Communicator e3000
MPE/iX Release 7.5
(Software Release C75.00)

HP e3000 MPE/iX Computer Systems

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Contents

1 Overview — MPE/iX Release 7.5 (C.75.00)

This *Communicator HP e3000* provides general and detailed information on the new and enhanced functionality for the MPE/iX Release 7.5 (C.75.00), as well as information on support, release strategy and installation prerequisites.

This MPE/iX 7.5 Communicator describes the following enhancements:

- MPE/iX A and N-Class Hardware Platforms
- Native Fibre Channel Support
- HP Surestore Tape Array 5300 and Disk System 2300 (DS2300)
- WebWise v.2 is part of FOS
- Sendmail is part of FOS
- HP Predictive Support Software
- High End Functionality (Large File Dataset, User Logging Limit Increase, IMAGE/SQL Performance
- LDEV 1 supports more than 4GB disk Space
- New CI Command :Shutdown, Restart
- UPS Monitor Enhancement

Communicator Summary

Following are brief descriptions of the articles and chapters.

Chapter 1, Overview — Communicator Summary

This chapter provides a summary of information contained in this manual. It also provides information about obtaining MPE patches from the HP Electronic Support Center.

Chapter 2, Announcements

Important announcements regarding availability of products and services are included in this chapter.

- Introducing MPE/iX Release 7.5 — provides overview of 7.5 enhancements.
- End of Support dates for MPE/ix Release 6.0 (extended to December 31, 2002) and 6.5 (extended to December 31, 2003)
- Software Distribution Media (6250 bpi Tapes) discontinued.
- HP 5000 Printer and HP e3000 A/N-Class Support Update — provides a listing of printer devices NOT supported on A/N-class Servers.
- Obtaining Software Security Patches for you HP Computer System — provides

Chapter 3, Internet and Interoperability

This chapter contains articles about updated Webwise and Sendmail.

Chapter 4, Fibre Channel Device Adapter Support on HP e3000

This chapter contains technical articles about the following: Fibre Channel Adapters and peripherals, configuration examples for Fibre Channel Adapters and devices, Fibre Channel Device Scan Utility, TDUtil, and HP Support Tools Manager.

Chapter 5, Technical Articles

This chapter contains the following: Updated HP e3000 A/N-Class Servers, HP Surestore Disk System 2300, HP Surestore Tape Array 5300, SCSI interface and Device Support for A/N-Class HP e3000, HP e3000 PA-8700 A/N-Class Core I/O Card, SHUTDOWN—New CI Command, Samba/IX Version 2.0.7, Heartbeat High Availability Cluster/iX, Updated Support Tools Manager, Support for using the entire disk space on LDEV1, UPS Monitor/iX and UPSUTIL enhancements, AS Clause enhancement in ALLBASE/SQL, POSIX pthread (Draft 10) APIs, OIDFAULT Generic Device IDs, Support for 2851 userlog processes, TurboIMAGE Scalability II, Attach enhancement in ImageSQL, Large File Data Set, HP Surestore Virtual Array 7100, HP SCSI-FC Fabric Router for the hp e3000.

Chapter 6, Product Release History

This chapter provides information on product release history.

Chapter 7, Catalog of User Documentation

This chapter provides a listing of all new or updated manuals at the time of the MPE/iX7.5 Release.

MPE/iX Patches on HP IT Resource Center

by Patch Support Team
Commercial Systems Division

MPE/iX patches for MPE/iX Releases are available on the IT Resource Center (previously the HP Electronic Support Center) to all customers.

Features and Benefits

The new patch access and delivery system benefits all MPE/iX customers with:

- Improved overall communication between HP and customers.
- Provision of useful and timely information for patch justification and decision making.
- Reduced system downtime for known problems.
- Reduction of the turnaround time for patch availability and delivery.
- Close to 24*7 access time.
- Unification of the MPE/iX and HP-UX patch delivery process.

Electronic access to patch information and delivery of patches provide three basic services:

1. Access to patch information in an automated, timely and accurate manner.
2. Electronic downloading of patch information and binaries.
3. Proactive notification of new patches via email.

Access Method to the HP IT Resource Center

To serve customers the IT Resource Center provides World Wide Web access for downloading patches.

Access to World Wide Web Server (www)

IT Resource Center is available through the World Wide Web.World Wide Web access is the easiest, fastest, and most popular method of browsing for patch information and downloading patches. It is more reliable, especially for large patches.

- **U.S. Web accessing address:**
  http://us-support.external.hp.com
- **European Web accessing address:**
  http://europe-support.external.hp.com

Electronic Digests

If you want to keep yourself up-to-date on the latest development of MPE/iX patches, you can sign up for the daily Security Bulletin and weekly mpeix_patch Bulletin. Once you have subscribed to these two bulletins, you will receive these digests on a periodic basis via electronic mail. HP IT Resource Center will inform you proactively about newly developed security and GR patches. For more information, refer to the instructions on the IT Resource Center website.

Patch Installation Tools

There are two tools available to install MPE/iX reactive patches, Patch/iX and AUTOPAT. HP recommends the use of Patch/iX for reactive patch installation. Patch/iX has many features and checks to ease and improve the installation process, including:

- A sophisticated patch qualification mechanism to ensure the integrity of your system.
- The ability to perform much of the patch installation process while your system is still up and available to users.
- An option to install a patch or set of patches using the HP Stage/iX Subsystem, which allows the application of a patch to be performed without tapes. For more information on Stage/iX, refer to the *System Software Maintenance Manua*l for your release. Patch/iX instructions are also available on the following website: *http://www.docs.hp.com/mpeix/*

You should use AUTOPAT only if you are familiar with its use, and have a good understanding of MPE/iX patch management.

Patch/iX Installation Document Retrieval

These are the steps for retrieving documents using Patch/iX.

1. Access the HP IT Resource Center WEB site (previously the Electronic Support Center) using the appropriate WEB address for your country.
2. Click on the link, “Individual Patches.”
3. Enter: “ITRC User ID” and “password.”
4. Click on the link, “MPE/iX Patches.”
5. Click on the link, “MPE Patch Installation Guide.”
6. Click on the link, “Use Patch/iX or AUTOPAT to install the patch.”
7. Click on the link, “Patch/iX Instructions.”

Patch/iX Version Identification

To ensure you have the latest version of Patch/iX, on your system do the following:

1. `:HELLO MANAGER.SYS,INSTALL`
2. `:PATCHIX VERSION`
3. Compare this version number (for example, B.01.02) with the latest version available for your release on the HP IT Resource Center Patch/iX download page. If you are running an earlier version than is available, you should download and install the newer one from the download page.

AUTOPAT Installation Document Retrieval

AUTOPATINST is the "DOCID" of the document with instructions to assist you in installing one or more patches needed by your MPE/iX system using the AUTOPAT installation tool.

1. Access the HP IT Resource Center WEB site (previously the Electronic Support Center) using the appropriate WEB address for your country.
2. In the Main Menu, Click on the link, "Search Technical Knowledge Base."
3. Enter: "ITRC User ID" and "password."
4. In the Technical Knowledge Base Home page from the pull down menu, Click on "Search By DOC ID" (do not Search by Keyword).
5. In the search field, enter "AUTOPATINST."
6. Click on the "SEARCH" button.

Create a CSLT Prior to Patch Installation

Before starting any patch application activity, you should always back up your system by creating a Custom System Load Tape and a full backup. This will allow you the flexibility of restoring your system to the previous environment. To create a CSLT, do the following:

1. Log on as MANAGER.SYS
2. :SYSGEN
3. >TAPE

Disclaimer

CAUTION Hewlett-Packard is not liable for errors occurring during data transmission through the Internet. HP assumes no responsibility for the use or reliability of its software on equipment that it has not furnished itself. Furthermore, for customers without a current support contract with HP, HP is not responsible for answering any questions in regard to the use of this patch delivery process.

2 Announcements

MPE/iX Release 7.5 Features

MPE/iX Release 7.5 is designed to further enhance our HP e3000 product offering that capitalizes on the PCI architecture of the A- and N-Class systems running MPE/iX. These enhancements provide additional functionality, increased performance and connectivity advancements

MPE/iX Release 7.5 enables the new A- and N-Class systems to higher speed and performance as provided by the new PA-8700 processors. Further, this release provides new functionality to these systems, such as Native Fibre Channel Support, new storage devices, increases in user logging limits, ability to access LDEV 1 disk space beyond 4 GB, and many other system enhancements designed to help MPE/iX and HP e3000 customers.

MPE/iX Release 7.5 features include the following:

Hardware Platform Enhancements

PA-8700 N-Class

For our mid-range and high-end customers, MPE/iX Release 7.5 supports up to a 4-way PA-8700-based N-Class system. The PA- 8700-based N-Class has the same configuration limits, supported peripherals and supported interface cards as on 7.0 Express 1. In addition, MPE/iX 7.5 provides many Fibre Channel features.

PA-8700 A-Class

For our low-end customers, MPE/iX Release 7.5 supports the PA-8700-based A-Class systems. The PA-8700-based A-Class has the same configuration limits, supported peripherals and supported interface cards as on 7.0 Express 1. In addition, MPE/iX 7.5 provides many Fibre Channel features.

External Storage and I/O Connectivity Enhancements

Native Fibre Channel Support

With MPE/iX Release 7.5, support has been introduced for the PCI 2GBs Fibre Channel Device Adapter card (A6795A) on A- and N-Class HP e3000 systems. This adapter card provides the ability to connect a fibre channel device directly to the HP e3000 system using fibre channel cables. The 2 GB/s FC card is supported with the VA7100 and XP512 Fibre Channel disk arrays on MPE/iX 7.5. Prior to MPE/iX 7.5, HP e3000 systems supported connectivity to Fibre Channel devices through the HP SCSI-Fibre Channel Router, which was connected to a PCI-SCSI adapter card. The router will continue to be available for those customers who choose to remain on MPE/iX 7.0.

HP Surestore Tape Array 5300

The HP Surestore Tape Array 5300 is a 3U rack enclosure that will hold a variety of full-height and half-height tape drives (DDS3, DDS4 and DLT8000), providing a truly flexible storage solution for use in a variety of different data storage situations. This device is also supported on MPE/iX 7.0 Express 1.

HP Surestore Disk System 2300 (DS2300)

The HP DS2300 is a 3U, 14-LP-disk, Ultra160 enclosure. Redundant hot-swappable components ensure system uptime. Mixed disk environment support, flexible deployment options, and upgradability to Ultra320 protect your investment. This device is also supported on MPE/iX 7.0 Express 1.

Internet and Interoperability

WebWise v.2 part of FOS

The current Apache web server in FOS has been replaced by the HP WebWise MPE/iX Secure Web Server which is built from recent versions of Apache, mod_ssl, and OpenSSL. In addition to the security related features of X.509 authentication and SSL transport encryption, there are new Apache features and bug fixes that have come out since 1.3.14.

SIB Item #4- Sendmail in FOS

The Sendmail MTA (Mail Transport Agent) is now included in FOS to facilitate the sending and receiving of e-mail. The functionality supported is comparable to the Sendmail functionality of HP-UX.

ODBC and JDBC Continue to be the Prime Database Connectivity

Updated ODBC access is provided via MB Foster Associates, ODBC/Link SE and is bundled at no additional cost with IMAGE/SQL and ALLBASE/SQL.

High End Functionality

Large File Dataset

Each dataset in a TurboIMAGE database is an MPE file. The maximum size of a dataset file was 4 GB. For dataset size greater than 4GB, TurboIMAGE used a set of files residing in HFS domain to store the data, called a JUMBO dataset. With the Large File Dataset enhancement, TurboIMAGE allows users to use MPE large file instead of JUMBO files as dataset files.

User Logging Limit Increase

With this solution, a single user level process can access 2851 user logging concurrently. This is improved from the current user-logging limit of 1140.

IMAGE/SQL Performance

IMAGE product performance increases by adding two new options to the Attach command: NOAUTO and NOAUTOSPLIT.

HP Predictive Support Software

Predictive provides proactive hardware support and helps increase the uptime of your systems by monitoring system memory and disk/tape drives. When Predictive detects a potential problem, it sends a message to the HP Response Center. The Response Center portion of the system screens the data and forwards problems requiring further analysis to a Response Center Engineer. If action is needed at your site, the Response Center Engineer and a Customer Engineer work with you to resolve the problem. This proactive hardware support is provided as part of your HP Hardware and Software Support Services Agreement.

Performance and Capacity Improvements

LDEV 1 Now Supports more than 4GB Disk Space

Prior to Release 7.5, MPE/iX supported and used only 4GB of disk space of LDEV 1 disk, even though the physical disk itself had more than 4GB disk space (such as 18GB, 36GB, 73GB) With the enhancement, the limitation on LDEV 1 using only 4GB is now removed so that LDEV 1 can use up to the maximum capacity of the physical disk.

New CI Command :Shutdown, Restart

This enhancement provides a shutdown mechanism with a reboot option in the command level similar to the HP-UX operating system. This enhancement provides a :SHUTDOWN command on the CI prompt, with a RESTART option, which shuts down the system completely and, optionally, reboots automatically.

UPS Monitor Enhancement

This enhancement allows user-controlled system shutdown when the UPS reports that incoming AC power has failed. The MPE/iX UPS Monitor software is now a part of FOS and has been enhanced to permit a System Manager to instruct the UPS device.

HP Announces Transition Plan for HP e3000 Server Series

In November 2001, Hewlett-Packard began advising customers to transition from HP e3000 servers to other HP server platforms over the next five years. The rapid evolution of technology away from proprietary platforms and customer and partner decisions to move to other platforms led to the transition plan.

HP is offering customers assistance for their transition, including migration services, financing options, consulting, outsourcing and education. Customers with newer HP e3000 servers will be able to convert them to HP-UX servers at no cost. Trade-in credits and discounts toward the purchase of the latest HP servers running HP-UX, Microsoft Windows or Linux also will be available. In addition, HP is working with e3000 application providers to transition their applications and then their customer bases to other HP platforms.

To ensure customers have time to plan any final server purchases, HP will continue to sell HP e3000 servers until November 1, 2003. During that time, HP plans to provide enhancements, including new processors and storage solutions.

HP also will provide a broad portfolio of support services for the e3000 servers until January 1, 2007. This support is designed to ensure that customers have time to plan and execute a transition to an alternative HP server platform.

HP is working with a number of tools, middleware and sustem integration partners to offer additional migration tools and services. A comprehensive program is being designed to track the tools and services available and to create linkages between partners to offer customer complete migration solutions. Partners cam find more information on HP's partner Web site at *http://www.hp.com/dspp/* or they may sign up for the partner-transition program at *http://www.hp.com/go/developers*.

For more details on the HP announcement, please visit *http://www.hp.com/go/e3000*.

End of Support Dates for MPE/iX Releases

Support for the MPE/iX Release 6.0 release has been extended to December 31, 2002. Support for MPE/iX Release 6.5 has been extended to December 31, 2004. MPE/iX release 7.0 and 7.5 will be supported until December 31, 2006.

Customers on releases 6.0 or 6.5 should plan to update to either MPE/iX 7.0 or MPE/iX 7.5 prior to these dates. We would encourage most customers to update to the 7.5 or 7.0 Express 1 release since these releases contain many performance and capacity enhancements for high-end systems, and bundled tools for using the HPe3000 with the Internet. Additionally, 7.0 and 7.5 releases will be supported longer than the 6.5 release.

As we have done for previous MPE/iX releases, Hewlett-Packard will continue to provide 18 months notice before terminating support of a given release.

Software Distribution Media (6250 bpi Tapes)

Hewlett-Packard has stopped using 6250 bpi tapes for the distribution of HP software with the shipment of MPE/iX Release 7.0. Customers can no longer sign up for 6250 bpi software distribution media. Customers with existing contracts that call for 6250 bpi tapes will still receive these tapes for releases prior to MPE/iX Release 7.0, but all customers are encouraged to update their contracts to use either DDS or CDs as their software distribution media.

The 6250 bpi tape drives will still be supported for customer usage. HP simply has stopped distributing software using this media.

HP 5000 Printers and HP e3000 A-/N-Class Support Update

In the April, 2001 *HP e3000 Business Servers Configuration Guide* and the *MPE/iX 7.0 Communicator*, it was incorrectly stated that the HP 5000 Fanfold Printers were supported on the HP e3000 A-/N-Class Servers. The following SCSI Printer Devices are NOT supported on HP e3000 A-/N-Class Servers:

C2753A Model F100 printer — 208 V, 60 Hz power

C2753B Model F100 Turbo printer — 208 V, 60 Hz

C2754A Model F100 printer — 230/400 V, 50 Hz

C2754B Model F100 Turbo printer — 230/400V, 50Hz

C2755B Model F135XP printer; 208 V, 60 Hz power

C2756B Model F135XP printer — 230/400 V, 50 Hz

C2772A Model F100XP printer — 208 V, 60 Hz power

C2773A Model F100XP printer — 230/400 V, 50 Hz

C2776A Model F135 printer — 208 V, 60 Hz power

C2777A Model F135 printer — 230/400 V, 50 Hz

These printers will continue to be supported, through their end of support life, December 1, 2002, when connected to S900 (9x8, 9x9, 99x) HP e3000 systems.

The HP 5000 Cut Sheet Printers are supported on the HP e3000 A/N-Class Servers.

Obtaining Software Security Patches for your HP Computer System

Hewlett-Packard would like to make you aware of a special free service provided for all customers of HP e3000 and HP 9000 computer systems. This service gives customers a direct route to Hewlett-Packard for obtaining information relating to the security of their Hewlett-Packard Computer System(s).

Hewlett-Packard issues information on the availability of Software security patches via Security Bulletins to subscribers of the HP Security Bulletin Digest e-mail service, a part of the IT Resource Center (formerly the HP Electronic Support Center). A Hewlett-Packard support contract is NOT required to subscribe to this service to obtain information or security patches. Any purchaser of an HP e3000 or HP 9000 Computer System can make use of the HP Security Bulletin services at no charge.

Customers may also obtain information and Security Bulletin services via the World Wide Web.

A security problem is a software defect that allows unauthorized personnel to gain access to a Computer System or to circumvent any of the mechanisms that protect the confidentiality, integrity or availability of the information stored on the system. When such problems in Hewlett-Packard software are brought to the attention of the company, their resolution is given a very high priority. This resolution is usually in the form of a Security Bulletin which may explain how to correct the problem or describe how to obtain a software security patch that will correct the problem.

Hewlett-Packard has introduced this service as the primary mechanism to alert subscribers to security problems and provide corrections. Hewlett-Packard will not analyze the relevance of any security patch to any individual customer site within the scope of the HP Security Bulletin service. The responsibility for obtaining and applying security patches resides with the customer.

The remainder of this letter outlines the various security related services offered by Hewlett-Packard IT Resource Center and the methods for subscribing to and retrieving information from it. It also outlines how you can inform Hewlett-Packard of potential security concerns you may have with your Hewlett-Packard Computer System.

HP IT Resource Center Security-Related Services

HP IT Resource Center offers subscribers the following benefits:

- Receive Security Bulletins automatically when they are published.
- Retrieve the archive list of bulletins issued prior to subscription.
- Download security patches if the subscriber configuration supports it.

Remember, an HP support contract is not required to subscribe to HP Security Bulletin services.

Subscribing to HP IT Resource Center Security Bulletin Services

Once you have placed your name on the subscriber list for future Security Bulletins (see instructions below), you will receive them via e-mail on the day they are issued by HP.

As referenced below, you can also view a list of past Security Bulletins issued in the “HP Security Bulletins Archive.”

Instructions

To subscribe to automatically receive future NEW HP Security Bulletins from the Hewlett-Packard Electronic Support Center via electronic mail, do the following (instructions subject to change without notice):

1. Use your browser to access the HP IT Resource Center web page at:

http://us-support.external.hp.com	US, Canada, Asia-Pacific, and Latin-America
http://europe-support.external.hp.com	Europe

2. Logon with your User ID and password (or register for one). Remember to save the User ID assigned to you, and your password.
3. Once you are on the Hewlett-Packard IT Resource Center home page, click on “Support Information Digests.” On this page, you can subscribe to many different digest services, including the Security Bulletin Digests.

To review Security Bulletins that have already been released, click on “Search Technical Knowledge Base (Security Bulletins only)” on the HP Electronic Support Center home page. Near the bottom of the next page, click on “Browse the HP Security Bulletins Archive.”

Once in the archive, click on “HP-UX Security Patch Matrix” to get a patch matrix of current HP-UX and BLS security patches. Updated daily, this matrix categorizes security patches by platform/OS release, and by Security Bulletin topic.

If You Discover a Security Problem

To report new security vulnerabilities, send e-mail to

security-alert@hp.com

Please encrypt any explicit information using the security-alert PGP key, available from your local key server, or by sending a message with a -subject- (not body) of ‘get key’ (no quotes) to security-alert@hp.com.

3 Internet and Interoperability

This chapter contains the following articles:

- WebWise replaces APACHE in FOS
- Introducing Sendmail for MPE/iX 7.5

WebWise Replaces Apache in FOS

By Mark Bixby, Commercial Systems Division

The HP WebWise MPE/iX Secure Web Server version A.01.00 was first introduced as a separately purchasable add-on product for MPE/iX 6.5 or greater. But as of MPE/iX 7.5, the WebWise web server has been updated to version A.03.00 and replaces Apache in FOS as a no-extra-cost bundled product.

This is the second release of the HP WebWise MPE/iX Secure Web Server. It was labeled version A.03.00 because it is replacing the A.02.00 version of Apache. There was no A.02.00 version of WebWise.

HP WebWise MPE/iX Secure Web Server version A.03.00 is based on Apache 1.3.22 and adds `mod_ssl` 2.8.5 to provide Secure Sockets Layer (SSL) encryption and X.509 authentication using digital certificates.

System Requirements and Patches

- MPE/iX 7.5
- HP highly recommends installing the latest NSTxxxxx network transport patch.

Support

HP WebWise MPE/iX Secure Web Server A.03.00 is supported through the HP Response Center as part of MPE/iX FOS support.

Product Overview and Feature Set

HP WebWise MPE/iX Secure Web Server offers secure encrypted communications between browser and server via the SSL and TLS protocols, as well as strong authentication of both the server and the browsers via X.509 digital certificates. The current release of the HP WebWise MPE/iX Secure Web Server is A.03.00 and is composed of:

- Apache 1.3.22
- `Mod_ssl` 2.8.5 SSL security add-ons for Apache
- MM 1.1.3 shared memory library
- Openssl 0.9.6b cryptographic/SSL library
- RSA BSAFE Crypto-C 5.2 cryptographic library (for the RC2, RC4, RC5, and RSA algorithms)

HP WebWise MPE/iX Secure Web Server is NOT a substitute for:

- A firewall (explicitly allow acceptable connections, etc.)
- Good host security practices (change default passwords, keep the OS up-to-date, etc.)
- Application security practices (use appropriate file and user security, carefully validate all input data, etc.)
- Good human security practices (communicate the importance of protecting sensitive or proprietary data, no password sharing, etc.)

WebWise is just one component in a secure environment and by itself does nothing to prevent the number one cause of web server break-in events — poorly written CGI applications. Well-written CGI applications must rigorously validate every byte of data sent by a browser, and must refuse to process any input data containing unexpected characters.

New Apache Functionality Since 1.3.14

Most of the Apache Software Foundation development work since 1.3.14 consists of portability enhancements and bug fixes for various problems including security issues. Some minor new functionality has also been added, as partially listed below:

- A new `LogFormat` directive of %c to display the connection status when each request is completed.
- `mod_auth` has been enhanced to allow access to a document to be controlled based on the owner of the file being served. `Require file-owner` will only allow files to be served where the authenticated username matches the user that owns the document. `Require file-group` works in a similar way checking that the group matches.
- The **rotatelogs** utility was enhanced to allow the logfile name to include customizable date stamps (using the standard starttime syntax) as well as the ability to specify the time offset from UTC.
- The Apache manual web pages can now be installed to a location other than the htdocs DocumentRoot, and so starting with WebWise A.03.00 these pages have been relocated to the `/APACHE/CURRENT/htmanual` directory tree. The WebWise A.03.00 installation process replaces the old `/APACHE/PUB/htdocs/manual` directory with a symbolic link pointing to `/APACHE/CURRENT/htmanual`.

SSLv2.0, SSLv3.0, and TLSv1.0 Protocols

These protocols lie between the HTTP and TCP/IP protocol layers and provide secure, authenticated, encrypted communications between the HP WebWise MPE/iX Secure Web Server and web browser clients.

X.509 Digital Certificates

Signed by external trusted Certificate Authorities, X.509 certificates provide authentication for both the HP WebWise MPE/iX Secure Web Server and web browser clients.

Flexible Encryption Cipher Configuration

HP WebWise MPE/iX Secure Web Server permits you to configure a wide variety of encryption ciphers, ranging from high-grade domestic-only algorithms to algorithms suitable for export.

Additional Log Files

Two new log files, `ssl_engine_log` and `ssl_request_log`, allow you to log various events associated with secure web requests.

Migrating From Previous Versions of Apache

The `/APACHE/PUB/JHTTPD` job stream file from previous versions of Apache is not compatible with HP WebWise MPE/iX Secure Web Server. You must manually create a new `JHTTPD` job stream file by using the WebWise `/APACHE/PUB/JHTTPD.sample` template.

The `/APACHE/PUB/conf/httpd.conf` configuration file from previous versions of Apache may or may not be compatible with WebWise depending on the previous Apache version:

- 1.3.4 — NOT compatible, you MUST use `/APACHE/PUB/conf/httpd.conf.sample` as a template to create a new `httpd.conf` file.
- 1.3.9 — compatible, but SSL functionality will not be enabled. To enable SSL functionality, you MUST use `/APACHE/PUB/conf/httpd.conf.sample` as a template to create a new `httpd.conf` file.
- 1.3.14 — compatible, but SSL functionality will not be enabled. To enable SSL functionality, you MUST use `/APACHE/PUB/conf/httpd.conf.sample` as a template to create a new `httpd.conf` file.

In addition to updating /APACHE/PUB/conf/httpd.conf, it is strongly recommended to update all of the other configuration files in the same directory by using the corresponding *.sample files.

Several new configuration subdirectories have been created to contain additional configuration files required by the SSL functionality. For complete details about configuring the SSL functionality, please see the *Configuring & Managing MPE/iX Internet Services* manual.

Migrating From WebWise A.01.00

HP WebWise MPE/iX Secure Web Server version A.03.00 was designed to be a drop-in replacement for Apache, and does not attempt to upgrade or migrate any files from the WebWise A.01.00 /APACHE/SECURE directory tree.

You must manually use the A.03.00 *.sample files in the /APACHE/PUB/conf directory tree to create new standard configuration files, and then propagate any local customizations that you made in the A.01.00 /APACHE/SECURE/conf directory tree.

You will need to copy your server key and certificate from the old A.01.00 locations of /APACHE/SECURE/conf/ssl.key/server.key and /APACHE/SECURE/conf/ssl.crt/server.crt to the new A.03.00 locations of /APACHE/PUB/conf/ssl.key/server.key and /APACHE/PUB/conf/ssl.crt/server.crt.

Any A.01.00 CGI applications in /APACHE/SECURE/cgi-bin or any data content in /APACHE/SECURE/htdocs can either be moved to the corresponding A.03.00 directories in /APACHE/PUB, or left in place after adjusting the new A.03.00 configuration files to refer to the old A.01.00 locations.

WebWise A.01.00 accessed web page content as the user SECURE.APACHE, but WebWise A.03.00 accesses web page content as the user WWW.APACHE. This is the same user as used by Apache A.02.00.

For Further Information

- http://your3000.yourdomain.com/manual/index.html (documentation included with the product)
- *Configuring and Managing MPE/iX Internet Services Manual*
- http://jazz.external.hp.com/src/webwise/ (HP WebWise)
- http://www.apache.org/ (Apache opensource project)
- http://www.modssl.org/ (Mod_ssl opensource project)
- http://www.engelschall.com/sw/mm/ (a library of shared memory functions)
- http://www.openssl.org/ (OpenSSL opensource project)
- http://www.rsasecurity.com/products/bsafe/cryptoc.html (RSA BSAFE Crypto-C commercial product)
- The HP3000-L mailing list where you can talk with other users of WebWise on MPE/iX:
  - The official HP3000-L web site of http://raven.utc.edu/Archives/hp3000-l.html
  - The gatewayed Usenet newsgroup of comp.sys.hp.mpe

Introducing Sendmail for MPE/iX 7.5

By Mark Bixby, Commercial Systems Division

Previously available as unsupported freeware, Sendmail is now bundled into MPE/iX 7.5 FOS as a fully supported product, which allows you to send and receive SMTP-based e-mail. The initial A.01.00 release of Sendmail for MPE/iX is based on the 8.12.1 Internet open source version from `sendmail.org`.

System Requirements and Patches

Sendmail has the following prerequisites:

- MPE/iX 7.5 Release.
- HP highly recommends installing the latest NSTxxxxx network transport patch.
- Syslog/iX configured and running so that Sendmail can log warnings, errors, and message traffic data. Syslog/iX is documented in the *Configuring and Managing MPE/iX Internet Services* manual.
- Your HP e3000 must be configured to use one or more DNS servers, and must have the correct entries in the DNS database corresponding to the configured hostname in :NMMGR. See “DNS Issues” for more detail.
- Any network firewalls, routers, or switches that your HP e3000 communicates with must be configured to allow your HP e3000 to send and receive packets on port 25 (SMTP) and port 53 (DNS). See “Firewall Issues” for more detail.

Support

Sendmail 8.12.1 for MPE/iX is supported through the HP Response Center as part of MPE/iX FOS support.

Product Overview and Feature Set

The feature set of Sendmail for MPE/iX is quite extensive; the following is only a partial list:

- Send and receive SMTP-based e-mail from sessions and/or batch jobs
- Deliver local e-mail to mailboxes, files, or programs
- A vast selection of tunable performance parameters
- Highly flexible and extremely powerful configuration language
- Access control for accepting or rejecting incoming e-mail
- Message header rewriting capabilities
- Modular feature set allows you to configure exactly the functionality you want; the following optional features have been configured by default in this distribution:
  - `access_db`
  - `domaintable`
  - `genericstable`
  - `mailertable`
  - `virtusertable`
- Open-source robustness and reliability

- Compatibility with the HP-UX Sendmail file layout

DNS Issues

The number one cause of Sendmail installation problems is due to improper system naming and/or a lack of DNS entries describing your HP e3000. Please verify the following before you attempt to run Sendmail for the first time:

- `/bin/uname -n` should report your HP e3000 hostname as a single token, i.e., "`JAZZ`" instead of "`JAZZ.EXTERNAL.HP.COM`". If you do not see a single token hostname, you must configure a proper hostname by using **:NMMGR**.
- `/SYS/NET/RESLVCNF` must contain a single "domain" statement that defines the domain part of your HP e3000's fully qualified hostname. For example, `/bin/uname -n` should display "`JAZZ`" and `/SYS/NET/RESLVCNF` should contain a "`domain external.hp.com`" statement.
- `/SYS/NET/RESLVCNF` must contain one or more "nameserver" statements which specify one or more DNS server IP addresses that your HP e3000 will be querying to resolve host names. It is not necessary to run a DNS server such as BIND on your HP e3000 itself.
- Your HP e3000 must be defined within the DNS nameserver databases as having a valid "A" record that maps the HP e3000's hostname to an IP address.
- Your HP e3000 must be defined within the DNS nameserver databases as having a valid "PTR" record that maps the HP e3000's IP address to a hostname.

Sendmail for MPE/iX is distributed with a convenient script that you can run to check all of the above DNS configuration issues and more:

1. `:HELLO SERVER.SENDMAIL`
2. `:XEQ SH.HPBIN.SYS -L`
3. `shell/iX> /SENDMAIL/CURRENT/bin/dnscheck`

The `dnscheck` script will instruct you how to fix any problems that it detects. After making each fix, keep rerunning the script until no more problems are found.

Firewall Issues

The number two cause of Sendmail installation problems is due to a firewall or other network security device blocking your HP e3000 from being able to send and receive packets on port 53 (DNS) and port 25 (SMTP).

Sendmail uses port 53 (DNS) to resolve hostnames into IP addresses and IP addresses into hostnames. Sendmail may do multiple DNS resolutions for every e-mail message sent or received, and if a firewall is blocking these DNS packets, Sendmail may experience long delays and/or generate various error messages logged to syslog.

Sendmail may need to contact external DNS servers if you are attempting to exchange e-mail with the Internet. Some intranet environments may require you to reference a "forwarding DNS server" (which can traverse your border firewall to talk to the Internet) via a nameserver statement in `/SYS/NET/RESLVCNF`. Consult your local network administrator for advice on how to choose a proper DNS server.

Port 25 (SMTP) is used to connect to remote mail servers to deliver outgoing e-mail, and is also used on the HP e3000 to listen for incoming e-mail. If a firewall is blocking outbound port 25 packets, Sendmail may experience long delays and generate various error messages logged to syslog as well as bounce messages returned to the e-mail originator. If a firewall is blocking inbound port 25 packets, Sendmail will not be able to receive any incoming e-mail, and there will be no extra syslog messages.

Migration from Sendmail 8.9.1

Many HP e3000 machines have been running the unsupported freeware version of Sendmail 8.9.1, available from `http://www.bixby.org/mark/sendmailix.html`. The following considerations apply if you are migrating from 8.9.1 to 8.12.1:

- The 8.9.1 daemon job stream file `/SENDMAIL/PUB/JDAEMON` is not modified by the 8.12.1 installation process, and it is not compatible with the 8.12.1 distribution. You must use `/SENDMAIL/CURRENT/JDAEMON.sample` as a template for manually creating an 8.12.1-compatible `/SENDMAIL/PUB/JDAEMON` job stream file.
- The 8.9.1 `/SENDMAIL/PUB/SENDMAIL` program file is renamed to `SENDMAIL.bak` and replaced by a symbolic link that points to the 8.12.1 `/SENDMAIL/CURRENT/SENDMAIL` program file. Any existing applications that refer to `/SENDMAIL/PUB/SENDMAIL` should continue to work properly without modification.
- All 8.12.1 distribution files live in different HFS directories than the 8.9.1 distribution files. Once you are satisfied that 8.12.1 is working properly, you should purge the old 8.9.1 files to conserve disk space and avoid confusion.
- All 8.12.1 configuration files reside in the `/etc/mail` directory instead of the old 8.9.1 location of `/SENDMAIL/PUB/etc`. The 8.9.1 `sendmail.cf` file is not compatible with 8.12.1, and so you will either have to use the default 8.12.1 `/etc/mail/sendmail.cf` file or create your own customized configuration file from the 8.12.1 configuration macros in `/SENDMAIL/CURRENT/cf/cf`.
- All 8.9.1 database maps including the aliases file should be rebuilt using the 8.12.1 makemap or newaliases utilities.
- Any undelivered messages still on the 8.9.1 queue will not be delivered by 8.12.1 which now has two separate queues residing at `/var/spool/clientmqueue` and `/var/spool/mqueue` instead of the previous single 8.9.1 queue location `/SENDMAIL/PUB/mqueue`.
- The implementation of local message submission has changed with 8.12.1. Previously with 8.9.1, the `/SENDMAIL/PUB/SENDMAIL` program file would copy new messages from `stdin` directly into a queue disk file. With 8.12.1, the `SENDMAIL` program file will copy new messages from stdin and then contact the local HP e3000's port 25 to queue the messages using standard SMTP protocol.
- 8.12.1 does not include the **Majordomo** mailing list software that was bundled with 8.9.1.

For Further Information

- *Configuring & Managing MPE/iX Internet Services* manual.
- The HP CSY Sendmail web page of `http://jazz.external.hp.com/src/sendmail/`.
- The official Sendmail web site of `http://www.sendmail.org/`.
- Information about unsupported freeware versions of Sendmail for MPE/iX can be found at `http://www.bixby.org/mark/sendmailix.html`.
- Documentation files installed on your local machine with this distribution:
  - `/SENDMAIL/CURRENT/doc/op/op.ps` — *Sendmail Installation and Operation Guide*
  - `/SENDMAIL/CURRENT/cf/README` — Sendmail Configuration Files
  - `/SENDMAIL/CURRENT/man` — directory tree containing man page documentation, i.e.,: `export MANPATH=/SENDMAIL/CURRENT/man:$MANPATH; man sendmail`
- The HP3000-L mailing list where you can talk with other users of Sendmail on MPE/iX:
  - The official HP3000-L web site of `http://raven.utc.edu/Archives/hp3000-l.html`

— The gatewayed Usenet newsgroup of `comp.sys.hp.mpe`.

4 Fibre Channel Device and Adapter Support on HP e 3000 Systems

by Senthil Kumar, Commercial Systems Division

This section contains articles providing information about the following topics:

Fibre Channel Device Adapter Support

- Introduction
- SCSI-FC Router vs. Fibre Channel Adapter
- Benefits to Customers
- Fibre Channel Adapter Cards Supported
- Fibre Channel Concepts

Fibre Channel Adapters and Peripherals Supported

- Fibre Channel Device Adapter Cards
- Fibre Channel Devices
- Fibre Channel Switches
- Fibre Channel Hubs
- Fibre Channel Topologies Supported
- Cables and Connectors

Configuration Examples for Fibre Channel Adapters and Devices

- Determining the type of cards in your system
- Configuring Fibre Channel Adapter Card
- Understanding Fibre Channel device paths
- Determining Fibre Channel Devices connected to an FC adapter card
- Configuring Fibre Channel Devices
- Using Fibre Channel disk as LDEV-1
- PDC Version Requirements for using FC disk as LDEV-1
- Default Configuration Groups for using FC disk as LDEV-1
- Upgrading from MPE/iX 7.0 to MPE/iX 7.5 with FC disk as LDEV-1

FCSCAN — Fibre Channel Device Scanning Utility

- Introduction
- FCSCAN Default Output
- FCSCAN Output with “-n” option
- FCSCAN Output with “-h” option
- FCSCAN Output in Fabric Topology
- Fibre Channel Topology Changes

TDUTIL — Fibre Channel Diagnostic Utility

- Introduction
- TDUTIL Sample Output

HP Support Tools Manager (STM) with FC Devices

HP SureStore Virtual Array 7100 on the HP e3000

HP SCSI-FC Fabric Router for the HP e3000

Fibre Channel Device Adapter Support

Introduction

With MPE/iX Release 7.5, support has been introduced for new Fibre Channel Device Adapter cards on N-Class and A-Class HP e3000 systems. These PCI-bus based adapter cards provide the ability to connect a Fibre Channel device directly to the HP e3000 system using Fibre channel cables. Prior to MPE/iX 7.5, HP e3000 systems supported connectivity to fibre channel devices only through a SCSI-Fibre Channel Router connected on a PCI-SCSI HVD card or NIO FW-SCSI card. Now with the support for Fibre Channel (FC) adapter cards, the router is no longer needed for N- and A-class systems.

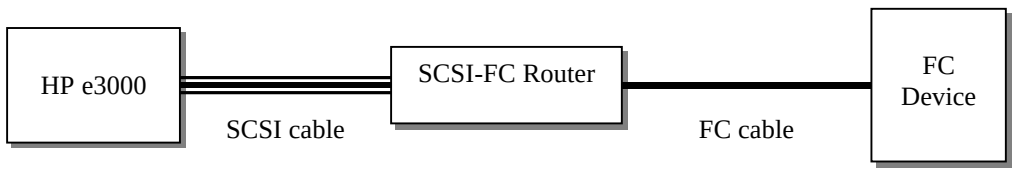
The Fibre Channel adapter cards require new software and new SYSGEN configuration values. The purpose of this article is to provide an external “System Administrator” view of these changes in MPE/iX. The opening section of the article describes the motive for supporting FC adapter cards. The next section gives details of the new FC Device Adapter cards supported. The third section is a review of Fibre Channel Concepts (which you may want to read first if all of this is new to you). The configuration of Fibre Channel adapter cards and attached FC devices using SYSGEN is covered in a separate article in this Communicator.

NOTE Installation of HP e3000 Device adapter cards is to be performed by licensed HP Hardware personnel only. All documents referred to in this article are available at http://docs.hp.com.

SCSI-FC Router vs. Fibre Channel Adapter

Prior to MPE/iX 7.5, fibre channel devices could be connected to N- and A-class HP e3000 systems only through a SCSI-FC Router (A5814A-003). This router is a protocol converter between SCSI and Fibre Channel. The SCSI-FC Router has one Ultra SCSI-HVD port and one Fibre Channel port. So a SCSI adapter card on an HP e3000 can be connected to the SCSI-FC Router through a SCSI cable. On the other end of the router, a FC cable connects to the FC device. This arrangement allows the HP e3000 system to access the FC device through the router.

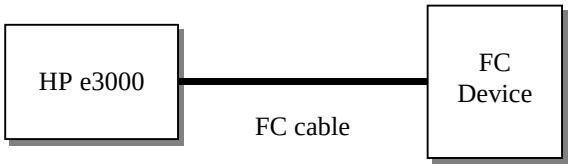
Figure 4-1 Accessing FC Device through SCSI-FC Router



Although this setup provided the capability for HP e3000 customers to connect FC devices, this arrangement has multiple components and hence not easy to maintain. Since there are multiple connections, there can be multiple points of failure possible. If there is a fault, it is necessary to individually check the SCSI adapter card, SCSI cable, SCSI-FC router, FC cable and the FC device to see where the problem is. Thus using the SCSI-FC router to access FC devices introduces multiple points of failure. Moreover accessing FC devices through the router and SCSI cable brings down the high FC transfer rates ultimately to lower SCSI transfer rates. Thus the FC storage devices are not getting used to their full performance capability. Also a “SCSI view” of the FC device provided by the router limits the number of Logical Units (LUNs) that can be

effectively used by the host system. SCSI-FC router can be viewed more as a quick and easier way of allowing fibre channel connectivity for HP e3000 systems. But this will not be able to meet the fibre channel storage needs of HP e3000 customers for long.

Figure 4-2 Accessing FC Device through FC Device Adapter



In order to allow HP e3000 customers to take full advantage of FC storage devices and also ease maintenance issues, MPE/iX 7.5 introduces the support of native Fibre Channel adapter cards. These adapter cards can be used in the PCI I/O slots of N/A-Class systems and can connect directly to the FC devices through an FC cable, thus providing higher I/O performance and simpler connectivity.

It is to be noted that fibre channel device adapter cards are supported only on N-Class and A-Class HP e3000 systems. Other HP e3000 models like 99x and 9x9 systems would continue to need the SCSI-FC router for connecting to fibre channel devices.

Benefits to Customers

The introduction of support for FC device adapter cards brings the following benefits to HP e3000 customers:

- Simplified connectivity to fibre channel devices
- Improved fibre channel I/O performance
- Reduced maintenance issues
- Ability to access the entire LUN-range of fibre channel devices
- Lower cost of ownership

Fibre Channel Adapter Card Supported

The Fibre Channel Device Adapter Card available for N- and A-Class Systems is:

- A6795A — PCI 4X 2Gbps Single Port Fibre Channel Adapter

This adapter card utilizes the Tachyon XL2 chip, the newest member of the Tachyon family product suite of Fibre Channel interface controllers. It can operate at 2 Gigabits per second speed in a 4x PCI slot and presents one fibre channel port to the outside world. It can be plugged into any of the PCI Bus slots on N- and A-Class HP e3000 systems.

Fibre Channel Concepts

Fibre Channel Basics

A fibre channel environment or network consists of host systems and devices connected together by an interconnection topology. In fibre channel terminology, both host systems and devices are referred to as *nodes*. Each node is a source or destination of information for one or more other nodes. Each node requires one or

more *ports* to provide a physical interface for communicating with other nodes via their ports. The port is a hardware attachment that allows the node to send and receive information via the physical interface. Ports may be integrated into the device or packaged as a separate pluggable card. Many peripheral devices such as disk or tape drives use integrated ports while most host systems use pluggable Host Bus Adapter (HBA) ports for flexibility. Fibre channel protocol allows transporting of upper layer protocols like SCSI command set over it, thus enabling it to be used for connecting mass storage devices.

Each fibre channel node contains at least one hardware interface port that connects the node to the topology and transports information to or from other ports. This port is referred to as a node port or N_Port for short. A node may have a single N_Port or multiple N_Ports.

Each N_Port has a Port_Name, which is a unique 64-bit identifier assigned to the port at the time of manufacture or installation. Since no two ports in the world are assigned the same name, it results in a unique "World-Wide Name" (WWN). Each N_Port also has one or more 24-bit address identifiers called the N_Port ID, which is used to address the node within a topology and route information to it.

Ports are connected together through an interface *topology*. The topology consists of the physical interface and interconnection scheme. The physical interface determines the signaling rate and communication distances. It defines transmission mechanisms such as optical of electrical signaling and specifies the cables and connectors used by that interface. The topology defines the interconnection scheme. It determines how many nodes can be connected together, how information is routed among the nodes, total bandwidth available and delivery latencies.

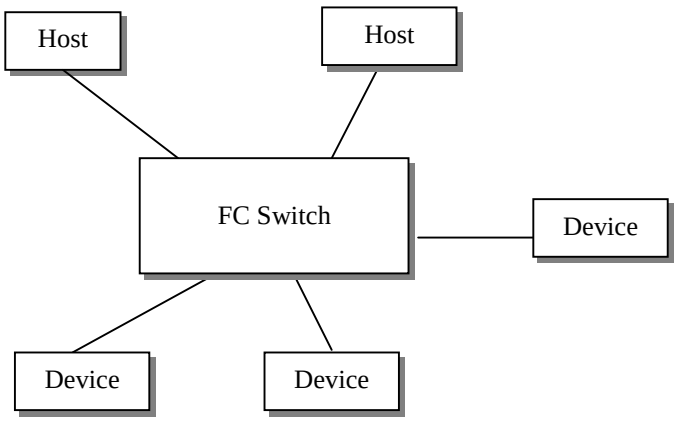
Fibre Channel Topologies

Fibre Channel allows three different types of topologies for interconnecting nodes. They are:

1. switched fabric
2. arbitrated loop
3. point-to-point

A *Fabric* topology is a mesh of host systems, FC devices and FC switches interconnected with fibre channel cables. At least one FC switch is required to form a fabric topology. Communication between any two nodes in the fabric happens through the switch directly without the intervention of other nodes. In a fabric, each node is uniquely identified using the 24-bit N_Port ID. The N_Port ID is assigned for each FC host or device in the fabric by the fabric controller present inside the FC switch.

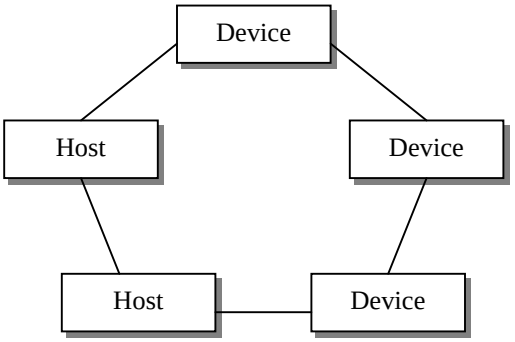
Figure 4-3 Fibre Channel Fabric



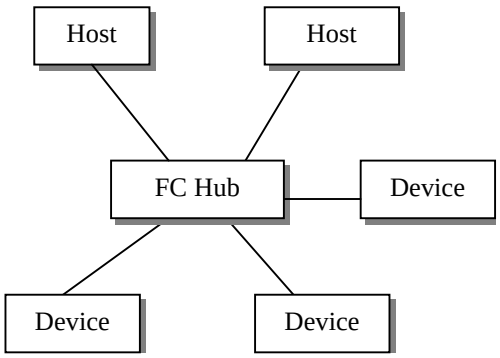
Since a fabric topology is complex and costlier, fibre channel technology allows FC devices to be connected in a rather simpler topology called the *Arbitrated Loop or Private Loop* topology. A private loop is just a ring-like connection of FC devices and host systems, with each entity physically connected only to its adjacent one on either side. It forms a loop because communication between any two entities will have to pass through all intermediate ones. In such a simpler topology, each host or device is identified simply by a Loop ID.

Figure 4-4 Fibre Channel Private Loop

Fibre Channel Private Loop (without Hub)



Fibre Channel Private Loop (with Hub)



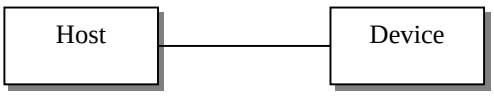
A private loop topology allows up to 126 nodes to be connected. The Loop ID of FC devices can be set through dial settings on the device itself. The Loop ID for host adapters is attained automatically through the fibre channel initialization process. A private loop topology can be formed by connecting adjacent nodes to each other directly or by interconnecting them through an *FC Hub*. The hub internally connects the receive and transmit wires of adjacent nodes to form the loop. The main advantage of using hub is that it electrically bypasses inactive ports, thus allowing loop communication to happen even if any of the nodes goes faulty.

There is also another variant of the arbitrated loop topology called *Public Loop* which results when an FC switch is introduced as part of an arbitrated loop. But as far as fibre channel protocol is concerned, this is considered to be covered under the fabric topology itself.

Another simpler topology is the *Point-to-Point* topology where a single device is connected to a single host by means of a direct connection. Some fibre channel protocol operations followed in a “point-to-point” topology is different from the private loop and fabric topologies.

Figure 4-5 Fibre Channel Point-to-Point

Fibre Channel Point-to-Point



Fibre Channel Adapters and Peripherals Supported

This section gives the list of supported fibre channel adapters and peripherals on N-Class and A-Class HP e3000 systems with MPE/iX 7.5.

Fibre Channel Device Adapter Card

The Fibre Channel Device Adapter Card supported on MPE/iX 7.5 for N- and A-Class HP e3000 systems is:

- A6795A — PCI 4X 2Gbps Single Port Fibre Channel Adapter

This fibre channel adapter card utilizes the Tachyon XL2 chip, the newest member of the Tachyon family product suite of Fibre Channel interface controllers. It operates at 2 Gigabits per second speed in a 4x PCI slot. This adapter card can automatically sense the fibre channel link speed to operate at 1Gbps or 2Gbps, thus enabling it to work with fibre channel devices supporting either speeds.

For further details on these FC adapter cards, see "*HP e3000 Fibre Channel Mass Storage Adapters -- Service and User Manual*".

Since this adapter card is PCI-bus based, it can be supported only on N-class and A-class HP e3000 systems. There will be no support for Fibre Channel Device Adapter cards on the NIO-bus based HP e3000 systems like 99x or 9x9 systems. These systems would continue to need a SCSI-FC router for connecting to fibre channel devices.

Fibre Channel Devices

The following fibre channel devices can be connected to N- and A-Class HP e3000 systems through fibre channel device adapter cards.

- HP SureStore Disk Array XP48
- HP SureStore Disk Array XP512
- HP SureStore Virtual Array 7100

At present, only FC disk devices are supported with FC adapter cards. No tape devices are supported on FC adapter cards.

Fibre Channel Switches

In order to support the fibre channel fabric topology and provide wide range of connectivity options for HP e3000 customers, the following fibre channel switches are supported with FC adapter cards.

- Brocade 2800 16-port FC Switch
- Brocade 2400 8-port FC Switch

Fibre Channel Hubs

The following fibre channel hub products are supported with FC adapter cards on N- and A-class HP e3000 systems.

- HP SureStore Hub S10 (ShortWave)
- HP SureStore Hub L10 (LongWave)

Fibre Channel Topologies Supported

The following fibre channel topologies are supported on HP e3000 N- and A-class systems using FC device adapter cards:

- Fabric
- Arbitrated loop (Private and Public)

HP e3000 systems will not support point-to-point topology in actual fibre channel sense. However connecting a single FC device to a single host system is still supported, but the setup will behave like a two-node private loop. The host and the device will speak in “private loop” mode rather than in “point-to-point” mode as per fibre channel protocol definitions. There is no major difference for customers from the point of view of connectivity.

Cables and Connectors

Fibre optic cables are used to interconnect fibre channel adapters, devices, switches and hubs. An optical fibre is made of two parts, the core and cladding, surrounded by a protective coating. The core and the cladding are made as a single piece of glass, but each section has a different index of refraction. The difference in refractive indexes creates a mirror around the core, which causes light entering the core to ricochet off the cladding surface and travel along the core. There are several parameters involved in specifying a cable type. They are:

Multimode vs. Single-mode: Multimode cables are the more common fibre channel cables used for short distance connections spanning over few meters. Single-mode cables are used for long distance applications that are longer than a few miles.

Duplex vs. Simplex: Duplex cables allow for simultaneous, bi-directional data transfer allowing devices to receive and send data simultaneously. Simplex cables only consist of one fiber allowing only one-way data transfer. The cables listed below are multimode duplex cables and are used for most common fibre applications.

Size: In a cable description, you will often see a reference to 50/125 or 62.5/125. This refers to the size of the core and the cladding. The most common diameter of the core is 62.5 and 50 micron. A 9 micron diameter may be seen in future technologies. The most common diameter of the cladding is 125 micron.

SC vs. LC Connectors: Fibre channel cables are plugged to adapter cards and devices through a Gigabit Interface Connector (GBIC) module. The GBIC is a small hot-swappable serial-to-serial connector module that can be used to provide a pluggable media interface for fibre channel devices. In recent fibre channel products, GBICs have been replaced by Small Form Factor (SFF) optical modules. GBICs provide a SC-type connector while SFFs provide a LC-type connector. The technical specifications for a FC adapter card or device will mention the type of connector supported by it. The fibre channel cable used for interconnection should be selected based on the type of connectors it will connect to at either end.

Table 4-1 Cabling Required for Connecting Fibre Channel Peripherals

Description	Product Number	Fibre Type	Fibre Size	Cable Length
Fibre Optic Cable SC/SC Connector				
	A3583A	Duplex	50/125	2 meter
	A3531A	Duplex	50/125	16 meter
	A3735A	Duplex	50/125	50 meter
	A3736A	Duplex	50/125	100 meter

Table 4-1 Cabling Required for Connecting Fibre Channel Peripherals

Description	Product Number	Fibre Type	Fibre Size	Cable Length
Fibre Optic Cable LC/LC Connector				
	C7524A	Duplex	50/125	2 meter
	C7525A	Duplex	50/125	16 meter
	C7526A	Duplex	50/125	50 meter
	C7527A	Duplex	50/125	200 meter
Fibre Optic Cable LC/SC Adapter				
	C7529A	Duplex	50/125	2 meter
	C7530A	Duplex	50/125	16 meter
Adapter Kit (includes 2-meter LC/SC adapter and SC F/F Coupler)	C7540A	Duplex	50/125	2 meter Adapter
Fibre Optic SC F/F Coupler	C7534A			

As an example on choosing the right type of FC cable, let us assume that we are trying to connect the A6795A FC adapter card to a Virtual Array 7100 device. A6795A adapter contains an LC-type connector whereas VA7100 device uses an SC-type connector. From the list of cable types in the previous table, we can see that we need to use the LC/SC adapter type cable (C7529A or C7530A) for interconnecting A6795A and VA7100. If a distance of more than 16 meters is needed, then we need to use a combination of C7540A adapter kit along with an SC-SC type cable (A3735A or A3736A).

Further information on choosing FC cables for interconnection can be found in the *Configuration Guide* for the respective *Fibre Channel* devices.

Configuration Examples for Fibre Channel Adapters and Devices

Device configuration for FC adapter cards on N-Class and A-Class systems is accomplished using the same tools (SYSGEN, IOCONFIG) as existing HP e3000 Systems. Your MPE/iX 7.5 Release software has default configuration files like `CONFACL1, CONFNCL1,` etc. These configuration files provide the minimum set of devices necessary to boot the system and start the installation process. You will need to modify your configuration file to connect additional Fibre Channel devices to your system. This article will provide a step by step description of configuring both FC Device Adapter cards and attached FC peripherals on an N-Class System. The A-Class's interface will be similar enough to allow a System Manager experienced in configuring hardware to apply this N-Class example to an A-Class system.

The steps discussed in this article for configuring FC devices cover only the configuration of device LUNs on MPE/iX. Other procedures like connecting the device and performing device-specific configuration (like LUN creation) are beyond the scope of this article. These details can be found in the Configuration Guide for the respective fibre channel device being used. Such procedures are expected to be completed before attempting to configure the device LUNs on MPE/iX.

NOTE The installation of Device Adapter Cards is a complex operation requiring partial disassembly of your system and is best left to your HP Hardware Support Technician.

Determining the Type of Cards in Your System

The following operations are accomplished while the system is "down," e.g., not running MPE/iX. Start by entering a Control-B at the system console. You may be prompted for a logon ID and password, each of which currently defaults to a single Carriage Return. At the GSP> prompt enter an **RS** or **TC** command, confirm it and acknowledge any prompts that are presented. You should soon find yourself at the main Boot Command Handler (BCH) menu (If you have problems please refer to the *MPE/iX System Software Maintenance Manual* for this Release which should include a more complete description of rebooting your system):

Console Display #1:

```
Main Menu: Enter command or menu > di


---- Main Menu ---------------------------------------------------------

     Command                          Description
     -------                          -----------
     BOot [PRI|ALT|<path>]            Boot from specified path
     PAth [PRI|ALT] [<path>]          Display or modify a path
     SEArch [DIsplay|IPL] [<path>]    Search for boot devices

     COnfiguration menu               Displays or sets boot values
     INformation menu                 Displays hardware information
     SERvice menu                     Displays service commands

     DIsplay                          Redisplay the current menu
```

```
     HElp [<menu>|<command>]          Display help for menu or command
     RESET                            Restart the system
----
Main Menu: Enter command or menu >
```

From the Main menu, proceed to the Information menu:

Console Display #2:

```
Main Menu: Enter command or menu > in


---- Information Menu -----------------------------------------------


     Command                    Description
     -------                    -----------
     ALL                        Display all system information
     BootINfo                   Display boot-related information
     CAche                      Display cache information
     ChipRevisions              Display revisions of major VLSI
     COprocessor                Display coprocessor information
     FRU                        Display FRU information
     FwrVersion                 Display firmware version
     IO                         Display I/O interface information
     LanAddress                 Display Core LAN station address
     MEmory                     Display memory information
     PRocessor                  Display processor information
     SerialNum                  Display serial number
     WArnings                   Display selftest warning messages

     BOot [PRI|ALT|<path>]      Boot from specified path
     DIsplay                    Redisplay the current menu
     HElp [<command>]           Display help for specified command
     RESET                      Restart the system
     MAin                       Return to Main Menu
----
Information Menu: Enter command >
```

For the purposes of this article we are only interested in the I/O information for this system. The “I/O” function will provide two sets of information in two sections. The first section is the listing of the System and Local Bus Adapters; the Local Bus Adapters with slot numbers 1-12 are potential Device Adapter locations. The second section is the listing of PCI Device Adapters that are actually present on the system. These controllers are either Device Adapter Cards or the embedded functions of the Core I/O Card.

Console Display #3:

```
Information Menu: Enter command > io
```

```
I/O MODULE INFORMATION

 WARNING:  The system io configuration does not match the expected
            io configuration. There may be missing or extra lower
            bus converters. There could also be one or more lower
            bus converters that are not configured as expected.


                       Path   Slot                          IODC
Type                   (dec)  Number    HVERSION  SVERSION  Vers
----                   -----  ------    --------  --------  ----
System bus adapter     0                0x8030    0xc10     0x0
Local bus adapter      0/0    Built_In  0x7820    0xa00     0x0
Local bus adapter      0/1    Built_In  0x7820    0xa00     0x0
Local bus adapter      0/2    6         0x7820    0xa00     0x0
Local bus adapter      0/4    2         0x7820    0xa00     0x0
Local bus adapter      0/5    1         0x7820    0xa00     0x0
Local bus adapter      0/8    4         0x7820    0xa00     0x0
Local bus adapter      0/12   3         0x7820    0xa00     0x0
System bus adapter     1                0x8030    0xc10     0x0
Local bus adapter      1/0    12        0x7820    0xa00     0x0
Local bus adapter      1/2    10        0x7820    0xa00     0x0
Local bus adapter      1/4    9         0x7820    0xa00     0x0
Local bus adapter      1/8    11        0x7820    0xa00     0x0
Local bus adapter      1/10   8         0x7820    0xa00     0x0
Local bus adapter      1/12   7         0x7820    0xa00     0x0
CI DEVICE INFORMATION
                            Path       Vendor  Device  Bus  Slot
Description                (dec)        Id      Id      #    #
-----------                -----        ----    ----    ---  ---
Ethernet cntlr             0/0/0/0     0x1011  0x19    0    Built_In
SCSI bus cntlr             0/0/1/0     0x1000  0xc     0    Built_In
SCSI bus cntlr             0/0/2/0     0x1000  0xf     0    Built_In
SCSI bus cntlr             0/0/2/1     0x1000  0xf     0    Built_In
Comp. ser cntlr            0/0/4/0     0x103c  0x1048  0    Built_In
Comp. ser cntlr            0/0/5/0     0x103c  0x1048  0    Built_In
Ethernet cntlr             0/4/0/0     0x1011  0x19    32   2
Ethernet cntlr             0/5/0/0     0x1011  0x19    40   1
Fibre channel              0/8/0/0     0x103c  0x1029  64   4
SCSI bus cntlr             0/12/0/0    0x1000  0xc     96   3
```

```
SCSI bus cntlr              1/4/0/0     0x1000  0xc     160  9


Information Menu: Enter command >
```

The hardware path can loosely be interpreted as:

```
System Bus Location / Local Bus Number / PCI Device / PCI Device Function
```

Each path marked “SCSI bus cntlr” represents a separate SCSI Bus. Each path marked “Fibre channel” represents a separate fibre channel port. The Vendor ID, Device ID, Path and Bus/Slot information may be used to uniquely identify each Fibre Channel Device Adapter Card type. The Vendor and Device IDs of Fibre Channel Adapter card supported are listed in Table 4-2.

Table 4-2 Supported Fibre Channel Adapter Card with Vendor ID and Device ID

Fibre Channel Card Type	Vendor ID	Device ID
A6795A	0x103c	0x1029

As a reference for our example, the list of supported PCI-SCSI adapter cards with Vendor ID and Device ID is also listed in Table 4-3

.

Table 4-3 Supported PCI-SCSI Adapter Cards with Vendor ID and Device ID

PCI-SCSI Card Type	Vendor ID	Device ID
A4800A (SP HVD)	0x1000	0xf (same as A5159A)
A5159A (DP HVD)	0x1000	0xf (same as A4800A)
A5149A (SP LVD)	0x1000	0xc
A5150A (DP LVD)	0x1000	0xb

From the information previously gathered from the Information Menu, I/O Function, we can see that the system has the following cards connected:

Example #1: Correlating Path and Card Type

Table 4-4

Path	Device ID	Card Type
0/0/1/0	0xc	Core I/O Embedded A5149A (SP LVD/SE SCSI)
0/0/2/0, 0/0/2/1 (pair on same bus)	0xf	Core I/O Embedded A5159A (DP HVD SCSI)
0/8/0/0	0x1029	A6795A (FC)
0/12/0/0, 1/4/0/0	0xc	A5149A (SP LVD SCSI)

Determining SCSI Devices Connected to Your System

The N-Class system has a built in function that will search for SCSI devices attached to the system. This function is available on the Main Menu as the **Search** command. It is to be noted that this **Search** command is helpful only in finding the devices attached to SCSI adapter cards and not for the devices attached to Fibre Channel adapter cards. The procedure to determine FC devices connected to FC adapter cards is covered in a later section.

Console Display #4:

```
Main Menu: Enter command or menu > sea


Searching for potential boot device(s)

This may take several minutes.


To discontinue search, press any key (termination may not be immediate).


   Path#  Device Path (dec)  Device Path (mnem)  Device Type

   -----  -----------------  ------------------  -----------

   P0     0/0/1/0.2          extscsi.2           Sequential access media

   P1     0/0/2/0.6          intscsia.6          Random access media

   P2     0/0/2/1.6          intscsib.6          Random access media

   P3     0/8/0/0.8                              Random access media

   P4     0/12/0/0.4                             Random access media

   P5     0/12/0/0.3                             Random access media

   P6     0/12/0/0.2                             Random access media


Main Menu: Enter command or menu >
```

Note that the **Search** command shows the FC card 0/8/0/0 as “0/8/0/0.8 Random access media”. This is not an actual FC device path but just a hint that there could possibly be random access media devices under this card. We will see later how to identify the FC devices connected to the card.

One piece of configuration data that is missing is the actual hardware device IDs. At this time the only source for this information is the ISL utility, ODE MAPPER2. MAPPER2 is the 64-bit version of the MAPPER program used for previous HP e3000 platforms. For more complete information on ODE MAPPER2, please see the *MPE/iX System Software Maintenance Manual* for this Release. It is highly recommended that your configured device IDs match the actual device IDs returned by ODE MAPPER2. For the purposes of this article we'll assume some arbitrary but legal device IDs.

The next part of your configuration must be done while the system is “up” and running MPE/iX. This will cover the detailed steps for configuring Fibre channel adapter card and Fibre channel devices. The configuration of SCSI devices on PCISCSI adapters is accomplished with the same exact steps as followed in MPE/iX 7.0 on N- and A-Class HP e3000 systems and is not discussed here.

Configuring Fibre Channel Adapter Card

The steps needed in SYSGEN to configure a Fibre Channel adapter card, i.e., one at path 0/8/0/0. As with the SCSI adapter, start by configuring System Bus Location equal to zero (“0”). Then configure Local Bus Number equal to eight (“8”), PCI Device equal to zero (“0”), and PCI Function equal to zero (“0”). In most cases, the System Bus component and Local Bus number component may already be configured. If so, directly proceed to configure the PCI Device component.

```
io> ap 0 id=pat_ioa_bc

io> ap 0/8 id=pat_pci_bc

io> ap 0/8/0 id=pci_device

io> ap 0/8/0/0 id=A6795A

          << This is the FC Device Adapter Card (from Example #1) >>
```

Checking that the FC Device Adapter Card is properly configured:

```
io> lp 0/8/0/0

PATH: 0/8/0/0                          LDEV:

  ID: A6795A                           TYPE: DA

PMGR: FC_DAM                        PMGRPRI: 6

LMGR:                                MAXIOS: 0
```

Note that the PMGR should be set to “FC_DAM,” which is the new manager software for FC device adapter card.

Understanding Fibre Channel Device Paths

Before identifying fibre channel devices connected to the adapter, let us understand about Fibre Channel device hardware path format used in MPE/iX. Unlike a SCSI device path, a Fibre Channel device path is interpreted differently. The path format used in MPE/iX for a fibre channel device is given below:

```
System Bus Location / Local Bus Number / PCI Device / PCI Device Function. FC Nport . FC LUN
```

Note that the second to last component here is “FC Nport” whereas in case of SCSI devices it would have been a “SCSI Target”. The FC Nport represents a “fibre channel node port” which represents the connection point for a fibre channel device. Under the FC Nport, there can be multiple LUNs of the FC device, which are accessible in the same way as SCSI LUNs. A single FC device can support multiple Nports and each Nport can have varying number of LUNs under it. This is analogous to multiple SCSI LUNs under a SCSI Target.

The last component in the FC path represents an “FC LUN” while in a SCSI device path it would be a “SCSI LUN”. Although the FC LUN is functionally the same as a SCSI LUN, it is termed differently to signify that it can take on much larger values.

Determining Fibre Channel Devices Connected to an FC Adapter Card

There is no way in the Boot Command Handler (BCH) Main Menu to identify the FC devices connected to an FC adapter card. Running ODE MAPPER2 from ISL does help to identify some FC devices but even this may not list out all FC LUNs under the FC devices. But for configuring in MPE/iX we ultimately need the FC LUN paths. In order to assist the System Administrator in identifying the FC devices and LUNs accessible from a FC adapter card, MPE/iX 7.5 comes with a new utility called FCSCAN. This utility is present in the system as “FCSCAN.PUB.SYS”. Before using this utility to identify FC devices/LUNs under a FC adapter, you need to configure the FC adapter in SYSGEN using the steps mentioned above and reboot the system. (If the FC card is configured online using online configuration tool IOCONFIG instead of SYSGEN, the reboot is not required).

When the system is rebooted with FC adapter configured, the software driver for the FC adapter card initializes the card and identifies FC devices connected to the card. At this time, a message appears on the system console saying:

```
td: claimed Tachyon XL2 Fibre Channel Mass Storage card at 0/8/0/0

Scanning for fibre channel devices at 0/8/0/0. This may take a while...
```

The appearance of this message indicates that the card has been initialized successfully and the software identified the FC devices connected to this adapter card. To get the list of FC devices connected to the card, you can run the utility FCSCAN from the MPE/iX CI prompt.

A sample output on running the FCSCAN utility is shown below:

```
:fcscan

FCSCAN has found the following Fibre Channel I/O Adapter Cards and Devices on this system.

 SYSGEN PATH         DESCRIPTION                 BOOT MENU PATH

=============       =============               ================


0/8/0/0           Fibre Channel Adapter

0/8/0/0.0         Fibre Channel N-Port

0/8/0/0.0.0       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.0

0/8/0/0.0.1       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.1

0/8/0/0.0.105     HP OPEN-3 disk              0/8/0/0.8.0.0.0.13.1

0/8/0/0.95        Fibre Channel N-Port

0/8/0/0.95.0      HP A6188A disk              0/8/0/0.8.0.95.0.0.0

0/8/0/0.95.5      HP A6188A disk              0/8/0/0.8.0.95.0.0.5

0/8/0/0.95.10     HP A6188A disk              0/8/0/0.8.0.95.0.1.2

0/8/0/0.95.50     HP A6188A disk              0/8/0/0.8.0.95.0.6.2
```

The output from FCSCAN shows the list of FC adapter cards and devices present in the system. The hardware paths printed by FCSCAN can be directly used in SYSGEN to configure the corresponding device.

The output from FCSCAN utility shows the following information:

- SYSGEN PATH:
  - — Hardware path of the FC adapter card or device. This is the path, which is to be used in SYSGEN to configure the card or device in the system.
- DESCRIPTION:
  - — Description about whether the path specifies a FC card or device. If device, it also specifies the model and type of the device.
- BOOT MENU PATH:
  - — Path value for an FC device to be used in the system Boot Command Handler or firmware Main Menu so as to set that particular device as the primary path. The boot menu path is a detailed long format path unlike the simplified SYSGEN path. It is necessary to use this long path in boot menu because the system firmware can understand only this format to access devices. So typically to install on or boot from an FC disk, the primary path will be set to this long path for that disk as printed by FCSCAN.

The above sample output shows that there is a Fibre Channel Adapter card configured in the system at path 0/8/0/0. Under this card, there are some devices listed.

Path 0/8/0/0.0 shows an FC N_Port (Node Port) which indicates the fibre channel port of a device connected to the card. FC N_port is required to be configured in SYSGEN while configuring devices. The output also shows three disks of type HP OPEN-3 shown with paths 0/8/0/0.0.0, 0/8/0/0.0.1 and 0/8/0/0.0.105. The last components of these paths refer to the LUN number of these disks. The type HP OPEN-3 usually refers to an XP512 disk array. Since the hardware paths of these three disks come under Nport 0/8/0/0.0, they all fall under the same Nport in the XP512.

Path 0/8/0/0.95 shows another FC N_Port (Node Port) indicating another device is connected to the card. Under this N_Port, there are four disk LUNs of type HP A6188A shown with paths 0/8/0/0.95.0, 0/8/0/0.95.5, 0/8/0/0.95.10 and 0/8/0/0.95.50. The type HP A6188A refers to a VA7100 disk array.

Thus FCSCAN utility shows all device N_Ports and LUNs connected to the adapter card. The next section describes how this information can be used to configure them in SYSGEN. More details on FCSCAN utility are covered in a separate article in this Communicator document.

Configuring Fibre Channel Devices

Since the FC adapter card at path 0/8/0/0 has already been configured, now go on to configure the FC devices. For this we should first configure the FC Nport paths and then the FC device LUNs. FC NPort should be configured in SYSGEN with the standard ID “FC_NPORT”.

```
io> ap 0/8/0/0.0 id=FC_NPORT
```

To check that the FC N_Port is properly configured:

```
io> lp 0/8/0/0.0

PATH: 0/8/0/0.0                          LDEV:

  ID: FC_NPORT                           TYPE: DA

PMGR: FCP_NM                          PMGRPRI: 6

LMGR:                                  MAXIOS: 0
```

Note that the PMGR will be set to “FCP_NM”, Fibre Channel Protocol Nport Manager, which is the new manager software for FC device adapter card. This is one significant difference between configuring a FC device and a SCSI device. For a SCSI device usually the path component at this level is configured in SYSGEN with “id = pseudo” to indicate a pseudo manager. But for FC devices, this path component level has a real software manager called FCP_NM.

After configuring the Nport, the next step is to configure the FC device LUNs. For this too, we can use the hardware paths of the LUNs as printed in FCSCAN output. The ID to be used while configuring any of the FC device LUNs is HPDARRAY.

```
io> ad 3 path=0/8/0/0.0.0 id=HPDARRAY

io> ad 4 path=0/8/0/0.0.1 id=HPDARRAY

io> ad 5 path=0/8/0/0.0.105 id=HPDARRAY
```

To check that the FC device LUNs are properly configured:

```
io> ld 3

 LDEV:   3    DEVNAME: 00000100       OUTDEV:        0   MODE:

   ID: HPDARRAY                       RSIZE:       128   DEVTYPE: DISC

 PATH: 0/8/0/0.0.0                    MPETYPE:       4   MPESUBTYPE:  2

CLASS: DISC     SPOOL
```

```
io> lp 0/8/0/0.0.0

PATH:  0/8/0/0.0.0                          LDEV:    1

  ID:  HPDARRAY                             TYPE: DISC

PMGR:  SCSI_DISK_AND_ARRAY_DM             PMGRPRI:     5

LMGR:  LOGICAL_DEVICE_MANAGER              MAXIOS:     0
```

Note that the PMGR will be set to "SCSI_DISK_AND_ARRAY_DM". This software manager is the same that is used for SCSI disk LUNs. At this point we have successfully configured the LUNs under the FC device XP512.

To configure the LUNs under the FC device A6188A:

```
io> ap 0/8/0/0.95 id=FC_NPORT

io> ad 10 path=0/8/0/0.95.0 id=HPDARRAY

io> ad 11 path=0/8/0/0.95.5 id=HPDARRAY

io> ad 12 path=0/8/0/0.95.10 id=HPDARRAY

io> ad 13 path=0/8/0/0.95.50 id=HPDARRAY
```

At this point, we have successfully configured the disk LUNs under both FC devices connected to the FC adapter card 0/8/0/0.

Using Fibre Channel Disk as LDEV-1

To use one of the disks under a Fibre Channel device as LDEV-1, it is necessary to first note down the long format path of the disk. This long format path is the one printed by FCSCAN utility as "BOOT MENU PATH".

For our discussion, let us take the FCSCAN output from the previous example:

```
:fcscan

FCSCAN has found the following Fibre Channel I/O Adapter Cards and Devices on this system.

 SYSGEN PATH         DESCRIPTION                 BOOT MENU PATH

=============       =============               ================

0/8/0/0           Fibre Channel Adapter

0/8/0/0.0         Fibre Channel N-Port

0/8/0/0.0.0       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.0

0/8/0/0.0.1       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.1

0/8/0/0.0.105     HP OPEN-3 disk              0/8/0/0.8.0.0.0.13.1

0/8/0/0.95        Fibre Channel N-Port

0/8/0/0.95.0      HP A6188A disk              0/8/0/0.8.0.95.0.0.0

0/8/0/0.95.5      HP A6188A disk              0/8/0/0.8.0.95.0.0.5

0/8/0/0.95.10     HP A6188A disk              0/8/0/0.8.0.95.0.1.2

0/8/0/0.95.50     HP A6188A disk              0/8/0/0.8.0.95.0.6.2
```

Given the above setup of FC devices, assume that we want to use the disk at path 0/8/0/0.95.5 as our new LDEV-1. Before going on to install this disk, first remember to note down the long format path for this disk. As we can see, the long format path for this disk is 0/8/0/0.8.0.95.0.0.5.

Now we can shutdown the system and come back to the Boot Command Handler Main Menu. From the Main menu, set the primary path of the system to the long format path of the FC disk, which we had noted down earlier.

Console Display #5:

```
---- Main Menu -----------------------------------------------------

     Command                          Description
     -------                          -----------
     BOot [PRI|ALT|<path>]            Boot from specified path
     PAth [PRI|ALT] [<path>]          Display or modify a path
     SEArch [DIsplay|IPL] [<path>]    Search for boot devices

     COnfiguration menu               Displays or sets boot values
     INformation menu                 Displays hardware information
     SERvice menu                     Displays service commands

     DIsplay                          Redisplay the current menu
     HElp [<menu>|<command>]          Display help for menu or command
     RESET                            Restart the system
----

Main Menu: Enter command or menu > pa pri 0/8/0/0.8.0.95.0.0.5

   Primary boot path:    0/8/0/0.8.0.95.0.0.5
                         0/08/0/0.8.0.5f.0.0.5(hex)

Main Menu: Enter command or menu >
```

Follow the usual procedure to do INSTALL from the tape. When the installation is over, the system can be rebooted with the primary path remaining as above. On booting from the FC disk as LDEV-1, follow the usual procedure in SYSGEN to modify the configuration for LDEV-1. During this time, the hardware path to be used to modify LDEV-1 should be the shorter path format and not the longer one. While setting up the SYSGEN configuration for the above disk as LDEV-1, use 0/8/0/0.95.5 as the hardware path.

```
io> ap 0 id=pat_ioa_bc
io> ap 0/8 id=pat_pci_bc
io> ap 0/8/0 id=pci_device
io> ap 0/8/0/0 id=A6795A
                    << This is the FC Device Adapter Card >>
io> ap 0/8/0/0.95 id=fc_nport
                    << This is the FC Device Nport >>
io> md 1 path=0/8/0/0.95.5 id=hpdarray
                    << This is the FC Device disk LUN >>
```

To verify the changes done in the configuration:

```
io> lp 0/8/0/0
PATH: 0/8/0/0                              LDEV:
  ID: A6795A                               TYPE: DA
PMGR: FC_DAM                            PMGRPRI: 6
LMGR:                                    MAXIOS: 0

io> lp 0/8/0/0.95
PATH: 0/8/0/0.95                           LDEV:
  ID: FC_NPORT                             TYPE: DA
PMGR: FCP_NM                            PMGRPRI: 6
LMGR:                                    MAXIOS: 0
io> ld 1
 LDEV:   1    DEVNAME: 00000100       OUTDEV:     0   MODE:
   ID: HPDARRAY                       RSIZE:    128   DEVTYPE: DISC
 PATH: 0/8/0/0.95.5                   MPETYPE:    4   MPESUBTYPE:  2
CLASS: DISC     SPOOL

io> lp 0/8/0/0.95.5
PATH:  0/8/0/0.95.5                        LDEV:    1
  ID:  HPDARRAY                            TYPE: DISC
PMGR:  SCSI_DISK_AND_ARRAY_DM           PMGRPRI:    5
LMGR:  LOGICAL_DEVICE_MANAGER            MAXIOS:    0
```

The main point to note while using an FC disk as LDEV-1 is that the long format path is to be used only for primary path setting in the Main Menu. In SYSGEN, the shorter path format should be used to configure the disk as LDEV-1.

NOTE The LDEVs for System “Streams device” and “Spooled printer”, namely LDEV 6 and LDEV 10, should always be configured using one of the existing PCI-SCSI Adapter card paths as the base. Configuring these devices over a Fibre Channel Adapter card path is NOT supported.

PDC Version Requirements for Using FC Disk as LDEV-1

In order to use FC devices as LDEV-1, there are certain minimum version requirements on the PDC firmware in HP e3000 systems. If the PDC firmware is less than the versions mentioned below, HP e3000 systems will not support booting from FC devices.

- N-Class Systems — 41.46
- A-Class Systems — 42.03

Default Configuration Groups for Using FC Disk as LDEV-1

MPE/iX 7.5 Release software comes with four new default configuration groups which can be used while configuring an FC disk connected through the FC adapter card as LDEV-1. These new groups are:

CONFACF2	A-Class (with Core I/O I) booting from external FC disk
CONFACF4	A-Class (with Core I/O II) booting from external FC disk
CONFNCF2	N-Class (with Core I/O I) booting from external FC disk
CONFNCF4	N-Class (with Core I/O II) booting from external FC disk

For details on Core I/O cards I and II, refer to the article titled “HP e3000 PA-8700 A-Class and N-Class Core I/O Card” in this Communicator.

Upgrading from MPE/iX 7.0 to MPE/iX 7.5 with FC Disk as LDEV-1

From the previous section it is clear that to use an FC disk as LDEV-1, we need the long format path of the disk to specify as the primary path. The long format path can be obtained by running FCSCAN utility. It must be remembered that FCSCAN utility is being introduced only with MPE/iX 7.5. If the existing release on your HP e3000 system is MPE/iX 7.0 and you wish to start using an FC adapter card with one of the FC device disks as LDEV-1, it will involve multiple steps to achieve this.

1. If the PDC firmware version on your system does not meet the version requirements mentioned above, upgrade the PCD firmware on your system.
2. Update your existing SCSI disk LEDEV-1 (or install one of the available SCSI disks) with MPE/iX 7.5.
3. Get the FC Adapter Card installed on your system through HP Hardware Support Technician.
4. Connect the FC Device to the Adapter Card using an FC cable.
5. Boot the system with MPE/iX 7.5 from the SCSI disk.
6. Configure the FC Adapter Card through online configuration utility IOCONFIG. Now the FC Adapter Card gets configured in the system.
7. Run FCSCAN utility. This gives the list of disk LUNs present under the FC device.
8. Select the disk that you want to use as LDEV-1 and note down its hardware path as well as the long format Boot Menu Path.
9. Now bring down the system to Boot Command Handler Main Menu.
10. Set primary path of the system to the long format path of the FC disk.
11. Use a tape to INSTALL the FC disk.

When the installation is complete, your HP e3000 system is ready to be booted using the FC disk as LDEV-1.

FCSCAN — Fibre Channel Device Scan Utility

FCSCAN is a new utility introduced in MPE/iX Release 7.5 to scan and print Fibre Channel Devices connected to the HPe3000 system. This utility can be used by MPE/iX System Administrators to know what FC devices are available in the system for configuring through SYSGEN.

FCSCAN utility is present in the system as FCSCAN.PUB.SYS and can be invoked from the MPE/iX CI prompt as:

```
:fcscan
```

The complete usage format of the utility with its allowed options is shown below.

Usage:

```
:fcscan  [ - n h ]
 default:  Show FC devices available for configuration
              -n:  Show only FC N-Ports
              -h:  Do a hardware scan and show configurable FC devices
```

The utility can be invoked by default without any options. It can also be invoked with “-n” option or with “-h” option or specifying both options together as “-nh”. Depending on the option used, the output format of the utility varies. These are covered in detail in the following sections.

FCSCAN Default Output

The default output format of FCSCAN when invoked without any options is to print the list of FC adapter cards and devices present in the system, which can be configured in SYSGEN. The hardware path formats printed can be directly used in SYSGEN to configure the corresponding device.

```
:fcscan

FCSCAN has found the following Fibre Channel I/O Adapter Cards and Devices on this system.

 SYSGEN PATH          DESCRIPTION                BOOT MENU PATH
=============        =============              ================


0/2/0/0           Fibre Channel Adapter
0/8/0/0           Fibre Channel Adapter
0/8/0/0.0         Fibre Channel N-Port
0/8/0/0.0.0       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.0
0/8/0/0.0.1       HP OPEN-3 disk              0/8/0/0.8.0.0.0.0.1
0/8/0/0.0.105     HP OPEN-3 disk              0/8/0/0.8.0.0.0.13.1
0/8/0/0.24        Fibre Channel N-Port
0/8/0/0.24.0      SEAGATE ST39103FC disk      0/8/0/0.8.0.255.1.8.0
0/8/0/0.25        Fibre Channel N-Port
0/8/0/0.25.0      SEAGATE ST39103FC disk      0/8/0/0.8.0.255.1.9.0
0/8/0/0.26        Fibre Channel N-Port
0/8/0/0.26.0      SEAGATE ST39103FC disk      0/8/0/0.8.0.255.1.10.0
0/8/0/0.27        Fibre Channel N-Port
```

```
0/8/0/0.27.0      SEAGATE ST39103FC disk       0/8/0/0.8.0.255.1.11.0
```

The output from FCSCAN utility shows the following information:

- SYSGEN PATH:
  - Hardware path of the FC adapter card or device. This is the path used in SYSGEN to configure the card or device in the system.
- DESCRIPTION:
  - Description about whether the path specifies an FC card or device. If device, it also specifies the model and type of the device.
- BOOT MENU PATH:
  - Path value for an FC device to be used in the system Boot Command Handler or firmware Main Menu to set that particular device as the primary path. The boot menu path is a detailed long format path unlike the simplified SYSGEN path. It is necessary to use this long path in boot menu because the system firmware can understand only this format to access devices. So typically to install on or boot from a FC disk, the primary path will be set to this long path for that disk as printed by FCSCAN.

The above sample output shows that there are two Fibre Channel Adapter cards in the system with paths 0/2/0/0 and 0/8/0/0. There are no FC devices shown for card 0/2/0/0, which implies that the card is not connected to any at present. There are some devices shown under card 0/8/0/0.

Path 0/8/0/0.0 shows an FC N_Port (Node Port) which indicates the fibre channel port of a device connected to the card. FC N_port is required to be configured in SYSGEN while configuring devices. The output also shows three disks of type HP OPEN-3 shown with paths 0/8/0/0.0.0, 0/8/0/0.0.1 and 0/8/0/0.0.105. The last components of these paths refer to the LUN number of these disks. The type HP OPEN-3 usually refers to an XP512 device disk. Since the hardware paths of these three disks come under Nport 0/8/0/0.0, they all fall under the same Nport in the XP512 device.

A typical configuration of the FC card and disks in SYSGEN is shown below:

```
:sysgen
sysgen> io
    io> lp 0/8/0/0
PATH:  0/8/0/0                              LDEV:
  ID:  A6795A                               TYPE: DA
PMGR:  FC_DAM                            PMGRPRI:     6
LMGR:                                     MAXIOS:     0
 io> lp 0/8/0/0.0
PATH:  0/8/0/0.0                            LDEV:
  ID:  FC_NPORT                             TYPE: DA
PMGR:  FCP_NM                            PMGRPRI:     6
LMGR:                                     MAXIOS:     0
 io> lp 0/8/0/0.0.0
PATH:  0/8/0/0.0.0                          LDEV:   60
  ID:  HPDARRAY                             TYPE: DISC
PMGR:  SCSI_DISK_AND_ARRAY_DM            PMGRPRI:     8
LMGR:  LOGICAL_DEVICE_MANAGER             MAXIOS:     0
```

```
     io> lp 0/8/0/0.0.1
PATH:  0/8/0/0.0.1                          LDEV:   60
  ID:  HPDARRAY                             TYPE: DISC
PMGR:  SCSI_DISK_AND_ARRAY_DM             PMGRPRI:     8
LMGR:  LOGICAL_DEVICE_MANAGER              MAXIOS:     0

     io> lp 0/8/0/0.0.105
PATH:  0/8/0/0.0.105                        LDEV:   60
  ID:  HPDARRAY                             TYPE: DISC
PMGR:  SCSI_DISK_AND_ARRAY_DM             PMGRPRI:     8
LMGR:  LOGICAL_DEVICE_MANAGER              MAXIOS:     0
```

NOTE For FCSCAN to be able to scan for devices under an FC card, the adapter card at this hardware path should have already been configured through SYSGEN. If the card is not configured in the system, FCSCAN will not recognize the card.

If FCSCAN output shows only the adapter card but no devices under it, then it is most likely that the device has not been connected properly. Verify the FC cable connecting the FC device to the adapter. Try again running FCSCAN with "-h" option.

FCSCAN Output with "-n" Option

The option "-n" specifies FCSCAN to print only the FC adapter cards and FC device N_Ports on the system. It does not print individual LUNs under the FC devices. This is a shorter version to easily know what FC devices are connected to each FC adapter card.

```
:fcscan -n
FCSCAN has found the following Fibre Channel I/O Adapter Cards and N-Ports on this system.
 SYSGEN PATH         DESCRIPTION
=============       =============

0/2/0/0           Fibre Channel Adapter
0/8/0/0           Fibre Channel Adapter
0/8/0/0.0         XP512 controller
0/8/0/0.24        SEAGATE ST39103FC disk
0/8/0/0.25        SEAGATE ST39103FC disk
0/8/0/0.26        SEAGATE ST39103FC disk
0/8/0/0.27        SEAGATE ST39103FC disk
0/8/0/0.34        HP A5236A controller
```

The above output indicates that there are two FC cards in the system at hardware paths 0/2/0/0 and 0/8/0/0. There is no device connected under card 0/2/0/0. Under card 0/8/0/0, there are some FC device N_Ports available. The description column in the output specifies what kind of device each N_Port belongs to. Note

that this option prints only the N_Port paths and not the paths of individual LUNs under the N_Ports. By looking at this simplified output format, the System Administrator can quickly identify what FC devices are connected to the FC cards in the system.

FCSCAN Output with "-h" Option

FCSCAN normally uses the internal I/O subsystem data structures of MPE/iX Operating System to get the list of FC cards and devices on the system. So this information reflects only what is currently known to the OS and may or may not actually match with the FC devices currently connected to the card. This is because FC physical interface allows devices to be connected while the interface is online. For example, when the system is up and running, it is possible to connect a new FC device to the system.

The option "-h" specifies FCSCAN to actually perform a hardware scan of the current state of devices connected to the FC cards, before printing out the list. Using the "-h" option guarantees that the list of devices printed more accurately matches what is currently connected on the system. This option is helpful for the case where the System Administrator connects a new FC device while the system is up and wants to know the hardware path of the device for configuring it.

Since the "-h" option involves an actual hardware scan of the FC devices, FCSCAN utility will take some extra time to print the output when this option is used.

```
:fcscan -h
Scanning for Fibre Channel devices. Please wait ...


FCSCAN has found the following Fibre Channel I/O Adapter Cards and Devices on this system.


 SYSGEN PATH        DESCRIPTION                  BOOT MENU PATH
=============      =============               ================


0/2/0/0           Fibre Channel Adapter
0/2/0/0.95        Fibre Channel N_Port
0/2/0/0.95.1      HP A6188A disk               0/2/0/0.8.0.95.0.0.1
0/2/0/0.95.5      HP A6188A disk               0/2/0/0.8.0.95.0.0.5
0/2/0/0.95.10     HP A6188A disk               0/2/0/0.8.0.95.0.1.2
0/8/0/0           Fibre Channel Adapter
0/8/0/0.24        Fibre Channel N-Port
0/8/0/0.24.0      SEAGATE ST39103FC disk       0/8/0/0.8.0.255.1.8.0
0/8/0/0.25        Fibre Channel N-Port
0/8/0/0.25.0      SEAGATE ST39103FC disk       0/8/0/0.8.0.255.1.9.0
0/8/0/0.26        Fibre Channel N-Port
0/8/0/0.26.0      SEAGATE ST39103FC disk       0/8/0/0.8.0.255.1.10.0
0/8/0/0.27        Fibre Channel N-Port
0/8/0/0.27.0      SEAGATE ST39103FC disk       0/8/0/0.8.0.255.1.11.0
```

The output shown above is after an actual hardware scan of the FC devices currently connected. Comparing this with the earlier default output (without any options), we can see that now a new FC device N_Port 95 is being shown under the FC card 0/2/0/0. This N_Port has three disk LUNs 1, 5 and 10 under it, referred to as HP A6188A disk. It is possible that the device was connected after the system booted up. So when FCSCAN

was run with hardware scan option, it actually probed the FC devices and recognized that the new device has been connected. Thus by looking at this output, the System Administrator can get the hardware paths of LUNs under N_Port 95 and use them to configure these disks in SYSGEN.

Note that now under card 0/8/0/0, the N_Port 0 is missing. It is possible that the device got disconnected. Running FCSCAN with the "-h" option helps to view the current state of the FC devices and find out which devices have been added to or removed from the system.

The "-h" option is particularly useful when the System Administrator wants to connect a new FC device to a running system and configure the device online through IOCONFIG utility. After physically connecting the device to the FC adapter card, the Administrator can run FCSCAN with "-h" option, find out the hardware paths of the N_Ports/LUNs under this device and then use these hardware paths to configure them online through IOCONFIG utility.

The output of FCSCAN with "-nh" option is the same as that of "-n" option, except that the list of N_Ports is printed after an actual hardware scan is performed.

FCSCAN Output in Fabric Topology

A sample output of FCSCAN utility with the FC adapter card in fabric topology is shown below:

```
:fcscan
```

FCSCAN has found the following Fibre Channel I/O Adapter Cards and Devices on this system.

```
SYSGEN PATH         DESCRIPTION                BOOT MENU PATH
=============       =============              ================


0/6/2/0             Fibre Channel Adapter
0/6/2/0.70383       Fibre Channel N-Port
0/6/2/0.70383.2     HP OPEN-3 disk             0/6/2/0.1.18.239.0.0.2
0/6/2/0.70383.12    HP OPEN-3 disk             0/6/2/0.1.18.239.0.1.4
0/6/2/0.70383.53    HP OPEN-3 disk             0/6/2/0.1.18.239.0.6.5
```

In the fabric topology output printed by FCSCAN, the path component corresponding to FC N_Port represents the 24-bit N_Port ID. This path component value is usually a large number. But in the case of private loop topology the value actually represents the Loop ID and is usually a smaller value. This detail is being mentioned here just as a clarification for FCSCAN users. In spite of this, there is actually no difference in the procedure for configuring the FC N_Port or devices in SYSGEN. For both topologies, the hardware path value of the N_Port and devices as printed by FCSCAN can be used as such in SYSGEN for configuring them. This implies that irrespective of the topology currently being used, the System Administrator can simply run FCSCAN to determine the correct hardware paths and use the same for configuring in SYSGEN.

Fibre Channel Topology Changes

Whenever there is a topology change to the fibre channel standards, i.e., from private loop to public loop or fabric to private loop, the addressing method for FC devices connected will change. This is because private loop topology uses Loop ID based addressing while fabric and public loop topologies use N_port ID based addressing. Since the Loop ID or the N_Port ID is present as a component in the hardware paths for FC devices, a change in topology causes this hardware path to change. Since MPE/iX device addressing is based on hardware paths configured in SYSGEN, a change in hardware path means that the device will no longer be accessible using the original path. For this reason, it is not recommended to change the Fibre Channel topology while the system is up and running.

Any changes to the fibre channel topology in order to add or delete switches/hubs should be done while the system is not running MPE/iX. After a topology change, it may be necessary to reconfigure even existing FC devices in the system because their hardware paths may have changed. It is always recommended that after a topology change, the System Administrator should run FCSCAN utility with “-h” option, find out the new hardware paths for devices and make appropriate changes in SYSGEN configuration to reflect the changes.

Although online topology change is not recommended, MPE/iX does support dynamic addition or deletion of fibre channel devices within the existing topology. This is covered in detail under the section on FCSCAN output with “-h” option.

TDUTIL — Fibre Channel Diagnostic Utility

TDUTIL is a new utility introduced in MPE/iX 7.5 for obtaining information on fibre channel host bus adapters, supported on HP e3000 systems. This utility provides the ability to display information such as the N_Port ID, Node World-Wide Name, Port World-Wide Name, link speed, chip revision number, VPD (Vital Product Data) information and more.

The utility can be run from MPE/iX **CI** command prompt by giving the FC adapter hardware path as parameter.

```
:tdutil <adapter hardware path>
```

TDUTIL Sample Output

A sample output of TDUTIL utility is shown below:

```
 :tdutil 0/8/0/0

 Vendor ID is = 0x00103c

                    Device ID is = 0x001029

         XL2 Chip Revision No is = 2.2

     PCI Sub-system Vendor ID is = 0x00103c

            PCI Sub-system ID is = 0x00128c

                       Topology = PTTOPT_FABRIC

                     Link Speed = 1Gb

              Local N_Port_id is = 0x011c00

     N_Port Node World Wide Name = 0x50060b00001000d4

     N_Port Port World Wide Name = 0x50060b00001000d3

                    Driver state = ONLINE

                Hardware Path is = 0/8/0/0

          Number of Assisted IOs = 126053

 Number of Active Login Sessions = 1

              Maximum Frame Size = 960

                  Driver Version = @(#) HP Fibre Channel Tachyon TL/TS/XL2 Driver B.11.00.10 (AR1201) Nov
17 2001
```

Invoking TDUTIL without specifying any options displays the adapter related information like the topology, link state, link speed, vendor ID, NPort ID, Port and Node WWNs, number of I/Os done so far, etc.

The most important things to note here are the Topology and the Driver state. The topology can be any of the following:

- PRIVATE_LOOP, when the card is in private loop topology.
- PUBLIC_LOOP, when the card is in public loop topology, i.e., a loop containing a switch.
- PTTOPT_FABRIC, when the card is directly attached to a switch.
- UNINITIALIZED, when the link has not been initialized, either due to the card not being connected to a cable or the device/switch connected on the cable is not functional.

The Driver State represents the state of the software driver controlling the adapter card. When the driver and the card are functioning properly, the Driver state should be ONLINE. Any other state can be considered a transient one with the exceptions of the states AWAITING_LINK_UP and OFFLINE. It is normal for the driver to temporarily stay in AWAITING_LINK_UP state, but if it stays for too long, typically more than 5 seconds, then there is a problem in the cable or with the device at the other end. If a loop contains multiple devices along with the host adapter card, one of the devices going faulty can temporarily result in the driver going out of ONLINE state. If the loop is through an FC hub, then the hub will automatically bypass the faulty device and the driver will come back to ONLINE state immediately.

Due to the impact on the functioning of the driver by using TDUTIL, only a user logging in as MANAGER.SYS can invoke the utility.

NOTE TDUTIL supports usage of options while invoking the utility but these options are meant to be used only by HP Support Representatives for troubleshooting. Customers are advised to use TDUTIL only by specifying the adapter path and not make use of use any of the options.

Using HP Support Tools Manager (STM) with Fibre Channel Adapters

This section describes how to use STM to gather information about the Fibre Channel adapters and diagnose problems. If you are not familiar with STM, check out the new *STM MPE/iX Quick Reference Guide* at the following URL: `http://docs.hp.com/hpux/diag`. Then select MPE/iX Diagnostics.

NOTE Use the CSTM command to start STM in Command Line Mode.

```
PUB:CSTM

CSTM B8343AA.75.00  Version created MON, JAN 28, 2002 12:02 PM

Running Command File (/usr/sbin/stm/ui/config/.stmrc).

This operation may take approximately one minute.

-- Information --

MPE/iX Support Tools Manager --Product Number B8343AA, Version A.75.00

(C) Copyright Hewlett Packard Co. 1995-2002 All Rights Reserved

Use of this program is subject to the licensing restrictions described in "Help-->On Version".  HP shall
not be liable for any damages resulting from misuse or unauthorized use of this program.
```

- The **Information tool** provides data about a Fibre Channel adapter without resetting the adapter.

The following is an example information log for a e3000/A500-200-14 system: (user input in **BOLD**)

```
cstm>MAP

  Dev                                                  Last         Last Op
  Num  Path              Product                       Active Tool  Status
  ===  ================= ======================      ===========  =======
  1  system            system ()
  2  0                 PCI Bus Adapter (582)
  3  0/0               PCI Bus Adapter (782)
  4  0/0/1/0           PCI SCSI Interface (10000
  5  0/0/1/0.16.0      Unknown ()
  6  0/0/1/0.17.0      Unknown ()
  7  0/0/1/1           PCI SCSI Interface (10000
  8  0/0/1/1.15.0      SCSI Disk (SEAGATEST39204
  9  0/0/2/0           PCI SCSI Interface (10000
 10  0/0/2/0.6.0       Unknown ()
 11  0/0/2/1           PCI SCSI Interface (10000
 12  0/0/2/1.6.0       Unknown ()
 13  0/0/2/1.15.0      SCSI Disk (SEAGATEST39204
 14  0/2               PCI Bus Adapter (782)
 15  0/2/0/0           PCI 100 BaseT LAN Interfa
 16  0/4               PCI Bus Adapter (782)
 17  0/4/0/0           PCI SCSI Interface (10000
```

```
 18  0/6               PCI Bus Adapter (782)
 19 0/6/0/0       FC Interface (HP6795A_Tac Information
 20 0/6/2/0       FC Interface (HP5158A_Tac Diagnose
 21  8                 MEMORY (9b)
 22  160               CPU (5cb)
 23  162               CPU (5cb)
cstm> SEL DEV 19

cstm>INFO
-- Updating Map --
Updating Map...
cstm>IL

-- Converting a (1368) byte raw log file to text. --
Preparing the Information Tool Log for FC Interface on path 0/6/0/0 File ...


-- Information Tool Log for FC Interface on path 0/6/0/0 --


Log creation time: Mon Jan 21 05:16:46 2002


Hardware path: 0/6/0/0


Product ID:                  FC Interface
Hardware Path:               0/6/0/0
Module Type:                 Bus Adapter
Vendor ID:                   0x103c
PCI Device ID:               0x1029
PCI Subsystem Vendor ID:     0x103c
PCI Subsystem ID:            0x128c
Topology:                    Direct Fabric Attach (N_Port to F_Port)
Channel N_PORT_ID:           0x11c00
N_Port Port World Wide Name: 50060B00001000D3
N_Port Node World Wide Name: 50060B00001000D4
Tachyon TL/TS Major Revision:2
Tachyon TL/TS Minor Revision:2
Memory Address Base:         0
ROM Alternate Addr Base:     0
Lower I/O Address Base:      0
Upper I/O Address Base:      0
Information Tool Log for FC Interface on path 0/6/0/0 --
```

- **Logtool utility** extracts log errors and allows them to be viewed. This tool provides information about a Fibre Channel adapter without resetting the adapter.

```
cstm>RU LOGTOOL
-- Logtool Utility --
To View a Summary of Events in a Raw Log

  1. Select a raw (unformatted) log file.  (File Menu -> "Select Raw")
     The current log file ends in ".cur", e.g. "log1.raw.cur".
     You do not have to switch logs.

 2. View the summary of the selected log file. (View Menu -> "Raw Summary")

To Format a Raw Log

  1. Set the format filter for the types of entries you want to see.
     (Filters Menu -> "Format").  To see all entries, skip this step.

  2. Format the raw log file. (File Menu -> "Format Raw")
  3. Display the formatted file. (View Menu -> "Formatted Log")

  4. To further narrow the entries displayed, set a display filter.
     (Filters Menu -> "Display" -> "Formatted")

For more information, use the on-line help (Help Menu -> "General help").
Logtool Utility>SR
-- Logtool Utility:  Select Raw Log File --

Select a raw log file or files to view, format or filter.
[/var/stm/logs/os/log542.raw.cur]
Path: /var/stm/logs/os/
File Name:  (RETURN IF YOU WANT CURRENT FILE OR ENTER FILE NAME)

Select Raw processing file /var/stm/logs/os/log542.raw.cur
Number of entries analyzed is 1.
Number of entries analyzed is 51.
Number of entries analyzed is 60.
The Select Raw operation completed.

The Display Raw Summary operation is currently in progress.
```

```
-- Converting a (1804) byte raw log file to text. --
Preparing the Logtool Utility: View Raw Summary File ...
.... ######.cup.hp.com  :  ##.##.##.### ....

-- Logtool Utility: View Raw Summary --

Summary of: /var/stm/logs/os/log542.raw.cur

  Date/time of first entry:    Mon Jan 21 08:37:28 2002
  Date/time of last  entry:    Wed Jan 30 11:44:34 2002

  Number of LPMC entries:              0
  Number of System Overtemp entries:   0
  Number of LVM entries:               0
  Number of Logger Event entries:      0
  Number of I/O Error entries:         60

    Device paths for which entries exist:
       (7)  0/6/0/0.72508.5
       (7)  0/6/0/0.72508.15
       (4)  0/6/0/0
       (4)  0/6/0/0.72508
       (38)  0/0/2/0.6.0
    Products for which entries exist:
       (4)  FC Interface
       (4)  VA 7100
       (52)
Product Qualifiers for which entries exist:
       (4)  HP6795A_Tachyon_XL2
       (4)  HPA6188A
       (52)
    Logger Events for which entries exist:
       (14)  SCSI_DISK_AND_ARRAY_DM
        (4)  FC_DAM
        (4)  FCP_NM
        (38)  SCSI_TAPE_DM

-- Logtool Utility: View Raw Summary --

View   - To View the file.
Print  - To Print the file.
SaveAs - To Save the file.
Enter Done, Help, Print, SaveAs, or View: [Done] (return)

Logtool Utility>FF
```

```
-- Logtool Utility: Set Format Filter --

Date and time of first log entry:  Mon Jan 21 08:37:28 2002

Date and time of last log entry:   Mon Feb  4 10:26:00 2002


Format entries logged within the following dates/times:

Starting Date and Time:: (mm/dd/yyyy|hh:mm:ss)[01/21/2002|08:37:28] (return)

Ending Date and Time:: (mm/dd/yyyy|hh:mm:ss)[02/04/2002|10:26:00] (return)

Lowest Entry id :  0x3c4c199800000001 (return)
Highest Entry id:  0x3c5ea80800000001 (return)
Display entries with entry ids within the following range:

Starting entry id (hex) : [0x3c4c199800000001] (return)
Ending entry id (hex)   : [0x3c5ea80800000001] (return)
Total Entries:  61

Display entries within the following range:

Starting Entry Number: [1] (return)
Ending Entry Number  : [61] (return)

Display entries of the following types:

Low Priority Machine Check? (y/n)[yes] N
System Overtemp? (y/n)[yes] N
LVM? (y/n)[yes] N


Log Suspend and Resume? (y/n)[yes] N
I/O Error Entries:

  *  1 All I/O Errors (io_all)

     2 No I/O Errors (io_none)

     3 Filter I/O Errors (qualifier choices below) (io_filt)

Enter selection: [io_all] io_filt

Device Path:

    1 0/6/0/0.72508.5
    2 0/6/0/0.72508.15
    3 0/6/0/0
    4 0/6/0/0.72508
    5 0/0/2/0.6.0

Enter selection [done]: (return)

Products:

    1 FC Interface

    2 VA 7100

    3

Enter selection [done]: 1

Products:

*   1 FC Interface

    2 VA 7100

    3
```

```
Enter selection [done]: (return)

Product Qualifiers:
    1 HP6795A_Tachyon_XL2
    2 HPA6188A
    3
Enter selection [done]: 1
Product Qualifiers:
*   1 HP6795A_Tachyon_XL2
    2 HPA6188A
    3
Enter selection [done]: (return)

Loggers:
    1 SCSI_DISK_AND_ARRAY_DM
    2 FC_DAM
    3 FCP_NM
    4 SCSI_TAPE_DM
Enter selection [done]: 2
Logtool Utility>FR

-- Logtool Utility:  Format Raw Log File --

Select a directory into which to place the formatted file:
Directory: [/var/stm/logs/os/]

The Format Raw operation is currently in progress.

Entries processed is 1 of 61 total entries; entries formatted is 0.
Entries processed is 51 of 61 total entries; entries formatted is 2.
Entries processed is 61 of 61 total entries; entries formatted is 4.
The Format Raw operation completed successfully. The following raw log file(s)
were formatted into /var/stm/logs/os/log542.fmt9:
      /var/stm/logs/os/log542.raw.cur

The Display Formatted Summary operation is currently in progress.

-- Converting a (1124) byte raw log file to text. --
Preparing the Logtool Utility: View Formatted Summary File ...

....####.cup.hp.com  :  ##.##.##.###....
Logtool Utility: View Formatted Summary –
```

```
Summary of:           /var/stm/logs/os/log542.fmt9
Formatted from:       /var/stm/logs/os/log542.raw.cur

  Date/time of first entry:    Mon Jan 21 08:37:28 2002

  Date/time of last  entry:    Mon Feb  4 10:26:00 2002
  Number of LPMC entries:               0
  Number of System Overtemp entries:    0
  Number of LVM entries:                0
  Number of Logger Event entries:       0

  Number of I/O Error entries:          4

    Device paths for which entries exist:
       (4)  0/6/0/0

    Products for which entries exist:
       (4)  FC Interface

    Product Qualifiers for which entries exist:
       (4)  HP6795A_Tachyon_XL2

    Logger Events for which entries exist:
       (4)  FC_DAM

    Device Types for which entries exist:
       (4)  Interface

    Device Qualifiers for which entries exist:
       (4)  FibreTL
-- Logtool Utility: View Formatted Summary --
View   - To View the file.
Print  - To Print the file.
SaveAs - To Save the file.
Enter Done, Help, Print, SaveAs, or View: [Done] D

Display of the formatted log file summary was successful.

Logtool Utility>FL

The Display Formatted Log operation is currently in progress.
```

```
-- Converting a (8168) byte raw log file to text. --
Preparing the Logtool Utility: View Formatted Log File ...

....#####.cup.hp.com  :  ##.##.##.###....

-- Logtool Utility: View Formatted Log --

Formatted Output of:  /var/stm/logs/os/log542.fmt9
Formatted from:       /var/stm/logs/os/log542.raw.cur

  Date/time of first entry:    Mon Jan 21 08:37:28 2002

  Date/time of last  entry:    Mon Feb  4 10:26:00 2002
Display Filters:

    Starting Date: Mon Jan 21 08:37:28 2002
    Ending Date:   Mon Feb  4 10:26:00 2002
=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=

Entry Type:  I/O Error
Entry logged on Fri Jan 25 15:43:12 2002
Entry id: 0x3c51c36000000005

    Device Path:        0/6/0/0
    Product:            FC Interface
    Product Qualifier:  HP6795A_Tachyon_XL2
    Logger:             FC_DAM
    Device Type:        Interface
    Device Qualifier:   FibreTL
--------------------------------------------------------------------------------
I/O Log Event Information:

     I/O Event Class - Software Triggered Event
     I/O Transaction Number - 0x00000000
     Length of Hardware Status Logged - 0 bytes
     Length of Driver Information Logged - 144 bytes

Low Level I/O (LLIO) Status:  0x11ff03e7
     Subsystem field = 999; Proc. Num. = -1; Error Num. = 17
Severity Level: Information
```

```
     Fibre Channel Driver received an ERQ Frozen interrupt from the adapter.


     Raw manager data:
          0x0000: 00 00 00 06   17 D3 7C 80   00 00 00 00   00 00 00 01
          0x0010: 43 54 44 49   53 52 2E 43   43 57 53 49   4F 2E 54 4C
          0x0020: 32 47 53 55   42 4D 00 7A   00 00 00 00   C0 21 00 08
          0x0030: 00 00 00 0A   02 1D 92 F0   00 91 DB 18   83 FC EB 04
          0x0040: 08 00 45 00   00 00 00 0B   FF FA 20 00   FF FA 20 00
          0x0050: 00 00 00 08   00 00 00 0A   00 00 14 51   07 00 FF FF
          0x0060: FF FF FF FF   00 10 83 FC   EB 04 08 00   D5 D2 3D 50
          0x0070: D5 D2 1D 50   00 00 00 01   00 00 00 08   00 00 00 00
          0x0080: D4 01 54 00   D4 01 54 00   00 00 00 00   00 00 10 00
=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-=-+-
```

- The **Diagnose tool** runs a loopback test on a Fibre Channel adapter. This test is destructive and should only be run by qualified personnel.

HP SureStore Virtual Array 7100 on the HP e3000

By Walter McCullough Commercial Systems Division

Product Brief

The HP SureStore Virtual Array 7100 is HP's newest mid-range fibre channel disk storage system that is the replacement for the 12H AutoRAID. The VA7100 holds from 4 to 15 disk drives. The array has scalable capacities from 72 GB to 270 GB (211 GB usable) with all 18-GB disk drives and from 144 GB to 540 GB (428 GB usable) with all 36-GB disk drives and from 292 GB to 1.1 TB with 73-GB disk drives. Capacities and spindle speeds can also be mixed.

For added reliability and redundancy the array should be ordered in a dual controller configuration. Each controller has two DIMM slots available to hold NVRAM. The NVRAM is used for read/write caching and for storing array memory maps.

The VA7100 can operate in either RAID 1+0 mode or AutoRAID mode, which eliminates the requirement for the system administrator to understand and configure RAID levels. AutoRAID dynamically adapts to the system's workload, optimizing performance and cost. Users will find configuration significantly easier than other array products, since RAID levels don't need to be configured or managed. The VA7100 supports one redundancy group, and all drives belong to that group. Using Virtual Storage Array (VSA) technology, when configured in AutoRAID mode the array controller automatically selects RAID 1+0 (disk striping and mirroring) or RAID 5DP (RAID 5 Double Parity) depending on the usage patterns of the data. RAID 5DP provides superior data redundancy by protecting against the simultaneous failure of two member disks by using independent error correction schemes.

Site, Software and Hardware Requirements

Device installation and support is to be provided by HP. For detailed information on the support and configuration of the Virtual Array 7100, field support personnel should consult the updated versions of the following documents:

- *HP SureStore Virtual Array 7100 Disk Array Quick Start Guide* `http://www.hp.com/products1/storage/disk_arrays/midrange/va7100/infolibrary/index.html`. Then click on technical support
- *HP SureStore Command View SDM* `http://www.hp.com/products1/storage/disk_arrays/modular/`

NOTE The Command View SDM software is currently required on an NT PC or HP-UX workstation.

VA7100 Configuration Requirements

- Firmware version HP13.
- Port behavior set to HPUX.
- Port Topology should be set to Private Loop.
- Use controller 1 as the primary access port.
- Rebuild Priority should be set to Low.
- Logical Unit Number (LUN) (0) must be configured for Command View SDM to work properly.

- Ldev 1 as a boot device is supported.

Host Hardware/Firmware Requirements

SCSI HBA (NIO based machines):

- F/W SCSI Device Adapter HP28696A. Firmware version 3728
- SCSI-FC Fabric Router A5814A #003. Firmware version 8.01.0A
- HSSDC Gigabit Interface Converters (GBIC)
- Fibre optic cable: 62- or 50-micron fibre optic cable with dual SC connector

SCSI HBA (PCI based machines):

- Ultra SCSI I/O Device Adapter HP A4800A or A5159A
- SCSI-FC Fabric Router A5814A #003. Firmware version 8.01.0A
- HSSDC Gigabit Interface Converters (GBIC)
- Fibre optic cable: 62- or 50-micron fibre optic cable with dual SC connector

Fibre Channel HBA (PCI based machines):

- A6795A PCI- 2Gbit Card — LC Cable interface
- No additional GBIC for Card, Device still requires one.
- LC/SC Fibre Channel Cable such as A5750A-008 or C7530A.

Host Software Requirements

- The VA7100 is supported on MPE/iX release 7.0 express 1 and 7.5 releases.
- The SYSGEN product ID is HPDARRAY.

Host Diagnostic Support

No host based diagnostics are supported. Diagnostic functions are accomplished via Command View SDM Product running on NT or HP-UX host.

Offline Diagnostic Support. No specific support for Offline Diagnostic support. Basic functions such as “ODE Mapper” will be able to identify and the Logical Units configured on the VA7100 as SCSI Disks.

Configuring the VA7100 for Performance on the HP e3000

- It is recommended that you purchase the VA7100 in a dual controller configuration. The second controller increases your reliability and availability. In the event of a controller failure the second controller will have a backup copy of the disk array maps and can be used to gain access to the storage array by reconnecting to the second port.
- Depending on your application’s I/O characteristics, you may chose to set the VA7100 in RAID 1+0 mode or trade some performance for capacity with a setting to AutoRAID. AutoRAID versus RAID 1+0 is set on an array bases not on a LUN bases.

- Some users have reported slow performance times when doing the first restore to the array. This problem can be corrected by changing the Data Resiliency Mode, from the Command View SDM utility, to Performance Mode only during the restore. Remember to reset the mode back to Normal when the restore has completed.

HP SCSI-FC Fabric Router for the HP e3000

By Walter McCullough, Commercial Systems Division

Product Brief

The A5814A option 003 SCSI-Fibre Channel Fabric Router allows those HP e3000s limited to SCSI HBAs access to HP's newest portfolio of fibre channel storage arrays.

Connected to an HP e3000, the router supports a number of fibre channel products.

The router SAN enables the HP e3000 by allowing it to connect to the HP SureStore Disk Array XP512, XP48 and the newest HP Virtual Disk Array 7100. The router also allows the user to incorporate the use of Brocade Silkworm Fibre Channel Switch model 2400, the 8 port version and the 2800 model which supports 16 ports into their storage topology.

The use of hubs and switches allows the user to do storage port consolidation and zoning. This allows the user to connect more host connections to an array than there are ports on the array itself.

The router is a stand alone unit separate from the storage array and computer. It is easy to setup and contains its own diagnostic (RS232) port onboard.

Site, Software and Hardware Requirements

Device installation and support is to be provided by HP. For detailed information on the support and configuration of the A5814A option 003 Fibre Channel Fabric Router, field support personnel should consult the updated version of the User Guide, which ships with the product or check for the Fabric Router Guide at the following website:

- *HP SCSI-Fibre Channel Fabric Router Installation and User Guide*
  `http://www.docs.hp.com/mpeix/all/`

The fabric router requires 8.01.0A version of firmware or greater. This version of router does not support the distancing solution where two routers are connected back to back to gain SCSI distancing for connecting SCSI tapes beyond the capabilities of SCSI.

NOTE The distancing router, firmware 7.62.00, is not upgradable to the fabric router version of 8.01.0A.

Features

- Ease-of-use
- Fibre channel connectivity
- Fast protocol conversion between SCSI and fibre channel
- Reliable host to peripheral connection

SCSI Connectivity

- Protocol: SCSI-2 Ultra-Wide High Voltage Differential (HVD)(40 MB/sec)
- Data Transfer Rate: 40 MB/sec (per SCSI-FC Router per SCSI Channel) burst

- SCSI-2 HVD: 68-pin High Density
- Device Support:
  - HP28696A F/W SCSI I/O HPPB card (NIO based machines)
  - HP4800A F/W SCSI I/O card (PCI based machines)
  - HP5159A F/W SCSI I/O card (PCI based machines)
- Supports: Command Processing, Tagged Queuing, Disconnect/Reconnect, Synchronous and Asynchronous data transfer

Fibre Connectivity

- Protocol: ANSI Fibre Channel (FC-PH) and ANSI Fibre Channel Arbitrated Loop (FC-AL)
- Classes of Service: Class 3
- Topology: FC-AL (private or public), Point-to-Point
- Data Transfer Rate: 100 MB/sec (per SCSI-FC Router per fibre channel)
- Port Speed: 100 MB/sec
- Short Wavelength Optical Cable
  - Data Rate: 100 MB/sec burst
  - Cable: 50 or 62.5 micron fibre optic
  - Distance: 500 meters (1640 feet) or 172 meter (564 feet)
  - Connector: Dual SC

Fabric System Requirements

- Fibre optic cable: 62-or 50-micron fibre optic cable with dual SC connector, HSSDC Gigabit Interface Converters (GBIC)
- SCSI-FC Router (host) microcode revision 8.01.0A or later
- SCSI-2 HVD compliant host adapter
- SCSI-2 compliant host
- SCSI-2 compliant cabling
- Proper electrical power source (UPS required for High Availability environments)
- Fabric solution requires one A5814A-003 router. *(A5814A is not upgradable to A5814A-003)*

Supported Devices

- HP SureStore Disk Array XP512 on MPE/iX 6.0 express 1 and greater
- HP SureStore Disk Array XP48 on MPE/iX 6.0 express 1 or greater
- HP Virtual Disk Array 7100 on MPE/iX 7.0 express 1 or greater
- Brocade 2400 Silkworm Fibre Channel Switch Firmware A2.4.1 or greater
- Brocade 2800 Silkworm Fibre Channel Switch Firmware A2.4.1 or greater
- Fibre Channel 1063 Mbps 10 port shortwave Hub A3724AZ

Host Hardware/Firmware Requirements

SCSI HBA (NIO based machines):

- F/W SCSI Device Adapter HP28696A. Firmware version 3728
- SCSI-FC Fabric Router A5814A #003. Firmware version 8.01.0A
- HSSDC Gigabit Interface Converters (GBIC)
- Fibre optic cable: 62- or 50-micron fibre optic cable with dual SC connector

SCSI HBA (PCI based machines):

- Ultra SCSI I/O Device Adapter HP A4800A or A5159A
- SCSI-FC Fabric Router A5814A #003. Firmware version 8.01.0A
- HSSDC Gigabit Interface Converters (GBIC)
- Fibre optic cable: 62- or 50-micron fibre optic cable with dual SC connector

Fibre Channel HBA (PCI based machines):

- A6795A PCI- 2Gbit Card — LC Cable interface
- No additional GBIC for Card, Device still requires one.
- LC/SC Fibre Channel Cable such as A5750A-008 or C7530A.

Router Setup

Step One: Ensure That Attached Devices Function Properly

1. Power on the storage device(s) that will connect to the router, as seen in Figure 1-3, of the *Installation and User for the Router*.
2. Ensure that the storage devices are functioning properly (refer to the storage device operating manual to determine proper operation).
3. Power on the host/server that will connect to the host router after connecting the SCSI and Fibre channel cables to the router.
4. Ensure that the host is functioning properly (refer to the operating manual for the host to determine proper operation).

Step Two: Clear the Node Mapping Table of the Router

1. Ensure power is off to the router.
2. On SW2 of the router, set DIP switches 4 and 5 in the down position to clear the Node Mapping Table.

3. Power on the router. The power LED (green) should be solid on. If the power LED is off then refer to router manual.
4. When the Fault LED (yellow) is solid on and the Status LED (green) is blinking, it indicates that the Node Mapping Table has been cleared.

NOTE When the Node Mapping Table has been cleared the Status LED (green) blinks a status code of 060 as described in Table B-1 of the *Installation and User Guide*.

---

5. The process will take approximately 15 seconds.
6. Power off the router.

Step Three: Operating Mode

1. Power off the router.
2. On SW2 of the router, set DIP switches 0 and 2 to the down position to activate the “host” operating.

3. Attach the router to the host/server with the appropriate SCSI cable. Ensure that cable and connectors are securely fastened.
4. Power on router and wait for blinking lights to stop.
5. ODE MAPPER should be used to verify that the HP e3000 can communicate with the fibre channel device.

NOTE Fibre channel addressing is similar to but does not exactly match that of SCSI addressing. The router will condense fibre channel addresses to fit into its map table. This map table can then be accessed by the HP e3000. The map table is a sequential list of target and LUN addresses starting at 0.0 incrementing to 0.7 then 1.0 where the left most digit (target address) increments to 15. Except for the target address of the SCSI HBA of (usually) 7 the total number of addresses the router can store is 127 per router.

It is best to configure your fibre channel LUN addresses starting at 0 with no holes. This be less confusing as you manage your devices on the SAN.

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5 Technical Articles

The following articles are about upgrades of various applications for MPE/iX 7.5:

- Updated HP e3000 A-Class and N-Class Servers
- HP Announces Availability of the HP Surestore Disk System 2300 (DS2300) for the HP e3000
- HP Announces Availability of the HP Surestore Tape Array 5300 for the HP e3000
- HPCPUNAME Model Strings Supported With MPE/iX Release 7.5 and Possible Bootup Failures
- SCSI Interface and Device Support for N-Class and A-Class HP e3000
- HP e3000 PA-8700 A-Class and N-Class Core I/O Card
- SHUTDOWN — New CI Command
- Introducing Samba/iX Version 2.0.7 on MPE/iX 7.5
- Announcing Heartbeat for MPE/iX 7.5
- Support Tools Manager (STM) Updated for MPE/iX 7.5
- Predictive Support Changes in MPE/iX
- Support for the Entire Disk Space on LDEV 1
- UPS Monitor/iX and UPSUTIL Enhancements
- AS Clause Enhancement in ALLBASE/SQL
- POSIX pthread (Draft 10) APIs
- IODFAULT Generic Device IDs
- More Opened Files in MPE/iX Programs
- Support for 2851 userlog Processes
- TurboIMAGE Scalability
- Attach Enhancement in Image/SQL
- Large File Data Set
- Support for 3000 NS Servers
- Support for 3300 Jobs and Sessions

Updated HP e3000 A-Class and N-Class Servers

By Kriss Rant, Commercial Systems Division

With MPE/iX Release 7.5, HP is introducing updated HP e3000 A-Class and N-Class Servers which are based on the PA-8700 processor technology.

The updated HP e3000 entry level A-Class servers replace the current A-Class configurations, which are based on the 110 and 140 MHz PA-8500 processors. These updated servers come in 1 to 2-way multi-processing configurations using 150 and 200 MHz PA-8700 processors and have a relative performance between 4.8 and 11.

Server	Product Number	Description	Relative Perf.	SW Tier
A400-100-150	A7018C	A400 1-way server using a 150 MHz processor	4.8	1 (310)
A500-100-200	A7019C	A500 1-way server using a 200 MHz processor	6.4	1 (310)
A500-200-200	A7019C plus A7020A proc.	A500 2-way server using a 200 MHz processor	11	1 (310)

The HP e3000 A400 Server supports only one 150 MHz processor, and the HP e3000 A500 Server supports one or two 200 MHz processors.

The HP e3000 A400 Servers support two Twin Turbo 4x PCI I/O slots with 500 Mbytes/sec of I/ O bandwidth each. The HP e3000 A500 Servers support two Twin Turbo 4x PCI I/O slots with 500 Mbytes/sec of I/O bandwidth each and two Turbo 2x PCI I/O slots that share 500 Mbytes/sec of I/O bandwidth. Each HP e3000 A-Class Server comes with a core I/O card that has one Ultra2 SCSI LVD/SE connection for external peripherals; one SE SCSI connection for external peripherals, two Ultra2 SCSI busses for integrated disks; three RS-232 ports for console, remote access and uninterruptible power supply (UPS) control; and one 10/100BaseT LAN connection. HP e3000 A-Class Servers can also support one or two internal disk drives of 18, 36 or 73 Gbytes in size.

HP e3000 A400 Servers support up to 2 Gbytes of main memory and A500 Servers support up to 8 Gbytes of main memory. In addition, all HP e3000 A-Class Servers come standard with the HP Secure Web Console functionality integrated onto the Core I/O card.

PA-8500 based A500 Servers are fully upgradable to the new PA-8700 processor technology; however, PA-8500 based A400 Servers are not upgradable to this new technology. I requires a box-swap.

The updated HP e3000 mid-range and high-end N-Class servers replace the current N-Class configurations, which are based on the 220, 330, 440 and 550 MHz PA-8500 and PA-8600 processors. These updated servers come in 1 to 4-way multi-processing configurations using 380, 500 and 750 MHz PA-8700 processors and have a relative performance between 15 and 100.

Server	Product Number	Description	Relative Perf.	SW Tier
N4000-100-380	A6103C	N4000 1-way server using a 380 MHz processor	15	4 (330)
N4000-200-380	A6103C plus A7015A proc.	N4000 2-way server using 380 MHz processors	27	4 (330)
N4000-100-500	A6914C	N4000 1-way server using a 500 MHz processor	20	4 (330)
N4000-200-500	A6914C plus A7016A proc.	N4000 2-way server using 500 MHz processors	37	4 (330)
N4000-300-500	A6914C plus A7016A proc.	N4000 3-way server using 500 MHz processors	52	4 (330)
N4000-400-500	A6914C plus A7016A proc.	N4000 4-way server using 500 MHz processors	65	4 (330)
N4000-300-750	A7014C	N4000 3-way server using 750 MHz processors	79	6 (340)
N4000-400-750	A7014C plus A7017A proc.	N4000 4-way server using 750 MHz processors	100	6 (340)

HP e3000 380 MHz N-Class Servers support 1 or 2 processors, and the 500 and 750 MHz N-Class Servers support 1 to 4 processors.

The HP e3000 N-Class Servers support ten Twin Turbo 4x PCI I/O slots with 480-530 Mbytes/sec of I/O bandwidth each. They also support two Turbo 2x PCI I/O slots with 240-266 Mbytes/sec of I/O bandwidth each. Each HP e3000 N-Class Server comes with a core I/O card that has one Ultra2 SCSI LVD/SE connection for external peripherals; two Ultra2 SCSI busses for integrated disks; three RS-232 ports for console, remote access and uninterruptible power supply (UPS) control; and one 10/100BaseT LAN connection. HP e3000 N-Class Servers can also support one or two internal disk drives of 18, 36 or 73 Gbytes in size.

HP e3000 N-Class Servers support up to 16 Gbytes of main memory. In addition, all HP e3000 N-Class Servers come standard with the HP Secure Web Console functionality integrated onto the Core I/O card.

PA-8500/PA-8600 based N-Class Servers are fully upgradable to the new PA-8700 processor technology.

All HP e3000 A-Class and N-Class Servers come standard with an unlimited user license and with Image/SQL bundled into the server. Customers who wish to buy the Allbase/SQL database can purchase the Allbase/SQL product (30368B) and specify an appropriate SW Tier option. In addition, HP e3000 to HP 9000 hardware conversion kits are also available for these servers as a separately orderable product.

HP Announces Availability of the HP Surestore Disk System 2300 (DS2300) for the HP e3000

by Kriss Rant and Jim Hawkins, Commercial Systems Division

The HP Surestore Disk System 2300 is a fourteen-slot Ultra160 SCSI (160 MB/s LVD SCSI) capable interface storage enclosure. The enclosure is 3 EIA units (3U) high and consists of a single bay in front that has 14 vertically oriented hot-swappable disk module slots. The low voltage differential Ultra160 SCSI bus provides a data transfer rate of up to 160 MB/s. The DS2300 has a storage capacity of up to one terabyte in a single enclosure. The DS2300 is intended as a standalone JBOD, connected to a host, or hosts (up to two).

Modular and redundant components are easy to upgrade and maintain. Disks, fans, power supplies, and Bus Control Cards (BCCs) are replaceable parts that plug into individual slots in the front and back of the disk system. Redundant fans and power supplies can be removed and replaced without interrupting storage operations. Disks also can be replaced with the system on and with only the affected file systems taken offline. Hewlett-Packard technical support is optional for these procedures.

A switchable, SES or SAF-TE, environmental monitoring controller and HP software enable remote monitoring and diagnostics. Sensors on the BCCs monitor the disk system environment, including temperature, voltage, fan speed, and component status. A not-for-resale version of Command View SDM is included with the enclosure providing monitoring and diagnostic capabilities for many configurations. For MPE/iX environments, the status of the enclosure controller and disk drives can be monitored using cstm. Command View SDM is not supported on MPE/iX.

This storage enclosure is available in field rack, factory rack, and deskside pedestal configurations. A minimum of one disk drive must be installed for the Disk System 2300 to function.

The Disk System 2300 also includes a product manual, a VHDTS68 LVD/SE terminator, disk drive filler panels, a BCC filler panel and AC power cords.

The Disk System 2300 is supported on HP e3000 A-Class and N-Class servers with MPE/iX 7.0 Express 1 or greater.

HP Announces Availability of the HP Surestore Tape Array 5300 for the HP e3000

by Kriss Rant, Commercial Systems Division

The HP Surestore Tape Array 5300 provides a high availability rack mount solution for HP Surestore DLT80, DAT24(DDS-3), DAT40(DDS-4) and DVD-ROM modules. Dual redundant power supplies, which can be hot-swapped, are available. (These are standard on the factory-integrated version.) The HP Surestore Tape Array 5300 occupies three EIA units of rack space. Individual SCSI connections are provided for each of the four half-height bays. DLT 80 module occupies two bays. SCSI terminators are not provided and must be ordered separately.

A maximum of FOUR half-height modules (DAT24, DAT40 and DVD-ROM) may be ordered with a HP SureStore Tape Array 5300. A maximum of TWO DLT80 modules can be ordered. A combination of ONE DLT80 module and TWO half-height modules may be ordered.

This unit replaces the SMART Storage range of rack mount tape drives.

- Supported on HP e3000 A-Class and N-Class servers with MPE/iX 7.0 Express 1 or greater. HP recommends a maximum of two drive modules per SCSI host bus adapter.
- Uses standard SCSI-2 68-pin high density SCSI connections.
- DDS-3 drive is a SCSI single-ended device and cannot be mixed with LVD devices.
- DVD-ROM module is available for software load.
- All modules except the DAT24 are Ultra-2 SCSI and can have a maximum cable length of 10m.

Table 5-1

Product Number	Option	Description
C7508A		HP Surestore Tape Array 5300 3U enclosure for field integration
C7508AZ		HP Surestore Tape Array 5300 3U enclosure with dual redundant power supply — factory integrate
C7496A		Tape Array 5300 redundancy kit. Not required for factory integrated module
C7498A		HP Surestore DAT24 DDS-3 tape drive module
C7498A	0D1	Factory integration
C7497A		HP Surestore DAT40 DDS-4 tape drive module
C7497A	0D1	Factory integration
C7499A		HP Surestore DVD-ROM module
C7499A	0D1	Factory integration
C7456A		HP Surestore DLT80 tape module
C7456A	0D1	Factory integration
C2364A		68-pin multi-mode SCSI terminator — order 1 per SCSI bus

Table 5-1 (Continued)

Product Number	Option	Description
C2978A		0.5m 68-pin HDTS-68-pin HDTS SCSI cable for interconnecting two drive modules.
SCSI Cable for A/N-Class Systems		
C2361B		1.0-meter 68-pin HDTS — 68-pin VHDCI multi-mode cable
C2362B		2.5-meter 68-pin HDTS — 68-pin VHDCI multi-mode cable
C2363B		10.0-meter, 68-pin HDTS — 68-pin VHDCI cable
C2365B		5.0-meter 68-pin HDTS — 68-pin VHDCI cable

HPCPUNAME Model Strings Supported With MPE/iX Release 7.5 and Possible Bootup Failures

By Kriss Rant, Commercial Systems Division

With the MPE/iX Release 7.5, a number of new model strings are now returned by the MPE/iX function HPCPUNAME. Following is a list of the new approved ASCI model strings for HP e3000 Servers supported with MPE/iX Release 7.5.

Model Description	Model String Returned by HPCPUNAME*
HP e3000 A400 1-way 150 MHz Servers	SERIES e3000/A400-100-15
HP e3000 A500 1-way 200 MHz Servers	SERIES e3000/A500-100-20
HP e3000 A500 2-way 200 MHz Servers	SERIES e3000/A500-200-20
HP e3000 N4000 1-way 380 MHz Servers	SERIES e3000/N4000-100-38
HP e3000 N4000 2-way 380 MHz Servers	SERIES e3000/N4000-200-38
HP e3000 N4000 1-way 500 MHz Servers	SERIES e3000/N4000-100-50
HP e3000 N4000 2-way 500 MHz Servers	SERIES e3000/N4000-200-50
HP e3000 N4000 3-way 500 MHz Servers	SERIES e3000/N4000-300-50
HP e3000 N4000 4-way 500 MHz Servers	SERIES e3000/N4000-400-50
HP e3000 N4000 3-way 750 MHz Servers	SERIES e3000/N4000-300-75
HP e3000 N4000 4-way 750 MHz Servers	SERIES e3000/N4000-400-75
* All A-Class and N-Class Servers only use two characters in the last term to show frequency	

The following table shows the model strings for all other HP e3000 A/N-Class servers supported by MPE/iX Release 7.5.

Model Description	Model String Returned by HPCPUNAME*
HP e3000 A400 1-way 110 MHz Servers	SERIES e3000/A400-100-11
HP e3000 A500 1-way 140 MHz Servers	SERIES e3000/A500-100-14
HP e3000 A500 2-way 140 MHz Servers	SERIES e3000/A500-200-14
HP e3000 N4000 1-way 220 MHz Servers	SERIES e3000/N4000-100-22
HP e3000 N4000 1-way 330 MHz Servers	SERIES e3000/N4000-100-33
HP e3000 N4000 1-way 440 MHz Servers	SERIES e3000/N4000-100-44
HP e3000 N4000 2-way 440 MHz Servers	SERIES e3000/N4000-200-44
HP e3000 N4000 3-way 440 MHz Servers	SERIES e3000/N4000-300-44
HP e3000 N4000 4-way 440 MHz Servers	SERIES e3000/N4000-400-44

Model Description	Model String Returned by HPCPUNAME*
HP e3000 N4000 3-way 550 MHz Servers	SERIES e3000/N4000-300-55
HP e3000 N4000 4-way 550 MHz Servers	SERIES e3000/N4000-400-55
* All A-Class and N-Class Servers only use two characters in the last term to show frequency	

For HP e3000 A- and N-Class Servers, the following definitions apply to model strings:

- First term = SERIES e3000
- Second term = family and model, may be variable length
- Third term = number of processors authorized, are only three characters
- Fourth term = frequency of authorized processors, are only two characters

Model strings for newly shipped servers are always properly set by the HP factory or by the US Distributor, Client Systems. Whenever an HP e3000 Server is upgraded through a chassis upgrade or by the addition of a processor, the model strings are properly set by the HP field CE doing the installation. Before completing an installation, HP field CEs should boot the HP e3000 Server to demonstrate proper setting of model string values.

Model Strings Cannot be Set by Customers or by Resellers

Mismatches between HP e3000 A- and N-Class Server model strings and the actual processors installed in the server may result in the server not successfully booting until an HP field CE properly sets the model strings. Mismatches related to processor module frequencies are the most frequent reason for “model string failure to boot” error messages.

If the actual number of processors in an HP e3000 A- or N-Class Server is greater than the number specified in the model string, the number of processors configured at bootup time are limited to the number authorized in the model string and a warning is issued to the user.

These bootup failures and warnings are most likely to occur if someone attempts to move processor modules between servers or if someone attempts to convert an HP 9000 Server to be an HP e3000 Server. HP fields CEs have been instructed to only reset model string values when repairing failing equipment or installing properly purchased HP e3000 field upgrade kits or additional processor modules—never to reset the model strings when someone has improperly added processor modules to an HP e3000 A- or N-Class Server.

For other HP e3000 Servers supported by MPE/iX Release 7.5, these bootup checks are not made at this time but may be added in future releases.

The following table shows the model strings for all other HP e3000 Servers supported by MPE/iX Release 7.5

Model Description	Model String Returned by HPCPUNAME
HP e3000 9x8 Family:	
HP e3000 918LX Servers	SERIES 918LX
HP e3000 918RX Servers	SERIES 918RX
HP e3000 928LX Servers	SERIES 928LX
HP e3000 928RX Servers	SERIES 928RX
HP e3000 968LX Servers	SERIES 968LX

Model Description	Model String Returned by HPCPUNAME
HP e3000 968RX Servers	SERIES 968RX
HP e3000 978LX Servers	SERIES 978LX
HP e3000 978RX Servers	SERIES 978RX
HP e3000 988LX Servers	SERIES 988LX
HP e3000 988RX Servers	SERIES 988RX
HP e3000 9x9KS Family:	
HP e3000 929KS/020 Servers	SERIES 929-020
HP e3000 929KS/030 Servers	SERIES 929-030
HP e3000 939KS Servers	SERIES 939
HP e3000 939KS/020 Servers	SERIES 939-020
HP e3000 939KS/030 Servers	SERIES 939-030
HP e3000 959KS/100 Servers	SERIES 959-100
HP e3000 959KS/200 Servers	SERIES 959-200
HP e3000 959KS/300 Servers	SERIES 959-300
HP e3000 959KS/400 Servers	SERIES 959-400
HP e3000 969KS/100 Servers	SERIES 969-100
HP e3000 969KS/200 Servers	SERIES 969-200
HP e3000 969KS/300 Servers	SERIES 969-300
HP e3000 969KS/400 Servers	SERIES 969-400
HP e3000 969KS/120 Servers	SERIES 969-120
HP e3000 969KS/220 Servers	SERIES 969-220
HP e3000 969KS/320 Servers	SERIES 969-320
HP e3000 969KS/420 Servers	SERIES 969-420
HP e3000 979KS/100 Servers	SERIES 979-100
HP e3000 979KS/200 Servers	SERIES 979-200
HP e3000 979KS/300 Servers	SERIES 979-300
HP e3000 979KS/400 Servers	SERIES 979-400
HP e3000 989KS/100 Servers	SERIES 989-100
HP e3000 989KS/200 Servers	SERIES 989-200
HP e3000 989KS/300 Servers	SERIES 989-300

Model Description	Model String Returned by HPCPUNAME
HP e3000 989KS/400 Servers	SERIES 989-400
HP e3000 989KS/500 Servers	SERIES 989-500
HP e3000 989KS/600 Servers	SERIES 989-600
HP e3000 989KS/150 Servers	SERIES 989-150
HP e3000 989KS/250 Servers	SERIES 989-250
HP e3000 989KS/350 Servers	SERIES 989-350
HP e3000 989KS/450 Servers	SERIES 989-450
HP e3000 989KS/550 Servers	SERIES 989-550
HP e3000 989KS/650 Servers	SERIES 989-650
HP e3000 99x Family:	
HP e3000 990 Servers	SERIES 990
HP e3000 991 Servers	SERIES 991
HP e3000 992/100 Servers	SERIES 992-100
HP e3000 992/200 Servers	SERIES 992-200
HP e3000 992/300 Servers	SERIES 992-300
HP e3000 992/400 Servers	SERIES 992-400
HP e3000 995/100 Servers	SERIES 995-100
HP e3000 995/200 Servers	SERIES 995-200
HP e3000 995/300 Servers	SERIES 995-300
HP e3000 995/400 Servers	SERIES 995-400
HP e3000 995/500 Servers	SERIES 995-500
HP e3000 995/600 Servers	SERIES 995-600
HP e3000 995/700 Servers	SERIES 995-700
HP e3000 995/800 Servers	SERIES 995-800
HP e3000 996/80 Servers	SERIES 996-80
HP e3000 996/100 Servers	SERIES 996-100
HP e3000 996/200 Servers	SERIES 996-200
HP e3000 996/300 Servers	SERIES 996-300
HP e3000 996/400 Servers	SERIES 996-400
HP e3000 996/500 Servers	SERIES 996-500

Model Description	Model String Returned by HPCPUNAME
HP e3000 996/600 Servers	SERIES 996-600
HP e3000 996/700 Servers	SERIES 996-700
HP e3000 996/800 Servers	SERIES 996-800
HP e3000 997/100 Servers	SERIES 997-100
HP e3000 997/200 Servers	SERIES 997-200
HP e3000 997/300 Servers	SERIES 997-300
HP e3000 997/400 Servers	SERIES 997-400
HP e3000 997/500 Servers	SERIES 997-500
HP e3000 997/600 Servers	SERIES 997-600
HP e3000 997/700 Servers	Never supported by HP.
HP e3000 997/800 Servers	SERIES 997-800
HP e3000 997/900 Servers	Never supported by HP.
HP e3000 997/1000 Servers	SERIES 997-1000
HP e3000 997/1100 Servers	Never supported by HP.
HP e3000 997/1200 Servers	SERIES 997-1200

SCSI Interface and Device Support for N-Class and A-Class HP e3000

by Jim Hawkins
Commercial Systems Division

Our basic goal is to have a useful set of SCSI peripherals available for use with N-Class and A-Class Systems, (Interfaces such as HP-IB and HP-FL are not supported). As always, we have a strong desire to protect our customers' existing hardware investment. The set of SCSI devices supported for N-Class and A-Class HP e3000 Systems with the 7.0 Release is based upon those SCSI devices supported in the 6.5 Release. However there are a large number of devices that are "supported" in MPE/iX Release 6.5 but actually obsolete and/or nearly obsolete. Therefore we've made our strongest efforts to actually test and support those SCSI devices that are currently (or recently) shipping from HP. Where possible, we've also sampled from older families of devices in order to allow continuing usage of these devices.

N-Class and A-Class Supported Devices Rules of Thumb:

1. HP e3000 Supported SCSI devices shipping as of January 2001 are supported.
   Exception: Devices specifically listed as NOT supported.
2. SCSI Devices obsolete or removed from HP Price List before January 2001 are NOT supported.
   Exception: Devices specifically listed as supported.

NOTE Devices listed as "unsupported" on N-Class or A-Class systems will still be found in the MPE/iX 7.0 and later copies of `IODFAULT.PUB.SYS` and will continue to be supported on OTHER HP e3000 Systems (e.g. 99x, 9x9, and 9x8).

Table 5-2 Interface Cards:

Product Number	Interface Description(s)	SCSI Chip Set
N-Class Core I/O	VHDCI 68-pin LVD/SE SCSI 2x Internal LVD/SE SCSI*	SYM53C895 SYM53C876
A-Class Core I/O	VHDCI 68-pin LVD/SE SCSI Internal LVD/SE SCSI* HD 50-pin SE-SCSI ** Internal LVD/SE SCSI*	SYM53C896 SYM53C876
A5149A	VHDCI 68-pin LVD/SE SCSI	SYM53C895
A4800A	HD 68-pin HVD SCSI	SYM53C875
A5150A***	2x VHDCI 68-pin LVD/SE SCSI	SYM53C896
A5159A***	2x HD 68-pin HVD SCSI	SYM53C876

* These Core I/O SCSI Buses are internal to the System. Each supports connection of a single LVD disk.

** This connection exclusively supports 8-bit wide SCSI transfers. Therefore only DDS3 and 7980 Tape Devices are supported; other devices will not function or will loose data.

*** Dual Port Cards are not supported on A-Class systems.

Table 5-3 SCSI Storage Enclosures:

Description	SCSI Interface(s)	HP Product Number
HP High Availability Storage Solution (HP HASS)	SE, HVD	A3312A, A3311A
HP SMART Family of Data Storage Products	SE, HVD	C4317A, C4318A
SureStore E Disk System HVD10	HVD	A5616A/AZ
HP SureStore DS2100, DS2300 Disk Storage Systems	LVD	A5675A/AZ, A6490A/AZ

Table 5-4 N-Class and A-Class System Internal Disk Modules:

HP Product	SCSI Interface	Disk Size (in Gigabytes)	Example Product ID
A5505A (N-Class)	(LVD)	9 GB	ST39102LC
A5531A (N-Class)	(LVD)	18 GB	ST318203LC
A6089A (N-Class)	(LVD)	36 GB	ST336706LC
A5573A (A-Class)	(LVD)	9 GB	ST39102LC
A5574A (A-Class)	(LVD)	18 GB	ST318203LC
A6154A (A-Class)	(LVD)	36 GB	ST336706LC
A6947A (A-Class)	(LVD)	18 GB 15K RPM	LVDDISK
A6948A (A-Class)	(LVD)	36 GB 15K RPM	LVDDISK

Table 5-5 HP HASS Disks Modules:

HP Product	SCSI Interface	Disk Size (in Gigabytes)	Example Product ID
A3517A	SE	2 GB	ST32550N
A3646A	SE	4 GB	ST15150N
A3628A	SE	9 GB	ST39173N
A3518A	HVD	2 GB	ST32550W
A3547A	HVD	4 GB	ST15150W
A5285A	HVD	9 GB	ST19173LC
A5286A	HVD	18 GB	ST318275LC

Table 5-6 HP SMART Stand Alone and Rack Mount Disks:

HP Product	SCSI Interface	Disk Size (in Gigabytes)	Example Product ID
C6388A/C6389A	SE	4 GB	ST34373W
C6392A/C6393A	SE	9 GB	ST19171N
C6394A/C6395A	SE	9 GB	ST39173W
C6398A/C6399A	SE	18 GB	ST318404W
C6390A/C6391A	HVD	4 GB	ST34373W
C6396A/C6397A	HVD	9 GB	ST39173WD
C6400A/C6401A	HVD	18 GB	ST318404WD

Table 5-7 SureStore E Disk System HVD10 Disk Modules:

HP Product	SCSI Interface	Disk Size (in Gigabytes)	Example Product ID
A5276A	HVD	9 GB	ST39204LC
A5282A	HVD	18 GB	ST318203LC
A5595A	HVD	36 GB	ST136403LC
A5622A	HVD	72 GB	ST173404LC

Table 5-8 DS2100/DS2300 Modules

HP Product	Disk Capacity	Disk Type
A6537A	18 GB 10K	LVDDISK
A6538A	36 GB 10K	LVDDISK
A6539A	73 GB 10K	LVDDISK
A6540A	18 GB 15K	LVDDISK
A6541A	36 GB 15K	LVDDISK

Table 5-9 Supported Disk Array Products:

Description	SCSI Interface	Internal Disk Capacity	HP Product Number
Nike Model 10	HVD	2 GB, 4GB, 9GB	A3539A
Nike Model 20	HVD	2 GB, 4GB, 9GB, 18GB	A3549A
AutoRaid 12H	HVD	9 GB, 18 GB	A3700
EMC	HVD		(non-HP product)

Table 5-9 Supported Disk Array Products: (Continued)

Description	SCSI Interface	Internal Disk Capacity	HP Product Number
XP256	HVD		A57xx

Table 5-10 Read Only Disks:

Description	SCSI Interface	HP Product Number
HP DVD-ROM	SE	C4314A

Table 5-11 Tape Devices:

Description	SCSI Interface	HP Product Number
HP DDS-3	SE	HPC1553A
HP DDS-3 6 Tape Changer	SE	A3716A
½" Reel Tape	SE	HP7980S
½" Reel Tape	SE	HP7980SX
DLT7000	HVD	C6531A
DLT8000	HVD	C6378A

Table 5-12 Tape Libraries:

Description	SCSI Interface	HP Product Number
15 Slot 2 Drive Library (DLT 7000)	HVD	A4851A
30 Slot 3 Drive Library (DLT 7000)	HVD	A4853A
28 Slot 2 Drive Library (DLT 7000)	HVD	A4850A
40 Slot 6 Drive Library (DLT 7000)	HVD	A4846A
588 Slot 10 Driver Library (DLT 7000)	HVD	A4845A
SureStore E 1/20 Library (DLT 8000)	HVD	C7200
SureStore E 2/20 Library (DLT 8000)	HVD	C7202
SureStore E 2/40 Library (DLT 8000)	HVD	C7210
SureStore E 4/40 Library (DLT 8000)	HVD	C7214
SureStore E 2/60 Library (DLT 8000)	HVD	C7222
SureStore E 4/60 Library (DLT 8000)	HVD	C7226
SureStore E 6/60 Library (DLT 8000)	HVD	C7230
SureStore E 20/700 Library (DLT 8000)	HVD	C5599

Table 5-13 TA5300 Modules

Description	Interface	Product Number
DLT80m	LVD Interface	C7456A
DLT40m	LVD Interface	C7497A
DLT24m	LVD/SE Interface	C7498A

Misc. SCSI Hardware and Software:

A5814A - SCSI-FIBRE CHANNEL ROUTER/EXTENDER (HVD)

HP Mirrored Disk/iX Software (SE or HVD disks)

SCSI Devices that will NOT be Supported on N-Class and A-Class HP e3000

Unsupported Disks Devices:

All Magneto-Optical (MO) Discs
All CDROM
SE EMC
SE/HVD Disks Less Than 2 GB
SE/HVD SCSI “Cascade” Arrays
XP512 Disk Array

Unsupported Tape Devices:

DDS-1 (and auto-changers based upon DDS-1)
DDS-2 (and auto-changers based upon DDS-2)
DLT 4000 (SE and HVD)
3480/3490 Devices
SE Tape Libraries
IEM 8MM Devices

Unsupported Printers:

No SCSI Printers are supported.

Unsupported Enclosures:

SureStore E SC10 LVD/SE Disk Enclosure

Other Unsupported SCSI Products:

SCSI Switch Boxes
SE SCSI Extender (28643-60001)

HP e3000 PA-8700 A-Class and N-Class Core I/O Card

By John Spitzer, Commercial Systems Division

Introduction

MPE/iX release 7.5 introduces support for the HP e3000 PA-8700 N-Class and A-Class hardware platforms. The Core I/O card is one of the hardware components of these platforms that has undergone significant improvement. There are changes to both the hardware and the I/O paths used to access the console and the functions of the Core I/O card. This article describes how these changes affect console commands and operations.

The Core I/O card is a component installed in the systems and contains all the I/O components necessary to configure a bootable system (not including disks and tapes drives and terminals). The Guardian Service Processor (GSP) is an independent support processor built into the N-Class and A-class Core I/O. The GSP provides the functionality required for basic console operations to control the hardware before the OS is booted and provides the connectivity and major system manageability features for the system.

You will see two significant changes to the Core I/O card for the PA-8700 platforms:

- The I/O paths used to configure the logical devices on the Core I/O card have changed.
- The GSP now incorporates a version of the Secure Web Console into the firmware.

This article also contains information on other enhancements related to the console and additional information on the usage of some command and functions that are available on both Core I/O I and Core I/O II.

Configuration of Console I/O Paths

The following data shows the details of the information that needs to be added to the IO configuration in Sysgen in order to configure the core I/O serial devices. The ldev 20 configuration is shown. The configurations of the remote session and UPS devices are the same except for the *PATH* and *LDEV* parameters. Additionally, the UPS port requires the class HPUPSDEV to be assigned. These entries are the same as the corresponding entries on the earlier N and A Class systems except the I/O path has changed.

```
io> lp 0/0/4/1

PATH:  0/0/4/1                              LDEV:
  ID:  PCI_CONSOLE                          TYPE: DA
PMGR:  PCI_CONSOLE_DAM                    PMGRPRI:     6
LMGR:                                      MAXIOS:     0
io> lp 0/0/4/1.0

PATH:  0/0/4/1.0                            LDEV:   20
  ID:  C1099A                               TYPE: TERM
PMGR:  CDM_CONSOLE_DM                     PMGRPRI:     9
LMGR:  TIO_TLDM                            MAXIOS:     0


io> ld 20

 LDEV:    20  DEVNAME:                   OUTDEV:       20   MODE:  JAID
```

```
   ID: C1099A                          RSIZE:        40   DEVTYPE: TERM
 PATH: 0/0/4/1.0                       MPETYPE:      16   MPESUBTYPE:  0
CLASS: TERM
```

I/O Paths Used for the Console I/O Serial Ports

The serial ports on the PA-8700 Core I/O card are configured on the following I/O paths:

```
0/0/4/1.0 - console; Ldev 20
0/0/4/1.1 - remote session
0/0/4/1.2 - UPS device
```

NOTE These paths are NOT in the same order as the paths as designated on the equivalent platforms for the rp7400 HP-UX systems. This order of the hardware paths is due to the way the `PCI_CONSOLE_DAM` is mapping the paths used by Sysgen to the physical hardware. The paths were mapped this way to maintain the three ldevs on the Core I/O card in the same order they were configured on earlier non-PCI platforms.

New Default Configuration Groups

MPE/iX release 7.5 includes four new default configuration groups that contain the configuration for the new PA-8700 Core I/O card. These groups define the I/O configuration for the console and the remote console port. The new groups are:

- CONFNCL3 — For a N-Class system with 2 internal disks.
- CONFNCL4 — For a N-Class system with an external disk.
- CONFACL3 — For a A-Class system with 2 internal disks.
- CONFACL4 — For a A-Class system with an external disk.

Secure Web Console

The GSP on PA-8700 Core I/O card contains the firmware that implements the Secure Web Console (SWC). The SWC can be used with either Microsoft Internet Explorer or Netscape Internet browsers. Once the GSP LAN console access has been configured with the LC command, the SWC access can be enabled with the GSP **EL** command. When the **EL** command is entered, following the prompts allows you to enable console access via telnet, SWC or both. To access the SWC from your Web browser, simply enter the IP resolved node name for the GSP LAN port in the address bar of your browser. For example, if the node name `GSP1.hp.com` is the full domain name resolved by a DNS server to the IP address assigned to the GSP/LAN port, then enter `'http://gsp1.hp.com'` in the address bar to access the SWC.

For more documentation on the Secure Web Console, see the documentation for the rp7400 Server system hardware on the web at: `http://www.docs.hp.com/`.

The GSP LAN/Console Port

This port has been enhanced to provide a 10-100Base-TX connection into the GSP. Previously this GSP LAN/Console port only supported 10Base-TX connections.

Additional Helpful Console Information

The PA-8700 version of the GSP has added the **EX** command. This command allows you to exit and cause a close of your connection to the GSP. When this command is issued, and after confirmation, your session is disconnected and all other connections revert to the console mode. This is useful because in the past, if you disconnected from the console while in GSP mode, all other connections stayed in the GSP mode and console messages from the MPE/iX OS were not visible on the console terminal.

There is the capability in the GSP to set two inactivity timers. The GSP Inactivity timer and Session Inactivity timer are configured with the **IT** command.

The GSP Inactivity timer prevents a user from inadvertently leaving the GSP in the **GSP** Command Interface mode thus preventing console output from being sent to the console terminals. The **GSP** Command Interface inactivity timeout may not be deactivated. For MPE/iX it is a good idea to set this to a value of 2 minutes or shorter. The Session Inactivity timer prevents sessions to the system that were started with the **SE** command from being inadvertently left open. An open session can prevent users from logging onto the GSP through a port and can also prevent system applications from initiating an outbound connection.

Conclusion

Although the hardware is new, you will see minimal change in how you use and manage your system via the core I/O card. The addition of the Secure Web Console simplifies the management of the system via a WEB browser and eliminates the need for the stand-alone or I/O card version of the SWC. This has the added benefit of eliminating the need for an additional node name and IP address to configure the stand-alone or I/O card version of the SWC.

SHUTDOWN — New CI Command

by S Shashikala, Commercial Systems Division

Enhancements Summary

Presently MPE/iX supports the **=SHUTDOWN** with console interrupt **[CTRL] [A]**. The **=SHUTDOWN** command performs an implicit **=LOGOFF** of all sessions, including the session logged at the system console. The CPU halts, and console interrupt **[CTRL] [A]** is ineffective.

The objective of this enhancement is to provide the shutdown mechanism with a reboot option in the command level similar to HP-UX operating system.

This enhancement provides a **:SHUTDOWN** command on the CI prompt, with a RESTART option which shuts down the system completely and reboots automatically.

Enhancement

```
:SHUTDOWN SYSTEM [;RESTART]
```

Syntax

`:SHUTDOWN SYSTEM` will shutdown the system completely.

`:SHUTDOWN SYSTEM;RESTART` will shutdown the system completely and reboot the system automatically. Control will result to the ISL> prompt.

This command can be issued from a session, job, program, or in BREAK. Pressing **[Break]** has no effect on this command. It can be issued only from the console unless it is distributed to users with the **ALLOW** command.

Parameters

SYSTEM	Specifies that the entire system should be shut down completely.
RESTART	Specifies that the system should be restarted after the shut down is complete.

Operation and Use of New Command

The MPE/iX operating system is shutdown in an orderly manner. `:SHUTDOWN` performs the same function as `=SHUTDOWN`, but may be entered from the CI in a job, session, or script. The **:SHUTDOWN** command supports the RESTART option.OP capability is required for this command.

The `:SHUTDOWN` performs an implicit `=LOGOFF` of all sessions, including the session issuing the command. All system processes are stopped in an orderly fashion. This includes the completion of all pending system activity and any processing necessary to ensure that the integrity of all system tables and directories is maintained. Once these procedures are complete, SHUT is displayed on the console, the CPU halts, and console interrupt **[CTRL] [A]** is ineffective.

Device configuration changes that were made after the preceding load (`UP, DOWN, ACCEPT, REFUSE` and `spooling` commands) are not retained. Configuration changes made during coldload are permanently recorded and retained until the next tape coldload. Newly assigned or released global Resource Identification Numbers (RINs) are permanently recorded.

All communication lines must be closed before issuing a **SHUTDOWN** command. Otherwise, a manual halt of the system may be necessary. Note that data will be lost if a transmission is in progress when the halt is performed. Also, if NS lines were left open before issuing the SHUTDOWN, lines to the remote system remain open and any remote sessions will be effectively "hung". In this case, the remote system's operator may need to issue ABORTIO commands for the hung sessions and then abort the sessions themselves.

Spooled devices will stop operation immediately upon receiving a **SHUTDOWN** command. A START RECOVER will keep spool files so that they may be printed when the system is returned online.

Presently =SHUTDOWN can be issued only at the physical console. The **:SHUTDOWN** command can be issued from a session, job, program, or in BREAK. Pressing **[Break]** has no effect on this command. It can be issued only from the console unless it is distributed to users with OP capability via the **ALLOW** command.

Example

To shut down the MPE/iX operating system enter:

```
:SHUTDOWN SYSTEM
```

This will shutdown the system completely.

To shut down the MPE/iX operating system and initiate a subsequent reboot operation enter:

```
:SHUTDOWN SYSTEM ;RESTART
```

This will shutdown the system completely and reboot the system automatically. Operator control will resume at the ISL> prompt.

Using AUTOBOOT Feature with :SHUTDOWN;RESTART Option

Autobooting allows you to boot the system from the primary boot path without the need to make any keyboard entries. This existing feature can be combined with **:SHUTDOWN SYSTEM;RESTART** command to restart the system without the interaction in ISL> prompt. More information on setting-up and using AUTOBOOT feature is available in *System Startup, Configuration, and Shutdown Reference Manual*.

The **RESTART** command interacts with the AUTOBOOT feature of MPE/iX in order to minimize operator intervention. When the AUTOBOOT feature is not enabled on the system the control is returned to the ISL> prompt. When the AUTOBOOT feature is enabled as described in this section, the system is restarted automatically.

As part of setting-up AUTOBOOT feature an autoboot file needs to be created. To facilitate the easy creation of the file, an utility FORMAT.MPEXL.SYS is made available as part of this enhancement. FORMAT utility enables user to create a specially formatted file that contains the special sequence of startup commands. The system automatically executes these commands in sequence during system startup if this feature is activated.

Steps to Build and Setup an AUTOBOOT file

1. Create a file called AUTOIN which contains the "START [NO]RECOVERY" command.
2. Run FORMAT.MPEXL.SYS. This will create a file called AUTOOUT in the same group.
3. Copy AUTOOUT,AUTOBOOT.MPEXL.SYS.
4. Set the autoboot file with the SYSGEN utility.:SYSGEN

```
>sy
>aa file=autoboot.mpexl.sys;type=disc
>hold
>exit
>keep
>tape verbose
```

5. Perform a configuration UPDATE to your system with the CSLT tape created under SYSGEN.
6. After UPDATE is complete, use the **ISL AUTOBOOT** command to enable the autoboot feature. At the ISL prompt enter:

   ```
   ISL> AUTOBOOT ON

   ISL> START start_options
   ```

Once the above steps are complete & the autoboot feature is enabled, the command **:SHUTDOWN SYSTEM;RESTART** will completely shutdown the system and the startup needs no operator intervention.

(See the sample output shown below.)

Note for AUTORESTART Product Users

There is no change in behavior for Autorestart product features due to the introduction of **:SHUTDOWN CI** command.

However, when the **:SHUTDOWN SYSTEM;RESTART** command is issued and if the AUTOBOOT file has the DUMP command, the system will take a DUMP of the system and execute the rest of the commands in AUTOBOOT file.

To disable taking full DUMP during normal shutdown and restart, you can use the Mini dump feature of the AUTORESTART product. It provides FULLDUMP, NULLDUMP and MINIDUMP options.

Refer to the *AUTORESTART User's Guide* for details.

Sample Output

```
1.:SHUTDOWN SYSTEM

     Shutdown of operating system begins. (Shut 1
     Shutdown of user processes begins. (Shut 2)
     Shutdown of jobs & sessions begins. (Shut 3)
     Spoolers notified of a shutdown. (Shut16)
     Shutdown of system processes begins. (Shut 4)
     Shutdown of system managers begins. (Shut 5)
     Shutdown of operating system complete. (Shut 6)

2.:SHUTDOWN SYSTEM;RESTART

     Shutdown of operating system begins. (Shut 1)
     Shutdown of user processes begins. (Shut 2)
     Shutdown of jobs & sessions begins. (Shut 3)
     Spoolers notified of a shutdown. (Shut16)
     Shutdown of system processes begins. (Shut 4)
     Shutdown of system managers begins. (Shut 5)
     Shutdown of operating system complete. (Shut 6)

 ------------------------------------------------------------

PDC - Processor Dependent Code - Version 1.2 (c) Copyright 1990-1993, Hewlett-Packard Company, All rights
reserved ------------------------------------------------------------

64 MB of memory configured and tested. Primary boot path: 56/52.4 (dec) Alternate boot path: 56/52.0 (dec)

------- Main Menu -----------------------------------------------------

 Command Description

BOot [PRI|ALT|<path>] Boot from specified path PAth [PRI|ALT] [<path>] Display or modify a path SEArch
[DIsplay|IPL] [<path>] Search for boot devices

COnfiguration menu Displays or sets boot values INformation menu Displays hardware information SERvice
menu Displays service commands
```

```
DIsplay Redisplay the current menu HElp [<menu>|<command>] Display help for menu or command RESET Restart
the system ------- Main Menu: Enter command or menu >bo pri Interact with IPL (Y or N)?> y

Booting...

3.:SHUTDOWN SYSTEM;RESTART

With the AUTOBOOT feature enabled:

     Shutdown of operating system begins. (Shut 1)
     Shutdown of user processes begins. (Shut 2)
     Shutdown of jobs & sessions begins. (Shut 3)
     Spoolers notified of a shutdown. (Shut16)
     Shutdown of system processes begins. (Shut 4)
     Shutdown of system managers begins. (Shut 5)
     Shutdown of operating system complete. (Shut 6)

 ---------------------------------------------------------------

PDC - Processor Dependent Code - Version 1.2 (c) Copyright 1990-1993, Hewlett-Packard Company, All rights
reserved ---------------------------------------------------------------

64 MB of memory configured and tested. Primary boot path: 56/52.4 (dec) Alternate boot path: 56/52.0 (dec)

 Processor is starting autoboot process.

 To discontinue, press any key within 10 seconds.

 10 seconds expired. Proceeding...

 Trying Primary Boot Path .. .. Booting... .. ..

4.:SHUTDOWN SYSTEM;RESTART

With the DUMP-TO-DISK and AUTOBOOT feature enabled:

     Shutdown of operating system begins. (Shut 1)
     Shutdown of user processes begins. (Shut 2)
     Shutdown of jobs & sessions begins. (Shut 3)
     Spoolers notified of a shutdown. (Shut16)
     Shutdown of system processes begins. (Shut 4)
     Shutdown of system managers begins. (Shut 5)
     Shutdown of operating system complete. (Shut 6)

 ---------------------------------------------------------------

PDC - Processor Dependent Code - Version 1.2 (c) Copyright 1990-1993, Hewlett-Packard Company, All rights
reserved ---------------------------------------------------------------

64 MB of memory configured and tested. Primary boot path: 56/52.4 (dec) Alternate boot path: 56/52.0 (dec)
Processor is starting autoboot process.

To discontinue, press any key within 10 seconds.

10 seconds expired. Proceeding...

Trying Primary Boot Path ------------------------

Booting.. .. ..

ISL booting DUMP MPE/iX launch facility

Dump of memory save area complete.

Main memory dump complete.

Dump completed - autoboot in progress.

Checking for Autorestart/iX product to be active. Autoresrt/iX product active, Hard booting the system.

------------------------------------------------------------------------- PDC - Processor Dependent Code
- Version 1.2 (c) Copyright 1990-1993, Hewlett-Packard Company, All rights reserved
------------------------------------------------------------------------- 64 MB of memory configured
and tested. Primary boot path: 56/52.4 (dec) Alternate boot path: 56/52.0 (dec)
```

```
Processor is starting autoboot process.

To discontinue, press any key within 10 seconds.

10 seconds expired. Proceeding...

Trying Primary Boot Path

Booting... .. .. ..

ISL booting START -R NORECOVERY MPE/iX launch facility ----------------------------end of sample output
----------------
```

Introducing Samba/iX Version 2.0.7 on MPE/iX 7.5

The new version of Samba/iX 2.0.7 is released as part of FOS MPE/iX 7.5. The Samba/iX 2.0.7 version of software resides inside the SAMBA account in HFS directories under /SAMBA/SMB207. The previous version of Samba/iX 1.9.16p9 still exists inside the SAMBA account in HFS directories under /SAMBA/PUB. You can only run one version of Samba/iX server at one time.

If you choose to run the new version of Samba/iX 2.0.7, please use the following procedures to start the Samba/iX 2.0.7 server.

Starting smbd and nmbd Listener Jobs

1. Logon as manager.sys
2. Use the following commands to create symbolic link to make /SAMBA/SMB207 link to /usr/local/samba

```
:purgelink /usr/local/samba
:newlink  /usr/local/samba, /SAMBA/SMB207
```

3. Customize the smb.conf, printcap and user.map files to suit your Samba/iX environment. The smb.conf, printcap and user.map files should reside in the /SAMBA/SMB207/lib directory.
4. Use the jobs supplied as JSMB207.SAMBA.SYS and JNMB207.SAMBA.SYS and stream them. By streaming these two jobs, it starts your SMBD listener and NMBD server.
5. Use SHOWJOB to see if the job is still alive; it can look as follows:

```
JOBNUM         STATE    JIN     JLIST    JOB NAME

#j50           EXEC     10S     LP       NMBMON,MGR.SAMBA

#j51           EXEC     10S     LP       SMBMON,MGR.SAMBA
```

Starting Samba/iX Under the INETD Control

If you choose to run SMBD and NMBD processes under control of INETD, you should use the following procedures to start the Samba/iX server:

1. Logon as managers.sys.
2. Use the following commands to create the symbolic link to make /SAMBA/SMB207 link to /usr/local/samba.

```
:purgelink /usr/local/samba
:newlink /usr/local/samba, /SAMBA/SMB207
```

Please read the following file for more information: /SAMBA/SMB207/READLXT2.

Windows Registry Hacks to Supported Unencrypted Passwords

Connecting to SMB servers (such as Samba) with unencrypted password fails after upgrading to Windows NT 4.0 service pack 3 (and above). Currently encrypted passwords are not supported in Samba/iX 2.0.7. Please follow the procedure given below to work around this limitation:

Cause: The SMB redirector in Windows NT 4.0 (service pack 3 and above) handles unencrypted passwords differently than previous version of Windows NT. Beginning with this version, the SMB redirector will not send an unencrypted password unless you add a registry entry to enable them.

Resolution: To enable unencrypted (plain text) passwords modify the registry in this way.

WARNING **Using Registry Editor incorrectly can cause serious, system-wide problems that may require you to reinstall Windows NT to correct them. Microsoft does not guarantee that any problems resulting from the use of Registry Editor can be solved. Use this tool at your own risk.**

1. Run Registry Editor (REGEDT32.EXE).
2. From the HKEY_LOCAL_MACHINE subtree, go to the following key:
   \system\currentcontrolset\services\rdr\parameters
3. From the Edit menu, select **Add Value**.
4. Add the following:

```
Value Name: EnablePlainTextPassword
Data Type: REG_DWORD
Data: 1
```

5. Choose **OK** and quit Registry Editor.
6. Shutdown and restart Windows NT.

Samba for MPE/iX Components

- /SAMBA/SMB207/lib with sample configuration file, sample user map file, mapdiffs and rawlp utilities.
- /SAMBA/SMB207/bin with binary files like nmbd, smbd, swat, smbstatus, nmblookup, testparm, testprns and smbtar.
- /SAMBA/SMB207/swat with image files and html-formatted help documentation for Samba Web based Administration Tool.
- /SAMBA/SMB207/docs with html-formatted documentation for Samba.
- /SAMBA/SMB207/man with manpage documentation for Samba.

Additional Samba Information

- Samba Web page at Samba Developer site
- Samba/iX Configuration Tool
- *Samba, Integrating, Unix and Windows* by John D Blair
- *Using Samba,* by Robert Eckstein and David Collier-Brown

Support

For the support of Samba/iX, please send your questions or problems to Response Center engineers.

Announcing Heartbeat High Availability Cluster/iX

By Walter McCullough
Commercial Systems Division

General Information

Cluster/iX for the HP e3000 is an orderable product that allows the user to create a multiple server configuration with any HP-supported dual-ported array to form a non-complex high availability cluster. The new Heartbeat enhancement allows the user to create job scripts to automatically control the switchover process in the event that the primary cluster server aborts or its access to the data becomes unavailable.

Description

The `Beat` and `Listen` commands have been incorporated into the Cluster/iX SXOUtil program to allow the user to set up job scripts on the both the primary and secondary systems. The primary system's job script is responsible for calling the `Beat` command. This command causes the job to wait indefinitely while it "beats" the heartbeat counter on the cluster volume set owned by this system.

The secondary system is responsible for incorporating a `Listen` command in its job script that monitors the heartbeat counter on the cluster volume set. In the event that the heartbeat stops, the secondary system can detect this change and, depending on the job script, change the ownership of the cluster volume set, open it and restart the application for users to access from the secondary system.

Who Should Use Cluster/iX

Users who require a non-complex high availability solution that allows the users to access business critical data from a secondary system within seconds of the primary system experiencing an outage should use Cluster/iX.

The Cluster/iX solution addresses machine outages typically caused by:

- System Aborts
- Adapter card failures
- Catastrophic server hardware failure

NOTE Failover/iX is not supported in a Cluster/iX configuration.

Required Hardware

- HP e3000

And one or more of the following:

- HP SureStore E Disk Array XP Family
- HP SureStore Virtual Array 7100
- HP SureStore Disk Array 12H (formally AutoRAID)

Required Software

- MPE/iX Version 7.5

- Cluster/iX version B.00.00 for MPE/iX version 7.5

Documentation

Refer to the manual, *MPE/iX High Availability Cluster/iX User's Manual*, (Part No. B9480-90001), included with the product, for more information.

Support Tools Manager (STM) Updated for MPE/iX 7.5

by Allen Hertling — CSY

The newest released version of the On-Line Diagnostics (aka MESA Diagnostics) for the HP e3000 product named Support Tools Manager (STM) is B8343AA.75.01. This release provides support for new hardware, improvements in the functionality of STM, and correction of several reported defects. Additionally, the content of STM has been slightly changed in that the Menu version of STM (known as MSTM) is no longer provided on the HP e3000. Also, the DTC support tool known as TERMDSM is no longer a part of STM, but is supported separately as part of the HP 32022 MPE/iX Terminal IO product.

New Hardware Support

STM provides support for the new HP e3000 PA8700 processors for the N4000s and the A500s. The software will properly identify the hardware for display by the **MAP** command and provide information as to the specific hardware status via the INFO and IL (Infolog) commands. The newly supported Fibre Channel Interface Card and the VA7100 disk array are also identified.

Improved Functionality

STM operates by starting a system process (aka a daemon) named DIAGMOND. This happens automatically at bootup and as the result of running the STMSTART.In previous versions, DIAG.SYS program. DIAGMOND and its child processes ran at a very high priority (13) in the A linear queue. This high priority caused some problems of competition (and hangs) for system resources between STM and the network software which STM is dependent upon. With the A.75.01 release, DIAGMOND and its child processes (CCLOGD, MEMLOGD, DIAGLOGD, etc.) now run in the B queue at priority 150. Customers should no longer utilize the various scripts provided by the HP Expert Center that provided workarounds to the resource problems by changing the queue and priority of the older versions of the STM programs.

When STM is started, the software conducts a hardware mapping of the system (also when a **REMAP** command is issued by a user). This process may take several minutes (typically 2 to 5, but sometimes more) during which the user interface program (CSTM) will not generally be usable. Once the system mapping is complete, the continuously running system log processes of DIAGLOGD, MEMLOGD, and CCLOGD are started as child processes of DIAGMOND. These processes have been improved to use fewer system resources and to consume less CPU time. A side effect of these changes may be evident in that some commands within CSTM may report that the commands are disabled for a few seconds after exiting a command (like **INFO**) or utility (like LOGTOOL or an expert tool). A short wait of 5 to 15 seconds should allow the background processes to complete and the online interface of CSTM to be re-enabled.

Corrected Defects

The A.75.01 release includes code changes for over a dozen service requests that were reported against the MPE/iX 6.5 and 7.0 releases of STM. The causes of various System Aborts (1746), machine checks, and hangs have been corrected and the A.75.01 release has been more robust during testing of the MPE/iX 7.5 Release so much so that the same software has been packaged into Patches for MPE/iX 6.5 and 7.0.

Some user interface changes are that the **FF** command within LOGTOOL no longer fails, Firmware Updates to DLTs no longer report FAILED when the updates were actually successful, Process PIM Information is now reported for the N- and A-series, and Console messages of "*** DIAGNOSTIC MONITOR ABORT FAILED" have been replaced with a more explanatory message of "STM Diagnostic Monitor already stopped".

Program Changes

The Menu version of STM (MSTM) has been removed from the product. The MSTM program added no functionality to the online diagnostics but confused users as to the product features due to the extensive HP-UX options which were not applicable to the HPe3000. Users entering `MSTM.PUB.SYS` will now be directed to use the command-driven `CSTM.PUB.SYS`. The version of the `TERMDSM` program which used to be available within the STM Run Utility command is no longer provided as part of STM. It was functionally identical to the standalone version of the program (`TERMDSM.DIAG.SYS`), which is part of the HP 32022 MPE/iX Terminal I/O product. Confusion over where to report problems and the additional support costs were deemed to be negative factors that led to the removal of the duplicate functionality.

Log files and Performance Problems

Customers should be aware that the STM product collects system information and places it into various log files. As these log files grow in size and number, system performance may be negatively impacted. Users should perform regular processes to clear or remove the many log files created by STM. The STM ResetSysActLog (**RSA**) command should be used regularly to clear the System Activity Log (after examining the log contents with the **SAL** command, of course). Several other log files may be seen under the `/var/stm/logs/` directory. Users may wish to stop STM with the `STMSHUT.DIAG.SYS` program, purge various files within these directories, and restart STM with the `STMSTART.DIAG.SYS` program. This might be performed as part of the Full Backup on a monthly basis. Special care should be taken not to purge historical logs that may provide critical hardware information such as the files under `/var/stm/logs/os/` of memlog and `log<nnnn>.raw.cur`.

Users may wish to examine the switch-threshold value in the `/var/stm/config/sys/diaglogd.cfg` file. Users should determine how fast the log files grow and choose a switch-threshold value that is appropriate for their system. Large files may cause backup delays and poor system performance. To avoid delays and reduced performance, consider enabling a appropriate switch-threshold with a choice of 1000 to 16000 depending on your system.

Predictive Support Changes in MPE/iX 7.5

By Gary Robillard – Commercial Systems R&D

Product Overview

The HP Predictive Support software (referred to as Predictive in the rest of this article) provides proactive hardware support and helps increase the uptime of your systems by monitoring system memory and disk/tape drives.

When Predictive detects a potential problem, it sends a message to the HP Response Center. The Response Center portion of the system screens the data and forwards problems requiring further analysis to a Response Center Engineer. If action is needed at your site, the Response Center Engineer and a Customer Engineer will work with you to resolve the problem.

This proactive hardware support is provided as part of your HP Hardware and Software Support Services Agreement.

Predictive Accesses STM Diagnostics in MPE/iX 7.5

Predictive uses the diagnostics platform to access memory and disk-related information. Starting with MPE/iX Release 6.5 and later, the diagnostics platform changed from sysdiag to Support Tools Manager (STM).

Predictive for MPE/iX 7.5 includes the following changes:

1. The Predictive version is B.75.01. Predictive runs on 9x8, 9x9, 99x, A400, A500 and N4000 systems. (including the new PA8700 A and N class systems)
2. Autoraid disk devices (such as the model 12H, XP256, XP512, etc.) are not covered by Predictive on MPE/iX.
3. The Predictive Support MONitor (PSMON) changes from `PSMON.PRED.SYS` to `PSMOND.PRED.SYS`. The Predictive code from the HP-UX version of Predictive was leveraged to create the new version of Predictive. When HP-UX Predictive was ported from sysdiag to STM, `PSMON` was changed to `PSMOND`. This was carried forward into MPE/iX 7.5. The new PSMOND monitor utilizes both the posix and MPE/iX environments.

   The PSMOND monitor uses network sockets to communicate with the STM diagnostic monitor diagmond. This requires the addition of an entry in the `SERVICES.NET.SYS` file for psmond. The installation job for Predictive attempts to add a psmond entry as socket number 1788, as follows:

   ```
   psmond      1788/tcp   # Predictive to STM diags
   ```

   If there is already a psmond entry, the installation job does not attempt to add another one. If there is another service using socket number 1788, the installation job adds 10 to the service number (1798) and checks if that service exists. The installation job tries incrementing the service number by 10 up to 50 times (service numbers 1788,1798,1808 through 2278). If the install job is unable to find an unused number, an install error 201 occurs, and the operator needs to manually add a psmond entry to `SERVICES.NET.SYS` before the installation can continue.
4. The Predictive SCSI disk scanner (`SCSISCNP.PRED.SYS`) has been changed to improve the accuracy of disk failure detection. The SCSISCAN scanner on the STM version of Predictive is able to look at the logs residing on both HP and OEM manufactured (Seagate, Quantum, IBM, etc.) disks. This enables more accurate problem detection. Both the standard SCSI log pages and Growing Defect List are looked at.

5. The Predictive Support Monitor (PSMOND.PRED.SYS) startup model has changed. The JPSMON.PRED.SYSjob has been modified to start PSMOND. To have Predictive monitor your system, JPSMON.PRED.SYS must always be running. We chose not to change the name of the job from JPSMON.PRED.SYS to JPSMOND.PRED.SYS so that customers would not have to change their existing environment. The sysstart.pub.sys file does not need to be modified, and if the JPSMON.PRED.SYS job is already incorporated into existing processes for starting and stopping the network, etc., they do not need to be changed.

   A noticeable change is that the logon changes from:

   PSMON,MANAGER.SYS

   or

   PSMON,PREDMON.SYS

   to:

   PSMOND,PREDMON.SYS

WARNING **If JPSMON.PRED.SYS is not running, Predictive will not perform the scheduled daily run to monitor your system.**

To determine if JPSMON is running, you can use the MPE/iX SHOWJOB command, as follows:

```
:SHOWJOB JOB=PSMOND,PREDMON.SYS
```

You should see one active job.

The installation job for Predictive Support attempts to place a "STREAM JPSMON.PRED.SYS" command in the system startup file (SYSSTART.PUB.SYS), after the STREAMS command. If this fails, then you should manually add a line to SYSSTART.PUB.SYS to stream the JPSMON.PRED.SYS job.

NOTE NOTE: The sysstart must have a creator of MANAGER.SYS in order to be automatically executed during system startup. Additionally, the first line of sysstart should be the STARTUP directive.

You should ensure that there is a "OPENQ LP" and a "STREAMS 10" command before the "STREAM JPSMON.PRED.SYS" command in the sysstart file. Also recognize that for your system, the line printer might have a different class name than "LP", and your streams device might have a logical device number other than 10.

Here is an example of what the lines in sysstart.pub.sys might look like:

```
Startup
        limit 20,60
        jobfence 7
        openq LP
        streams 10
        stream jstrtlan.sysmaint.sys
        stream jpsmon.pred.sys
        **
```

6. The logon for the job PSMON.PRED.SYS was changed to the user PREDMON.SYS, which does not have AM, SM or PM capability, for enhanced security.

This was done because a job being streamed from the sysstart file must have existing passwords for user, account and group embedded.

The original logon was MANAGER.SYS, and it was perceived as a security violation to embed the MANAGER.SYS passwords. The install job creates the PREDMON user with OP,ND,SF,BA capabilities. The PREDMON.SYS user is NOT created with IA capability. Also, the JPSMON.PRED.SYS has access restricted to (L,X:AC), so only the creator of the file (MANAGER.SYS), or a user with SM or AM (within the SYS account) could read the file and see the embedded passwords.

7. A warning message was added if JPSMON.PRED.SYS is not running when the PSCONFIG.PRED.SYS program is run. PSCONFIG uses the JOBINFO intrinsic to detect if a job is logged on as either "PSMOND,PREDMON.SYS" or "PSMOND,MANAGER.SYS". If there is not a job matching either of these names running, the following is displayed on the system console, and the users terminal:

```
************************************
  * WARNING: JPSMON.PRED.SYS IS NOT      *
  *          RUNNING.  PREDICTIVE CAN NOT*
  *          MONITOR THE SYSTEM WITHOUT  *
  *          JPSMON.PRED.SYS RUNNING.    *
  *                                      *
  * To enable PREDICTIVE monitoring on   *
  * this system, :STREAM JPSMON.PRED.SYS *
  ************************************
```

HP Predictive supports the following Disk models via SCSISCAN:

Table 5-14 Supported Disk Models

1 GB Disks			
DSP3107LS	DSP3107LSW	ST31200N	ST31200W
ST31230N	ST31230W		
2 GB Disks			
ST12400N	ST12400W	ST32171N	ST32171W
ST32272N	ST32272W	ST32272WC	ST32272WD
ST32550N	ST32550W	VP3215S	VP3215SW
XP32181S	XP32181W	XP32181WD	
4 GB Disks			
DGHS04Y	ST15150N	ST15150W	ST34371N
ST34371W	ST34572N	ST34572W	ST34572WC
ST34572WD	ST34573N	ST34573W	ST34573WC
ST34573WD	XP34361S	XP34361W	XP34361WD
9 GB disks			
DDYS-T09170	DDYS-Y091	DGHS09Y	DMVS09
DMVS09D	IC35L009UCD210	IC35L009UDC210	IC35L009UWD210
IC35L009XCD210	IC35L009XWD210	NEPS-309170W	NEPS-309170Y

Table 5-14 Supported Disk Models (Continued)

ST19171N	ST19171W	ST19171WD	ST19173N
ST39102LC	ST39103LC	ST39103LW	ST39103WC
ST39173N	ST39173W	ST39173WC	ST39173WD
ST39175LC	ST39175LW	ST39175WC	ST39176LC
ST39176LW	ST39204LC	ST39204LW	ST39205LC
ST39205LW	ST39216LWV	ST39216N	ST39216W
ST39226LC	ST39226LW	ST39236LC	ST39236LCV
ST39236LW	ST39236WD	ST39251LC	XP39100S
XP39100W	XP39100WD		
18 GB Disks			
DDYS-T18350M	DMVS18	DMVS18D	DRH18D
DRHS18D	DRHS18V	IC35L018UCD210	IC35L018UCPR15
IC35L018UDC210	IC35L018UWD210	IC35L018UWPR15	IC35L018XCD210
IC35L018XCPR15	IC35L018XWD210	IC35L018XWPR15	MAJ3182MC
NEPS-318350W	NEPS-318350Y	ST118202LC	ST118202LW
ST118202WC	ST118273N	ST118273WC	ST118273WD
ST18452LC5	ST318203LC5	ST318203LW5	ST318203WC5
ST318204LC5	ST318204LW5	ST318251LC	ST318251LW
ST318275LC5	ST318275LW5	ST318275WC	ST318276LC5
ST318276LW5	ST318404LC	ST318404LW	ST318405LC5
5ST318405LW	ST318406LC5	ST318406LW	ST318416N
ST318417N5	ST318417W5	ST318426LC5	ST318426LW5
ST318432LC	ST318432LW5	ST318436CV5	ST318436LC5
ST318436LW5	ST318436WV5	ST318437LC5	ST318437LW5
ST318451LC	ST318451LW5	ST318452LC5	ST318452LW5
36GB Disks			
DDYS-T36950M	DRH36D	DRHS36D	DRHS36V
IC35L036UCD210	IC35L036UCPR15	IC35L036UDC210	IC35L036UWD210
IC35L036UWPR15	IC35L036XCD210	IC35L036XCPR15	IC35L036XWD210
IC35L036XWPR15	MAJ3364MC	MAJ3365MC	ST136403LC
ST136403LW	ST136403WC	ST136475LC	ST136475LW

Table 5-14 Supported Disk Models (Continued)

ST136475WC	ST336404LC	ST336404LW	ST336476LC
ST336476LW	ST336605LC	ST336704LC	ST336704LW
ST336705LC	ST336705LW	ST336706LC	ST336706LW
ST336732LC	ST336732LW	ST336737LC	ST336737LW
ST336752LC	ST336752LW	ST373405LC	ST373405LW
72 GB Disks			
IC35L072UCD210	IC35L072UDC210	IC35L072UWD210	IC35L072XCD210
IC35L072XWD210	ST172804LC	ST172804LW	ST173404LC
ST173404LW	ST373405LC	ST373405LW	

The following peripherals are no longer supported:

Any HPIB or FLEX Interface Disk, including but not limited to:

HPC2200A - 335MB HPIB Disk

HPC2202A - 670MB HPIB Disk

HPC2203A - 670MB HPIB Disk

HPC2281A - 335MB HPIB Disk

HPC2282A - 670MB HPIB Disk

HPC2201A - 670MB FLEX Disk

HPC2204A - 1.34GB FLEX Disk

The following SCSI disks are no longer supported:

HPC2460x - 420MB Disk

HPC2461x - 673 MB Disk

HPC2462x - 1.36GB Disk

HPC2470x - 234MB disk mechanism

HPC2471x - 328MB disk mechanism

HPC2472x - 422MB disk UPGRADE KIT

HPC2473x - 673MB Disk UPGRADE KIT

HPC2474R - 1.36GM C3 UPGRADE KIT

HPC3010M1 - 2GB SCSI Disk (As of April 30, 2000)

Support for Using the Entire Disk Space on LDEV 1

By Ushadevi H N, Commercial Systems Division

Beginning with MPE/iX 7.5 release, the MPE/iX operating system uses the full capacity of the disk configured as LDEV 1. This article explains the enhancement and briefly describes the user level changes for customers to use the system appropriately after installing MPE/iX 7.5 release.

Background

Before the 7.5 release, MPE/iX limited the access on LDEV 1 to only the first 4GB of the total disk space with the rest of the disk unavailable for use.

Primarily, this limitation existed because the initial system loader (ISL> prompt) could access only the first 4GB of the disk. System utilities such as **START**, **DUMP**, and **DISCUTIL** need to reside in the first 4GB of the disk. As a result, LDEV 1 disk access overall was limited to 4GB of the disk space.

With this enhancement, the operating system can utilize the entire disk space for storing other files. Because the ISL limitation is not removed, system utilities still need to be stored within the first 4GB of the disk.

Hardware and Software Requirements

This enhancement is enabled by default once the MPE 7.5 version of the operating system (Release C.75.00) is installed. This feature applies to all HP supported disks and disk arrays, regardless of the disk capacity.

NOTE Even though this feature is to take advantage of all disks greater than 4GB, only disks with a capacity greater than (or equal to) 5GB will have their extra capacity available for use.

Enhancement Details

For disks configured as LDEV 1, this enhancement distinguishes between files residing within 4GB and those beyond 4GB. Proper functioning of the MPE/iX operating system requires that some specific system utilities reside in the first 4GB of the disk. Therefore, user files targeted for LDEV 1 are stored in the first 4GB under only two circumstances:

- If there is not enough space beyond the first 4GB to accommodate the file.
- When forced by the file equate option described below.

HP highly recommends that user files be kept in the disk space beyond 4GB to preserve space for system files, now and in the future. A new designator is provided to differentiate and help users keep files within or beyond 4GB.

```
;DEV=**$SYSTEM_MASTER
```

The device designator $SYSTEM_MASTER is now used to refer to the file space within the first 4 GB of LDEV 1. Using $SYSTEM_MASTER in file commands such as **BUILD** and **FILE**, and in file intrinsics (for example, **HPFOPEN**) will create and refer to files within the first 4 GB.

EXAMPLE: Creating files within the first 4GB of LDEV 1

Prior to 7.5 all installation tools/applications, such as **PATCH/iX**, **AUTOINST**, **HPINSTAL**, **AUTORESTART/iX**, etc., use the following equation to create AXLDEV1 (for the purpose of reserving space):

```
: BUILD AXLDEV1;DISC=n,1,1;DEV=1
```

where n is the number determined in "Estimating Disk Space" as given in the *MPE/iX System Maintenance Manual*.

For 7.5 the above equation needs to be changed to:

```
: BUILD AXLDEV1;DISC=n,1,1;DEV=**$SYSTEM_MASTER
```

WARNING **In case the requested space is not available within the 4GB, an error indicating out of space is returned (even if enough space is available beyond the first 4GB) when creating this file.**

OUT OF DISK SPACE (FSERR 46)

To make more space within 4GB, read the section "Freeing Space within 4GB"

```
;DEV=1
```

For user files, (i.e., for non-system files) HP recommends that these files be stored in private volumes. In cases where user files are stored in LDEV 1, use ;DEV=1. By specifying ;DEV=1 during creation, the system attempts to create/store the files beyond 4GB. If the required space is not available in the area beyond 4GB, the system creates/stores the files within the first 4GB of the disk.

Freeing Disk Space within 4GB

During system update or other activities that create files on LDEV 1, you may receive OUT OF DISK SPACE (FSERR 46) errors. Even when the discfree utility shows plenty of free space, you may need to free disk space within the first 4GB of LDEV 1 to enable system files to reside there. The following method can be used to free the disk space:

To identify where files are stored on LDEV 1, use the **SHOWUSAGE** command in VOLUTIL:

```
VOLUTIL:SHOWUSAGE  1;PERM;FORMAT=DETAIL
PERM Space on LDEV 1:

processing ...

SECTOR ADDRESS        SIZE (in sectors)   SPACE_USED_BY
--------------         -----------------    -------------

         48                96             MMSAVE.MPEXL.SYS
      14128                32             MPEXLDIR.PUB.SYS
      14160               320             ISL.MPEXL.SYS
      14480             53904             START.MPEXL.SYS
       68384              25120                  DISCUTIL.MPEXL.SYS
```

The sector address of 4GB is 16777216. Any **user** file having an address lower than this number is a potential candidate to be moved beyond the first 4GB of disk space.

Once the files are identified, you may use the following set of commands to move the files beyond 4GB:

```
File t;dev=disc
Store <files>;*t
Restore *t;<files> (use the ;olddate option to retain dates before the STORE)
```

Generally, the files loaded at ISL > are the files that *MUST* reside within 4GB. The list of such files can be obtained at the ISL prompt using the **LS** command.

```
ISL> LS

ISL         START      DISCUTIL   SAT         DUMP        STAGEISL
A1002AI     A1002AM    A1002AP    EDBC        EDPROC      MDIAG
MPROC       ODE        ODEDATA    ODEDATA2    TDIAG       UNIPROC
BCDIAG       CAEXR        XMAP         CLKUTIL     SADPATCH    AUTOBOOT
```

Compatibility Issues

- STORE/RESTORE

If files stored from MPE/iX 7.5 are restored to a machine with a pre-7.5 OS, the following warning message may appear. This is due to the $SYSTEM_MASTER interpretation (explained above) and can be ignored. The files that show this warning are restored on LDEV 1.

```
COULD NOT BE RESTRICTED TO THE SYSTEM MASTER VOLUME
```

- SYSTEM REBOOT after MPE/iX 7.5 Installation/Update

During the first boot after install/update of this version, the following message may appear on the system console (the system reports that it is mapping the entire LDEV 1 disk capacity for use):

```
"relocate ssm map to(in sectors) #####"
"To map to the full disk size ###### in pages"
```

Before Backdating Your System

Important Details Please Read

Before backdating from MPE/iX 7.5 version (or later) to an earlier version of MPE/iX (like 6.0, 6.5 or 7.0), it is critical to understand that this LDEV 1 enhancement is not available in any of these pre-7.5 versions. Hence, these pre-7.5 versions of the operating system cannot differentiate whether the files are within the first 4GB of LDEV 1 or beyond it.

After backdating, pre-7.5 versions of the operating system will still be able to access the entire capacity of LDEV 1 and start filling the disk from the beginning of the available free space. As a result, system utilities, such as **START** and **INSTALL**, may be stored in the disk space beyond the first 4GB. If that occurs, the system **will not BOOT**. A reinstall of the system from the pre-7.5 backup would then be required.

Once the system is able to boot after the backdating, the entire disk is available for the operating system and entire disk files are available for use. However, this same risk exists every time a patch is applied to the system.

RECOMMENDATION if considering backdating from 7.5 to an older release:

HP highly recommends that the user perform an **INSTALL** from the pre-7.5 backup instead of backdating. Alternatively, the user could perform a full backup, **INSTALL** a pre-7.5 version, and then restore from the backup.

UPS Monitor/iX and UPSUTIL Enhancements

By Bob Berliner — Commercial Systems Division

Introduction

In response to user community requests, the UPS Monitor/iX subsystem of MPE/iX has been enhanced in Release 7.5 to provide new capabilities related to the system's handling of AC power failures at UPS devices.

The `UPSUTIL` utility program for UPS subsystem management has been correspondingly enhanced to support the new features of UPS Monitor/iX.

UPS Monitor Enhancements

New UPS subsystem configuration options have been added to the UPS Monitor's configuration file facility. The new options permit users (System Managers) to specify and make use of a custom-tailored MPE/iX Command File to control the HP e3000 system's behavior in the event of a UPS-device-detected AC power failure lasting longer than a user-specified amount of time.

The primary benefit of this "powerfail command file" enhancement is that it can be used in conjunction with another Release 7.5 enhancement, the new CI-based "**:shutdown**" command, to cause an orderly system shutdown when the system is notified of a UPS-detected power failure. (For information about the new "**:shutdown**" command, see the SHUTDOWN: NEW CI COMMAND article elsewhere in this Release 7.5 Communicator.)

One of the new configuration options specifies the amount of time (called the "powerfail grace period") that a power failure must last in order for the UPS Monitor to cause the user's "powerfail command file" to begin execution.

Another new option allows the user to specify, by its file name, the particular MPE/iX command file to execute in response to a power failure that meets the "grace period" time duration specification.

A third new configuration option allows a System Manager to override the standard behavior of the UPS Monitor subsystem in case of a power failure that nearly exhausts a UPS device's battery backup power capacity. Normally, the UPS Monitor intentionally causes a special System Abort in case of a "low battery charge" condition reported from a UPS device. The reason for this is to ensure that no disk device is in the midst of writing data to the disk surface at the time at which the disk device actually loses its AC power, because modern SCSI disk devices are susceptible to writing garbled data if they are performing a write operation when power disappears. To prevent this possibility, the UPS Monitor aborts the running system ahead of UPS battery exhaustion time, so that existing disk write operations either complete or abort (harmlessly), and no new disk write operations are started, prior to the time when a disk device actually loses its power. The new configuration option allows a brave-hearted and insistent HP e3000 System Manager, who strongly believes that she/he can manage the disk situation effectively by other means, to prevent this intentional system abort, and allow the HP e3000 system to "keep running" even after a UPS device has announced "low battery charge — approximately two minutes of power remaining".

NOTE Use of this "keep running" option is entirely at the discretion and responsibility of the HP3000 System Manager. Hewlett-Packard DOES NOT RECOMMEND the use of this option, and can not assure users that disk-stored data will not be corrupted if this option is used.

New UPS Monitor Configuration Options

The following new configuration options are made available by this enhancement. Each option requires one new line in the UPS Monitor's configuration file, either the default UPSCNFIG.PUB.SYS configuration file, or another UPS Monitor configuration file that you have established via UPSUTIL's **Newconfig** command.

Powerfail Command File

This option allows you to establish your own MPE/iX command file to be launched into execution by the UPS Monitor whenever there is a UPS-device-detected AC power failure whose duration exceeds the time specified as the "powerfail grace period" time.

The powerfail command file can be any valid MPE/iX **CI** command file within the "standard" MPE/iX file system — i.e., it is a file with a file name of the form myfile.mygroup.myacct. Its content is not known to and not restricted by the UPS Monitor/iX subsystem. UPS Monitor/iX simply passes this command file by name to the MPE/iX CI (as a subordinate process of UPS Monitor/iX) whenever conditions for command file execution are met.

The syntax for the powerfail command file option is:

```
powerfail_command_file = file.group.account [; parm1 parm2 … parmN]
```

or

```
powerfail_command_file   =  $null
```

The first format above specifies a particular file to be the powerfail command file. Parameters (*parm1.. parmN*) are optional; if they are specified, then they are passed to the MPE/iX CI "as is" at the time at which the powerfail command file is launched into execution.

The second format simply states explicitly that no powerfail command file is to be used by UPS Monitor, and is no different in its effect from not having any "powerfail_command_file = xxx" command in the UPS Monitor configuration file at all.

Powerfail Grace Period Delay Time

This option establishes the amount of time (in seconds) that a UPS-detected AC power failure must endure before the UPS Monitor begins to execute the user's "powerfail command file". The grace period allows an amount of time to pass, to give AC power a chance to return, before causing any "powerfail command file" actions to take place, so that short-duration power failures does not cause system shut downs (and/or whatever other actions, such as aborting jobs and sessions, closing volume sets, etc., may be specified within the user's "powerfail command file").

The permissible range of times for the "grace period" is from zero seconds (no time at all; begin to execute the user's "powerfail command file" immediately upon AC power failure detection) through a maximum of 1800 seconds (30 minutes), and is based on the nominal 15-minutes at full power load reserve capacity of the UPS device's battery pack.

The syntax for the powerfail grace period option is:

```
powerfail_grace_period   =   nnnn
```

where nnnn is the desired integer number of seconds of "grace period", from 0 through 1800.

While it doesn't really make sense to specify this configuration option unless there is a companion specification of the "powerfail command file" option, there is no harm in doing so. If there is a configuration of the "grace period time" but no specification of a powerfail command file, then the UPS Monitor takes no action following the expiration of the "grace period" time … it may as well never have been specified.

Powerfail Low Battery Action

This option allows you to override (at your risk!!) the UPS monitor's default action of causing a special System Abort in case, during an AC power failure, a UPS device signals "low battery charge" condition. You can force the system to continue running even after the UPS has notified the system of its "low battery charge" condition by using the "keep running" form of this configuration option.

The syntax for this option is:

```
powerfail_low_battery   =  system_abort
```

or

```
powerfail_low_battery   =  keep_running
```

Summary: Sample UPS Monitor Configuration and Powerfail Command Files

Here is a sample UPS Monitor/iX configuration file, to illustrate the configuration file options being provided in this enhancement, as well as the prior "routing of ** RECOVERY FROM POWERFAIL ** messages" option.

```
upscnfig.pub.sys
powerfail_message_routing = all_terminals
powerfail_low_battery     = system_abort
powerfail_command_file    = mypfail.mygroup.sys; inventory_data_set, orders_data_set
powerfail_grace_period    = 300
```

And the companion "powerfail command file" (`mypfail.mygroup.sys`) might look as follows:

```
parm volset_one, volset_two
tellop ------------------------------------------------------------
tellop UPS POWERFAIL -- powerfail command file "mypfail.mygroup" starting
tellop ------------------------------------------------------------
comment
tell @S -----------------------------------------------------------
tell @S  Please LOG-OFF IMMEDIATELY, system going down due to
tell @S  UPS Power Failure.
tell @S -----------------------------------------------------------
comment
pause  60
vsclose  !volset_one
vsclose  !volset_two
shutdown  system
tellop ------------------------------------------------------------
tellop Powerfail command file "mypfail.mygroup" completed execution.
tellop ------------------------------------------------------------
```

UPSUTIL Enhancements

The UPSUTIL utility program (UPSUTIL.MPEXL.TELESUP), which helps to manage the UPS subsystem by providing an online "query and control" interface to UPS Monitor/iX, has been enhanced to correspond to the new features of UPS Monitor/iX. UPSUTIL's "status" display has been expanded to show the status of the new

configuration options for powerfail command file, powerfail grace period, and powerfail low battery action. In addition, a new command, **RESETPFAIL**, has been added to UPSUTIL. It clears-out status display information pertaining to any prior execution of the “powerfail command file”.

Status Display Enhancements

a sample of the new version of the UPSUTIL status display. The enhancements to the status display are marked with “arrows and numbers” in the right margin, and are explained below.

Figure 5-1 Status Display

```
Begin display of UPS Monitor status.

UPS MONITOR PROCESS STATUS:

UPS Monitor Operating State : Running            (PIN =  196)
UPS Monitor Version Number  :   9                 2 UPS Devices Configured
System Power State          : Power has failed.   2 UPS Devices Monitored
Powerfail Recovery Messages : All terminals.      2 UPS Devices Allocated
Configuration File Name     : UPSCNFIG.PUB.SYS   ( Config File Ok )
Powerfail Command File Name : MYPFAIL1.PUB.SYS   ( Pfail Cmd File Ok )        ← 1
Powerfail Command File Parms: [inventory_data_set  orders_data_set]           ← 2
Powerfail Grace Period (secs:  300                                            ← 3
Powerfail Grace Timer       : Completed.          WED, FEB 20, 2002, 10:34 AM ← 4
Powerfail Command File      : Running.                                        ← 5
Action on UPS Low Battery   : Keep Running                                    ← 6

UPS DEVICES STATUS:

UPS# Ldev#  Alloc Init    State     Power   Hardware Status
~~~~ ~~~~~~ ~~~~~ ~~~~ ~~~~~~~~~~~~ ~~~~~~  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
  1    22   Yes   Yes  Monitoring   Normal  AC Power Normal
  2   104   Yes   Yes  Monitoring   Failed  AC Power Fail

End display of UPS Monitor status.
```

1. **Powerfail Command File Name and its status:** This part of the status display shows the name of the current powerfail command file (if any; it may be $null), and its status with respect to its validity as a powerfail command file (either “OK” or “has error”).
2. **Powerfail Command File Parms:** If the UPS Monitor configuration file command (powerfail_command_file = filename [; <parm1> … <parmN>]) that specified the current powerfail command file did include some parameters, then those parameters are listed here. If not, then this part of the status display will be blank.
3. **Powerfail Grace Period:** This part of the status display shows the current powerfail grace period, in seconds, if one was specified in the UPS Monitor configuration file. Otherwise, zero appears here.
4. **Powerfail Grace Timer:** This part of the status display shows the current state of the powerfail grace timer, either “Not Running” (no powerfail is in progress, timer is not running), or “Running “(AC power failure in progress, grace period timer is running), or “Completed” (AC power failure lasted longer than the grace period, timer has run-out). If the timer has completed, then the date and time of completion is shown on this line.

5. **Powerfail Command File:** Similar to the powerfail grace period status display, this line shows the current state of the powerfail command file: either “Not Running” (no powerfail, or powerfail has not yet exceeded the grace period time), or “Running” (power failure in progress and has exceeded the grace period; the user’s powerfail command file is now being executed), or “Completed” (powerfail command file execution completed). If it completed, then the date and time of completion are shown on this line.
6. **Action on UPS Low Battery:** The configured action of the UPS Monitor in case of UPS “low battery charge” condition is shown here in the status display. It may be either System Abort or Keep Running.

RESETPFAIL Command

RESETPFAIL is a new command added to the UPSUTIL command set, to support the new “powerfail command file” capability. All it does is to reset (clear) the information in the UPSUTIL status display that pertains to the Completed state and date/time of completion of the powerfail grace period timer and the powerfail command file execution. That is, the **RESETPFAIL** command changes the states of the Powerfail Grace Timer and Powerfail Command File in the UPSUTIL status display from Completed to Not Running, and clear-out the dates and times of completion of the Powerfail Grace Timer and Powerfail Command File.

The motivation for this capability is to preserve the Completed states and dates and times of completion of the most recent executions of the Powerfail Grace Period Timer and Powerfail Command File until the system manager has had an opportunity to observe them. Having observed them via the **STATUS** command, then the system manager can use the **RESETPFAIL** command to clear them back to a “dormant” condition (Not Running), waiting for the next system power failure to be recorded.

For Further Information

For further detailed information about the new UPS Monitor enhancements, including a full discussion of the UPS Monitor Configuration File and Powerfail Command File, refer to the new chapter on UPSUTIL in the *MPE/iX System Utilities Reference Manual*, which has been added as part of Release 7.5 manual updating.

AS Clause Enhancement in ALLBASE/SQL

by Sekhar N.D CSY — Databases

Objectives of the Enhancement

The objective of the enhancement is to allow users to specify an alias name for the items in the Select Statement. The specified alias name is returned as the column heading in the query result.

Usage of Column Alias Name

The syntax of the Select Statement with Alias Name:

```
==========
SYNTAX
==========

-- Select Statement Level --

[BULK] QueryExpression [ORDER BY {ColumnID [ASC ]} [,...]]
[ { [DESC]} ]

-- Subquery Level --

(QueryExpression)

-- Query Expression Level --

{QueryBlock } [UNION [ALL] {QueryBlock }] [...]
{(QueryExpression)} [ {(QueryExpression)}]

-- Query Block Level --

SELECT [ALL ] SelectList [INTO HostVariableSpecification]
[DISTINCT]

FROM FromSpec [,...] [WHERE SearchCondition1] [GROUP BY GroupColumnList]

[HAVING SearchCondition2]

where SelectList =

{* }
{[Owner.]Table.* }
{CorrelationName.* } [,...]
{Expression [AS] Alias_name }
{[[Owner.]Table.]ColumnName [AS] Alias_name }
{CorrelationName.ColumnName [AS] Alias_name}


where Alias_name can be an identifier, a single-quoted string or a
double-quoted string

=========
EXAMPLE
=========

SELECT PartNumber [AS] "Part Number" , AVG (UnitPrice) [AS] avg_price,
AVG (deliverydays) [AS] 'avg days' FROM PurchDB.SupplyPrice GROUP BY
partnumber;
```

If the alias name is specified as an identifier it should conform to the following rules which are the rules defined for "Basic Names" in ALLBASE/SQL:

- The name can be up to 20 characters in length.
- The name can be made of any combination of letters (a to z, A to Z), decimal digits (0 to 9), $, #, @, or underscore (_). The first character cannot be an underscore or a decimal digit

When the alias name is specified as a single-quoted identifier or as a double-quoted identifier, it can contain spaces and special characters in addition to the characters allowed in the “Basic Names” as defined above and the name can be up to 20 characters in length. The alias name cannot be only spaces and it should not be of zero length, i.e., it cannot be specified as '' or as ' '.

NOTE Key word FROM can be used as Column alias name, only when it is enclosed within Quotes (“FROM”).

```
=========
EXAMPLE
=========

SELECT COL1 FROM FROM TABLE; (Not Allowed)
SELECT COL1 "FROM" FROM TABLE; (Allowed)
```

Constraints

1. The alias name cannot be used in the other clauses of the query.
2. Column Alias Name cannot be used in sub-queries because the sub-query result is not returned to the user and hence the alias name doesn’t have any significance here.
3. Column Alias Name cannot be used in the Select Statement of Create View, Type 2 Insert or Genplan because it doesn’t have any significance here.

New Error Messages

Column Alias cannot be used in sub-queries. (DBERR 1172)

— This error occurs when AS Clause is specified in sub-queries.

AS Clause cannot be used in the Select Statement of Create View, Type 2 Insert or Genplan. (DBERR 1173)

— This error occurs when AS Clause is specified in the Select Statement of Create View, Type 2 Insert or Genplan.

Expected something between the single quotes. (DBERR 1174)

— This error occurs when the alias name is specified as a single-quoted identifier and the identifier doesn’t contain any characters, i.e., the alias name is specified as ''

Column Alias name cannot be only spaces. (DBERR 1175)

— This error occurs when the alias name is specified as a single-quoted identifier or as a double-quoted identifier and the identifier is made of only spaces.

Column Alias Name cannot be used in the Select Statement of Create View, Type 2 Insert or Genplan. (DBERR 1176)

— This error occurs when Alias Name is specified in the Select Statement of Create View, Type 2 Insert or Genplan.

POSIX pthread (Draft 10) APIs

by Ranjani Narayan Commercial Systems Division

Introduction

For sometime now, customers of HP e3000 have been facing problems with the threads implementation on MPE/iX. Though DCE did some "workaround" to get around these problems, this was insufficient for multiple reasons. These were done only for DCE applications. Customers with JAVA and other applications using POSIX implementation of threads would not be satisfied. These workarounds resulted in a lot of performance problems, especially for high-end customers including DCE. A solution for these were to provide the necessary POSIX pthread (Draft 10) APIs as part of FOS on MPE/iX. This article gives a technical overview of the changes done to the various subsystems in order to provide a subset of POSIX `pthread` (Draft 10) APIs.

Current Limitations

Prior to this release, in order to write a multi-threaded application, it was mandatory to buy the DCE product on MPE, since threads was packaged along with DCE product. DCE lab was responsible for all the fixes, enhancements and maintenance of threads. This had the following disadvantages:

- Mandatory to buy DCE product (to use threads feature)
- Dependency on DCE lab for enhancements, fixes and maintenance
- A logical part of O.S. (threads) was made a part of a product (DCE)

Solution Objectives

The main objectives of this solution is to provide threads as a part of FOS (make threads a logical part of the O.S.) and provide all the necessary POSIX thread interfaces as per customer (JAVA) requirements. The other objectives are to provide POSIX signals as per specification and to asynchronously cancel threads (when desired).

Solution Overview

Make available Draft 10 threads APIs as per customer needs:

Prior to this release, thread APIs that were provided as part of DCE were Draft 4 compliant. With this release, POSIX pthread APIs are provided as a part of FOS and are Draft 10 compliant (unless explicitly stated). However, it is to be noted that the entire POSIX Draft 10 threads APIs are not provided as a part of this solution. Only those APIs which were immediately needed by JAVA and DCE are provided.

Interaction of POSIX signals with thread APIs on MPE/iX:

Prior to this release, there have been problem reports from customers regarding the functioning of signals in MPE, specifically with respect to threads. With this release, signals behave the way they should, as stated in POSIX 1003.c standard.

Support cancellation points for threads to become cancel aware:

Until this release, Threads on MPE, were not asynchronously cancellable. With this release, threads can be asynchronously cancelled, if desired, according to the POSIX 1003.c standard.

The following POSIX threads APIs are provided as a part of this solution:

pthread_atfork, pthread_sigmask, pthread_kill, pthread_mutex_init, pthread_mutex_destroy, pthread_mutex_lock, pthread_mutex_trylock, pthread_mutex_unlock, pthread_cond_init, pthread_cond_destroy, pthread_cond_signal, pthread_cond_broadcast, pthread_cond_wait, pthread_cond_timedwait, pthread_attr_setscope, pthread_getschedparam, pthread_setschedparam, pthread_attr_init, pthread_attr_destroy, pthread_attr_setstacksize, pthread_attr_getstacksize, pthread_create, pthread_join, pthread_detach, pthread_exit, pthread_self, pthread_once, pthread_key_create, pthread_setspecific, pthread_ getspecific, pthread_cancel, pthread_setcancelstate, pthread_setcanceltype, pthread_testcancel, pthread_cleanup_push, pthread_cleanup_pop, pthread_continue, pthread_suspend, alarm, pause, sleep.

The following POSIX signals have been implemented as a part of this solution:

kill, sigemptyset, sigfillset, sigaddset, sigdelset, sigismember, sigaction, sigprocmask, sigpending, sigsuspend, sigwait, sigwaitinfo, sigtimedwait, sigqueue.

Solution Highlights

Some of the important enhancements done for this solution are:

- The “forking” from a threaded environment
- The “exec” family of APIs work in multi-threaded environment
- Signals implemented in threaded environment as per POSIX Draft 10 specification

Customer Benefits

As more and more POSIX applications get ported to MPE, the need for POSIX compliance on MPE increases. In order to retain old customers loyal to MPE and attract new customers, and in order to reduce the time required for porting onto MPE, we provide all necessary APIs on MPE. This release provides missing/non-functioning APIs of threads and signals, which are the immediate requirements of customers, like JAVA.

JAVA is one of the (many) middle level applications needed for other e-services applications. With HP e3000 moving towards the e-world, it is necessary to e-enable MPE. Providing threads as part of FOS on MPE is one small step towards the big goal.

Conclusion

A subset of POSIX pthreads (Draft 10) APIs is packaged as a part of FOS on MPE/iX 7.5 release. This enables applications to use POSIX pthreads (Draft 10) APIs to be ported from other platforms with minimal porting effort. New multi-threaded applications can be written and executed on HP e3000 with minimal effort.

IODFAULT Generic Device IDs

by Larry Nichoalds, CSY Labs

Starting with MPE release 7.5, generic device ids have been added to the IODFAULT file to help facilitate the configuration of I/O devices.

The generic IDs are particularly useful for configuring disks, since they tend to change every few months and their respective IDs tend to be quite cryptic. Now they need only be identified as the disk type category.

For disk there are three different types: LVDDISK, HVDDISK, SEDISK.

LVDDISK	low-voltage differential disks	Used on A and N class machines associated with the A5149A and A5150A adaptor cards
HVDDISK	high-voltage differential disks	Used primarily on Hawk platforms, but are also available on A and N class machines using an HVD card; e.g., A4800A or A5159A
SEDISK	single-ended disks	Used mainly by Hawk platforms, but could be used on an A and N class machine using an LVD bus. However if SE disks are used on an LVD bus and other LVD devices exist on the same bus, the performance of the LVD devices is limited by the SE device(s)

For all disk arrays, use HPDARRAY. Products, such as, DVD, CDROM, and UPS can be configured by simply using the appropriate generic name.

Tape devices fall into one of two categories; i.e., DDS or DLT (non-DDS) tape products.

The following is the complete generic id list that is located at the end of the IODFAULT file:

```
{------------------------------------------------------------------------}
{                 G E N E R I C   D E V I C E   I D s                    }
{------------------------------------------------------------------------}


       { **********  Single-Ended Disk ********** }
SEDISK    DISC 4  2 0128 SCSI_DISC_DM LOGICAL_DEVICE_MANAGER 0008 NONE NONE &
DISC+SPOOL 0 DA 0 FALSE FALSE


       { **********  Fast_Wide (HVD) Disk ********** }
HVDDISK   DISC 4  2 0128 SCSI_DISK_AND_ARRAY_DM LOGICAL_DEVICE_MANAGER 0008 &
NONE NONE DISC+SPOOL 0 DA 0 FALSE FALSE


       { **********  LVD Disk ********** }
LVDDISK   DISC 4  2 0128 SCSI_DISK_AND_ARRAY_DM LOGICAL_DEVICE_MANAGER 0008 &
NONE NONE DISC+SPOOL 0 DA 0 FALSE FALSE


       { **********  Fibre_Channel Disk ********** }
FCDISK    DISC 4  2 0128 SCSI_DISK_AND_ARRAY_DM LOGICAL_DEVICE_MANAGER 0008 &
NONE NONE DISC+SPOOL 0 DA 0 FALSE FALSE
```

```
       { **********  Disk Array ********** }
HPDARRAY  DISC 4  2 0128 SCSI_DISK_AND_ARRAY_DM LOGICAL_DEVICE_MANAGER 0008 &
NONE NONE DISC+SPOOL 0 DA 0 FALSE FALSE

       { **********  CDROM  ********** }
CDROM     DISC 4  2 0128 SCSI_DISC_DM LOGICAL_DEVICE_MANAGER 0008 NONE NONE &
NONE 0 DA 0 FALSE FALSE

       { **********  DVD  ********** }
DVD       DISC 4  2 0128 SCSI_DISC_DM LOGICAL_DEVICE_MANAGER 0008 NONE NONE &
NONE 0 DA 0 FALSE FALSE

       { **********  DDS  ********** }
DDS       TAPE    24 7  0128   SCSI_TAPE_DM LOGICAL_DEVICE_MANAGER 0010   &
JOB+DATA+INPUT+OUTPUT+AUTOREPLY  NONE   TAPE  0  DA 0 FALSE FALSE

       { **********  DDS AUTOCHANGER ********** }
DDSAUTO    TAPE    24 7  0128   SCSI_TAPE_DM LOGICAL_DEVICE_MANAGER 0010   &
JOB+DATA+INPUT+OUTPUT+AUTOREPLY  NONE   TAPE  0  DA 0 FALSE FALSE

       { **********  DLT  ********** }
DLT       TAPE    24 8  0128   SCSI_TAPE2_DM LOGICAL_DEVICE_MANAGER 0010  &
JOB+DATA+INPUT+OUTPUT+AUTOREPLY  NONE   TAPE  0  DA 0 FALSE FALSE

       { **********  UPS  ********** }
HPUPS     TERM 16 0  0040 CDM_CONSOLE_DM  TIO_TLDM 0009                     &
  JOB+DATA+DUPLICATIVE+INTERACTIVE+INPUT+OUTPUT                          &
  JOB+DATA+DUPLICATIVE+INTERACTIVE              HPUPSDEV  0   DA  0  FALSE FALSE

       { ********** Tape Library Transport Device  ********** }
CHANGER    MOSAR_AC   24 4  0128   MO_SCSI_PTHRU_DM LOGICAL_DEVICE_MANAGER   &
0010 JOB+DATA  NONE   NONE  0  DA 0 FALSE FALSE

       { ********** Pass-Through Driver  ********* }
PASSTHRU   MOSAR_AC   24 4  0128   MO_SCSI_PTHRU_DM LOGICAL_DEVICE_MANAGER   &
0010 JOB+DATA  NONE   NONE  0  DA 0 FALSE FALSE
```

More Opened Files in MPE/iX Programs

by Janardhanan.PS, Prakash.SR — Commercial Systems Division

Introduction

When a file is opened by a process, an entry is made in a table of finite size. The number of files that can be opened concurrently in a program depends on the size of this table. It also depends on several other resources used in the program. In a POSIX program, many resources are treated as files for ease of reference. They are sockets, pipes, streams etc. With MPE/iX being used as a web server by more and more customers, entries in the process local file table are being used extensively. This in turn limits the number of files that can be opened by a process. This article describes an enhancement to MPE/iX 7.5, enabling a process to open more files.

Current Limitation

At present, a process can keep only up to 1024 file objects in the opened state. This includes 9 system files, sockets, pipes, streams etc. For regular MPE files, one entry is made in the Process Local File Descriptor (PLFD) table and for pipes, two entries are made. When a device like a serial communication channel is opened, then one entry is made in this table.

Need for Expansion

With MPE/iX being ported to high-end systems, the environment in which it is being used is also changed. Applications running on multiple low-end systems are consolidated into single high-end systems. During consolidation and application enhancements, several customers have run into this limit. They were overcoming this limit by restructuring their applications. Most of them reached a state in which they cannot manage by restructuring alone. The main factor now is the number of devices that are used in the applications. Most of them have exhausted all available options to further reduce the number of files they need to open. The limit on files opened per process is now preventing the number of their clients to grow. This had a significant negative impact on many solution providers.

A process can open up to a maximum of 1024 sockets concurrently. This allows 1024 simultaneous external connections. For any useful application, the program needs to open a large number of files also. Unless the size of the PLFD table is increased, one program can never to make use of the maximum number of allowed socket connections.

To enable the customers to open a large number of files in their programs and to make more external socket connections, it was decided to increase the number of entries in the PLFD table from 1024 to 4096.

Design Changes

There are 3 tables in which the file information is stored. All of these tables are per process structures. The first table is the **Process Local File Descriptor** (PLFD), this table is used to keep track of the opened files. This table exists in the system global space. The entry number in this table is same as the file number returned to the user, when a file is opened. The size of this table is increased to the limit based on demand, in multiples of 64 at a time. To begin with, a process starts with a table having a size of 64. The size of this table can be increased 63 times. This allows a maximum of 4096 opened files. Since the size of the table is increased based on demand, the impact on the consumption of system global space is negligible for existing installations which do not need this enhancement.

The second table is the **Process Local File Access State Table** (PLFAST) which is used primarily for unblocked input/output to files. In this table, a series of bitmaps are kept in which each bit represents the state of one of the possible files that a process may have opened. This table is always memory resident. This table also exists in the system global space and is expanded there itself. The PLFAST table is implemented as a single table and all processes will get a table with the enhanced size.

The third table, the **File Access Rights** (FAR) table is used by the file system and virtual space management to keep track of which files a process has a legitimate right to access. This table is hash indexed using the interval timer present in the unique file identifier. At present, this table exists as part of the process information block extension in the system global space. This table is accessed by a very small and localized set of routines, which makes it ideal for moving it out of the system global space. In this enhancement, the size of the table is increased and moved to the process local address space. A pointer to this table is kept in the process information block. No separate locking mechanism is provided for accessing this new table. It is considered as an extension of the process information block in the process local address space.

Performance

With this enhancement, there is not any adverse effect on performance. On the other hand, there are improvements in performance if the program is opening more than 512 files. Prior to this enhancement, only the first 512 entries in the FAR table were hash addressable. Now the entire 4096 entries are made hash addressable and this speeds up the search operation in the FAR table which in turn reduces the time spent in locating an entry.

Compatibility Issues

There are not any compatibility issues for the existing applications. All the intrinsics interface remain without change. An application running on the previous versions runs on the enhanced 7.5 release without any problem.

Limitations of Current Expansion

This enhancement affects only the number of file like resources. The current limits on sockets, pipes and streams are not increased individually. However, this enhancement helps users in using more number of these resources in presence of large number of regular files. Note that a program making use of these enhancements does not run on the earlier versions of MPE/iX.

Conclusion

With this enhancement, users are able to concurrently open more files, sockets, pipes and streams. The current limit of 1024 is increased to 4096. This enables users to develop programs to handle a large number of files in conventional OLTP applications and in Web applications.

Support for 2851 userlog Processes

By Jyothi BS — Commercial Systems Division Background

Current Limit

At present 1140 user processes (users) are allowed access per User logging process. With an increased number of high-end systems and increased number of users, this limit may become a roadblock to many that employ User Logging.

The Objective of the solution is to increase the maximum number of user level processes to 2851 from the current 1140 level.

How to Increase the Limit in SYSGEN

1. Go to `'log (lo)'`
2. Set the limit by the command `'ulog usersperproc = 2851'`

   This changes the current value of # users per logging process to 2851.
3. The system has to be booted again to implement this change.

TurboIMAGE Scalability II

by Tien-You Chen, Commercial Systems Division

The Put/Del semaphore is an internal lock, one for each database, used to serialize DBPUT, DBDELETE and DBUPDATE (CIU) operation to ensure the physical integrity of the database. Because of the serialization, TurboIMAGE may not be able to scale up well with the system growth. The TurboIMAGE scalability I (a.k.a. DSEM) project was to replace the Put/Del semaphore by a set of dependency semaphores, one for each data set, to increase the concurrency. TurboIMAGE scalability II (a.k.a. DSEMII or EHWM) is trying to manage the internal lock at block level in order to gain better performance.

Data set User Label

Put/Del semaphore, dependency semaphores or block level semaphores are all internal runtime structures. The duration of locking the semaphore(s) is short and does not extend across intrinsics. In addition to Put/Del semaphore, another potential bottleneck is when adding or deleting a record to a detail data set, TurboIMAGE needs to update information in the data set user label, which includes the high water mark, delete chain head and number of free records in the data set. For each DBPUT, TurboIMAGE gets a record either from the high water mark or delete chain head and decrements by one the number of free records.

The operation is similar for DBDELETE. TurboIMAGE returns the record to the delete chain head and increases the number of free records by one. The information needs to be kept intact during the process of modification. Either the Put/Del semaphore or DSEM can serve the need to lock out other processes, but that is a bottleneck for DSEMII. In order to solve this problem, TurboIMAGE allocates an array in the user label, which we name extended high water mark (EHWM). The first user, who adds to a detail data set triggers TurboIMAGE to get 20 blocks beginning from the high water mark and to store those blocks in an array with one block for each element. After that, each DBPUT can lock one element of the array instead of the whole user label, hence increasing the concurrency. This EHWM sustains after database close. Only when the user disables the feature via DBUTIL, are the unused records in those blocks returned to either the delete chain or the high water mark. The EHWM will cease to exist.

DBUTIL Change

DBUTIL has a new option in **ENABLE/DISABLE** command to turn on/off this feature.

```
>>ENABLE database name/maint word FOR EHWM
```

After the user enables this feature and the first DBPUT to a detail data set, TurboIMAGE creates EHWM for this data set. Internally, at runtime, DSEMII also uses features like prefetch, DSEM and HWM dbput. When the user disables this feature, TurboIMAGE checks every detail data set in this database to destroy the EHWM and return unused records.

NOTE When you do any kind of database maintenance work, such as restoring the database to an early version of TurboIMAGE, restructuring the database or repacking the database, you have to disable this feature.

Attach Enhancement in Image/SQL

by Maheedhar PV — Commercial Systems Division

Introduction

Currently, when a database is attached to Allbase DBE through the IMAGESQL utility, all the datasets including automatic masters are attached. Similarly, at the time of attaching all the compound items are split into simple items. This enhancement to IMAGESQL utility is to add two new options for the ATTACH command. The options are:

- Not to attach automatic masters (NOAUTO)
- Not to split the compound items (NOAUTOSPLIT).

Why this Enhancement?

NOAUTO

Currently, when an attach command is issued all the data sets in the database are written into the ATCINFO file, and are registered with Allbase DBE. This enhancement allows you to have an option of not registering automatic masters during attach, as data retrieval is never done from automatic masters. If the NOAUTO option is used, the views involving the automatic masters are also not created and the data from the automatic masters cannot be viewed.

NOAUTOSPLIT

Currently, during the attach time, all the Image data types are mapped to their nearest equivalent in the SQL data types. If the equivalent data type does not exist, they are mapped to char data type of the equivalent size. The compound items in the Image database are automatically split as individual items. By splitting of the compound items the number of items of a dataset can exceed 1023 (the limit in a table in Allbase). This enhancement provides an option for not to split the compound items, but register them as a single item even if the count of no of items in the dataset is below the limit. The compound items are treated as single item and are mapped to their nearest SQL data type which if not available are mapped to char.

Changes in User Interface

The syntax of the Attach command is

```
ATTACH     [WITH OWNER=owner]     [NOAUTO or NA]     [NOAUTOSPLIT or NAS]
                                  [AUTO]             [AUTOSPLIT]
```

:

```
        Examples

           ATTACH

           ATTACH NOAUTO

           ATTACH AUTOSPLIT

           ATTACH WITH OWNER = DOCUMENT

           ATTACH WITH OWNER = DOCUMENT NOAUTO NOAUTOSPLIT
```

The default behavior of the **ATTACH** command is retained as is today, i.e. the automatic masters are attached, and compound items split.

Conclusion

This enhancement:

- Does not change the default behavior of the **ATTACH** command of IMAGESQL utility
- Allows a new option `NOAUTO` in the **ATTACH** command not to attach the automatic masters
- Allows a new option `NOAUTOSPLIT` in the **ATTACH** command not to split the compound items.

Large File Data Set (LFDS)

by Tien-You Chen, Commercial Systems Division

Overview

When TurboIMAGE was introduced, the size of a data set was limited to 4GB (this was the MPE limitation until recently). When users demanded a larger data set, JUMBO data set was introduced, which can have a maximum size of 396GB (max. size per chunk multiplied by max. no. of chunks = 4GB * 99 = 396GB). Jumbo and single file data set are functionally similar except for dynamic expansion capability; while single file data set can grow dynamically, jumbo data set cannot. Now, with the availability of LARGE FILES (file greater than 4GB) on MPE, starting from version 6.5, we can increase the limit on a single file data set to 128GB, which is now the MPE file system limit.

Changes

1. Creation of Large File Data Set

   By default, any data set size less than 128GB is created as a single file data set, while a data set size greater than 128GB is created as Jumbo data set. The user can force creation of Jumbo data sets, if data set size is greater than 4GB, with a `$CONTROL JUMBO` option in the database schema. Each jumbo chunk file would be a maximum of 4GB and can have up to 99 chunks. If the user specifies `$CONTROL NOJUMBO`, which is default, any data set greater than 4GB but less than or equal to 128GB will be LFDS, while data set size greater than 128GB cannot be created.

NOTE	Large File Data Set cannot co-exist with Jumbo data set within one database. For example, a database contains either all single file data sets if their size are less than 128GB or if any of a data set is greater than 128GB in size, all the data sets that their size are greater than 4GB have to be Jumbo data set. However, TurboIMAGE supports both LFDS and Jumbo.

2. DBUTIL

   `DBUTIL` "`show all`" command displays the current usage of data set file. Depending on whether or not the database has large file data sets, either `Database has at least one large file dataset` or `Database has no large file dataset present` is displayed.

3. DBINFO

   `DBINFO` mode 406 returns information about fully qualified database name and open mode. In addition to that, the 17th element is a bitmap denoting which features this database has used. If the 8th bit (start from left, 0 based) is 1, it denotes the database has at least one large file data set, otherwise it is 0.

Conversion

The customer can convert Jumbo data set to Large File data set by using `DBLOAD/DBUNLOAD` utility. `DBLOAD/DBUNLOAD` has been enhanced to unload database to one or more disk files instead of writing to tape. Third party tools are available for this kind of conversion if performance is the concern.

Support for 3000 NS Servers

By Prashanth Bhat K, Commercial Systems Division

Background

Prior to the 7.5 release, a maximum of 2600 NS servers could be created using the `nscontrol`command. With this change the number of simultaneous servers on MPE/iX 7.5 onwards has increased to 3300. This limit can only be achieved on systems where the `BIGPIN` (greater than 8190 system wide process) enhancement is enabled.

Solution Objective

To increase the maximum number of NS Servers from 2600 to 3300.

How to Increase the Limit

Now the `nscontrol` command can take the maxservers value as 3300. The command to do it is:

```
nscontrol server={server type}{,minservers},3300
```

Here, server type can be any of the servers supported by NS services.

Support for 3300 Jobs and Sessions

By Indu S, Commercial Systems Division

Background

Prior to the 7.5 release, 3010 user logins (jobs and sessions) were allowed simultaneously to access the machine. With this enhancement in 7.5, 3300 jobs and sessions can be invoked simultaneously.

Solution Objective

To increase the maximum number of jobs and sessions from 3010 to 3300.

How to Increase the Limit

For Sessions

```
:sysgen
sysgen> misc
misc> se maxlimit=3300
```

The above set of commands changes the current value of session to 3300.

For Jobs

```
:sysgen
sysgen> misc
misc> jo maxlimit=3300
```

The above set of commands changes the current value of jobs to 3300.

This change comes into effect after the system reboot. At the system reboot at the command prompt, the limit command can be used to limit the number of concurrently running jobs and sessions.

6 Product Release History

This chapter contains tables that provide information on the currently supported Commercial Systems MPE/iX releases and products, and the systems supported for the 7.5 Release.

Product Changes by Releases

The following table provides information on the currently supported Commercial Systems MPE/iX releases and products. Included are the MPE/iX release or SUBSYS VUF and a list of products introduced. It also provides information on significant changes made to a release.

Table 6-1 MPE/iX Product Releases

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.60.00	C.60.00	R3812	MPE/iX Release 6.0 (Platform Release) User-defined job Queue FTP enhancements Java for MPE/iX Samba/iX Performance enhancements System limit enhancements DNS BIND/iX
C.60.01	C.60.01	R3926	PowerPatch 1 based on Release 6.0 CI Enhancements NPCONFIG Variable on NW Spooler PATCH/iX Enhancements DLT4000/DLT7000 Differential Tape Drives IMAGE/SQL Enhancement: P and Z Data Types HP Driver FOR JDBC Java Developer's Kit Version 1.1.7B Legato NetWorker Storage Node for MPE/iX HP 3000 997 Large Memory Subsystem Support for 36 Gigabyte Disks

Table 6-1 MPE/iX Product Releases (Continued)

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.65.00	C.65.00		MPE/iX Release 6.5 (Platform Release) Support for large files Increased TCP connections Support for 511 Disks Support Tools Manager (STM) Enterprise Management Solution HP Secure Web Console Apache for MPE/iX LDAP C-SDK/iX NEWCI Command
C.65.02	C.65.02	R4046	Express 2 based on Release 6.5 High Availability FailOver/iX High Availability Cluster/iX Dataset >80 GB in TurboIMAGE/iX Increase Limits in TurboIMAGE/iX IMAGE/SQL supports increased limits in TurboIMAGE/iX Business BASIC supports increased limits in TurboIMAGE/iX ANSI AS clause in ALLBASE/SQL QUERY/iX enhancements
C.70.00	C.70.00		MPE/iX Release 7.0 N-Class systems A-Class systems Guardian Service Processor (GSP) PCI-SCSI Device Adapter Cards PCI WAN Sync MUX PCI 100Base-T Link Product

Table 6-1 MPE/iX Product Releases (Continued)

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.70.01	C.70.01		A and N-Class High End Functionality: IOVA (Large Memory) MP Support 100 Base-T on Core IO card Big Pin Support 6.5 Express 2 Functionality HAFO HA Cluster/iX Image/SQL (HP36385B ALLBASE/SQL (HP3621-02A) TurboIMAGE/iX (HP30391C) I&I New Functionality Apache Ph. II-B Samba/iX 2.0.7 DCE 1.2.1 RPC 1.2.1 Hot Spot (dependent on threads) Java SDK 1.3 Threads (mid-term) PINFO() evaluator function Predictive (Mesa Based) Mesa (bug fixes) Mesa Diagnostics for DVD Mesa Diagnostics for DDS4 I/O default files SCO's (bug fixes)

Table 6-1 MPE/iX Product Releases (Continued)

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.75.00	C.75.00		A and N-Class Enhancements: PA-8700 Core I/O Card Updated A- and N-Class Servers HP Surestore Disk Array 5300 HP Surestore Tape Array DS2300 HPCPUNAME Model Strings SCSI Interface and Device Support I&I New Functionality: SendMail Samba 2.0.7 WebWise Fibre Channel: Fibre Channel Adapters and Peripherals Supported FCSCAN Utility Diagnostic Utility HeartBeat UPS Monitor/iX and UTIL SHUTDOWN Command Support for Entire Disk Space on LDEV 1

Supported Releases

Table 6-2 Supported System Release Matrix

Supported Releases	Supported Systems	Support Termination Date
Release 6.0 (60.xx)	9x8LX, 9x8RX, 929KS/020,929KS/030 939KS, 939KS/020,939KS/030 959KS/100, 959KS/200, 959KS/300, 959KS/400, 969KS/100, 969KS/200, 969KS/300, 969KS/400, 969KS/120, 969KS/220, 969KS/320, 969KS/420, 979KS/100, 979KS/200, 979KS/300, 979KS/400, 989/100, 989/200, 989/400, 989/600, 989/150, 989/250, 989/450, 989/650, 991CX, 995/100CX, 995/200CX, 995/300CX, 995/400CX, 995/500CX, 995/600CX, 995/700CX, 995/800CX, 991DX, 995/100DX, 995/200DX, 995/300DX, 995/400DX, 995/500DX, 995/600DX, 995/700DX, 995/800DX, 996/80, 996/100, 996/200, 996/300, 996/400, 996/500, 996/600, 996/700, 996/800, 997/100, 997/200, 997/300, 997/400, 997/500, 997/600, 997/800	October 31, 2002

Table 6-2 Supported System Release Matrix (Continued)

Supported Releases	Supported Systems	Support Termination Date
Release 6.5 (65.xx)	9x8LX, 9x8RX, 929KS/020, 929KS/030, 939KS, 939KS/020,939KS/030 959KS/100, 959KS/200, 959KS/300, 959KS/400, 969KS/100, 969KS/200, 969KS/300, 969KS/400, 969KS/120, 969KS/220, 969KS/320, 969KS/420, 979KS/100, 979KS/200, 979KS/300, 979KS/400, 989/100, 989/200, 989/400, 989/600, 989/150, 989/250, 989/450, 989/650, 991CX, 995/100CX, 995/200CX, 995/300CX, 995/400CX, 995/500CX, 995/600CX, 995/700CX, 995/800CX, 991DX, 995/100DX, 995/200DX, 995/300DX, 995/400DX, 995/500DX, 995/600DX, 995/700DX, 995/800DX, 996/80, 996/100, 996/200, 996/300, 996/400, 996/500, 996/600, 996/700, 996/800, 997/100, 997/200, 997/300, 997/400, 997/500, 997/600, 997/800 997/1000, 997/1200	December 31, 2004

Table 6-2 Supported System Release Matrix (Continued)

Supported Releases	Supported Systems	Support Termination Date
Release 7.0 (70.00)	9x8LX, 9x8RX, 929KS/020, 929KS/030, 939KS, 939KS/020,939KS/030 959KS/100, 959KS/200, 959KS/300, 959KS/400, 969KS/100, 969KS/200, 969KS/300, 969KS/400, 969KS/120, 969KS/220, 969KS/320, 969KS/420, 979KS/100, 979KS/200, 979KS/300, 979KS/400, 989/100, 989/200, 989/400, 989/600, 989/150, 989/250, 989/450, 989/650, 991CX, 995/100CX, 995/200CX, 995/300CX, 995/400CX, 995/500CX, 995/600CX, 995/700CX, 995/800CX, 991DX, 995/100DX, 995/200DX, 995/300DX, 995/400DX, 995/500DX, 995/600DX, 995/700DX, 995/800DX, 996/80, 996/100, 996/200, 996/300, 996/400, 996/500, 996/600, 996/700, 996/800, 997/100, 997/200, 997/300, 997/400, 997/500, 997/600, 997/800997/1000, 997/1200 A400-100-110, A500-100-140, A500-200-140* N4000-100-220, N4000-100-330, N4000-100-440, N4000-200-440*, N4000-300-440*, N4000-400-440*; N4000-300-550*, N4000-400-550*	December 31, 2006
*(Supported with 7.0 Express 1)		

Table 6-2 Supported System Release Matrix (Continued)

Supported Releases	Supported Systems	Support Termination Date
Release 7.5 (75.00)	9x8LX, 9x8RX, 929KS/020, 929KS/030, 939KS, 939KS/020,939KS/030 959KS/100, 959KS/200, 959KS/300, 959KS/400, 969KS/100, 969KS/200, 969KS/300, 969KS/400, 969KS/120, 969KS/220, 969KS/320, 969KS/420, 979KS/100, 979KS/200, 979KS/300, 979KS/400, 989/100, 989/200, 989/400, 989/600, 989/150, 989/250, 989/450, 989/650, 991CX, 995/100CX, 995/200CX, 995/300CX, 995/400CX, 995/500CX, 995/600CX, 995/700CX, 995/800CX, 991DX, 995/100DX, 995/200DX, 995/300DX, 995/400DX, 995/500DX, 995/600DX, 995/700DX, 995/800DX, 996/80, 996/100, 996/200, 996/300, 996/400, 996/500, 996/600, 996/700, 996/800, 997/100, 997/200, 997/300, 997/400, 997/500, 997/600, 997/800 997/1000, 997/1200 A400-100-110, A400-100-150 A500-100-140, A500-200-140, A500-100-200, A500-200-200, N4000-100-220, N4000-100-330, N4000-100-440, N4000-200-440, N4000-300-440, N4000-400-440; N4000-300-550, N4000-400-550 N4000-100-380, N4000-200-380, N4000-100-500, N4000-200-500, N4000-300-500, N4000-400-500, N4000-100-750, N4000-200-750, N4000-300-750, N4000-400-750	December 31, 2006

7 Catalog of User Documentation

This chapter provides a listing of customer manuals for the HP e3000 computer system that have been introduced or changed since the MPE/iX 7.0Release.

With this release, you will receive two CD-ROM documentation CDs: an HP Instant Information CD and a MPE/iX Documentation Collection PDF Format CD. Using the PDF Format CD-ROM requires that you have Adobe Acrobat Reader installed on your computer. If you do not have Acrobat Reader, you can download the latest version, free of charge, from the Adobe website at http://www.adobe.com. The pdf files are viewable and printable using Adobe Acrobat Reader 3.0 or later. Acrobat Reader also allows you to perform keyword searches on the entire CD-ROM contents.

You can also view MPE/iX document files on an external website, http://www.docs.hp.com. The files on this website are presented in a html format which is searchable and printable from the website.

Customers who want to have hardcopy documentation for their HP e3000 can order the MPE/iX Hardcopy Documentation set. Contact your local sales office and order B9412AA with option 260 (MPE/iX 6.0 documentation), option 265 (MPE/iX 6.5 documentation), option 270 (MPE/iX 7.0 documentation) or option 275 (MPE/iX 7.5 documentation).

MPE/iX 7.5 New or Updated Manuals

This section lists customer manuals introduced or updated for MPE/iX 7.5.

Table 7-1 MPE/iX 7.5 New or Updated Manuals

Manual Title	Part No.	Latest Edition
Communicator e3000 MPE/iX Release 7.5	30216-90336	8/02
HP e3000 MPE/iX System Software Maintenance Manual	30216-90342	8/02
System Startup, Configuration, and Shutdown Reference Manual	32650-90907	8/02
MPE/iX System Utilities Manual	32650-90908	8/02
MPE/iX Cluster Users Guide	B9480-90003	8/02
Configuring and Managing MPE/iX Internet Services	32650-90906	8/02
HP e3000 Fibre Channel Mass Storage Adapter User and Service Manual	32650-90910	8/02

Manual Collections

Table 7-2 Manual Collections

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
Communicators and System Software Maintenance Manuals					
Communicator e3000 (7.5)	30215-90336	30216-90336	Aug-02	B	y
Communicator e3000 (7.0 Exp 1)	30216-90328	30216-90328	Feb-01	B	y
Communicator e3000 (7.0)	30216-90312	30216-90312	Aug-01	B	y
Communicator e3000 (6.5 Exp 2)	30216-90322	30216-90322	Dec-00	B	y
Communicator 3000 (6.5)	30216-90291	30216-90291	Mar-00	B	y
Communicator 3000 (PowerPatch 1 based on 6.0)	30216-90286	30216-90286	Aug-99	B	y
Communicator 3000 (6.0)	30216-90269	30216-90269	Oct-98	B	y
Communicator 3000 (PowerPatch 5 based on 5.5)	30216-90257	30216090257	Aug-98	P	y
Communicator 3000 (PowerPatch 7 based on 5.5)	30216-90282	30216-90282	Mar-99	P	y
HP e3000 MPE/iX System Software Maintenance Manual (7.0)	30216-90342	30216-90342	Aug-02	B	y
HP e3000 MPE/iX System Software Maintenance Manual (7.0)	30216-90317	30216-90317	Feb -01	B	y
HP e3000 MPE/iX System Software Maintenance Manuals (6.5 Exp 2)	30216-90325	30216-90325	Dec-00	B	y
HP 3000 MPE/iX System Software Maintenance Manual (6.5)	30126-90298	30216-90298	Mar-00	B	y
HP 3000 MPE/iX System Software Maintenance Manual (6.0)	30126-90272	30216-90272	Oct-98	B	y
HP 3000 MPE/iX System Software Maintenance Manual (5.5)	30216-90223	30216-90223	Jul-96	P	n
MPE/iX Operating System					
CI Programming Quick Reference Pocket Card	32650-90316	32650-90269	Mar-00	HC	n
FCOPY Reference Manual	32212-90003	32212-90008	Jun-92	B	y
* The documentation website address is: *http://www.docs.hp.com*.					

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP 3000 Series 9X8LX Computer Systems: Commands Reference	B3813-90011	B3813-90012	Apr-94	B	y
HP 3000 Series 9X8LX Computer Systems: Getting Started	B3813-90003	B3813-90014	Apr-94	B	y
HP 3000 Series 9X8LX Computer Systems: Task Reference Manual	B3813-90009	B3813-90010	Apr-94	B	y
HP 3000 Series 9X8LX Computer Systems: Understanding Your System	B3813-90001	B3813-90013	Apr-94	B	y
HP Easytime/XL Quick Reference Card	B1940-90001	B1940-90611	Jun-92	HC	n
HP Easytime/XL User's Guide	B1940-90002	B1940-90602	Sep-91	HC	n
MPE/iX Commands Reference Manual	32650-90877	32650-90877	Mar-00	B	y
MPE/iX Day to Day Tasks Reference Card	A1707-90004	A1707-96034	Jun-92	HC	n
MPE/iX Documentation Guide	32650-90896	32650-90896	Aug-01	B	y
MPE/iX Error Messages Manual Vol 1	32650-90878	32650-90878	Mar-00	B	y
MPE/iX Error Messages Manual Vol 2	32650-90902	32650-90902	Aug-01	B	y
MPE/iX Error Messages Manual Vol 3	32650-90880	32650-90880	Mar-00	B	y
MPE/iX Glossary of Terms and Acronyms	32650-90893	32650-90893	Aug-01	B	y
MPE/iX Quick Reference Guide	32650-90881	32650-90881	Mar-00	B	y
MPE/iX System Utilities Reference Manual	32650-90908	32650-90908	Aug-02	B	y
SORT-MERGE/XL General User's Guide	32650-90883	32650-90883	Mar-00	B	y
SORT-MERGE/XL Programmer's Guide	32650-90884	32650-90884	Mar-00	B	y
Using HP 3000: Advanced Skills Tutorial	32650-90872	32650-90872	Oct-98	B	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
Using HP 3000: Fundamental Skills Tutorial	32650-90871	32650-90871	Oct-98	B	y
Development Tools and Distributed Computing					
Accessing Files Programmer's Guide	32650-90885	32650-90885	Mar-00	B	y
ALLBASE NET User's Guide	36216-90031	36216-90101	Apr-94	B	y
ALLBASE/SQL Advanced Application Programming Guide	36216-90100	36216-90099	Apr-94	B	y
ALLBASE/SQL C Application Programming Guide	36216-90023	36216-90080	Jun-92	B	y
ALLBASE/SQL COBOL Application Programming Guide	36216-90006	36216-90081	Jun-92	B	y
ALLBASE/SQL Database Administration Guide	36216-90005	36216-90214	Aug-97	B	y
ALLBASE/SQL FORTRAN Application Programming Guide	36216-90030	36216-90079	Jun-92	B	y
ALLBASE/SQL Message Manual	36216090213	36216-90009	Aug-97	B	y
ALLBASE/SQL Pascal Application Programming Guide	36216-90007	36216-90082	Oct-92	B	y
ALLBASE/SQL Performance and Monitoring Guidelines	36216-90102	36216-90103	Apr-94	B	y
ALLBASE/SQL Reference Manual	36126-90216	36216-90216	Mar-00	B	y
Asynchronous Serial Communications Programmer's Reference Manual	32022-61001	32022-90052	Oct-98	B	y
BASIC Interpreter Reference Manual	30000-90026	30000-90026	Nov-78	HC	n
BASIC/3000 Compiler Reference Manual	32103-90001	32103-90001	Sep-77	HC	n
Berkeley Sockets/iX Reference Guide	32650-90363	32650-90372	Apr-94	B	y
Command Interpreter Access and Variables Programmer's Guide	32650-90011	32650-90493	Apr-94	B	y
Compiler Library/XL Reference Manual	32650-60014	32650-90029	Oct-88	HC	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
Data Dictionary Managing Information Network Primer	5958-8527	5958-8527	Nov-86	HC	n
Data Types Conversion Programmer's Guide	32650-60010	32650-90015	Oct-89	B	y
DBChange Plus Technical Addendum for MPE/iX Release 4.0	36386-90005	36386-90005	Jun-92	P	y
DBChange Plus User's Guide	36386-90001	36386-90003	Feb-91	P	y
DCE for the HP 3000	B3821-90003	B3821-90003	Aug-01	B	y
Dictionary/3000 Reference Manual	32244-90001	32244-90001	Dec-87	HC	y
Dictionary/3000 Documentation Update Notice	32244-90013	32244-90013	Oct-96	HC	n
EDIT/3000 Reference Manual	03000-90012	32650-90385	Aug-80	B	y
Getting Started as an MPE/iX Programmer	32650-90008	32650-90421	Jun-92	B	y
Getting Started with HP IMAGE/SQL	36385-90008	36385-90011	Dec-94	B	y
Getting Started with HP Software Revision Controller (SRC)	30234-60002	30234-90002	Nov-88	HC	n
Getting Started with TRANSACT	32247-60002	32247-90007	Jul-88	HC	y
High Level Screen Management Intrinsics Library Reference Manual	32424-60001	32424-90002	Nov-87	HC	y
HP 3000 Basic for Beginners	03000-90025	03000-90025	Nov-72	HC	n
HP ALLBASE Query User Guide Kit	32426-64001	32426-64001	Oct-89	HC	n
HP ALLBASE/4GL Developer Administration Manual	30601-90201	30601-90205	May-92	P	y
HP ALLBASE/4GL Developer Quick Reference Guide	30601-90210	30601-90211	May-92	P	y
HP ALLBASE/4GL Developer Reference Manual Vol 1	30601-90202	30601-90206	May-92	P	y
HP ALLBASE/4GL Developer Reference Manual Vol 2	30601-90204	30601-90208	May-92	P	y
HP ALLBASE/4GL Installation Manual	30601-64212	30601-64213	May-92	HC	n

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP ALLBASE/4GL Developer Self-Paced Training Guide	30601-90203	30601-90207	May-92	P	y
HP ALLBASE/4GL Software Update Notice B.06 Release	5961-7797	5063-3725	Feb-93	HC	y
HP ALLBASE/BRW Reference Manual	35360-90051	35360-90052	Jan-92	P	y
HP ALLBASE/BRW SW Update Notice for MPE/iX (BRW A.01.50)	35360-90204	35360-90203	Apr-94	P	y
HP ALLBASE/BRW Tutorial	35360-90201	35360-90202	May-92	P	y
HP Browse/XL User's Guide	36384-90001	36384-90001	Oct-90	HC	y
HP Business BASIC Programmer's Guide	32115-90003	32115-90003	Jul-87	HC	n
HP Business BASIC Quick Reference Guide	32115-90002	32115-90002	Jul-85	HC	n
HP Business BASIC Reference Manual	32115-90001	32115-90001	Jul-87	HC	n
HP Business BASIC/XL Migration Guide	32715-60002	32715-90003	Oct-89	HC	y
HP Business BASIC/XL Reference Manual	32715-60001	32715-90001	Oct-89	HC	y
HP C Programmer's Guide	92434-90002	92434-90009	Jul-96	P	y
HP C/iX Library Reference Manual	30026-90001	30026-90004	Oct-92	P	y
HP C/iX Reference Manual	31506-90005	31506-90011	Jun-92	P	y
HP COBOL II/V Reference Manual	32233-90001	32233-90001	May-89	HC	n
HP COBOL II/XL Migration Guide	31502-60011	31500-90004	Oct-88	HC	y
HP COBOL II/XL Programmer's Guide	31500-90002	31500-90014	Jul-91	P	y
HP COBOL II/XL Quick Reference Guide	31500-90003	31500-90015	Jul-91	HC	y
HP COBOL II/XL Reference Manual	31500-90001	31500-90013	Jul-91	P	y
HP Data Entry and Forms Mgmt System (VPLUS) Reference Manual	32209-90024	32209-90024	Mar-00	B	y
HP EDIT Quick Reference Guide	30316-90005	30316-90017	Dec-90	P	n

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP EDIT Reference Manual	30316-90001	30316-90016	Dec-90	P	y
HP FORTRAN 77/iX Migration Guide	31501-90004	31501-90023	Jun-92	P	y
HP FORTRAN 77/iX Programmer's Guide	31501-90011	31501-90022	Jun-92	P	y
HP FORTRAN 77/iX Reference Manual	31501-90010	31501-90021	Jun-92	P	y
HP GlancePlus User's Manual (for MPE/iX Systems)	B1787-90001	B1787-90008	Apr-92	HC	y
HP IMAGE/SQL Administration Guide	36385-90001	36385-90012	Aug-97	B	y
HP Link Editor/iX Reference Manual	32650-90030	32650-90309	Dec-90	P	y
HP Link Editor/iX Technical Addendum	32650-09476	32650-90845	Oct-95	P	y
HP Pascal/iX Migration Guide	31502-60011	31502-90004	Nov-87	HC	y
HP Pascal/iX Programmer's Guide	31502-90002	31502-90023	Jun-92	HC	y
HP Pascal/iX Reference Manual	31502-90001	31502-90022	Jun-92	HC	y
HP Performance Collection Software User's Manual	50700-90022	50700-90038	Apr-92	P	n
HP RPG/iX Pocket Guide	30318-90002	30318-90002	Oct-89	HC	n
HP RPG/iX Programmer's Guide	30318-60001	30318-90001	Jul-89	HC	y
HP RPG/iX Reference Manual	30318-60002	30318-90011	Dec-93	P	y
HP RPG/iX Reference Manual Software Update Notice	30318-90016	30318-90017	Mar-95	P	y
HP RPG/iX Utilities Reference Manual	30318-60003	30318-90006	Oct-89	HC	y
HP Search/XL User's Guide	36383-90001	36383-90001	Oct-90	HC	y
HP Software Revision Controller (SRC) Implementation Guide	30234-60002	30234-90003	Nov-88	HC	n
HP Software Revision Controller (SRC) Quick Reference Card	30234-60002	30234-90005	Nov-88	HC	n
HP Software Revision Controller (SRC) User's Guide	30234-60002	30234-90001	Nov-88	HC	n

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP Software Revision Controller/XL Product Information Update	30234-60002	30234-90006	Nov-88	HC	n
HP Symbolic Debugger/iX User's Guide	31508-90003	31508-90014	Jun-92	P	y
HP System Dictionary/XL COBOL Definition Extractor	32257-90001	32257-90001	Dec-87	HC	y
HP System Dictionary/XL General Reference Manual Vol 1	32256-90004	32256-90004	May-88	HC	y
HP System Dictionary/XL General Reference Manual Vol 2	32256-90005	32256-90005	May-88	HC	y
HP System Dictionary/XL Intrinsics Reference Manual	32256-90002	32256-90002	May-88	HC	y
HP System Dictionary/XL SDMAIN Reference Manual	32256-90001	32256-90001	May-88	HC	y
HP System Dictionary/XL Self-Paced Customer Training	32254-91001	32254-91001	Aug-87	HC	n
HP System Dictionary/XL Utilities Reference Manual	32256-90003	32256-90003	May-88	HC	y
HP Toolset/XL Reference Manual	36044-60001	36044-90001	Jan-84	HC	y
HP TRANSACT Documentation Update Notice	32247-90028	32247-90028	Oct-96	P	y
HP TRANSACT Quick Reference Guide	32247-90020	32247-90027	Oct-96	P	y
HP TRANSACT Reference Manual	32247-60003	32247-90026	Apr-94	P	y
INFORM/V User's Guide	32246-60002	32246-60002	Mar-88	HC	y
Introduction to MPE/XL for MPE V Programmers	30367-90005	30367-90005	Oct-89	P	y
Introduction to MPE/XL for MPE V System Administrators	30367-90003	30367-90017	Dec-90	P	y
IPC Communications Programmer's Guide	32650-90019	32650-90019	Nov-87	B	y
ISQL Reference Manual for ALLBASE/SQL & IMAGE/SQL	36216-90096	36216-90095	Apr-94	B	y
KSAM/3000 Reference Manual	30000-90079	32650-90386	Jun-92	B	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
Learning HP EDIT	30316-90002	30316-90015	Dec-90	P	y
Message Catalogs Programmer's Guide	32650-90021	32650-90021	Mar-90	B	y
Migration Process Guide	30367-90007	30367-90019	Jun-92	P	y
MPE Segmenter Reference Manual	30000-90011	30000-90011	Aug-86	P	y
MPE V to MPE XL: Getting Started Mentor's Guide	30367-90004	30367-90004	Oct-89	P	y
MPE V to MPE XL: Getting Started Self-Paced Training	30367-90002	30367-90002	Oct-89	P	y
MPE/iX AIF: OS Reference Manual	36374-90001	36374-90013	Dec-94	B	y
MPE/iX Developer's Kit Reference Manual Vol 1	36430-90001	36430-90007	Apr-94	B	y
MPE/iX Developer's Kit Reference Manual Vol 2	36430-90002	36430-90008	Apr-94	B	y
MPE/iX Intrinsics Reference Manual	32650-90905	32650-90905	Aug-01	B	y
MPE/iX Shell and Utilities Reference Manual Vol 1	36431-90001	36431-90007	Apr-94	P	.pdf
MPE/iX Shell and Utilities Reference Manual Vol 2	36431-90003	36431-90008	Apr-94	P	.pdf
MPE/iX Shell and Utilities User's Guide	36431-90002	36431-90006	Apr-94	HC	n
Native Language Programmer's Guide	32650-90022	32650-90207	Sep-91	B	y
ODBCLINK/SE Reference Manual	36217-90410	36217-90410	Feb-01	P	y
Process Management Programmer's Guide	32650-90023	32650-90023	Nov-87	B	y
QUERY Reference Manual for MPE/iX	30000-90889	32650-90889	Mar-00	B	y
Resource Management Programmer's Guide	32650-90024	32650-90024	Nov-87	B	y
RPG/V Reference Manual	32104-90001	32104-90001	Sep-89	HC	n
SPL to HP C/XL Migration Guide	30231-60001	30231-90001	Oct-89	HC	y
Switch Programming Guide	32650-60030	32650-90014	Nov-87	P	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
System Debug Reference Manual	32650-90901	32650-90901	Feb-01	B	y
The POSIX.1 Standard: A Programmer's Guide ISBN-0-8053-9605-5	-	36430-90006	Apr-94	HC	n
Trap Handling Programmer's Guide	32650-90026	32650-90026	Mar-90	P	y
TurboIMAGE/XL Database Management System Reference Manual	30391-90012	30391-90012	Aug-01	B	y
Up and Running with ALLBASE/SQL	36389-90011	36389-90016	Jun-92	B	y
User Logging Programmer's Guide	32650-90027	32650-90027	Jul-88	B	y
Using KSAM/XL	32650-90886	32650-90886	Mar-00	B	y
Using VPLUS/V: An Introduction to Forms Design	32209-90004	32209-90004	Aug-86	HC	y
High Availability					
Auto/Restart/XL User's Guide	36375-90001	36375-90004	Oct-92	B	y
High Availability Failover/iX Manual	32650-90899	32650-90899	Nov-00	B	y
Installation/Upgrade Procedures for SHAREPLEX	B3933-90005	B3933-90005	Jun-97	P	.pdf
Legato NetWorker ClientPak for MPE/iX Installation Guide	B5475-90001	B5475-90001	Dec-97	P	.pdf
Legato NetWorker ClientPak for MPE/iX Release 5.0 Supplement	B5475-90005	B5475-90005	Feb-98	P	.pdf
Legato NetWorker ClientPak for MPE/iX Users Guide	B5475-90002	B5475-90002	Dec-97	P	.pdf
Legato NetWorker ClientPak and Storage Node for MPE/iX Installation Guide	B6266-90006	B6266-90006	Aug-99	P	.pdf
Legato NetWorker ClientPak and Storage Node for MPE/iX Users Guide	B6266-90005	B6266-90005	Aug-99	P	.pdf
Legato Networker ClientPak and Storage Node for MPE/iX Release 5.5 Supplement	B6266-90004	B6266-90004	Dec-98	P	.pdf

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
Mirrored Disk/iX User's Guide	30349-90003	30349-90005	Jun-92	B	y
MPE/iX High Availability Cluster/iX User's Guide	B9480-90003	B9480-90003	Aug-02	B	y
NBSpool for MPE Reference Guide	B3933-90002	B3933-90002	Jun-97	P	.pdf
NBSpool Release Notes Version 9.7	B3933-90008	B3933-90008	Jun-97	P	.pdf
NetBase for MPE Reference Guide	B3933-90001	B3933-90001	Jun-97	P	.pdf
NetBase Release Notes Version 9.7	B3933-90007	B3933-90007	Jun-97	P	.pdf
NetBase SQL Shadowing Handbook	B3482-90006	B3482-90006	Jun-97	P	.pdf
VISTA Plus for MPE Administrators Guide	B3933-90004	B3933-90004	Jun-97	P	.pdf
VISTA Plus for MPE User's Guide	B3933-90003	B3933-90003	Jun-97	P	.pdf
VISTA Release Notes Version A.07	B3933-90006	B3933-90006	Jun-97	P	.pdf
System Hardware and Diagnostics					
CPU Upgrade Manual (9x9KS)	-	A2375-90012	Jan-98	P	.pdf
Expansion Cabinet Installation Guide (99X/Family)	-	A1809-90006	May-97	P	.pdf
Firmware Update Guide (99X/Family)	-	A1820-90002	May-97	P	.pdf
Firmware Update Quick Reference (99X/T-Class)	-	A1820-90003	May-97	P	.pdf
HP 3000 9X9KS Site Preparation and Requirements Guide	-	A2375-90073	Nov-96	P	.pdf
HP 3000 and HP 9000 PA-RISC Computer System Support Log	09740-90013	09740-96033	Feb-96	P	.pdf
HP 3000 CS 99x/890/T500 Families Operator's Guide	A1809-90009	A1809-96019	Apr-97	P	n
HP 3000 Series 9X8LX/RX Computer Systems Inst. and Configuration Guide	A2051-90006	A2051-96006	Oct-93	P	n
HP 3000/9x9KS Installation Guide	-	-	-	P	.pdf
HP PA-RISC Computer Systems Integrated Cabinet Installation Guide (9X9KS)	-	A2375-90007	Jan-98	P	.pdf

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP PA-RISC Computer Systems System Upgrade Guide (9X9KS)	-	A2375-90010	Feb-97	P	.pdf
I/O Upgrade Manual (9X9KS)	-	A2375-90027	Jan-98	P	.pdf
Installation Guide (99X Family)	-	A1809-90001	Oct-97	P	.pdf
Internal Peripherals Update Guide (9X9KS)	-	A2375-90008	Jan-98	P	.pdf
Operator's Guide (99X Family)	-	A1809-90009	Jun-97	P	.pdf
Site Preparation and Requirements Guide (99X Family)	-	A1809-90002	May-97	P	.pdf
System Memory Upgrade Guide (9X9KS)	-	A2375-90009	Jan-98	P	.pdf
System Upgrade Installation Guide (CS 99X Family) (990/992 to 996)	-	A3310-90002	May-97	P	.pdf
System Upgrade Installation Guide (CS 99X Family) (991/995 to 996)	-	A3310-90001	May-97	P	.pdf
Networking and Communications					
8-Port Serial PCI ACC Multiplexer Install and Users Guide	30219-90508	30219-90508	Feb-01	B	y
APPC Subsystem on MPE/XL Node Manager's Guide	30294-61002	30294-90007	Jun-92	B	y
Configuring and Managing Host-Based X.25 Links	36939-61004	36939-90054	Oct-98	B	y
HP ARPA File Transfer Protocol User's Guide	36957-90159	36957-90159	Mar-00	B	y
HP e3000 Fibre Channel Mass Storage Adapter User and Service Manual	32650-90910	32650-90910	Aug-02	B	y
HP SNA Products Remote System Configuration Guide	J2220-61025	30292-90008	Mar-95	B	y
HP SNMP/XL User's Guide	36922-61029	36922-90036	Mar-94	B	y
HP Telnet/iX User's Guide	36957-90154	36957-90156	Oct-98	B	y
HP-PB 100Base-T Network Adapter Installation and Service Guide	B5427-90001	B5427-90001	Aug-97	B	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP-PB 100VG-AnyLAN Network Adapter Installation and Service Guide	B5426-90001	B5426-90001	Aug-97	B	y
LU 6.2 API Application Programmer's Reference Guide	30294-61000	30294-90008	Jun-92	B	y
Managing Host-Based X.25 Links Quick Reference Card	36939-61003	36939-90051	Dec-94	B	y
NetIPC 3000/XL Programmer's Reference Manual	36920-61005	5958-8600	Oct-89	B	y
NS Cross-System NFT Reference Manual	36920-61003	5960-1634	Jan-89	HC	n
NS3000/iX Error Messages Reference Manual	36922-90043	36922-90043	Aug-01	B	y
NS3000/iX NMMGR Screens Reference Manual	36922-90040	36922-90040	Feb-01	B	y
PCI 100Base T-Network Adapter Installation and Service Guide	32650-90900	32650-90900	Feb-01	B	y
SNA IMF Programmer's Reference Manual	30293-61005	30293-90009	Jun-92	B	y
SNA IMF/XL Node Manager's Guide	30293-61000	30293-90010	Jun-92	B	y
SNA Link/iX Node Manager's Guide	36922-90042	36922-90042	Aug-01	B	y
SNA NRJE Node Manager's Guide	30292-61000	30292-90007	Oct-92	B	y
SNA NRJE User/Programmer Reference Manual	30292-61001	30292-90006	Oct-92	B	y
Using NS3000/iX Network Services	36920-61000	36920-90008	May-94	B	y
Using SNA IMF Pass Thru	30293-61008	30293-90006	Dec-90	B	y
Network and System Management					
Configuring and Managing MPE/iX Internet Services	32650-90906	32650-90906	Aug-02	B	y
Configuring Systems for Terminals, Printers, and Other Serial Devices	32022-61000	32022-90051	Oct-98	B	y
Customizing Terminal and Printer Type Files with the Workstation Configurator	5959-2870	32022-90031	Feb-94	B	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
HP 3000/iX Network Planning and Configuration Guide	36922-90943	36922-90943	Aug-01	B	y
HP OpenView Console Manager's Guide	B3118-90002	B3118-90012	Aug-92	B	y
HP OpenView Console User's Guide	B3118-90001	B3118-90011	Aug-92	B	y
HP Security Monitor/iX Manager's Guide	32650-90455	32650-90498	Apr-94	B	y
HP Security Monitor/iX User's Guide	32650-90454	32650-90497	Apr-94	B	y
Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide	36957-90159	36957-90159	Oct-98	B	y
Manager's Guide to MPE/iX Security	32650-90474	32650-90473	Apr-94	B	y
Managing Spooler Operations Quick Reference Pocket Card	32650-90268	32650-90488	Apr-94	HC	n
MPE/iX HP 3000 Series 99X Software Startup Manual	36123-90046	36123-90046	Apr-94	P	n
Native Mode Spooler Reference Manual	32650-90166	32650-90867	Oct-98	B	y
New Features of MPE/iX: Using the Hierarchical File System	32650-90351	32650-90492	Apr-94	B	y
NS3000/iX Operations and Maintenance Reference Manual	36922-90942	36922-90042	Aug-01	B	y
Openview DTC Technical Reference Manual	5961-9820	5961-9882	Oct-94	HC	n
Performing System Management Tasks	32650-90004	32650-90854	Jul-96	B	y
Performing System Operation Tasks	32650-90137	32650-90484	Apr-94	B	y
STORE and TurboSTORE/iX Products Manual	B5151-90003	B5151-90003	Mar-00	B	y
System Startup, Configuration, and Shutdown Reference Manual	32650-90907	32650-90907	Aug-02	B	y
Troubleshooting Terminal, Printer and other Serial Devices	32022-61002	32022-90030	Oct-93	B	y

Table 7-2 Manual Collections (Continued)

Manual Title	Order Part Number	Part Number	Latest Edition	How Available? HC = Hardcopy only P = PDF CD B = PDF & Inst. Info	View on the WEB *
User's Guide to MPE/iX Security	32650-90472	32650-90471	Apr-94	B	y
Using HP OpenView DTC Manager	D2355-90001	D2355-95018	Jan-93	HC	n
Using the HP 3000 Workload Manager	B3879-90001	B3879-90002	Dec-94	B	y
Using the Node Management Services (NMS)Utilities	32022-90054	32022-90054	Aug-01	B	y
Volume Management Reference Manual	32650-90045	32650-90491	Apr-94	B	y
* The documentation website address is: *http://www.docs.hp.com*.					