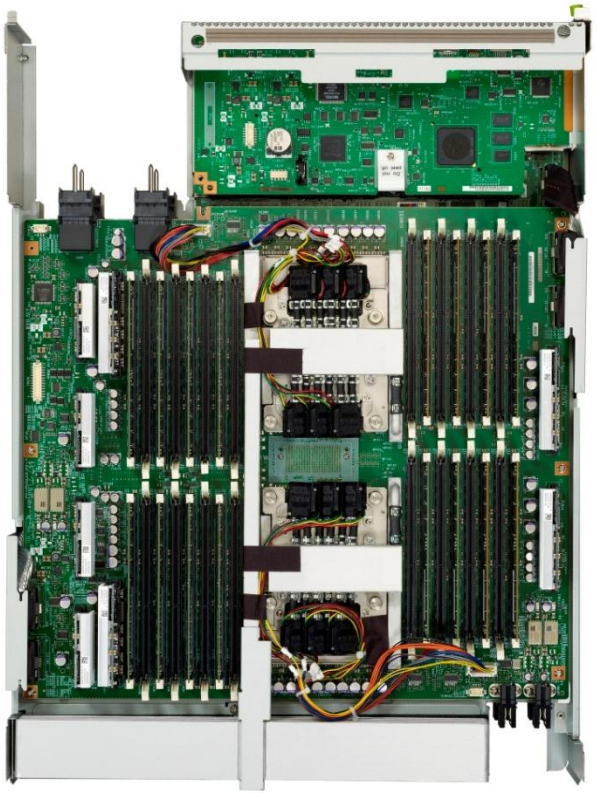
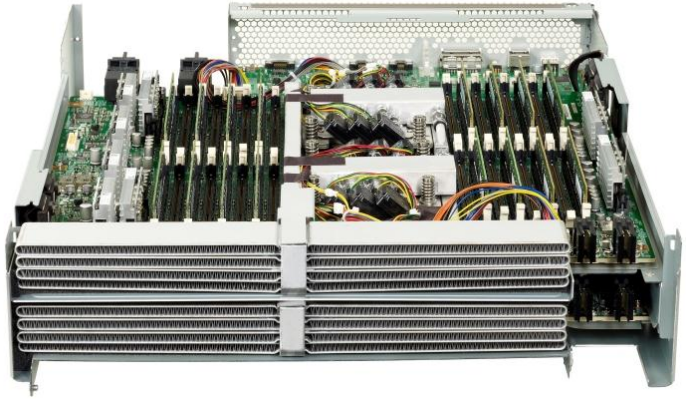
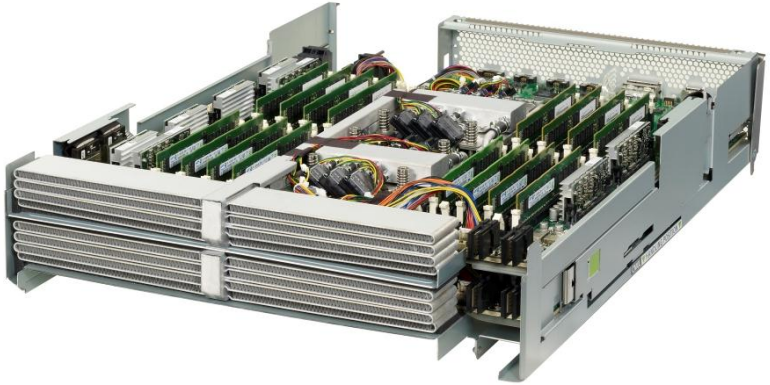
M10-4S System Board







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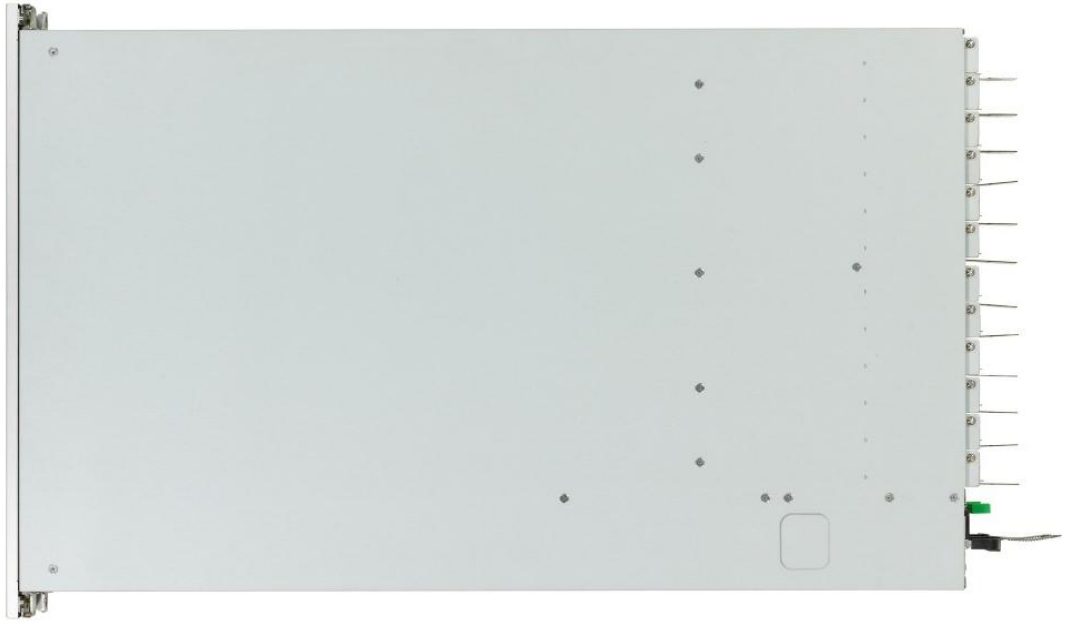
PCI Box



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1 Rack, 8 Building Blocks

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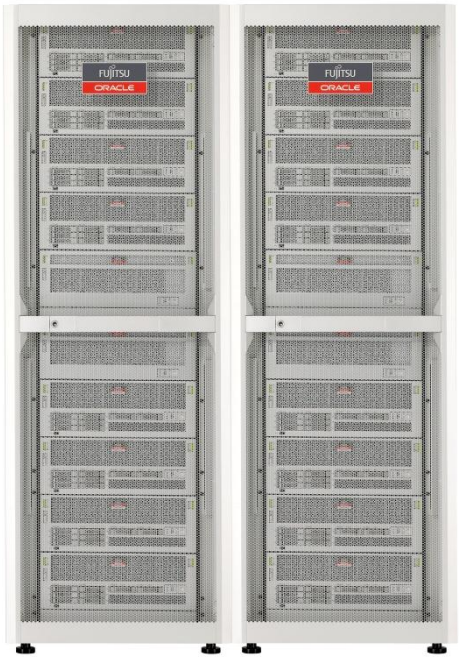
2 Racks, 16 Building Blocks



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Specifications

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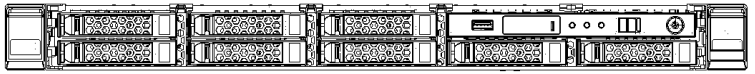
SPARC M10-1: Specification

		SPARC M10-1
CPU	Frequency	2.8 GHz
	Number of cores per CPU chip	16 cores
	Number of threads per core	2
	L1$ per core	64KB (I) + 64KB (D)
	L2$ per CPU chip	22MB
Memory	Number of slots	16
	DIMM type	DDR3
	Max capacity	512GB
HDD	Number of HDD bays	8
PCI slot	Number of slots	3(*1)
	PCI standard	PCI Express 3.0
Form Factor		1RU
Max Power consumption		870W



Front view

Rear view

*1: In addition, Possible to connect PCI Expansion unit

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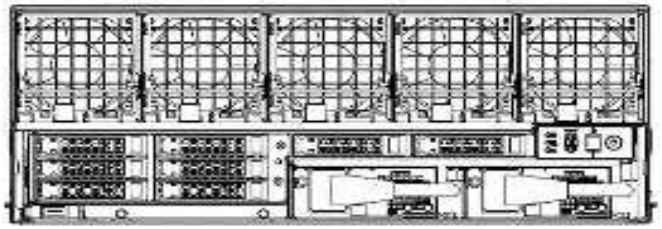
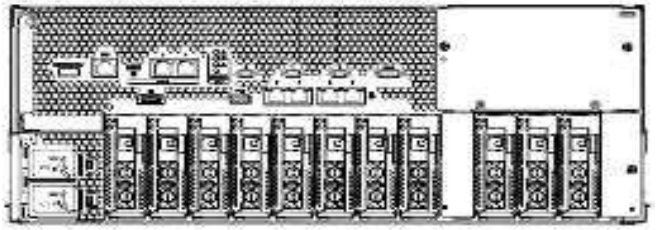
SPARC M10-4: Specification

		SPARC M10-4
CPU	Frequency	2.8GHz
	Number of Max CPU	4
	Number of cores per CPU chip	16 cores
	Number of threads per core	2
	L1$ per core	64KB (I) + 64KB (D)
	L2$ per CPU chip	24MB
Memory	Number of slots	64
	DIMM type	DDR3
	Max capacity	2TB
HDD	Number of HDD bays	8
PCI slot	Number of slots	11(*1)
	PCI standard	PCI Express 3.0
Form factor		4RU
Max Power consumption		2,600W



Front view



Rear view

*1: In addition, Possible to connect PCI Expansion unit

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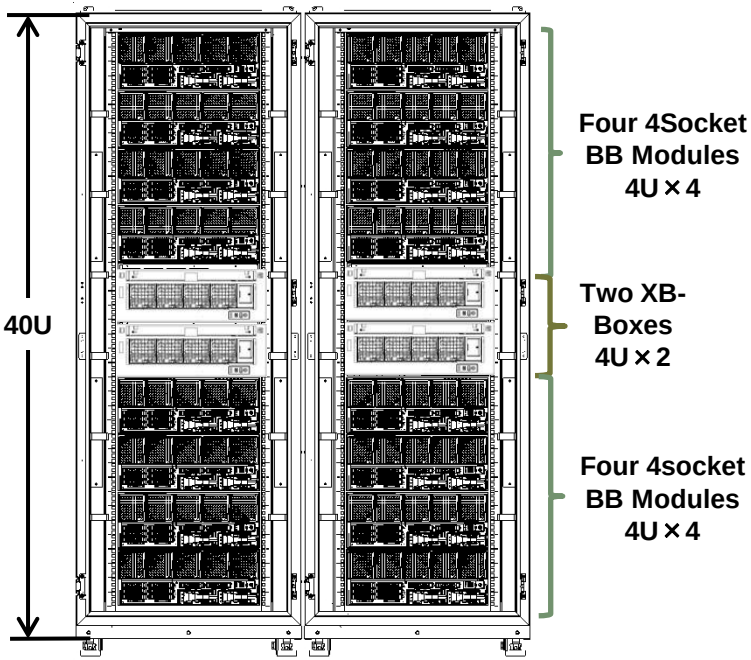
SPARC M10-4S: Specification

		SPARC M10-4S(Building Block model)		
Configuration		**1BB**	**4BB**	**16BB**
CPU	**Frequency**	3.0GHz		
	Number of cores per CPU chip	16 cores		
	Number of threads per core	2		
	L1$ per core	64KB (I) + 64KB (D)		
	L2$ per CPU chip	24MB		
	Maximum Number of CPU chip	4	16	64
	Maximum Number of CPU core	64	256	1024
Memory	**Number of slots**	64	256	1024
	DIMM type	DDR3		
	Max capacity	2TB	8TB	32TB
HDD	**Number of HDD bays**	8	32	128
PCI slot	**Number of slots**	8(*1)	32(*1)	128(*1)
	PCI standard	PCI Express 3.0		
Form factor		4RU	16RU	40U Rack x2
Max Power consumption		2800W	11kW	50kW



*1: In addition, Possible to connect PCI Expansion unit

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