FUJITSU COMPUTERS SIEMENS

Hardware Product

RM600 CS42 Enterprise Server

Reliant Cluster Server II Model

RM600 CS42 - Enterprise Server for unbeatable performance

The RM600 CS42 server generation has been developed to meet the very highest requirements in the UNIX enterprise server class. It is based on the tried-and-tested RM600 E systems, which offer a hardware platform ideally suited for server consolidation. In design, technology and performance, they set standards in keeping with the overriding importance of your information technology infrastructure to the competitiveness of your company.

In day-to-day corporate life, RM servers prove their worth not only by virtue of their technical superiority, but also because of their cost-effectiveness in operation. This covers long-term considerations of the total cost of ownership (TCO) just as much as the reliability of a long-term development strategy that is based on continuity. Make sure you get the picture - and let yourself be convinced of the performance muscle of a server family that is making its mark in the UNIX market.

The CS42 Enterprise Server provides you with two independent systems in one cabinet, which can be expanded to form a cluster with two nodes. (Cluster in a Box).

This design allows youi to utilize both the cabinet and the footprint to the full.
Based on the innovative system architecture of the RM600 E systems, the entire performance spectrum of the Reliant UNIX servers is available in the RM600 CS42 system, with up to 24 processors and 24 gigabytes in a single cabinet (2 nodes).
The following components are supplied ready configured with the cabinet:

RM600 CS42 (2 nodes)

- 1 Ethernet port for console connection and for LAN applications.

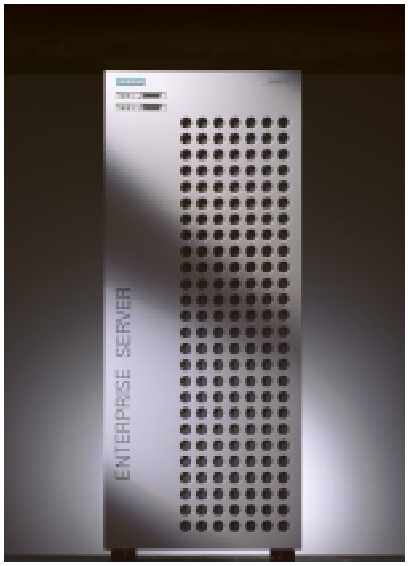
Cluster options:

- Failover Edition with live monitoring via Ethernet
- Scalability Edition with Cluster Interconnect via SCI or Ethernet

The combination of these elements in a single cabinet provides a wide range of options to set up powerful cluster configurations.

The external dimensions of the cabinet have been carefully chosen to ensure that the cabinet will fit through any standard doorway, both height-wise and width-wise, complete with its packaging.

This configuration enables rapid deployment at the required location in your data center. The RM600 CS42 is designed to meet your requirements, delivering ready-to-run high-availability solutions direct from the factory.



Space-saving design concept

The cabinet comes with all the components required , including those for cluster installation, such as remote communication adapter and Ethernet hub, permanently preinstalled. Therefore all you need for both systems is a single LAN access facility. By interconnecting a number of cabinets, either stringing them closely together or with greater distances between them, it is thus possible to implement large configurations as compact functional units or as disaster recovery solutions.

Investment protection

Thousands of RM server systems prove themselves day in, day out, in organizations of all sizes, across all sectors of trade and industry. The benefit for you is system stability, based on tried-and-tested technology. By engaging in close dialogue with our customers we also receive constant suggestions and ideas arising out of real-world use of the systems, and all this practical experience is fed into further developments at the same time as we integrate innovative technologies. In this process we are constantly guided by the principle of binary compatibility based on the standardized Reliant UNIX operating system. For you as the customer, this consistency pays off in the long term, as your RM server upgrades are also guaranteed in the future. Another bonus is the stability of Siemens, one of the leading IT suppliers operating in the international markets.

Cost-effectiveness

If you compare our performance offering on the basis of cost, we will gladly direct your attention to the outstanding scalability of the RM600 CS42. This model represents a tailor-made configuration incorporating precisely those performance features that your company needs today.

If your requirements change, we can respond quickly and upgrade your RM600 CS42 to match the growth in need, simply by adding further components. There are virtually no limits to your flexibility, or ours. In any node, for example, main memory can be expanded to a maximum of 12 GB and the number of processors can be increased to 12 with an almost linear rise in performance.

High availability

You can rely on the high availability (HA) of the RM600 CS42, anytime and anywhere. Many companies base their decision to opt for our RM servers on this consideration, which is of considerable relevance in view of the importance of trouble-free IT operation.

The RM600 CS42 server satisfies customer requirements in all areas of commercial data processing. The many installations handling online transaction processing (OLTP), data warehousing (DWH) and mission-critical applications (R/3, BAAN) are impressive confirmation of this.

Technology

The impressive system performance, exceptional scalability and high availability of the RM600 CS42 are based on its advanced symmetrical multiprocessor (SMP) architecture. This supports dynamic load balancing and parallel processing of applications on multiple processors. It enables up to 12 processors to be interconnected in one node to match individual performance requirements. Up to 24 processors are available in a “Cluster in a Box”. Further nodes are added if performance requirements exceed these levels. In the RM600 CS42, optimally tuned system configurations, state-of-the-art processor boards and bus systems translate the high processor performance into top-class data throughput rates. The evidence is clear: the RM600 CS42 offers the flexibility to cope effortlessly with increasing performance requirements.

Technical openness

Integration into existing data center installations is made easy thanks to the availability of all today’s most common drivers and interfaces. Connection of RAID, FC600 E (Fibre Channel disk subsystem), tape libraries, robot systems and other storage subsystems is possible via Fibre Channel or SCSI with load balancing. Today more than ever, heterogeneous installations including NT servers are deployed in many data centers with RM servers.

Reliant UNIX

For many years now, the Reliant UNIX operating system has amply demonstrated its power and technical maturity in business-critical applications. UNIX 95 branding for the current 64-bit version of the Reliant UNIX operating system underlines this standardization strategy for maximum openness, reliability and stability.

High availability

With the RM600 CS42, the requisite level of availability can be provided through the installation and combination of different standard components according to your requirements:

- Uninterruptible power supply (UPS). The signaling links to the system ensure data consistency and fast database restart following a protracted power failure.
- Redundancy and online replacement (OLR) for fans, system power supply (optional) and mirrored hard disks.

New performance features

Fibre Channel

Fibre Channel is a technology that grew out of concerns about high availability. Basic fault detection mechanisms are an integral part of the specification. To ensure operation can continue even if a connection goes down, Fibre Channel uses redundancy and multipath technology. The user data is stored in FC600 E cabinets or in RAID systems connected to the server via redundant Fibre Channel connections .

Cluster Interconnect

Cluster Interconnect (CI) is based on Scalable Coherent Interface (SCI) technology and allows a high-performance point-to-point connection between two nodes in a cluster configuration. With the Reliant Cluster Server II (RCS), Siemens provides the basis of cluster technology for failover clusters and for database clusters with ORACLE or INFORMIX. Ethernet, Fast Ethernet and Gigabit Ethernet are the preferred communication protocols for Cluster Interconnect links for failover and for covering great distances.

PCI 64-bit subsystem

Using this new technology it is possible to achieve a high I/O capacity with a 64-bit bus width and a high I/O performance based on a 64-bit EHIOS PCI subsystem. In addition to the new 64-bit FC and Gigabit Ethernet controllers, all 32-bit PCI controllers of the RM600 E series can also be used, such as the new WAN and ISDN communication controllers.

System architecture

The RM600 CS42 UNIX SMP server consists of standardized functional units. The 128-bit Synchronous Pipelined Bus (SPbus), which is clocked at 55 MHz, forms the backbone of the central unit. The processor boards with their local main memory are directly connected to the SPbus, as also are the enhanced high-performance I/O boards (EHIOS) with the PCI subsystems for connecting the I/O controllers. The PCI I/O controllers are used to connect mass storage devices, communications facilities and LAN.

Processor board

A single processor board can accommodate up to four R12000/285 MHz processors and up to 4GB of main memory. Processors and main memory can be upgraded in the field.

Processor daughterboard

Each processor daughterboard features a MIPS R12000 Risc processor and an onboard second-level cache (SLC) of 8 MB on the CS42 model. The SLC uses copy-back memory technology and has error correction code (ECC) protection.

ccNUMA architecture

In choosing the ccNUMA architecture (cache-coherent Non-Uniform Memory Access) we are helping to give a major boost to memory access speeds and at the same time significantly increase the data throughput of the overall system - Performance to delight not just IT specialists but also cost-conscious customers.

I/O cabinet

RM600 CS I/O (24” rack)

Up to 72 (36/node) further PCI slots can be accommodated in an add-on cabinet, thereby offering a large number of additional I/O connection options.

Expandability of an RM600 CS42 node

Components	
System cabinet, each node expandable with:	
Processor board for max. 4 processors (individually pluggable)	1 - 3
Number of processors	1 - 12
Main memory: per processor board per system	 256 MB - 4 GB max. 12 GB
1st local PCI subsystem with EHIOS board (basic) with submodule (SM) **PCI subsystem local** **SCI adapter,** optional	2 x V.24 (console, Teleservice) Submodules: 1x8SE, 2x16SE and 1xETH 2 PCI buses each 3x32-bit, 3x64-bit data width 0 – 1 x SCI ring adapter
EHIOS-SCI **with 4 submodule slots** (optional)	Interface for 2 SCI rings for external PCI subsystems 0 – 3 x ETH 10/100 bit/s or 0 – 4 x SCSI 16-bit/DF or 0 – 1 x SCSI 8-bit/SE
2nd local PCI subsystem **with 4 submodule slots** (optional) **SCI adapter,** optional	2 PCI buses each 3x32-bit, 3x64-bit and 0 – 3 x ETH 10/100 Mbit/s or 0 – 4 x SCI 16-bit/DF or 0 – 1 x SCSI 8-bit/SE 0 – 1 x SCI ring adapter
EHIOS-CI	2 ports for SCI Cluster Interconnect
SCSI strings in the system cabinet: 8-bit SE 16-bit SE	 1 x for removable media drives 2 x for system disks
Remote communication adapter	TCP/IP Ethernet, 10BaseT / RJ45 connection
8 Port HUB (Class II Repeater)	every 10/100Mbps (RJ45)
Drive bays for hard disks	2 x 5

Maximum values are in part mutually exclusive

Expansion cabinet, expandable with:	**0 - 4**
Hard disk bays **PCI subsystem, external** (per 12 PCI slots)	36 0 - 1

24“ I/O cabinet, expandable with:	**0 - 1**
2*PCI subsystem, external (per 12 PCI slots)	2*(1 – 3)

FC600 E cabinet	**0 - 4**
expandable up to 48 HD drives with:	1-4 disk chassis per 12 drives

Max. disk capacity in TB with 18-GB drives and max. no. of cabinets	6 TB formatted
Terminal / printer connection	via commercially available terminal servers
PCI controllers (per PCI subsystem) WAN X.21/V.24/V.35 ISDN S_0 ISDN S_{2M} Fibre Channel 100 MB/s Fast-Ethernet 100 Mbit/s Gigabit Ethernet FDDI (SAS/DAS) Token Ring ATM 155 Mbit SCSI Ultra, 16-bit ESCON Adapter	 0 – 12 0 – 12 0 – 8 0 – 8 0 – 8 0 – 4 0 – 2 0 – 2 0 – 4 0 – 12 0 – 2
Teleservice	Modem and Tele-X software
Redundant power supply	Optional
Console	Connection via LAN

Technical Data
RM600 CS42 node

MIPS R12000 processor

Clock speed (MHz)		285
0.35µ technology		
6,100,000 transistors		
Processing width (bits)		64
Floating-point unit (FPU)		on chip
Memory management unit (MMU):		on chip
Primary cache		
- instruction cache	(KB)	32
- data cache	(KB)	32
Second-level cache controller		on chip
Second-level cache (MB)		8
Cache management		2-way associative
Processor performance (estimated)		
RM600 CS42 with SLC 8 MB :		
- for one CPU (SPECint95)		17
Throughput :		
- for 12 CPUs (SPECint_rate95)		1780

(**Note**: 1 MB = 2^{20} bytes, 1KB = 2^{10} bytes)

Processorboard

Individually pluggable processors	1 - 4
RAM on board	max. 4 GB
RAM upgrade increments	256 MB

Number of processor boards

RM600 model CS42 / node: max. 3

Main memory configuration

SDRAM 256 MB in 64-Mbit technology, multibit error detection and 1-bit error correction (ECC).
Maximum onboard main memory capacity over multiple processor boards with:
RM600 model CS42 / node: 12 GB

Hard disks

3½" hard disk drives (16-bit, Fast SCSI-2) in rackmount chassis for direct plugging into system and expansion cabinets:

Hard disk drive [3]	**9 GB**	**18 GB**	**9 GB**	**18 GB**
Net capacity (GB)	9.1	18	9.1	18
Number of cylinders	5952	7	6526	7
Number of heads	20	24	16	24
Speed (rpm)	**7200**	**7200**	**10,000**	**10,000**
Average latency time (ms)	4.17	4.17	2.99	2.99
Avg. positioning time (ms)	7.5/8.5²	7.9/8.7[2]	5.4/6.2[2]	6.2/6.8[2]
Data transfer rate (MB/s)	20	20	20	20

MTC drives

MTC drive 8mm	**7/14[1] GB**
- Form factor	5¼" HH
- Helical scan recording (mm)	8
- Storage capacity, formatted (GB)	7/14[1]
- Tape speed ips	0,436
- Tracks per inch	1638
- Average data transfer rate (MB/s)	0.5/1
- Rewind time (s)	130

MTC drive 8mm	**20/40[1] GB**
- Form factor	5¼" HH
- Helical scan recording (mm)	8
- Storage capacity formatted (GB)	20/40[1]
- Average data transfer rate (MB/s)	3/6[1]
- Data search speed (MB/s)	87.5/175[1]
- Rewind time (min)	< 2

MTC drive ¼-inch	**4/8 MB**
- Form factor	5¼" HH
- Storage capacity, formatted (MB)	4/8[1]
- Serpentine recording	On 46 tracks
- Average recording speed (KB/s)	387

MTC drive 4mm (DAT)	**12/24[1] GB**
- Form factor	3½"(1.6 inch)
- Storage capacity, formatted (GB)	12/24[1]
- Helical scan recording (mm)	4
- Average data transfer rate (KB/s)	1000
- Recording format	DDS3

CD-ROM drive (32xspeed with caddy)

- Form factor	5¼" HH
- CD-ROM media	650 MB
- Format	ISO 9660
- Data transfer rate (MB/s)	2-4.8 MB/s
- Average seek time (ms)	85

Floppy disk drive

- Form factor	3.5"
- Storage capacity, formatted (MB)	1.44
- Data transfer rate (Kbit/s)	500

[1] with data compression
[2] read/write
[3] 1 MB = 10^6 bytes, 1 GB = 10^9 bytes

Installation Data

Cabinet type	System cabinet CS42	I/O cabinet RM600 CS I/O
Electrical specifications		
AC power input (V)	208 - 240	208 - 240
Power input tolerance (%)	+6 / -10	+6 / -10
Rated frequency (Hz)	47 - 63	47 - 63
Power consumption (VA)	2x970+27/Hub +25/RCA *)	810 *)
Effective power (W)	2x1000*)	810 *)
Rated current (A)	5 *)	3 *)
Mechanical specifications		
H (mm)	1825	1825
WxD (mm)	730x930	730x930
Weight (kg) *)	400	400

*) in maximum configuration

AC power connection

Cabinet type: CS42 system cabinet and I/O cabinet:

230 V (Europe): 3-phase, standard power cable for Europe with CEE connector, circuit breaker: 16A slow-acting, power-off switch

120/208 V (North America): 2-phase connection (L6-30P), 2-phase per power supply unit, power-off switch, circuit breaker: 16A slow-acting

Service and maintenance area

Front: 1000 mm x 730 mm Back: 800 mm x 730 mm

Environmental conditions (valid for all cabinets)

Operation	Class 3K2 to EN 60721-3-3	**Transportation**	Class 2K2 to EN 60721-3-2
Temperature (°C)	15 - 32	Temperature (°C)	-25 to +60
Rel. humidity (%)	10 - 75	Rel. humidity	max. 75% at 30 °C
Altitude above sea level	3000 m	Altitude above sea level	12,000 m

Mechanical conditions (valid for all cabinets)

Operation	Class 3M2 to EN 60721-3-3	**Transportation**	Class 2M2 to EN 60721-3-2
Mech. active subst.	Class 3S2 to EN 721-3-3	Mech. active subst.	Class 2S1 to EN 721-3-2
Chem. active subst.	Class 3C2 to EN 60721-3-3	Chem. active subst.	Class 2C2 to EN 60721-3-2

Compliance with standards (valid for all cabinets)

Safety	**EMC specifications**	**Noise level** (per cabinet to ISO 9296; in operation)	
	EN 55022-B	Noise output level	L_{WAd}: 7.5 B
EN 60950	EN 500082 T2	Workplace-related noise output level for	
UL 1950	FCC Class A (USA)	cabinet type: CS42, 72-drive, 24“ I/O	L_{pAm}: 55 dB
CSA 22.2 No. 950	CSA 108.8 Class A (Canada)		

Certifications: GS, CB, CSA $_{NRTL/C}$, conformity declaration (CE)

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