FUJITSU COMPUTERS
SIEMENS

Hardware product

RM300 model E

Server for Reliant UNIX®

Based on an innovative and flexible system design, the RM300 E UNIX® servers offer scalable performance by single-processor and dual-processor systems. They can be expanded to up to 2 GB of main memory and offer two powerful SCSI subsystems (Ultra-1 with up to 40 MB/s). For the internal connection of disk drives optionally ultra-2 operation with up to 80 MB/s is possible.

The use of forward-looking technologies and their further development based on the same system architecture ensure the ability to run applications for a long time to come. This is reinforced by such things as the flexible housing design, which allows use of the

same basic arrangement in both standalone and rack configurations.

The high-availability capabilities are exemplary, including ECC-secured main memory, redundant power supplies, hot-replace hard drives and power supply units, warm replace of accesible drives.

With the accompanying peripheral cabinets, an RM300 E configuration today attains a storage capacity of up to more than 2 TB.

As a result of great ease of maintenance and comprehensive server management, service and administration costs are considerably reduced.

The new RM300 E models form the bridge to the new generation of enterprise UNIX servers. With characteristics that up until now were not to be found in this device class, they are a cost-effective alternative for the highest demands in the midrange departmental server segment.

Extensive high-availability functions and use of the latest technologies provide for secure and expandable operation of Reliant UNIX solutions both now and in the future.

The new Quad- Processor Line   RM300 **E**

RM300 E70	RPI: 17,5- 33,7
1 .. 2 R12000, 285 MHz, 4 MB SLC	
RM300 E60	RPI: 15,7 - 29,7
1 .. 2 R10000, 250 MHz, 4 MB SLC	
RM300 E50	RPI: 12,4 - 23,3
1 .. 2 R10000, 200 MHz, 2 MB SLC	

RM300 E25	RPI: 9,8
1 R5000, 300 MHz, 2 MB SLC	
RM300 E10	RPI: 6,4
1 R5000, 180 MHz, 0.5 MB SLC	

Max. main memory	**2 Gbyte**
Hard- disk capacity	**144 Gbyte** (intern)
16-bit Ultra-2 SCSI	**80 Mbyte/s**
Internal RAID	**Levels 0, 1, 5**

Drive bays:	4 x 3,5" (hot replace), 3 x 5,25"
I/O Slots:	3 PCI, 2 EISA, 1 PCI/EISA
Ethernet:	10/100 Mbit/s
Redundant Power Supply option	

Reliant UNIX 5.44 and 5.45® operating system

The RM300 E models require a 64-bit Reliant UNIX 5.44 operating system and further releases. This new Reliant UNIX version offers 64-bit innovations such as support for large main memory, file systems, and address spaces. Naturally, Reliant UNIX 5.44 and 5.45 are fully compatible with previous versions.

Application areas

Based on its broad scalability and diverse functionality, the RM300 E can be used in the widest variety of functions.

To be emphasized here are applications such as:

- Application server e.g. BAAN, R/3
- Cluster server e.g. in connection with OBSERVE, RMS or OPS
- Database server e.g. the use of ORACLE or INFORMIX
- Internet server
- Multiuser system

System cabinet

- Innovative compact housing can be used as tower or 19" rack insert.

- Hard disk subsystem with up to 4 "hot-replace" hard disks
- 3 drive bays for external accessible drives
- Integrated floppy disk drive
- RAID possible inside the system cabinet; RAID-1 or RAID-5
- Redundant "hot-replace" power supply units optional
- Integrated server management hardware for diagnosis and monitoring
- Insertion and removal of expansion cards without tools
- Remote diagnosis and maintenance for power supplies and fans
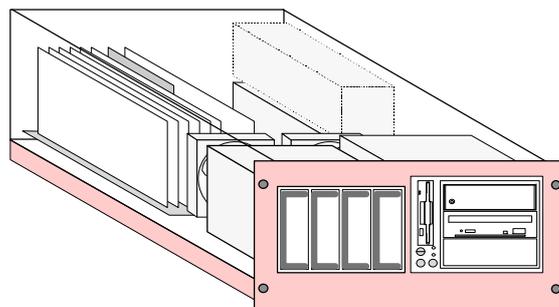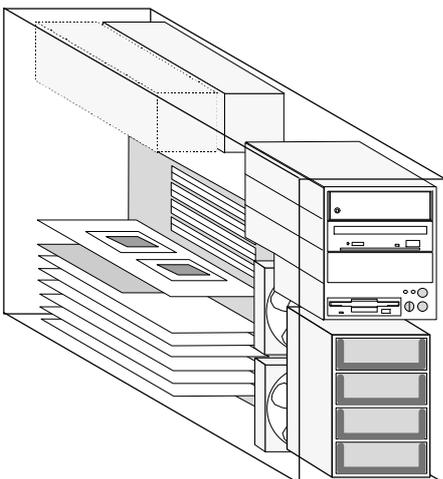
System board

On the system board, the essential basic functions of the system are implemented using the following components:

CPU boards:

- R5000 mono-processor board, 180 MHz, 0.5 MB second level cache (SLC) or

- R5000 mono-processor board, 300 MHz, 2 MB second level cache (SLC) or

- R10000 basic processor board, 200 MHz, 2 MB SLC, upgradeable to 2 CPUs, or

- R10000 basic processor board, 250 MHz, 4 MB SLC, upgradeable to 2 CPUs, or

- R12000 basic processor board, 285 MHz, 4 MB SLC, upgradeable to 2 CPUs.

- **64-bit CPU bus:**
  64 bits wide, up to 528 MB/s, links the CPU boards with the system controller.

- **System controller:**
  Bus coordinator between CPU, main memory, and I/O bus

- **64-bit memory bus:**
  64 bits wide, up to 528 MB/s, connects the main memory with the system controller.

- **Main memory:**
  4 slots for memory modules with 64, 128, 256, and 512 MB for a maximum capacity of 2048 MB. The modules are ECC-protected.

- **Slots for controllers**
  3 PCI controllers
  2 EISA controllers
  1 slot for PCI or EISA controller

- **LAN controller Ethernet**
  with a transfer rate of 10/100 Mbit/s for 10BaseT/100 Base TX connection

- **Two SCSI controllers**
  with a transfer rate of up to 40 MB/s for operating magnetic disks and accessible drives. The internal magnetic hard disks can be operated at up to 80 MB/s with the appropriate controllers.
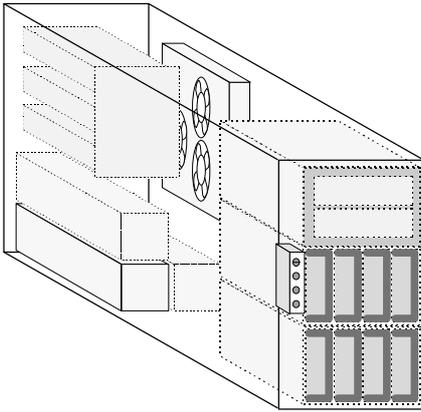
- **Graphics controller**
  with 2 MB storage for operating a graphics display

- **I/O controller with the following interfaces:**
  - Four V.24, 38.4 Kbit/s with modem support
  - Mouse and keyboard ports
  - Bitronics parallel interface for printer connection (Centronics-compatible)
  - Floppy disk interface

Hardware architecture RM300 E
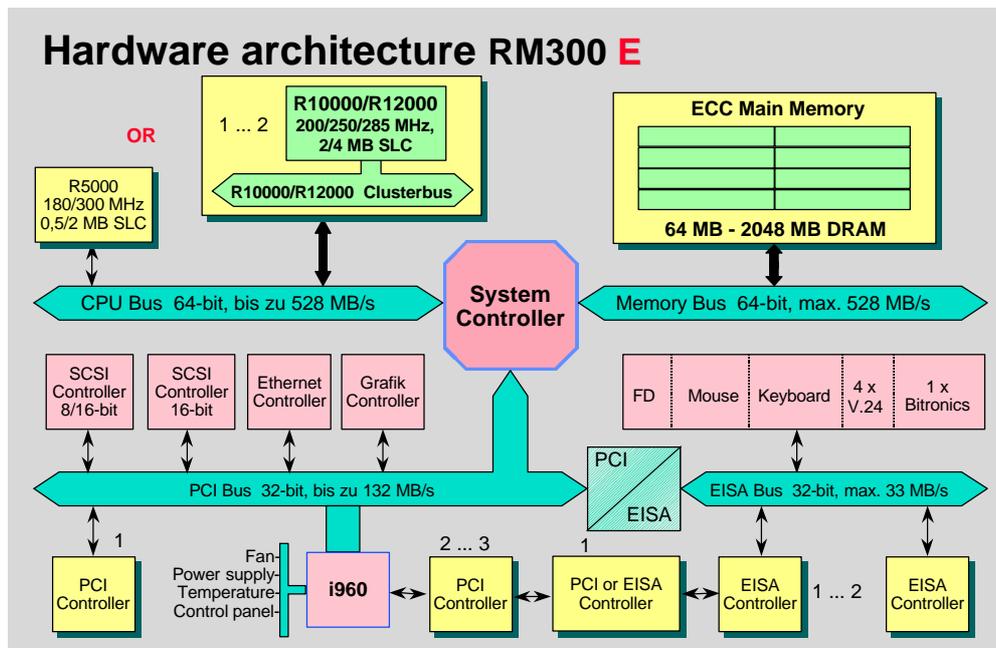
Peripheral cabinet

- Innovative compact housing, can be used as tower or 19" rack insert
- 3 drive cages, each for holding up to 4 "hot-replace" hard disks or up to 2 external accessible drives
- Control of the drive cages via separate SCSI channels
- Use as standard or RAID SCSI subsystem
- Optional switching modules for high availability
- Optional redundant "hot-replace" power supply units
- Integrated server management hardware for diagnosis and monitoring
- Up to 432 GB disk capacity possible

High availability

Continuous operational readiness and a high degree of fault tolerance were essential development goals for the new RM300 E models. They support up to 2 GB of ECC-protected main memory (error correction code). The 512 KB, 2 MB, and 4 MB second level cache (SLC) memories of the MIPS processors are also ECC-protected and thus ensure constant data integrity in server operation.
The hard disks in the system can be replaced during operation ("hot replace") and can be secured against data loss through the use of RAID technology.

System diagnosis

The network capability of the server management, supplemented by a graphical configuration tool, supports remote monitoring of the RM300 E models.
All status information and all measured values are received by centralized hardware found on the system board, stored, and passed to the appropriate management software. This hardware module monitors the entire system, including the attached peripheral cabinets.
For this purpose, a processor system based on the i960 microprocessor, including battery-buffered memory, is maintained on the system board. The information involved includes, among other things, temperature measurements relative to housings, power supply units, and fans, as well as status information regarding the power supply and drives.

Console

An operating screen can be connected as console via the I/O controller on the system board. This can also be a graphical display. In normal operation it is also possible to operate the system without a console.

Graphical monitor

A 15", 17" or 21" graphics monitor can be connected to the graphics controller present on the system board. All monitors conform to the MPR II standard. The use of LCD flat panel displays is also possible.

PCs and workstations

Workstations and X terminals are connected directly to Ethernet. PCs can be connected to serial interfaces (V.24, IHSS) or directly to Ethernet. PCs can be operated with a variety of terminal emulations.

Printers

Printers are generally equipped with a V.24 interface and/or a parallel interface. Therefore, in addition to possible connections via the V.24 interfaces, there is also the option of a direct connection via the Bitronics interface on the system board. By means of this interface it is also possible to operate a printer with a Centronics interface.

Communication

LAN

For connecting the systems to local area networks the following controllers are available:

- On-board Ethernet
  - 10/100 Mbit/s
  - 10BaseT or 100BaseTX connection conforming to IEEE 802.3
  - TCP/IP, OSI, and SNA protocols

- Fast Ethernet controller
  - as 1-channel and 4-channel version
  - 10/100 Mbit/s
  - 10BaseT and 100BaseTX connection conforming to IEEE 802.3
  - TCP/IP, OSI, and SNA protocols

- Gigabit Ethernet controller
  - 1000 Mbit/s
  - 1000BaseSX connection conforming to IEEE 802.3z
  - TCP/IP, OSI, and SNA protocols

- Token ring controller
  - 4/16 Mbit/s
  - Conforming to IEEE 802.5
  - TCP/IP and SNA protocols

- FDDI controller
  - 100 Mbit/s
  - Single or dual attached station
  - TCP/IP protocol

ATM

The controller to connect the systems to ATM networks is as follows:

- ATM controller
  - 155 Mbit/s SONET/SDH glass fiber connection
  - Support for the ATM adaption layer AAL5
  - 1024 simultaneous active VCs
  - Protocols: TCP/IP via
  - Classical IP over ATM
  - LAN Emulation

  .

WAN

The controllers to connect the systems to wide area networks of the various types are as follows:

- EWAN-L controller (1- port)
  - V.24 or X.21 interface
  - 64 kbit/s synchronous
  - Protocols: TCP/IP, NEA, OSI, SNA, X.25, X.32, PPP, Frame Relay

- PWXV controller (2-port)
  - 2 x V.24 /V.35/X.21 interfaces controlled by smart cable
  - Maximum aggregated data transfer rate 4 Mbit/s
  - expandable to 4 ports with submodule
  - Protocols: TCP/IP, NEA, OSI, SNA, X.25, X.32, PPP, Frame Relay

- ISDN S_0 controller ICCS0
  - Basic card with one S_0 interface
  - Expandable with a second S_0 interface or G3 fax (14.4 Kbit/s)
  - each S_0 with two B-channels with 64 kbit/s and one D-channel with 16 kbit/s
  - D-channel signaling: 1TR6 or DSS1 (Euro ISDN)
  - Protocols: TCP/IP, NEA, OSI, SNA, X.25, X.32, PPP

- ISDN S_0 controller PWS0
  - Basic card with two S_0 interfaces
  - each S_0: two B-channels with 64 kbit/s and one D-channel with 16 kbit/s
  - D-channel signaling: 1TR6 or DSS1 (Euro ISDN)
  - Protocols: TCP/IP, NEA, OSI, SNA, X.25, X.32, PPP

- ISDN-S_{2M} controller PWS2
  - 30 B-channels and 1 D-channel with 64 Kbit/s
  - D-channel signaling DSS1 (Euro ISDN)
  - Protocols: TCP/IP, NEA, OSI, SNA, X.25, X.32, PPP

Other controllers

- Fibre Channel
  - Multimode fibre optic
  - Connecting external sub-systems: PXRE and EMC[2] Symmetrix
  - Max. transfer rate 100 MB/s
  - Bridgeable distances max. 500 m direct, with HUBs and single-mode fibre optics up to 10 km possible

- RAID controller
  - 1 SCSI interface on basic board
  - 2 additional interfaces can be added with expansion card
  - RAID modes: 0, 1, 5
  - Max. transfer rate 80 MB/s

Teleservice

The RM300 E system can be connected to a service center via modem and telephone network for remote diagnostics. The connection is made via a V.24 interface on the system board and via an external modem.

Technical Data

RM300	E10	E25	E50	E60	E70
Processor	R5000	R5000	1 - 2 R10000	1 - 2 R10000	1 - 2 R12000
Clock rate (MHz)	180	300	200	250	285
Floating Point Unit	on chip	on chip	on chip	on chip	on chip
First level cache per processor (KB)					
- data	32	32	32	32	32
- instructions	32	32	32	32	32
Second Level Cache per processor (MB)	0,5	2	2	4	4

Main Memory					
Number of modules per system	1 - 4				
Capacity per module (MB)	64/128/256/512				
Capacity overall (MB)	64-2048				

Interfaces on the system board					
Ethernet controller	1				
SCSI controller (8/16 Bit)	1				
SCSI controller (16 Bit)	1				
V.24/Bitronics interfaces	4/1				
Processor board slots	1				
PCI-/EISA-bus slots	3/1/2				

Hard disk storage (expandability)					
Hard disks in the system cabinet	1 - 4				
Hard disks in the peripheral cabinet	1 - 12				
Max. disk capacity (TB**)	über 2				

Hard disk configurations (technical data)					
Capacity per drive formatted (GB*)	4.5	9.1	18	9.1	18	36
Form factor	3½" sl	3½" sl	3½"	3½" sl	3½"	3½"
Revolutions per min.	7.200	7.200	7.200	10.000	10.000	10.000
Mean positioning time (read/ write) (ms)	7.4/8.2	6.9/7.4	6.9/7.4	5.2/5.8	5.2/5.8	5.2/6.2
SCSI-2 interface	16 bit ultra-2	16 bit ultra-2	16 bit ultra-2	16 bit ultra-2	16 bit ultra-2	16 bit ultra-2

* 1 GB = 10^9 byte

** 1 TB = 10^{12} byte

CD-ROM drive

Speed	32X
Form factor	5 ¼", half-height
Medium	CD, no caddy
Interface	SCSI-2
Capacity range (MB)	650/741
Data format	ISO 9660
	or
	High Sierra
Average access time (ms)	90
Data transfer rate (kB/s)	4800

Magnetic tape cassette drive, 8 mm (with data compression)

	7-14 GB	20-40 GB
Capacity (GB, form.)	7.0	20.0
Capacity compr. Typical (GB)	14.0	40.0
Form factor	5 ¼", HH	5 ¼", HH
Interface	SCSI-2	SCSI-2
Recording format	8 mm helical scan	
Recording speed (KB/s) native	1000	3000
(KB/s) w/ compression	2000	6000

Magnetic tape cassette drive, DLT 7000 (with data compression) 35-70 GB

Capacity native (GB)	35.0
Capacity with compression	
With appropriate data structure, higher compression rates are also possible.	
Typical (GB)	70.0
Form factor	5¼", full-height
Interface	SCSI-2
Recording format	SPR (symmetrical phase recording)
Recording speed (KB/s) native	5000
(KB/s) with compression	10000

Magnetic tape cartridge drive, ¼ "

Capacity, native (GB)	0.5	4
with compression (GB)	--	8
Higher compression factors are possible, depending on the data structure.		
Form factor	5 ¼", half-height	5 ¼", half-height
Interface	SCSI-2	SCSI-2
Recording format	QIC 525/150	QIC 2GB/ 1000/525
Recording density (bpi)	16000	49550
Data transfer rate (Kb/s), native	200	380
with compression	--	760

Diskette drive

Form factor	3½"
Capacity net (MB)	1.44
Support for MS-DOS formats	Yes

Magnetic tape cassette drive, 4 mm (DAT)

	4-16 GB	12-24 GB
Capacity native (GB)	4.0	12.0
Capacity compressed Typical (GB)	8.0	24.0
Capacity compressed Max. (GB)	16.0	
Form factor	3 ½"	3 ½"
Interface	SCSI-2	SCSI-2
Recording format	DDS-1	DDS-1
	DDS-2	DDS-2
		DDS-3
Recording speed (kB/s) native	510	1000
(kB/s) w/compression	1000	2000

Magnetic tape cassette changer, 4 mm (DAT autoloader) 72-144 GB

Capacity without compression (GB) per cassette	12
Total	72
With compression (GB, typical) per cassette	24
Total	144
With appropriate data structure, higher compression rates are also possible.	
Form factor	5 ¼"
Interface	SCSI-2
Recording format	DDS-1
	DDS-2
	DDS-3
Recording speed (kB/s) native	1000
(kB/s) with compression	2000

In addition, depending on the operating system, all standalone devices released for the RM family can also be used on the RM300 E models, such as DLT7000, 8 mm MTC changer, ½" MTC (3490), Optical Disk Library.

Installation data

<table>
<tr><th colspan="2">Ambient conditions (as per DIN EN 60 721-3)</th><th colspan="2">Standards adhered to</th></tr>
<tr>
<td>Climatic environmental conditions
(maximum operating range):
- Temperature (°C)
- Relative humidity (%)
Transport:
- Temperature (°C)
- Relative humidity (%)</td>
<td>Class 3K3
5 to 40
5 to 85
Class 2K2
-25 to 60
15 to 98</td>
<td>Product safety and
ergonomics:</td>
<td>IEC 950, EN 60950, UL 1950
CSA 950, ZH1/618</td>
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<tr>
<td>Mechanical environmental conditions
Operation
Transport</td>
<td>
Class 3M2
Class 2M1</td>
<td>Electromagnetic
- Interference
- Resistance:</td>
<td>Compatibility:
EN 55022, class B
EN 50082-2</td>
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<td>CE</td>
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<td>CE designation:</td>
<td>Low-voltage guideline LVD
73/23/EEC
EMV guideline 89/339/EWG</td>
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<tr>
<td></td>
<td></td>
<td>Certifications:</td>
<td>GS, UL (USA); cUL (CND),
CB certificate</td>
</tr>
</table>

Cabinet variants	System cabinet		DU41 peripheral cabinet		BG50 peripheral box for SCSI devices
Electrical values:					
Rated voltage	100 - 240 V		100 - 240 V		100 - 240 V
Line voltage tolerance	+6/-10%		+6/-10%		+/-10%
Rated frequency	50 Hz/60 Hz		50 Hz/60 Hz		50 Hz/60 Hz
Rated current	max. 2.6 A at 240 V		max. 2.8 A at 240 V		max. 0.5 A at 240 V
	max. 5.5 A at 100 V		max. 7.1 A at 100 V		max. 1.0 A at 100 V
Power draw					
Active power (=heat dissipation)	max. 600 W		max. 725 W		max. 74 W
Apparent power	max. 600 VA		max. 725 VA		max. 148 VA

Size and weight	Standalone	19" rack	Standalone	19" rack	
Height (mm)	481	266 (6HE)	481	266 (6HE)	110
Width (mm)	220	483	265	483	215
Width with base (mm)	278	-	324	-	
Depth (mm)	700	754	748	720	405
Weight (kg)	max. 40	max. 45	max. 50	max. 50	max. 7

Noise output (ISO 9296)			
Noise generation level L_{WAd}	6.5 B	6.5 B	4.6 B
Workstation-related noise level L_{pAm}	45 dB	45 dB	33 dB

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