

## MPE/iX Release 6.5

MPE/iX, Multiprogramming Executive with integrated POSIX, is the Internet enabled operating system for the HP e3000 family of computers utilizing HP Precision Architecture RISC (PA-RISC).

MPE/iX is a robust operating system that is designed to handle a variety of business-critical, online transaction processing (OLTP) applications in addition to supporting leading industry standards. It also has the added benefit of supporting many e-services/Internet tools, allowing the connectivity to the Internet. MPE/iX offers a unique combination of strengths that make it suitable for both OLTP and web applications: ease of operations, high degree of ease and integration, superior data availability, and flexibility through open systems. MPE/iX runs on a broad range of HP e3000 servers ranging from entry-level, departmental or workgroup servers to mainframe-class servers within the data centers of large enterprises (See Figure 1).



### Benefits

- Higher multi-processor performance
- Higher transaction throughput
- Improved system management capabilities
- Improved data access capabilities
- Reduced application development costs

### New Features

- New midrange and high-end servers
- Support for memory sizes up to 16 Gbytes
- Support of fixed length record and KSAM files of up to 128 Gbytes
- Up to 511 disk spindles
- Up to 3,300 terminal sessions
- Up to 2,600 virtual terminal sessions
- Up to 255 user-controlled job queues
- Up to 20,000 TCP connections
- Web Server based on Apache (Standard Edition)
- JAVA version 1.2
- HP JDBC (Java Database Connectivity) Driver
- LDAP (Lightweight Directory Access Protocol) client
- Support of HP SureStore E XP256 and 12H (AutoRAID) disk arrays
- Support for higher capacity DLT-8000 tape devices

MPE/iX Release 6.5 is the newest in a series of ongoing operating system releases for the HP e3000 that consolidates proven technology released on MPE/iX 6.0 Express releases, in addition to offering several new features.

### **Investment Protection**

Since its commercial debut on PA-RISC in 1987, MPE/iX has provided customers application binary compatibility when upgrading to new MPE/iX releases. This translates directly to increased productivity for development and administrative staff who can devote their time to planning for future business requirements rather than managing migrations. MPE/iX 6.5, which supports most of the PA-RISC servers, continues to provide application investment protection so customers can quickly and easily take advantage of the new features of the operating system.

Most applications developed today for PA-RISC HP e3000 servers will be able to execute unmodified in the future on next generation PA-RISC and IA-64 HP e3000 servers.

MPE/iX 6.5 has been certified compliant to the HP Year 2000 compliancy definition, making it an excellent foundation for the new millennium.

In addition, MPE/iX features full application binary compatibility for MPE V customers looking for a cost-effective growth path to newer HP e3000 PA-RISC servers.

MPE/iX 6.5 continues to be the ideal operating system to support business-critical, Internet, and e-services applications.

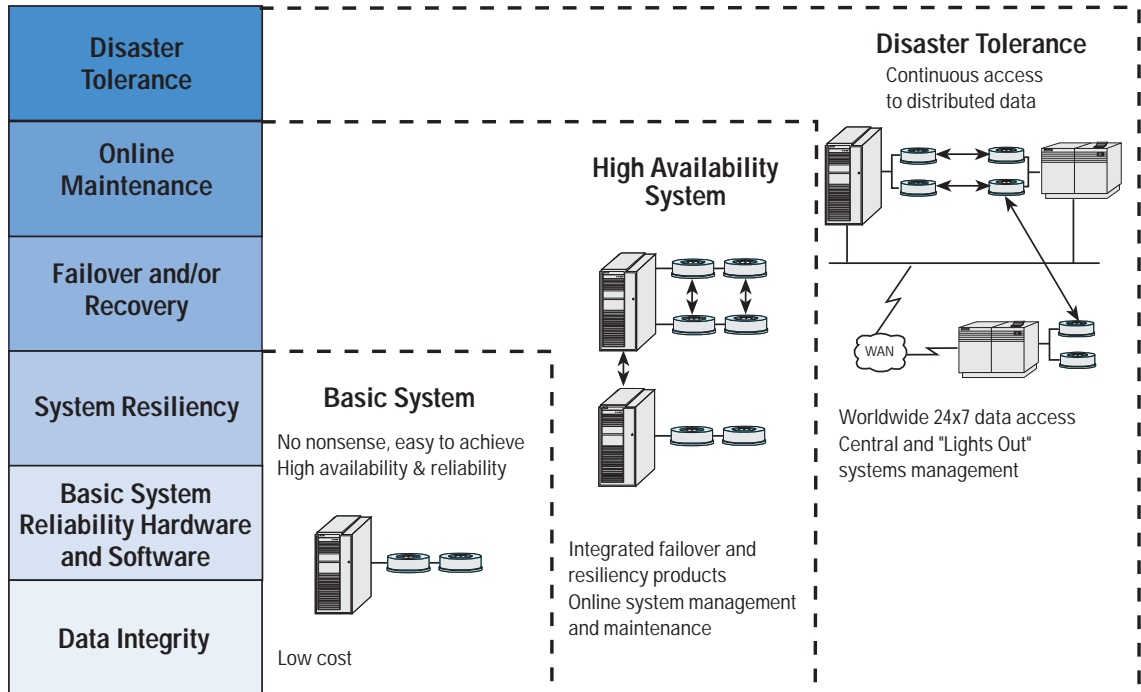
### **Performance and Scalability**

MPE/iX is completely scalable from the deskside to the data center. Applications can be developed on an entry-level HP e3000 server and deployed without having to be rewritten or modified on a mainframe-class HP e3000 server, such as the Series 997 with support for up to 12-way symmetric multiprocessing (SMP).

MPE/iX has been delivering SMP functionality since 1991 and is tuned to give superior performance for commercial, OLTP applications. Superior performance translates into higher transaction throughput necessary to support today's Internet environment. Performance is improved even further on MPE/iX 6.5 with new platforms, higher ways of SMP and performance tuning. At the high end, the Series 997 has been enhanced to support up to 12-way SMP. The HP e3000 929KS/030 and 939KS/030 are the newest midrange platforms, providing excellent performance at affordable prices.

For memory intensive applications that require high levels of system performance, MPE/iX Release 6.5 supports up to 16 GB of main memory (8 GB in the midrange Series 9x9KS and 16 GB in the high-end Series 997 HP e3000 servers).

Figure 2. HP e3000 High Availability



## High Availability

With an increasing dependence on computer systems, today's businesses have an ever growing need for high availability. Reliability, resiliency, and availability are no longer mere luxuries; they are crucial to the survival and success of any business. MPE/iX provides an excellent foundation for businesses that require the highest levels of availability.

## Basic System Availability

Basic system availability needs include data integrity, hardware and software reliability, and system resiliency (See Figure 2). Basic system availability needs are built into the core MPE/iX operating system. For example, the integrated transaction manager enables MPE/iX to recover from interruptions in service quickly and easily with no loss of data.

Basic system availability is improved even further in MPE/iX with features such as file system resiliency and Subsystem Dump. File system resiliency is improved by minimizing the types of file system errors that could cause a system abort. Subsystem Dump is a facility that lets privileged subsystems dump the contents of specific areas of memory into a Subsystem Dump file without aborting the system. Trained professionals can then analyze the file online.

**High Availability System**

System availability can be increased even further by products, tools, and services that improve failover/recovery and online maintenance (*See Figure 2*).

The HP Mirrored Disk/iX product eliminates application downtime due to disk failure by providing full data redundancy through disk mirroring. Identical copies of the data are maintained, transparent to the application, on two separate disks. When one disk of the mirrored pair experiences an interruption, the system continues to access the other transparent to the application. Disks in the system domain, which cannot be mirrored, can be protected using HP disk array products.

Data storage integrity can also be enhanced using HP SureStore E XP256 disk arrays which use RAID-3 level data protection. For low cost, high availability data protection, MPE/iX supports HP SureStore E 12H (AutoRAID) disk arrays.

The HP AutoRestart/iX product provides fast recovery in the event of an operating system failure by reducing the time between failure and reboot. If the system fails, AutoRestart/iX automatically resets the system, dumps key system failure information to a disk file, and then restarts the system.

Online maintenance is improved even further in MPE/iX with the TurboSTORE/iX 7x24 True-Online Backup product, HP's Legato NetWorker for MPE/iX backup products, online configuration of system peripherals, dynamic configuration of terminals, printers, and other serial devices, and a set of patch management tools called Patch/iX and Stage/iX.

TurboSTORE/iX 7x24 True-Online Backup increases system availability by allowing users to remain online and active within their application while the system backup occurs. TurboSTORE/iX 7x24 automatically quiesces and synchronizes IMAGE/SQL and ALLBASE/SQL databases to achieve logical database integrity. Additional features allow synchronization of third-party databases.

HP's Legato NetWorker storage node for MPE/iX allows high-speed DLT libraries to be directly connected to an HP e3000 server. Also supported are tape archiving within the library and cloning of tape archives.

Online Device Configuration is an MPE/iX facility that allows system managers and operators to configure new devices such as tape drives, disks, and system printers while the system is online. This facility eliminates rebooting of the system in conjunction with device configuration changes, increasing system availability. In addition, MPE/iX allows dynamic (or online) configuration of terminals, printers, and other serial devices without the need to shutdown and boot the system to have the changes take effect.

Patch/iX and Stage/iX provide a convenient and easy method for preparing, applying, and managing MPE/iX patches. Patch/iX allows simultaneous preparation of a PowerPatch (proactive) patch with one or more Reactive patches, eliminating the downtime associated with one of the system updates and subsequent reboots. Users can remain on the system during the patch preparation, increasing system availability further.

Stage/iX is a facility for applying and managing MPE/iX patches. It reduces system downtime by allowing patches to be installed from disk instead of tape and provides an easy and reliable method for backing out patches. Stage/iX works in conjunction with Patch/iX. Stage/iX allows Patch/iX to stage patches to staging areas on disk (as well as create CSLT/STORE tapes). Patches can be applied by selecting a disk staging area and then rebooting the system from that staging area. Patch/iX and Stage/iX are both standard tools with MPE/iX.

#### **Disaster Tolerant System**

The HP SharePlex/iX product provides the highest level of availability when disaster tolerance is a must (*See Figure 2*). SharePlex/iX is a clustering methodology that provides high availability, horizontal growth potential, load balancing, and resource sharing across multiple loosely coupled HP e3000 servers. The shadowing feature of SharePlex/iX allows the data from a complete application environment to be replicated over both local and wide area networks. The advantage of complete replication is that users have access to vital data regardless of any single point of failure or of a total data center disaster.

## **System Management**

MPE/iX offers robust functionality for managing large data center environments. HP and third-parties offer a wide variety of system management products in the areas of network management, performance management, system accounting and configuration, security, operations control, and storage management.

#### **Systems and Network Management**

HP OpenView IT/Operations uses a UNIX based management console and provides a fully integrated, consistent framework for managing HP e3000 systems along with other types of servers (i.e., as part of a heterogenous system environment). Through exception-based system management, operators are notified of system events graphically and automatically by the HP OpenView network map. Operators can define which events to report, providing flexibility and eliminating unwanted notifications. Task-based filtering of events lets the operator focus on specific categories of messages all at once (e.g., all tape messages or all printer messages) and an automatic response feature brings the system one step closer to being self-managing.

HP Easytime/XL provides an easy-to-use interface through which the system administrator can communicate with the HP e3000. Easytime/XL uses pull-down menus with user-friendly descriptive phrases to make it easy to perform day-to-day tasks such as managing system resources, starting a job, printing a report, or sending a message to another user on the system. Easytime/XL is a standard tool with MPE/iX.

#### **Workload and Performance Management**

The Workload Manager/iX product allows the system manager to choose how to allocate the CPU resources amongst applications on the system. Key mission-critical applications can be assured that they will be able to execute when they need to without being inhibited by other applications. User-defined job queues, complementary to Workload Manager/iX and standard tools with MPE/iX, allows the system manager to define input job queues to maximize batch processing throughput.

Threshold Manager utility monitors vital system tables which if depleted, could cause a system failure. When a failure mode is anticipated, Threshold Manager notifies the operator and limits further system usage until the vital resource is out of danger. Threshold Manager is a standard tool with MPE/iX.

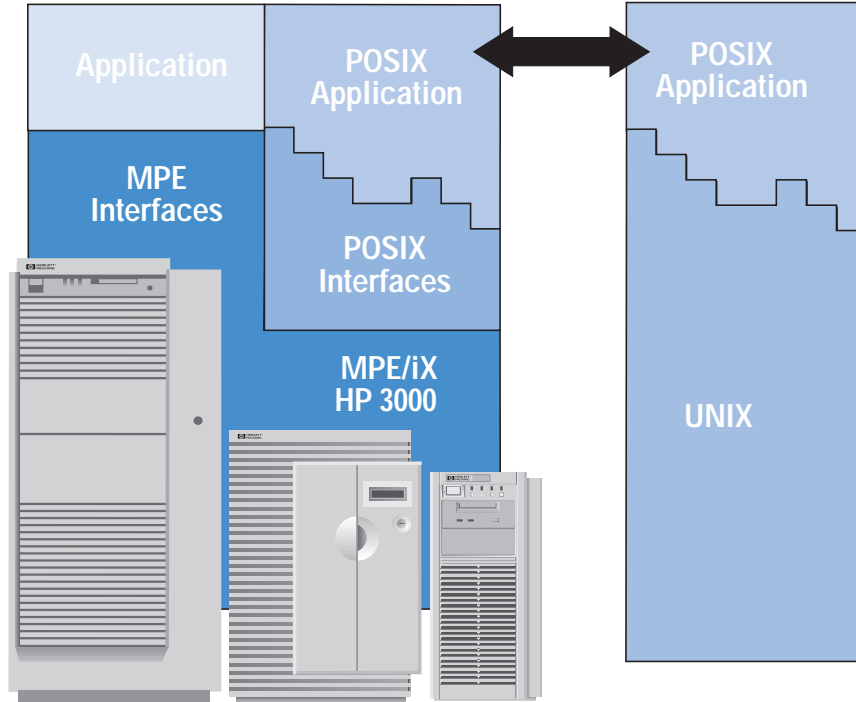
HP GlancePlus/iX, a performance monitoring and diagnostic software product for MPE/iX, provides information on current server resource usage and process activity to help system managers and operators quickly isolate and resolve performance bottlenecks when they occur. Another product, GlancePlus Pak

for MPE/iX, includes both GlancePlus/iX and a tool to collect comprehensive resource and performance measurement data. HP PerfView Analyzer for Windows NT or HP-UX displays this measurement data in graphical and numerical formats and can be used to analyze the data for troubleshooting, bottleneck detection and load balancing. HP PerfView Planner can be used to forecast the measurement data and to assist in capacity planning of your HP e3000 Server.

#### **Security**

Operating system security is an essential component of system management. To protect your system from unauthorized access and data corruption, MPE/iX provides robust system security. The MPE/iX operating system is designed so that the user capabilities, the account structure, the file system, and the system security are all integrated. Every file and device can optionally have an Access Control Definition (ACD) which specifies which users have access to that file or device. System security is further augmented with multi-level logon access and auditing. Additionally, the HP Security Monitor/iX product can be used to provide further protection against unauthorized access to sensitive data and system resources through stronger password protection, stronger audit trails, and tighter access security. It is fully integrated with the MPE/iX Access Control Definition (ACD), and is compatible with the MPE V Security Monitor product. Security Monitor/iX complies with the U.S. Government's "C2" security specification.

Figure 3. HP 3000 POSIX: Makes Application Portability Easy



### Interoperability

MPE/iX provides OLTP performance and functionality for business-critical applications while also supporting leading industry and de facto standards for interoperability with heterogeneous platforms. Internet Services enables network interoperability, while support for POSIX, SQL, Java, and ANSI standard compilers enable application portability.

Internet Services, a standard tool with MPE/iX, makes it easy to integrate the HP e3000 into a multi-platform environment. Internet Services includes FTP/iX (File Transfer Protocol), Telnet/iX, DNS BIND/iX, and Berkeley (BSD) Sockets. Telnet/iX Server (for inbound Telnet access) and Telnet/iX Client (for outbound Telnet access) strengthen the HP e3000 as an open system by providing access between the HP e3000 and computers that support Telnet, such as

UNIX-based and NT-based systems. In addition, ThinLAN/iX software, which includes the TCP/IP protocol and SNMP agent, is a standard tool with MPE/iX.

MPE/iX supports IEEE POSIX 1003.1 interfaces and POSIX 1003.2 commands and utilities. POSIX, a standard tool with MPE/iX, makes it easy to port UNIX-based applications to MPE/iX or to develop portable applications on MPE/iX using HP C/iX in conjunction with the MPE/iX (POSIX) Developer's Kit (See Figure 3). The MPE/iX Developer's Kit is a standard tool with MPE/iX. The POSIX interfaces are tightly integrated with MPE/iX such that traditional MPE/iX applications and new POSIX applications can share resources easily. This tight integration of the POSIX interfaces with MPE/iX has the added benefit of allowing POSIX applications to leverage MPE/iX security, high availability, transaction management, workload and performance management, and systems and network management.

Java, a popular internet-enabled programming language, enables applications to be developed once and deployed on any platform that supports the Java Virtual Machine, reducing application development costs. MPE/iX 6.5 supports Java version 1.2, which includes the Java Virtual Machine with Just-In-Time Compiler (JIT) and the Java Software Developer's Kit (SDK). The HP Java Database Connectivity (JDBC) driver is a standard tool with MPE/iX and allows Java applications to easily access data stored in IMAGE/SQL and ALLBASE/SQL databases.

### **Information Management**

MPE/iX supports several database management products for information management (HP ALLBASE/SQL, HP IMAGE/SQL, and Oracle). HP ALLBASE/SQL is a functionally rich, high-performance relational database management system (RDBMS) that is tightly integrated with MPE/iX. It provides key features for customers requiring a mainframe-class RDBMS such as support for large databases (> 50 GB) and large numbers of concurrent users (> 500). In addition, low cost-of-ownership makes ALLBASE/SQL ideal for replicated site applications.

ALLBASE/SQL is ANSI'92 Entry-Level Compliant. Support is also provided for Microsoft Open Database Connectivity (ODBC) for client/server access and for Java Database Connectivity (JDBC). In addition, ALLBASE/SQL supports key application development features such as stored procedures, business rules/triggers, and referential integrity.

HP IMAGE/SQL is Hewlett-Packard's popular TurboIMAGE/XL database management system, integrated with the ALLBASE/SQL SQL interface. IMAGE/SQL is ideal for OLTP applications. The SQL interface enables access to client/server tools that support ODBC and JDBC.

IMAGE/SQL was enhanced in MPE/iX 6.0 to support an 80 GB dataset capacity up from the previous 40 GB limit, for mainframe-class applications that require very large databases. In addition, IMAGE/SQL was enhanced to support indexed sequential access, resulting in improved data retrieval performance for partial or generic key searches.

Oracle is available on MPE/iX for customers who require a multi-platform database or a large selection of off-the-shelf applications. The Oracle Transparent Gateway to IMAGE/SQL enables database interoperability between IMAGE/SQL and Oracle databases.

With MPE/iX Release 6.5, the MPE/iX operating system and tools have been enhanced to support fixed length record files and KSAM files that can be up to 128 Gbytes in size.

### **MPE/iX Internet Interoperability**

In today's e-business environment, interoperability is key. E-services depend on seamless computing in heterogeneous environments, and the HP e3000 with MPE/iX 6.5 delivers interoperability with UNIX, NT and other major Internet and intranet platforms.

With the release of MPE/iX 6.5, the HP e3000 includes industry-standard Internet services, such as FTP, Telnet, DNS BIND, TCP/IP and Sockets. MPE/iX also supports http protocol through Apache and Secure Apache, enabling the HP e3000 to act as a Web server, and includes Java 1.2, JDBC, and LDAP. In addition, HP e3000 supports XML-enabled applications.

## Networking

HP networking products are based on de facto and industry standards, including Transmission Control Protocol / Internet Protocol (TCP/IP), Open Systems Interconnect (OSI), and Systems Network Architecture (SNA). Networking solutions based on standards provide integration into a variety of computing environments, protect existing investments, and give organizations the freedom to choose the best computing platform regardless of vendor.

### Basic Connectivity

HP offers a variety of industry-standard network link products for building a network infrastructure. A network link provides a physical connection to a network—a connection to be used for the exchange of information between computer systems either over a Local Area Network (LAN) or a Wide Area Network (WAN). Extended LAN environments are also supported.

The HP e3000 supports the 802.3/Ethernet, 802.3u/Ethernet, 802.5/Token Ring, SNA/Token Ring, and Fiber Data Distributed Interface (FDDI) LAN protocols. All new HP e3000 systems include the hardware and software to implement the 802.3/Ethernet, the most commonly used LAN protocol. The 802.3u/Ethernet protocol provides a high speed LAN connection and is supported in MPE/iX with the 100Base-T LAN card.

The 802.5/Token Ring and SNA/Token Ring protocols provide a slightly higher bandwidth, and are best suited for HP e3000 environments which also have IBM systems and already have a Token Ring LAN installed. FDDI provides a high speed, very reliable backbone network link.

The HP e3000 supports the X.25 WAN protocol. NS Point-to-Point is also supported as an alternative, direct connection between HP e3000 systems. IBM SNA/SDLC Link and BSC Link are supported for a point-to-point connection between HP e3000 and IBM systems. SNA over X.25 connectivity is also available.

### System-to-System Connectivity

For system-to-system communications, including HP e3000-to-HP e3000 and HP e3000 to UNIX-based and NT-based systems, there is a complete offering of products available from HP. For HP e3000-to-HP e3000 communication, the HP NS3000/iX Network Services product provides virtual terminal, file transfer, and program-to-program communication.

Internet Services, a standard tool with MPE/iX, allows file transfer, program-to-program communication, and virtual terminal access between the HP e3000 and UNIX-based and NT-based systems in a TCP/IP environment. File transfer and program-to-program communication is provided using the ARPA File Transfer Protocol (FTP) and Berkeley Sockets, respectively. Virtual terminal capabilities are provided with Telnet/iX Server (for inbound Telnet access) and Telnet/iX Client (for outbound Telnet access). I/O modes supported by Telnet/iX Server include: VPLUS, HP and user block modes, line mode, character mode, and binary mode.

DNS BIND/iX provides centralized host-to-IP address translation with improved load-balancing capabilities, increased security, and quicker response times. With LDAP (Light Weight Directory Access Protocol) client, an HP e3000 server can access X.500 network directories. Other Internet Services that are standard tools with MPE/iX include inetd, bootpd, and tftpd.

#### **IBM Integration**

For seamless integration into an IBM computing environment, MPE/iX offers a complete array of IBM connectivity products supporting both Systems Network Architecture (SNA) protocols and IBM Bisynchronous (BSC) protocols. HP-IBM SNA IMF provides IBM 3270 terminal emulation for interactive communication with IBM systems. HP-IBM SNA DHCF allows IBM users interactive access to the HP e3000. HP-IBM SNA/NRJE and HP-IBM BSC/RJE products provide batch access to IBM systems. The HP-IBM LU6.2/PU2.1 product provides for program-to-program communication between HP e3000 and IBM systems.

#### **Desktop and Workgroup Integration**

MPE/iX connects to a wide range of desktop operating systems and their respective devices, including Microsoft DOS, Windows, Windows for Workgroups, Windows 95, Windows 98, Windows NT, IBM OS/2, Apple, and UNIX. Samba/iX, enables Windows NT desktop users to access enterprise-wide information and share computing resources on the HP e3000.

NSF/iX from Quest Software enables MPE/iX users to access files on UNIX systems.

The MPE/iX spooler supports network or LAN-based printers over TCP/IP. This feature enables printers to be placed in workgroups where the demand is the greatest, resulting in improved user productivity. MPE/iX spoolfiles can be printed to any Printer Command Language (PCL)-based printer attached to the HP e3000 via a TCP/IP network connection and a JetDirect interface. Page level recovery is also supported for printers supporting Printer Job Language (PJM). Page level recovery enables the printer to continue printing from the next logical page in a spoolfile should a paper jam or a device powerfail occur.

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## **Services**

A broad range of services, including support, consulting, and training, is available worldwide for all HP e3000 products. Classes are available through local HP Education Centers. Courses include instruction and labs for hands-on learning. Contact your local Hewlett-Packard office for course outlines and schedules, or call 1-800-472-5277 in the U.S. or 1-800-563-5089 in Canada. Alternatively, visit the HP Educational Services web site at <http://www.hp.com/education>.

## **Documentation**

A comprehensive set of documentation is included with every HP e3000 for ease of system management. Documentation is available on CD-ROM with HP Instant Information and on the web at <http://www.docs.hp.com>. Documentation is also available in paper format.

## **Ordering Information**

MPE/iX and HP add-on software products are available preloaded and preconfigured on all new HP e3000 systems. Existing MPE/iX customers on support contract with HP have automatically received MPE/iX 6.5. Customers may upgrade directly to MPE/iX 6.5 from MPE/iX 6.0 or 5.5.

## **For More Information**

For more information on MPE/iX 6.5, contact your HP authorized reseller or visit the following website: [www.hp.com/go/3000](http://www.hp.com/go/3000).

For additional information please contact any of our worldwide sales offices or HP Channel Partners.

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Printed in USA R00200  
5968-8856E