



an hp technical
white paper

september 2002

hp server rp2405

table of contents

introduction to the hp server 05 series.....	3
enterprise-class high availability	3
industry-leading functionality	3
easy ordering and deployment	3
introduction to the hp server rp2405.....	4
overview and illustration.....	4
operating system support and binary compatibility.....	5
architecture.....	7
minimum and maximum memory configurations.....	8
I/O subsystem design	8
booting over I/O	9
speeds and feeds.....	10
scalability	10
rp2405 industrial design and packaging.....	11
racking in hp cabinets	11
racking in third-party cabinets	11
standalone or desktop configuration.....	11
high availability.....	12
hot-plug disk drives	12
advanced ECC and parity in main memory	12
dynamic processor de-allocation.....	13
dynamic processor resilience.....	13
other high-availability features.....	13
manageability.....	14
comprehensive front-panel LEDs.....	14
hp event monitoring service.....	14
extended fault management system	15
multiple console options.....	15
secure Web console.....	15
LAN console (telnet)	16
ASCII terminals.....	16
remote console via modem connection	16
ordering information.....	17
for more information.....	17

introduction to the hp server 05 series

Today's business environment is changing in a fundamental way. Despite significant competitive pressures, businesses must increasingly stretch their IT budgets further. For many IT managers, this has created a challenging situation: whether to purchase systems that offer enterprise-level availability and functionality—or to buy more economical systems that sacrifice functionality and reliability. Regardless of the decision, many businesses find themselves making an uncomfortable trade-off between functionality and price. As the organization's reliance on its IT infrastructure increases, the importance of this trade-off decision can literally be a matter of business survival.

The HP 05 series servers address this new business reality by offering your business the ability to deliver top-line results without compromising on the bottom line. Designed for workgroup applications; front-end applications (such as caching, firewall, and workload balancing); and Web, application, and small database serving, 05 series systems offer the right performance while delivering the high-availability and manageability features you've come to expect from HP servers.

enterprise-class high availability

The 05 series servers from HP allow you to stretch your budget dollars further while offering enterprise-class high availability that no one else can match. Standard high-availability features on all 05 series servers include dynamic processor resilience, full error-checking and -correcting (ECC) protection, and HP's Event Monitoring Service (EMS) which provides proactive fault avoidance, detection, and notification. The 05 series product family also supports a wide range of high-availability software solutions to keep your business running, including industry-leading HP MC/Serviceguard.

industry-leading functionality

The 05 series products offer unparalleled opportunity to manage your server resources. Integrated features, such as HP Secure Web Console, give you the capability for full remote management, including centralized single-system and multi-system configuration. Other industry-leading capabilities include HP-UX Workload Manager (WLM), which allows various workloads to be managed to meet the service-level objectives of your business.

easy ordering and deployment

Designed for ease of ordering and deployment, the 05 series product line offers a full range of standardized configurations with the flexibility to meet immediate business requirements. Pre-configured with high-powered PA-RISC processors, and offering a choice of four pre-integrated and tested HP-UX 11i operating environments, 05 series servers can be put to work to rapidly address business demands. 05 series systems also offer industry-leading form factors that allow multiple servers to be racked in the data center, preserving valuable floor space and lowering operating costs.

introduction to the hp server rp2405

The new HP Server rp2405 was designed to meet the low-end needs of the enterprise data center, the remote office deployment, and the IP-based service provider market. Fulfilling the need for faster, smaller servers, the rp2405 delivers industry-leading symmetric multiprocessing (SMP) performance, with up to two PA-8700 processors in a 2-EIA-unit chassis. The two processors, coupled with 8 GB of main memory and four PCI slots, deliver a balanced system with outstanding price/performance and performance density.

The rp2405 series continues HP's tradition of in-chassis investment protection. ***get details from Kate****

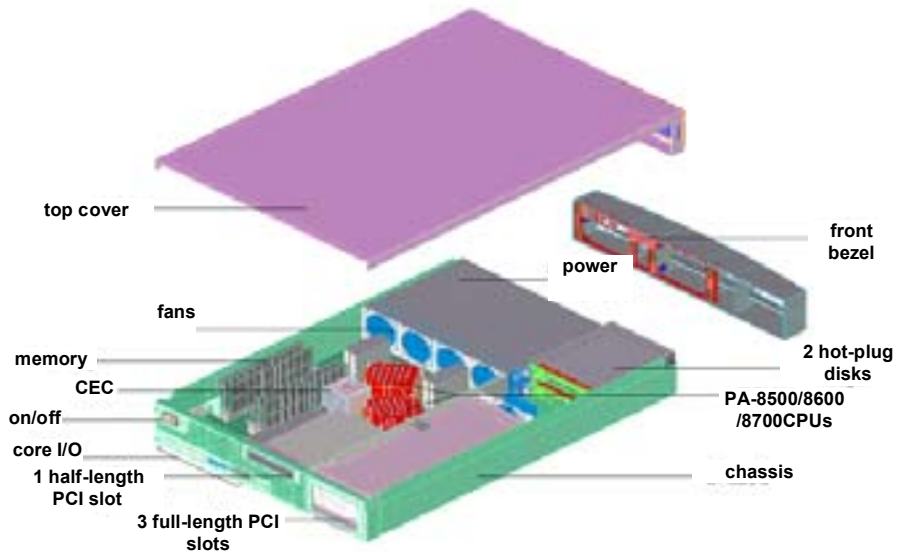
In addition, the rp2405 offers high-availability features normally found only in larger, more expensive servers. Hot-plug disks, memory scrubbing and page de-allocation, dynamic processor de-allocation and resilience, independent PCI buses, independent SCSI controllers, failure avoidance and notification capability, and MC/Serviceguard support are all standard.

All of these features are packed into a compact, 2-EIA-unit package—that's only 3.5 inches high! With up to 20 servers and 40 processors in a 2-meter cabinet, the rp2405 offers industry-leading performance density and availability. For those customers who don't need a cabinet, up to six rp2405 servers can be securely stacked on the floor. If desired, a pedestal stand allows customers to use a single server in a standalone vertical position.

overview and illustration

Figure 1 reveals the location of major components as well as the mechanical and architectural features of the rp2405. The server is partitioned into two main electrical assemblies—the system board and the I/O backplane—and into four main volumes: system, I/O, disk, and power.

figure 1. hp server rp2405 rear view showing internal components



The front of the server consists of the disk and power volumes. Two hot-plug Ultra 160 SCSI disk bays are accessible behind a hinged door on the left front of the server. The power system, made up of a single 600W power supply, extends across the rest of the front volume. The main fan system is located at the rear of the power system.

The rear of the server houses the main system volume as well as the removable I/O card bay. The system volume contains the system board, which houses up to two CPUs, eight DIMM memory slots, the core I/O, the extended fault management system, and one of the four available PCI I/O slots. The removable I/O card bay, at the left rear of the server, houses the three additional PCI I/O slots.

rp5405 features at-a-glance

- One or two 650 MHz PA-8700 64-bit CPUs
- 120 MHz system bus
- 512 MB to 8 GB of memory
- Two or four PCI I/O slots (66 MHz × 64-bit) with adaptive signaling
- Independent PCI buses for the I/O slots and core I/O
- Two hot-plug disk drives on two independent controllers
- 1.9 GB/s system bus bandwidth
- 1.9 GB/s I/O bus bandwidth (1.3 GB/s in the A7121A 1-way version of rp2405)
- 1.9 GB/s memory bus bandwidth
- HP-UX 11.0 and 11i operating system support
- High-density 2-EIA-unit, 3.5-inch rack mount or standalone package
- HP MC/Serviceguard support
- Out-of-box support for non-HP racks

operating system support and binary compatibility

The HP Server rp2405 supports the 64-bit HP-UX 11 operating system. Both versions 11.0 and 11i of this operating system can be used with the rp2405. With HP-UX 11, HP maintains its longstanding tradition of providing the industry's best record of investment protection. For instance, HP-UX provides forward binary compatibility, which means a fully bound application developed on an earlier version of HP-UX will run smoothly on HP-UX 11. Thus, current 32-bit and 64-bit applications can run without requiring recompilation. Additionally, HP-UX provides binary compatibility with the Itanium family of processors, facilitating the migration path to the next generation of server architectures.

The award-winning HP-UX 11i operating environment addresses the major computing challenges that server users face today in online transaction processing (OLTP), enterprise resource planning (ERP), supply chain management (SCM), server consolidation, telco billing applications, high-performance technical computing, and customer relationship management (CRM). HP-UX is also ideal for use in business intelligence systems and in Internet, scientific, and technical applications. This mainframe-class, 64-bit operating system enjoys the industry's greatest support from independent software vendors, allowing a choice of more than 15,000 applications—including native 64-bit versions of all major databases and leading ERP applications.

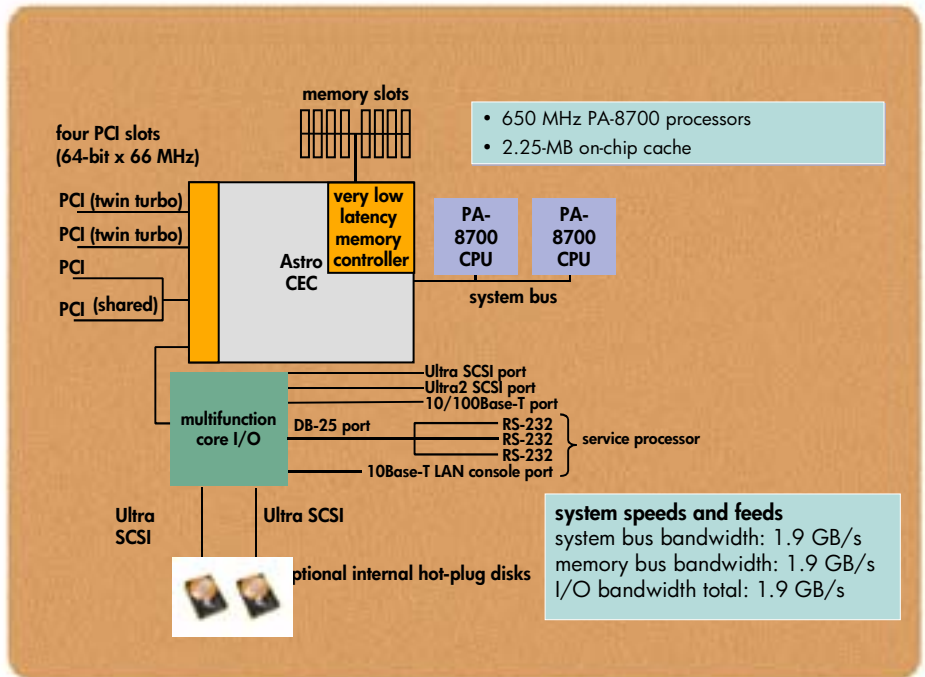
Major features of HP-UX 11i include:

- Performance and scalability
 - Optimized memory page sizing
 - Kernel threads
 - Network file system PV3
 - 64-bit journaled file system
 - Dynamic kernel tuning
- Enhanced Internet infrastructure
 - Java™ runtime
 - Java JIT compiler
 - Common Internet file system (CIFS) for secure HP-UX/Windows® interoperability
 - Bundled, industry-leading Web server software
 - Bundled search engine capability
 - E-speak dynamic brokering software
 - LDAP directory services
- Manageability
 - HP WebQoS for service-level management
 - Event monitoring service
 - System administration manager (SAM) and HP Servicecontrol Manager
 - Dynamic patching
- Security
 - IPSec
 - Common data security architecture (CDSA)

architecture

Figure 2 shows the relationship of the rp2405 (model A7122A) main blocks and the buses that connect them.

figure 2. architecture of the hp server rp2405 (model A7122A)



Processors, memory, and I/O are interconnected via an integrated high-speed core electronics complex (CEC). This CEC was specifically designed for the rp2405 to provide no-compromise features and performance at a low-end price point, as well as to offer important form factor benefits. Integrated within the CEC chip are the memory and I/O controllers, with several peripheral ASICs to control and drive the specific I/O and memory buses.

The integrated design contributes to a significant reduction in the memory latency over that found in previous-generation HP servers. The memory controller supports two sets of integrated four-slot memory arrays, providing a total of eight DIMM slots. The rp2405 can be configured with a minimum of 512 MB and a maximum of 8 GB of SDRAM memory.

A single 120 MHz front-side bus connects the CEC with up to two PA-RISC processors, providing up to 1.9 GB/s of bandwidth. The I/O controller provides seven 250 MB/s data channels distributed over the I/O slots and the core I/O. Please see page 9 for a detailed description of the I/O architecture.

The architecture of the rp2405 (model A7121A) is similar to that of the rp2405 (model A7122A). However, only one processor and only two PCI I/O slots are available in the A7121A. Also, the system allows a maximum of 2 GB of memory spread over the eight DIMM slots.

minimum and maximum memory configurations

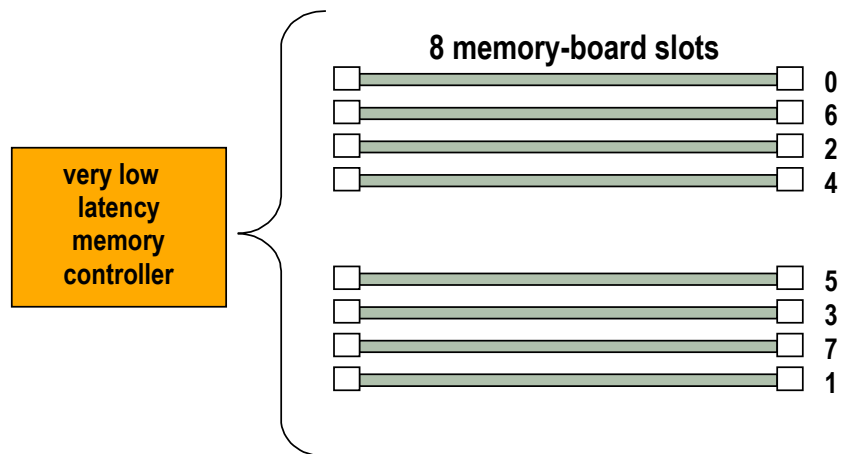
The rp2405 uses state-of-the-art SyncDRAM technology, which can be ordered in single-DIMM modules (128 MB) or in two-DIMM board pairs (256 MB, 512 MB, 1 GB, and 2 GB). The memory provides advanced error-correcting code.

The standard configurations of the rp2405 come with either 512 MB (2 x 256 MB DIMMs) or 2 GB (2 x 1 GB DIMMs). All DIMM sizes other than 128 MB must be loaded in pairs. Additionally, all memory slots must be filled in a specific sequence that is clearly labeled on the system board. (See **figure 1**.)

The rp2405 model A7122A maximum memory consists of eight 1 GB DIMMs (ordered as four 2 GB board pairs). The rp2405 model A7121A maximum memory consists of eight 256 MB DIMMs (ordered as four 512 MB board pairs).

Note that the 1 GB and 2 GB board pairs do not provide any value in the rp2405 model A7122A because the maximum memory can be achieved with the less-expensive 512 MB board pairs.

figure 1. hp server rp2405 memory slots (showing loading order of DIMM modules)



I/O subsystem design

The rp2405 model A7122A has seven I/O channels, each providing 250 MB/s of peak bandwidth. The channels are laid out to support two "twin-turbo" PCI slots, two shared PCI slots, and the core I/O.

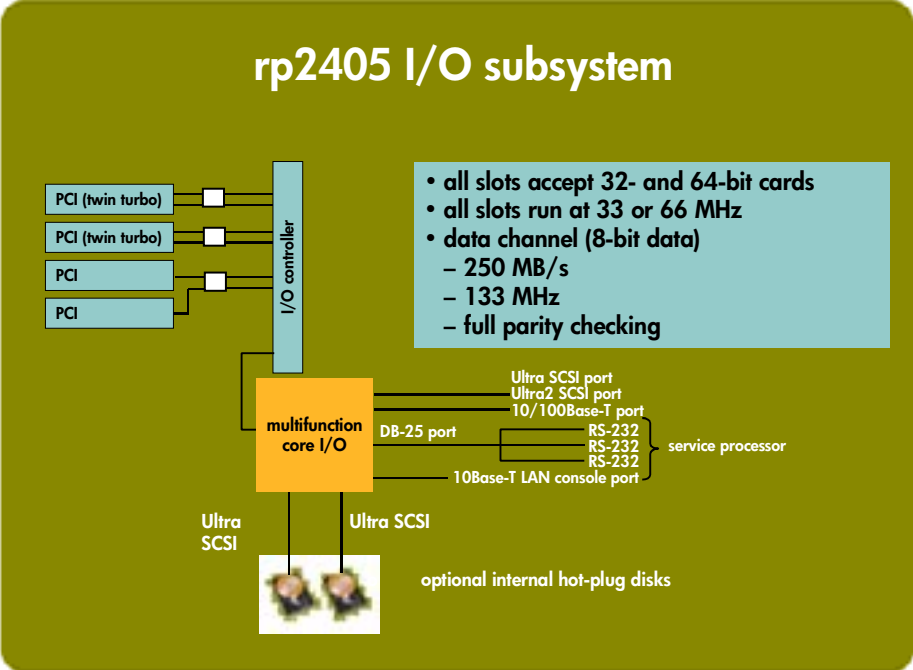
The term "turbo" refers to a PCI slot that has a dedicated I/O channel. The rp2405 has two twin-turbo slots, each with two dedicated channels. The dedicated, independent channels provide both performance and availability advantages. The twin-turbo slots, labeled slots 1 and 2 on the chassis, each provide 500 MB/s of peak bandwidth. The independent design prevents slow cards from affecting the performance of a fast card. Independence also provides error containment. For example, if the card in slot 1 presents a problem, the cards in slots 2, 3, and 4 will still function properly. The twin-turbo slots should be reserved for higher performing, multi-port cards.

Slots 3 and 4 share two I/O channels. If only one of these two slots is occupied, that slot will operate in twin-turbo mode, with 500 MB/s of dedicated bandwidth. If both slots are occupied, the I/O controller arbitrates the activity between them, providing 500 MB/s of shared bandwidth.

The seventh and final I/O channel provides 250 MB/s of dedicated bandwidth to the core I/O. The core I/O consists of two internal hot-plug disks, an Ultra2 SCSI connection, an Ultra SCSI connection, a 10/100Base-T LAN port, a 10Base-T management LAN port, and three RS-232 serial ports multiplexed from a single DB-25 connection.

All of the I/O slots in the rp2405 can accept 64-bit PCI cards. The rp2405 uses HP-developed adaptive signaling technology to automatically detect a card's performance features. The data width (64-bit or 32-bit) and the speed (66 MHz or 33 MHz) of the card are automatically detected to ensure that the card runs at the optimal level. One exception is the two shared slots; if one of the two shared slots contains a 66 MHz card and one contains a 33 MHz card, then both slots will run at 33 MHz.

figure 3. I/O subsystem in the rp2405 (model A7122A)



The rp2405 model A7121A has the same I/O features as the rp2405 model A7122A except for the number of PCI slots. Only the two twin-turbo slots are available in the rp2405 model A7121A; the two shared slots are not active.

booting over I/O

The rp2405 can boot from the internal disks, from the core external SCSI connections, or from any of the four I/O slots. Additionally, the system can be booted over the 10/100Base-T LAN connection as part of the HP-UX ignite process. Please refer to the *HP-UX Server Configuration Guide* for a list of I/O cards that support boot.

speeds and feeds

table 1. maximum bus bandwidths for the rp2405

	# of buses (or controllers)	maximum bus bandwidth	aggregate bus bandwidth
twin-turbo PCI slots	2	500 MB/s	1.0 GB/s
shared PCI slots	1	500 MB/s	500 MB/s
core I/O	1	250 MB/s	250 MB/s
I/O subsystem	1 (controller)	1.9 GB/s	1.9 GB/s
memory subsystem	1	1.9 GB/s	1.9 GB/s
CPU buses	1	1.9 GB/s	1.9 GB/s

scalability

The rp2405 is designed to offer the best scalability of any 1U or 2U server in its class, without trade-offs in CPU, memory, internal storage, or I/O expandability.

- **memory upgrades**—With eight available DIMM slots, the rp2405 supports a minimum of 512 MB up to a maximum of 8 GB of main memory.
- **internal storage**—The rp2405 supports up to two internal, low-profile hot-plug disk drives. Supported disk capacities include 18 GB, 36 GB, and 73 GB, for a maximum of 146 GB of internal storage.
- **in-chassis expansion upgrades**—An rp2405 can be fully upgraded to a 1-way or 2-way capable HP Server rp2470. Hence, rp2405 users can migrate to 750 MHz PA-8700 processing power while protecting their initial investment in chassis, memory, and I/O.

rp2405 industrial design and packaging

racking in hp cabinets

The HP Server rp2405 has been designed to fit into environments ranging from the data center to the utility closet to the desktop. The industrial design is coordinated with other HP servers and peripherals for a consistent appearance.

The rp2405 is designed to provide unprecedented performance density that easily adapts to different environments. At just 2 EIA units each (1 EIA unit= 1.75 inches), up to 20 servers can be installed into a single 2-meter HP cabinet. With the high cost of computer room floor space, the server's small footprint dramatically lowers total cost of ownership.

The rp2405 was designed for and tested in HP cabinets (A490xA). HP cabinets are the best option for customers who want to ensure that their rack environments offer the utmost in safety, ease of service, factory integration, and HP field support. The rp2405 field and factory rack kits contain advanced, high availability slider rails. These rails were designed to allow easy service access to the system. The system can be completely serviced without removing it from the rack, thus allowing racks of rp2405 servers to be installed side by side, a feature that can save substantial floor space in the data center.

racking in third-party cabinets

For customers who choose to use non-HP cabinets, the rp2405 server provides simple options for installation and HP field support. The field rack kit contains an adjustable mounting bracket that fits onto the high-availability slider rails. This bracket telescopes to mounting depths of 28 to 31.25 inches, allowing the server to be mounted in most four-post, third-party cabinets.

Once an rp2405 server is mounted in a third-party cabinet, it must meet some simple criteria to ensure that HP field personnel can fully support the rack environment:

- **anti-tip**—The rack or cabinet must be solidly anchored to the floor in both front and rear. This is usually accomplished by anti-tip feet or by direct bolting to the floor.
- **air flow**—The rp2405 uses front-to-back airflow to cool the unit. Thus, a cabinet cannot have a solid front or rear door. Solid doors may have to be removed or changed to an open-perforation pattern.
- **cable strain relief**—A proper method of strain relief must be used. This may require the elimination of the rear door in some cases.
- **front and rear access**—For proper cooling and ease of service access, HP recommends 32 inches of unobstructed floor space in the front and rear of rack installations. This recommendation applies to both HP and third-party racks and cabinets.

standalone or desktop configuration

If the installation does not call for a cabinet, the rp2405 is also available in a standalone or a stackable configuration. The standalone server is ideal for an office environment, under a desk, or on a shelf. A pedestal stand is included to secure the server in a vertical position, if desired. Additionally, up to six systems can be stacked directly on the floor. A stacking strap is included to secure the stacked systems and to maintain safety requirements.

table 3. hp server rp2405 dimensions

	length	width	height	max. weight
racked	25 in. (28 in. with bezel)	19 in.	3.75 in. (2U)	50 lbs
standalone	25 in. (28 in. with bezel)	17 in.	3.44 in.	45 lbs

Note: a few extra inches of length may be needed to manage cables in the rear of the server.

high availability

The rp2405 has numerous high-availability features that are unmatched in its class. Standard features on every server include hot-plug disks, memory scrubbing and page de-allocation, dynamic processor de-allocation and resilience, independent PCI slots, independent SCSI controllers, failure avoidance and notification capability, and MC/Serviceguard support.

hot-plug disk drives

The rp2405 supports up to two hot-plug, Ultra160 SCSI disks accessible from the front of the server. These disks can be removed and inserted while the server continues to operate.

Two dual-channel SCSI controllers manage the two internal hot-plug disks. For added availability, the disks are on separate SCSI controllers. Thus on systems running HP Mirrordisk/UX, a SCSI controller, SCSI channel, or root disk could fail and the server would continue to run properly. Furthermore, each of the internal disks can be mirrored to external storage connected on a separate channel and controller.

The rp2405 contains circuitry to properly control the disk's power and reset during the hot-plug operation. Either SAM (System Administration Manager) or the MESA suite of online diagnostic software can be utilized to effectively de-configure and re-configure the disk. Both of these tools are available as a standard feature of the HP-UX operating environment.

advanced ECC and parity in main memory

Data stored in the rp2405's main memory is protected by error checking and correcting (ECC) code and address/control parity. The ECC design provides memory scrubbing and page de-allocation functionality that will tolerate single-bit SDRAM failures without requiring DIMM replacement.

The data controllers generate ECC bits and store these ECC bits with the data in the DIMMs. When reading the data back, the data controllers are able to detect and correct single-bit data errors. Although double-bit data errors cannot be corrected, these errors are highly unlikely because the data and ECC bits are stored at one bit per SDRAM chip, which means that multiple SDRAM chips would have to be involved in the error.

The system also detects address and control parity errors to prevent data corruption that might occur because of reading or writing to the wrong location in main memory. The address controller and each address buffer generate address and control parity. Each address buffer detects address and control parity problems and reports it back to the address controller. There are three levels of address buffers as the address lines fan out. These address buffers are located on the system board, on each memory carrier, and on each DIMM.

dynamic processor de-allocation

Incorporated into version 11 of the HP-UX operating system, this feature provides the ability to de-allocate a processor—that is, take it out of service while the system is running—without interrupting applications. Once a processor is de-allocated, the HP-UX operating system will immediately transfer all application processes that are currently scheduled on that processor to other active processors. If the processor has been assigned to handle interrupts for any I/O drivers, it will continue to do so while it is de-allocated.

dynamic processor resilience

PA-RISC processors have the ability to detect and correct single-bit cache errors. The Event Monitoring Service (EMS) keeps track of the rate of correctable errors in each processor's on-board cache. These errors are manifested as low-priority machine checks (LPMCs). While occasional correctable errors are to be expected in the on-board cache, too many of these errors in a short period of time indicate an increased likelihood that a non-correctable cache error could occur. The EMS LPMC monitor can continuously monitor the rate at which LPMCs are occurring and dynamically de-allocate a processor, using the dynamic processor de-allocation facility. This technology is referred to as "dynamic processor resilience."

other high-availability features

Other HA features in the HP Server rp2405 include:

- **independent PCI slots**—Two of the four PCI slots are on independent PCI buses, which means that cards in these independent slots are unaffected by failures in other cards.
- **failure avoidance and notification**—The rp2405 has several features that monitor system features, take corrective actions when necessary, and notify administrators if pre-defined thresholds are reached. See the next section, on manageability, for more information on the manageability features.
- **hp mc/serviceguard support**—The rp2405 supports MC/Serviceguard for high-availability clustering solutions. MC/Serviceguard software is not included with any of the rp2405 servers. It must be ordered as an additional feature.

manageability

The rp2405 has several features that simplify system management, including the LED front panel, the Event Monitoring Service, and the extended fault management system. Moreover, the servers provide multiple console options to meet both local and remote administrative needs.

comprehensive front-panel LEDs

The LEDs on the front panel are the best way for an operator to get simple, fast, server management information. These LEDs, which are clearly labeled on both the plastic front bezel and the metal chassis, convey information by their color (green, yellow, or red), and often also by flashing. The five LEDs and a description of some key messages are as follows:

- **run**—green: normal system operation; flashing green: system operating, no OS code
- **attention**—flashing yellow: non-critical operator intervention required
- **fault**—red: critical operator intervention required; flashing red: unexpected reboot, system recovered
- **remote**—yellow: remote console enabled via modem
- **power**—green: system power on; flashing green: system in standby mode

hp event monitoring service

The HP Event Monitoring Service (EMS) is a system monitoring application designed to facilitate remote or centralized real-time monitoring and error detection for HP products in the enterprise environment. This framework provides centralized management of hardware devices and immediate notification of hardware failures and system status. HP EMS can receive data on unusual activity, add information about the problem's source, and provide recommendations on problem resolution.

HP EMS consists of a set of system and network monitors within a monitoring environment. This monitoring framework has an easy-to-use interface and provides a mechanism for monitoring resources, registering monitoring requests, and sending notification when resources reach user-defined critical values. EMS monitors are available for a variety of hardware, including disks, disk arrays, network adapters, memory, and network switches.

How it works:

1. A hardware event monitor detects abnormal behavior in one of the hardware resources (devices) it is monitoring.
2. The hardware event monitor creates the appropriate event message, which includes suggested corrective action, and passes it to the Event Monitoring Service.
3. EMS sends the event message to the system administrator using the notification method specified in the monitoring request (for example: e-mail, telephone page, message to the console, or entry in a system log).
4. The system administrator (or Hewlett-Packard service provider) receives the messages, corrects the problem, and returns the hardware to its normal operating condition.
5. Events can also be passed to MC/Serviceguard. If desired, MC/Serviceguard can provide failover to a redundant hardware resource.

extended fault management system

The rp2405 employs an innovative fault management system that aids administration and problem diagnosis. This hardware-based system is entirely independent of the operating system, allowing administrators to diagnose problems even in the unlikely event that the system is unable to boot.

The extended fault management system allows system power to be remotely turned on or off, and the fault management system has battery backup that allows diagnosis even if the main power has failed. The service processor interfaces to key system components via an inter-integrated circuit (I²C) bus to continually monitor the status of system fans, temperature, and power supplies.

Major features of the extended fault management system include:

- System console redirection
- Console mirroring
- Configuration of system for automatic restart
- Viewing history log of system events
- Viewing history log of console activity
- Setting inactivity timeout thresholds
- Remote system control
- Telnet capability to other server extended fault management systems
- Power control, with remote power on and off
- Viewing system status logs
- Configuration of virtual front-panel display
- Event notification to system console, e-mail, pager, and HP Response Centers
- Auto system restart
- Virtual front-panel display
- Power consumption, power supply status, and temperature monitoring
- External ambient air temperature
- Fan operation
- Password security (same level as UNIX[®])

multiple console options

The HP Server rp2405 supports multiple management console options, a LAN console, ASCII terminals, and remote and modem connections.

secure Web console

The integrated LAN console is now used for standard telnet connections as well as for Secure Web Console access. This is a major improvement over previous-generation HP-UX servers that required either a PCI card or an external peripheral for Web console access.

Major features of the Secure Web Console include:

- Secure system management over a corporate intranet
- Mirrored access, in which up to four operators can simultaneously share the same screen and keyboard
- SSL security
- Universal browser-based support for Netscape and Microsoft[®] Internet Explorer Web browsers
- Easy updates of Web console software over the network
- Support for HTTP, FTP, TFTP, and other key Internet standards

LAN console (telnet)

The rp2405 also provides a LAN console interface using industry-standard telnet connections. Like the Web console, the LAN console can be used remotely for managing many systems from a single control center. The telnet interface allows scripts to be used to vastly simplify multiple system management. Password protection provides a high level of security to control access to the LAN console, ensuring that only authorized personnel perform system management.

ASCII terminals

The rp2405 provides an RS-232 port to use for ASCII terminal console connections. Any VT100-capable terminal or emulator can be used as a local system console.

remote console via modem connection

The rp2405 provides an RS-232 modem port that can be used for dial-up remote management. This feature is particularly useful for obtaining help from HP service experts. Security is ensured in two ways:

- The requirement to explicitly enable remote console access, which is protected with a password
- The use of dial-back phone verification

ordering information

The HP Server rp2405 can be ordered with two pre-integrated configurations. These configurations were chosen to allow ease of ordering and rapid deployment. Anything not included in the standard configuration can be ordered as a standalone accessory, including HP-UX operating environments. Standalone accessories will not be factory-integrated.

hp server rp2405 standard configurations

hp server rp2405	A7121A	A7122A
standard CPU	1 x PA-8700 650 MHz	2 x PA-8700 650 MHz
standard memory	512 MB (2 x 256 MB DIMMs)	2 GB (2 x 1 GB DIMMs)
disk	2 x 18 GB 15K	2 x 36 GB 15K
available PCI slots	2	4
maximum CPU configuration	1 x PA-8700 650 MHz	2 x PA-8700 650 MHz
maximum memory configuration	2 GB	8 GB

for more information

HP product information and technical documentation are available online at www.eproducts.hp.com.

In addition, configuration tools and pricing information allow registered users to place orders online. For registration, please contact your Hewlett-Packard sales representative.

Contact any of our worldwide sales offices or HP Channel Partners (in the U.S., call 1-800-637-7740) or visit our HP-UX servers Web page at <http://www.hp.com/go/rp2405>.

Java is a U.S. trademark of Sun Microsystems, Inc. Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation. Netscape is a U.S. trademark of Netscape Communications Corporation. UNIX is a registered trademark of The Open Group.

Technical information in this document is subject to change without notice.
© 2002 Hewlett-Packard Company
Printed in U.S.A.
09/02
5981-3275EN

