

**Communicator 3000
MPE/iX Express 7
Based on Release 5.5**

HP 3000 MPE/iX Computer Systems

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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 3000 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 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 3000 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 HP Electronic Support 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 Electronic Support Center Security-Related Services

HP Electronic Support 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 Electronic Support 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 HP Electronic Support Center via electronic mail, do the following (instructions subject to change without notice):

1. Use your browser to access the HP Electronic Support 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 HP Electronic Support 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 exploit 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.

1 Overview—MPE/iX Release 5.5 Express 7

This *Communicator* includes information about this release. This chapter contains general information about the MPE/iX-Express 7 software release process.

Communicator Summary

Following is a summary of the articles in this document.

MPE/iX Patches on HP Electronic Support Center

MPE patches are now available on HP Electronic Support Center via the Internet to all customers. For more details, refer to the article, "MPE/iX Patches Now on HP Electronic Support Center," in this chapter.

HP Instant Information for Delivery of Learning Products

HP Instant Information is a replacement for the HP LaserRom on-line document delivery system. For more details, refer to the article, "HP Instant Information for Delivery of Learning Products," in this chapter.

New MPE Release Obsolescence Strategy

Provide guidelines on how long a release is supported.

Chapter 2 System Information

Upgrading a Pre-997 Corporate Business Server to a 997

Gives an overview of the recommended upgrade process when upgrading to a 997 Corporate Business Server from a 990, 991, 992, 995, or 996 computer.

Predictive Support

Describes the new peripherals and SPUs supported by Predictive.

Chapter 3 Networking/Client-Server

Introducing 100VG-AnyLAN Network Adapter

Describes the high-speed network link that provides HP 3000 systems with a connection to a 100VG local area network.

Introducing 100Base-T Network Adapter

Describes the high-speed network link that provides HP 3000 systems with a connection to a 100Base-T local area network.

The REMSH Client Functionality

Describes the new REMSH Client that allows a user to connect to the remote system, execute a command on that remote system, and see the results of that command.

Hewlett-Packard NetWorker Client for MPE/iX

Explains that MPE/iX Express 3 for 5.5 (or later version) or a patch is required for the Hewlett-Packard NetWorker Client.

Hewlett-Packard NetWorker Storage Node for MPE/iX

Provides information about the Storage Node capabilities to allow the 3000 to support directly connected DLT7000 libraries.

New Functionality Supported in DTS/TIO

Describes the following new functionality that was added in the release of C.55.02:

- Support of 400 DTCs
- Support of 2000 device classes
- Three new modem types: US modem In Out, European modem In Out, and Five wires modem.
- Two more parity types: 8 bits data length with even parity and 8 bits data length with odd parity.

These enhancements significantly increase the number of DTCs, supported modem types, and parity setting for HP 3000 machines.

Telnet/iX Server—Full Functionality Release

Describes the functionality added with Release 5.5 PowerPatch (C.55.01). Updated files are included with this patch.

Chapter 4 Peripherals

New Disk Devices Supported

Describes the new 2 GB and 4 GB disk drives that are now supported.

High Availability Disk Array (Nike)

Describes the support for the 9 GB and 18 GB disk drives.

Chapter 5 Technical Articles

Documentation Changes for MPE/iX Languages

Provides changes that you should make in your copy of several MPE manuals.

DLT4000/DLT7000 Differential Tape Support on MPE/iX

Provides information about two stand-alone Differential Tape Drives.

IMAGE/SQL Enhancement: P and Z Data Types

Provides information about the `SPLIT` and `UPDATE` data types.

New NPCONFIG Variable Added to NW Spooler

Provides information to configure the new `NPCONFIG` item.

ALLBASE/BRW JCWs for Year 2000

Provides information for presetting the two new JCWs for year 2000 compliance.

New Features in ALLBASE/SQL Version G3

Describes several major enhancements in version G3:

- String functions are a new feature for ALLBASE/SQL G3
- New authorities for security introduced in ALLBASE/SQL G2
- Year 2000 compatibility introduced in ALLBASE/SQL G2

It gives an overview of the `CAST` function that was added in the G1.15 release of ALLBASE/SQL.

Year 2000 Web Page

Gives the URL for the HP web page, "HP Cure2000 Solution."

Year 2000 Enhancements for MPE/iX

Describes the enhancements to the operating system for Express 4 for 5.5 (and later releases) for the year 2000 and beyond. Gives the URL for the HP web page for up-to-date information on the state of year 2000 readiness for specific HP products.

New Date intrinsics for MPE/iX

Describes these enhanced date intrinsics and new date formats for MPE/iX introduced with Express 4 for 5.5:

- `HPDATECONVERT` — Converting dates from one supported format to another.
- `HPDATEFORMAT` — Converting the supported format dates to the display formats desired by the user.
- `HPDATEDIFF` — Determining the number of days that separate two given dates.
- `HPDATEOFFSET` — Adding/subtracting an offset (days) to/from the given date.
- `HPDATEVALIDATE` — Validating the given date for conformance to a supported date format.
- `HPCALENDAR`, `HPFMTCALENDAR` — Using the new 32-bit `HPCALENDAR` format.

Year 2000 and Other Enhancements in VPLUS

Describes enhancements in B.06.07 version of VPLUS for the following functionality:

- Turn-of-century enhancement
- Ability to define default Field Type and Data Type for a Form
- Ability to define more than 52 single character fields per Form
- New intrinsics to get and set Save Field values programmatically
- Ability to renumber a Form with interactive `FORMSPEC`

Other Products

Provides some miscellaneous information about other MPE products.

RPG/iX 4-Digit Year Enhancement

Provides information about how RPG/iX supports dates to allow 4-digit year format.

CI Enhancements

Describes the new functionality added to the CI software to improve the ease of use and overall functionality:

- `LISTF`, `LISTFILE` now shows accessors to files.
- `PAUSE` can now wait for jobs to complete.
- `PRINT` can display all data in a file, even if the data appears to be line numbers.
- `FLABELINFO` and `FINFO()` return additional file information.
- `INPUT` allows specifying the number of characters to read from `$STDIN`.
- `HPLASTSPID` and `HPSPPOOLID` are new variables.

FTP Enhancements

Describes the new functionality added to the FTP software:

- Support for non-standard MPE/iX file types.
- Ability to configure the server time-out.
- Hash command permits user to receive progress status.

Transact/V and Transact/iX Enhancements

Describes these new enhancements to Transact/V and Transact/iX:

- Literal strings and numeric constants can now be passed as parameters in the PROC verb.
- Transact now provides a method for increased decimal precision in arithmetic expressions.

Dictionary/3000

Describes these new enhancements to Dictionary/3000:

- The capability of copying entities with the new COPY command.
- The ability to enter elements multiple times within an HP Inform group.

COBOL II/iX Enhancements

Describes the COBOL II/iX enhancements in Express 3 and Express 4 for 5.5:

- Internal data structures of the compiler have been expanded to permit compiling significantly larger programs.
- The compiler is now able to detect when a source file is in Qedit format, and the Qedit product was not properly installed.
- The run-time library has been enhanced with a set of procedures to simplify bit manipulation in COBOL II/iX.

Inform/V

Announces that Inform/V is enhanced to support the Dictionary/3000 version A.03.00 enhancements.

HP ALLBASE/BRW

Describes the enhancements and defect repairs in this release of HP ALLBASE/BRW.

Pseudo-Mapped Files Removed from ALLBASE/SQL

Describes the process of moving pseudo-mapped files to mapped files before upgrading ALLBASE/SQL to a G.x release.

QUERY/iX Enhancements

Describes the enhancements made to QUERY to utilize the new B-tree index features in TurboIMAGE/XL.

IMAGE/SQL with TurboIMAGE/XL Enhancements

Explains these highlights of this release of IMAGE/SQL and TurboIMAGE/XL:

- Dynamic data set expansion for master sets (MDX or DDXM)
- Performance enhancement for databases with third-party indices
- 80 GB data sets
- Predicate locks when updating manual masters
- B-Tree indices enhancement
- New 16-bit and 32-bit ODBC driver, ODBCLink/SE, bundled with IMAGE/SQL
- Support for third-party composite indices in IMAGE/SQL
- Scalability for DBPUT, DBDELETE, and DBUPDATE (CIU on)
- Dynamic detail data set expansion (DDX) fix

TurboSTORE/iX II, TurboSTORE/iX 7x24 Patches

Explains how to remove True On-line Backup if you do not want this feature with TurboSTORE II or TurboSTORE/iX 7x24 and do not have a license for it.

Chapter 6 Product List — How to Order

This chapter provides information on how to order the products and manuals.

Chapter 7 Product Release History

This chapter provides information on the currently supported Commercial Systems MPE/iX Releases and products. It also includes a matrix of the currently supported releases, the SPUs the releases are supported on, and the factory support termination dates.

Chapter 8 Catalog of User Documentation

This chapter contains a list of customer manuals for the HP 3000 Computer System that were updated or available at the time of this release.

MPE/iX Patches on HP Electronic Support Center

*by Patch Support Team
Commercial Systems Division*

MPE/iX patches for MPE/iX Release 5.0 and beyond, are available on 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 Electronic Support Center

To serve customers the HP Electronic Support Center provides World Wide Web access for downloading patches.

Access to World Wide Web Server (www)

HP Electronic Support 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 Electronic Support Center will inform you proactively about newly developed security and GR patches. For more information, refer to the instructions on the

Electronic Support Center website.

AUTOPAT Installation Document

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

To retrieve the **AUTOPAT** patch installation instructions:

1. Access the “HP Electronic Support Center” website using the appropriate web address for your country.
2. Enter login user ID and password.
3. Click on Technical Knowledge Base.
4. Click on Retrieve a document.
5. Enter **AUTOPATINST** in the Enter Document ID field.

HP Instant Information for Delivery of Learning Products

Hewlett-Packard recently introduced HP Instant Information, a new way of delivering learning products on CD-ROM that gives you easier access to multiple HP support documents. Instant Information on CD-Rom replaces HP LaserROM as the viewing mechanism for documentation. With Instant Information, Hewlett-Packard has created a delivery system that better meets the current needs of customers. At the same time, we're establishing an infrastructure to meet future demand.

Improved Searches, Printing and Collection

Starting in October 1998, documentation will be written in FrameMaker+SGML, then published and stored on Instant Information. This uses SGML instead of HP's proprietary HP Tag format. Instant Information reduces costs and employs off-the-shelf, standards-based software for viewing on PCs.

Using HP Instant Information, you can look at a book's table of contents or index and, with a mouse click, jump to a specific topic. You can search multiple manuals and documents quickly for matching key words. Users no longer will have to rely on paper manuals. Access to HP support information will be easier and more efficient.

With the new browser, you can view both document text and the table of contents in the same window. You will find an improved collection structure. Collections now will be based on specific products (such as NS3000/iX) rather than on hardware platforms, which was the base used by HP LaserROM bookshelves.

Another significant improvement is the advanced printing functionality of HP Instant Information. One or more chapters, or entire books can be printed with page numbers. Also, proportional fonts, graphics, and tables can be printed as postscript-quality.

Documents Available on the World Wide Web

The release of HP Instant Information represents the critical first step of converting all necessary documents. Many documents are also available on the world wide web: <http://www.docs.hp.com>. These new delivery media will dramatically change the way our learning community accesses technical information.

The first releases of HP Instant Information for MPE/iX will include the most critical MPE/iX learning products. Books for which no revisions are planned will not be converted to HP Instant Information, but can be accessed on the last version of the HP LaserROM (December, 1997).

You can subscribe to HP Instant Information through your support contact or by purchasing a stand-alone subscription. Customers who currently receive documentation updates on HP LaserROM for MPE/iX, will receive HP's new Instant Information automatically.

MPE/iX-Express General Information

by MPE/iX System Release Team

This section is included for your information for this Express release.

MPE/iX-Express is a quicker and easier process for receiving and installing new and updated systems and products for your MPE/iX General Release 5.5 based system. You can install Release 5.5 subsystem products with FOS dependencies without installing a new operating system.

Features and Benefits of MPE/iX-Express

- **New and updated software.** HP 3000 products such as systems, peripherals, databases, networks, software, and support products are now available more frequently.
- **Minimal impact to your system during installation.** New functionality can be added to your MPE/iX Release 5.5 system without updating the base system. System integrity is preserved. You do not need to recertify your system after adding functionality because your base operating system has not changed.
- **Reduced downtime.** System availability is increased. The end-user realizes increased functionality without the downtime impact required to do a system update. Software stability is maintained at the same time functionality is increased.
- **Unchanged software ordering process.** There is no change in the software ordering process.
- **Improved ordering structure for peripherals.** Software is ordered automatically when the peripheral order is placed. You do not have to place a separate order for software for peripherals.
- **Communicator.** New or enhanced product availability is announced through this *Communicator 3000*. Issued usually in conjunction with Express releases.

What You Receive with MPE/iX-Express

When you order new or updated software or hardware, you receive the following:

- **Customized SUBSYS tape.** The customized SUBSYS tape contains the ordered subsystem products (for optionally purchased products only). Although Express releases usually include a SUBSYS tape, 5.5 Express 4 did not include a SUBSYS tape.
- **PowerPatch tape.** The operating system patch tape containing system changes that are required for subsystem and peripheral product functionality.
- **HP 3000 MPE/iX System Software Maintenance Manual.** The manual required to perform an install, update, add-on, or Patch installation.

New MPE/iX Release Obsolescence Strategy

*by Jon Cohen
Commercial Systems Division*

The "MPE/iX Release Obsolescence Strategy" is a collection of guidelines that determines how long a particular MPE/iX Release is supported.

In recent years, our Obsolescence Strategy has grown to be very complex, ambiguous, and confusing. Even HP people had difficulty interpreting these guidelines to determine when a particular release would no longer be supported.

In response, we have adopted a new, simpler Obsolescence Strategy:

- In general, HP will support the two most recent mainline releases.
- In order to facilitate customers moving to new releases, we will support the oldest release for at least six months after the new release ships. In other words, Release "N-2" will still be supported for at least six months after Release "N" ships.
- The release of an Express Release or a Powerpatch on any particular release does not extend its support life.

Given the rate with which we ship releases, this new strategy implies that any particular release will be supported for at least three years, and in most cases, most releases will be supported for a significantly longer period of time.

This new strategy is effective now. This implies that Release 5.0, which first shipped February 17, 1995, will become obsolete as early as six months after Release 6.0 ships.

2 System Information

This chapter includes the following articles on system information:

- Upgrading a Pre-997 Corporate Business Server to a 997
- Predictive Support

Upgrading a Pre-997 Corporate Business Server to a 997

by Hank Cureton

Commercial Systems Division

Introduction

The I/O configuration on a 997 server has one additional hardware layer (the HP-PB I/O bus converter) compared to the earlier Corporate Business Servers (990, 991, 992, 995, and 996). As a result, the system I/O configuration on a 997 needs to be updated to reflect this additional hardware layer.

Example:

A typical SCSI disk device I/O configuration on a 995 would be described by the following I/O path:

```
2/52.3.0
```

The same SCSI disk device I/O configuration on a 997 would be described by the following I/O path:

```
2/28/52.3.0
```

NOTE The HP-PB bus converter always has the fixed slot address 28 (decimal).

The utility packages `IOCNVRT` and `JADETOOL` are used to convert the OS software I/O configuration of a pre-997 Corporate Business Server to the new 997 I/O configuration format.

Order of Upgrade Process

The recommended order for upgrading a pre-997 Corporate Business Server (990, 991, 992, 995, or 996) to a 997 server follows:

1. Make a backup copy of the `CONFIG.SYS` group and the file `NMCONFIG.PUB.SYS`.
2. Convert the `SYSGEN` configuration files using the command file `IOCNVRT`.
3. Convert the file `NMCONFIG.PUB.SYS` using the tool `JADETOOL`.
4. If RJE links are used on the system, run `NMMGR` to update any RJE links.
5. Shut down the system.
6. Upgrade the hardware to a 997.
7. Reboot the system using the newly created configuration files.
8. If the 997 `SYSGEN` configuration files are not in the group `CONFIG.SYS`, copy them into the `CONFIG.SYS` group.
9. Run `NMMGR` and validate `DTS`.

10. Shut down and reboot the system.

IOCNVRT.PUB.SYS

The command file IOCNVRT.PUB.SYS is used to convert the system SYSGEN I/O configuration from a pre-997 Corporate Business Server configuration to a 997 configuration, or vice versa.

Syntax:

```
:IOCNVRT {source group}, {target group}
```

source group is the name of a valid SYSGEN configuration group in the SYS account, containing the "source system" I/O configuration. This is a required parameter. The files in the *source group* will remain untouched unless the *target group* name is the same as the *source group*. The group must exist, and its files must be valid for IOCNVRT to work.

target group is the name of the SYSGEN configuration group in the SYS account into which the "target system" configuration files will be stored. This is a required parameter. If the group does not exist, it will be created by the program.

Examples:

```
:IOCNVRT CONFIG, CONFIG
```

This command converts a pre-997 configuration in the group CONFIG.SYS into a 997 configuration in the same group CONFIG.SYS.

```
:IOCNVRT CONFIG, NEWCONFIG
```

This command converts a pre-997 configuration in the group CONFIG.SYS into a 997 configuration and places it into the group NEWCONFIG.SYS.

JADETOOL

The JADETOOL utility is used to convert a pre-997 Corporate Business Server data communications configuration to a 997 data communications configuration.

Example:

```
:JADETOOL  
Jade Tool      Version A0000006
```

```
  W A R N I N G ! ! ! ! !  
This program is only to be used after authorization from HP
```

```
In a failure situation, use of this program could corrupt  
the configuration file which could result in a system abort
```

```
It is recommended that this program be only used on a copy  
of the NMCONFIG configuration file
```

Do you understand and agree to the above warning? (Y/N) y

Enter file name to convert: NMCONFIG.PUB.SYS

Restrictions

IOCNVRT requires that its user has SM (System Manager) capability, as a safety measure to prevent unauthorized or inadvertent changes to the system configuration file groups.

JADETOOL does not automatically convert RJE link I/O paths. This means that any users of RJE must reconfigure those links manually in NMMGR.

Recommended Sequence of Steps for Upgrading from a Pre-997 to a 997

1. Update the system with C.55.05 or later.
2. Reboot the system.
3. Back up the S995 CONFIG.SYS group and the file NMCONFIG.PUB.SYS.

Note: In the event that you need to convert back to the pre-997 configuration, these files will be needed.

4. :IOCNVRT CONFIG995,CONFIG997

where your current 995 SYSGEN configuration files are located in the group CONFIG995.SYS and the new 997 SYSGEN configuration files will be placed in the group CONFIG997.SYS.

5. :RUN JADETOOL

Convert NMCONFIG.PUB.SYS.

6. :RUN NMMGR.PUB.SYS

Update any RJE links in NMCONFIG.PUB.SYS.

7. Shutdown the system.
8. Upgrade the hardware configuration to a 997.
9. Reboot the system using the new configuration group.
10. Move the 997 SYSGEN configuration to CONFIG.SYS group—if not already there.
11. :RUN NMMGR.PUB.SYS

Validate DTS.

12. Shut down and reboot the system from CONFIG.SYS configuration group.

Predictive Support

Product Overview

HP Predictive Support provides hardware support and helps increase the uptime of your systems by monitoring system memory and disk/tape drives.

When the HP Predictive Support software 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 the account Customer Engineer will work with you until the problem is resolved.

This proactive hardware support is provided as part of the HP Hardware Support Agreement.

Predictive Support Understands the Year 2000

The Predictive Support software has been modified to correctly handle dates in the Year 2000 including correctly displaying the dates as appropriate and being able to understand code words that expire in the year 2000 or beyond.

Upgrading Predictive Support Software

The HP Predictive Support software is upgraded each time you install a new version of the MPE Operating System. The Predictive Support Monitor (PSMON) runs as a system process so this program file and its message catalog file is on the SLT. The rest of the files needed to make up the Predictive Support software is on the FOS tape and is automatically updated by using the AUTOINST process of updating the operating system software.

Support for New Peripherals

HP Predictive Support now supports the following new peripherals:

- HPC2257A Cascade 2 Way Disk
- HPC2257B Cascade 2 Way Stripped Disk
- HPC2257HA High Availability Cascade 2 Way Disk
- HPA2958A 1 GB 3.5 in. SCSI Disk
- HPA3304A 2 GB 3.5 in. SCSI Disk
- HPA3351A 2 GB 3.5 in. SCSI Disk
- HPA3352A 4 GB 3.5 in. SCSI Disk
- HPA3353A 4 GB 3.5 in. Fast Wide SCSI Disk
- HPA3306A 2 GB 3.5 in. Fast Wide SCSI Disk

- HPA3628A 9 GB 3.5 in. SCSI Disk
- HPA3629A 9 GB 3.5 in. Fast Wide SCSI Disk
- Quantum DLT4000 DAT Drive
- HPC1533B DAT Drive
- HPC1537A DAT Drive

Before You Update HP Predictive Support

Before you install the update, you should run HP Predictive Support to ensure that any data indicating potential problems is transmitted to the HP Response Center.

If you have an HP Hardware Support Agreement, and wish to have HP Predictive Support activated, please contact Hewlett-Packard and a Customer Engineer will perform the initial configuration and activation.

3 Networking/Client-Server

This chapter contains the following articles related to networking and client-server applications:

- Introducing 100VG-AnyLAN Network Adapter
- Introducing 100Base-T Network Adapter
- The REMSH Client Functionality
- Hewlett-Packard NetWorker Client for MPE/iX
- HP 3000 NetWorker Storage Node for MPE/iX
- New Functionality Supported in DTS/TIO
- Telnet/iX Server—Full Functionality Release

Introducing 100VG-AnyLAN Network Adapter

by *Randy Pawell*
Commercial Systems Division

Overview

100VG-AnyLAN Network Adapter (B5426AA) is a high-speed network link that provides HP 3000 Series 900 systems that have HP-PB (HP Precision Bus, also known as NIO) backplanes, with a UTP cable RJ-45 connection to a 100VG local area network. The 100VG adapter connects to the 100Mb/s (Megabits per second) network through any 100VG hub or switch meeting the IEEE 802.12 standards.

100VG-AnyLAN takes advantage of collision-avoidance and noise-immunity characteristics of the 100VG protocol to provide high network reliability. It provides an evolutionary path for HP 3000 customers needing increased throughput over their existing 10Mb LAN links.

100VG-AnyLAN Network Link includes the 100VG network adapter, 100Mb driver components, and hardware product manuals. TCP/IP Transport is already included with the HP 3000/iX fundamental operating system (FOS).

Product Features

The product features include:

- Supports ARPA, NS, NetIPC, and a subset of 4.3 BSD Sockets over TCP/UDP/IP.
- Provides tools compatible with those of ThinLAN, Token Ring, and FDDI 3000/iX.
- Has online diagnostics for status information (VGPBA).
- Has support software configurable with NMMGR.
- Is compatible with the IEEE 802.12 standard.
- Provides two traffic priorities: normal and demand.
- Provides 100Mb high-speed connectivity over CAT-5 or CAT-3 voice-grade unshielded twisted pair (UTP), RJ-45 terminated cabling.
- Provides 10Mb connectivity compatible with existing 10Base-T UTP networks.
- Supports a maximum cable length of 100 meters in 100Mb mode.

Introducing 100Base-T Network Adapter

*by Randy Pawell
Commercial Systems Division*

Overview

100Base-T Network Adapter (B5427AA) is a high-speed network link that provides HP3000 Series 900 systems that have HP-PB (HP Precision Bus, also known as NIO) backplanes, with a UTP cable RJ-45 connection to a 100Base-TX local area network. The 100Base-TX adapter connects to the 100Mb/s (Megabits per second) network through any 100Base-TX hub or switch meeting the IEEE 802.3u standards.

100Base-T Network Adapter provides an evolutionary path for HP 3000 customers needing increased throughput over their existing 10Mb LAN links.

100Base-T Network Adapter includes the 100Base-TX network adapter, 100Mb driver components, and hardware product manuals. TCP/IP Transport is already included with the HP 3000/iX fundamental operating system (FOS).

Product Features

The product features include:

- Supports ARPA, NS, NetIPC, and a subset of 4.3 BSD Sockets over TCP/UDP/IP.
- Provides tools compatible with those of ThinLAN, Token Ring, and FDDI 3000/iX.
- Has online diagnostics for status information (using VGPBA).
- Provides software configurable with NMMGR.
- Is compatible with the IEEE 803.2u standard.
- Provides 100Mb high-speed connectivity over CAT-5 unshielded twisted pair (UTP), RJ-45 terminated cabling.
- Provides 10Mb low-speed connectivity compatible with existing 10Base-T UTP networks, also with CAT-5 cabling.
- Supports a maximum cable length of 100 meters in 100Mb mode.

The REMSH Client Functionality

by Cas Caswell
Commercial Systems Division

An Overview of the REMSH Service

The remote shell, or REMSH, service is used to connect to a specified host and execute a command on that remote host. This article describes:

- Verifying installation
- Configuring the REMSH client
- Using REMSH
- Troubleshooting REMSH
- Implementation differences between REMSH on MPE/iX and REMSH for HP-UX
- Available documentation

REMSH is the same service as rsh on BSD UNIX systems. The name was changed due to a conflict with the existing command rsh (restricted shell) on System V UNIX systems.

REMSH allows a user to connect to the remote system and execute a command on that remote system. Output from the remote command is sent to the REMSH standard output so the user can see the results of the command.

Verifying Installation

The REMSH client is part of the Internet Services product with release C.55.03. To verify that REMSH is available on your system, use NMMMAINT to verify versions of the Internet Services.

```
hawaii(PUB): nmmaint,73  
NMS Maintenance Utility 32098-20014 B.00.09 (C)Hewlett Packard Co. 1984
```

```
MON, MAR 17, 1997, 10:35 AM  
Data comm products build version: N.55.15
```

```
Subsystem version ID's:
```

```
Internet Services for the HP3000 module versions:
```

```
NM program file: INETD.NET.SYS           Version: A0010003  
NM program file: BOOTPD.NET.SYS         Version: A0010003  
NM program file: BOOTPQRY.NET.SYS       Version: A0010002  
NM program file: TFTPD.NET.SYS          Version: A0010002  
NM program file: REMSH.NET.SYS          Version: A0010001  
XL procedure:   INSVXL_SECURE_VERS      Version: A0010004  
XL procedure:   INSVXL_IPCSEC_VERS      Version: A0010002  
XL procedure:   INSVXL_NSRW_VERS        Version: A0010003  
XL procedure:   INSVXL_NETOF_VERS       Version: A0010002  
XL procedure:   INSVXL_SYSLOG_VERS      Version: A0010003
```

```
XL procedure:    INSVXL_SIGNAL_VERS          Version:  A0010002
XL procedure:    INSVXL_GETTIME_VERS       Version:  A0010003
```

Internet Services for the HP3000 overall version = A.00.10

Configuring the REMSH Client

There is only one file on the MPE/iX system that you will need to change in order to allow use of the REMSH client. That is the file `services.net.sys`. However, there are some files that will need to be configured on the remote unix systems.

Editing the Services File

The services file associates official service names and aliases with the port number and protocol the services use. To enable REMSH use, you must edit the services file.

To edit the services file:

1. Open the services file with a text editor. You may edit the `/etc/services` file from the POSIX shell or the `SERVICES.NET.SYS` file from MPE/iX, whichever you prefer. Both names should point to the same file.

2. Verify that the following line exists in the file.

```
shell    514/tcp    cmd    # remote command, no passwd used
```

- a. Add the line if it does not exist.
 - b. If the line already exists in the file and is preceded by a pound symbol (`#`), delete the `#` and any spaces before the service name to enable the service.
3. Save the file and exit the editor program.

Unix Configuration

The REMSH service does not prompt for user ID and passwords. That information is handled via the command line parameters and configuration on the Unix host. See the using REMSH section for details on how the user id is determined and passed to the Unix host.

Password information is bypassed by use of a `.rhosts` file in the remote user's home directory or by use of the file `/etc/hosts.equiv`. See the man pages of the unix system for details on how to set up a `/etc/hosts.equiv` file. A user's `.rhosts` file entry will consist of the MPE/iX system name and user id.

For example, to access the HP-UX system "taltos" as user "cawti," from the MPE/iX system "jhereg" while user `MANAGER.SYS`, set up a host equivalency via the `/etc/hosts.equiv` file, or you will create a `.rhosts` file in the home directory of user "cawti" on the "taltos" machine. The `.rhosts` file would look like this:

```
jhereg  MANAGER.SYS
```

This will cause the REMSH daemon on the unix host to allow a connection from `MANAGER.SYS` on "jhereg" to the "cawti" user on the host "taltos." The `.rhosts` file for user "cawti" would contain an entry for every host and userid that you desired to access the "taltos" host as if they were the user "cawti."

NOTE The MPE/iX equivalent of the Unix user id is the User.Account. An artifact of the MPE/iX implementation is that the MPE/iX information is usually reported in upper case. So be sure your `.rhosts` or `/etc/hosts.equiv` entries use the MPE/iX user ID information in upper case.

Using REMSH

The REMSH service is accessed by running the `REMSH.NET.SYS` program. You may do so under the MPE/iX CI or under the Posix shell. While the format of the commands will differ depending on how you run the program, the parameter list remains the same. We'll first look at the parameters and then look at running the program under the Posix Shell or from MPE/iX CI.

For the purposes of explaining the parameters, look at a sample invocation from the Posix shell. Detailed examples of both the Posix shell and MPE/iX invocations will follow later.

From the Posix shell you would invoke the REMSH by typing:

```
/SYS/NET/REMSH remotehost -l remoteuser remotecommand
```

In all cases you must provide a *remotehost* and a *remotecommand*. The REMSH program will fail and generate an error message otherwise. Unless the remote system has MPE/iX type userids, you will also need to provide a `-l remoteuser` parameter as well. Otherwise the remote system will not allow the connection.

remotehost is the name of the remote host you are attempting to connect to. The host name can be either the official name or an alias as understood by `gethostbyname()`.

remoteuser is the userid on the remote system you wish to be.

NOTE The traditional UNIX implementation of REMSH makes the `-l remoteuser` parameter optional. If you do not provide a `-l remoteuser` parameter, REMSH takes your current userID and assumes that you wish to connect to the same userID on the remote system. Since the MPE version of the userID is `USER.ACCOUNT`, and the Unix equivalent is `user`, it is unlikely that you will find a user on the remote system to match your id. We recommend that you always provide the `-l remoteuser` argument to REMSH.

remote- command is the command that you wish to execute on the remote machine. This command may be a CI command, a program (that meets certain criteria) or a shell script. If *remotecommand* is not specified, REMSH will terminate and provide a usage message.

NOTE REMSH cannot be used to run commands that require a terminal interface (such as VI) or commands that read their standard error (such as `more`).

MPE/iX Examples

To run REMSH from MPE/iX prompt, type:

```
run remsh.net.sys;info="remotehost -l remoteuser [-n]
remotecommand"
```

```
jhereg(PUB): run remsh.net.sys;info="taltos -l cawti -n pwd"
/u2/home/cawti
jhereg(PUB):
```

Posix Examples

From the Posix Shell prompt, type:

```
/SYS/NET/REMSH remotehost -l remoteuser [-n] remotecommand
shell/iX> /SYS/NET/REMSH taltos -l cawti -n pwd
/u2/home/cawti
shell/iX>
```

Since you are running under the Posix shell, there are a number of shell features that you can take advantage of.

Shell metacharacters that are not quoted are interpreted on the local host; quoted metacharacters are interpreted on the remote host. The following command line appends the *remotefile* to the local file *localfile*:

```
SYS/NET/REMSH taltos -l cawti cat remotefile >> localfile
```

The following command line appends *remotefile* to the *otherremotefile*:

```
/SYS/NET/REMSH taltos -l cawti cat remotefile ">>" otherremotefile
```

The following command line runs REMSH in the background on the local system, and the output of the remote command comes to your terminal asynchronously:

```
/SYS/NET/REMSH otherhost -l remoteuser -n remotecommand
```

The following command line causes REMSH to return immediately without waiting for the remote command to complete:

```
/SYS/NET/REMSH otherhost -l remoteuser -n
"remotecommand 1>&- 2>&- &"
```

In REMSH, if the first parameter in its argument vector is not REMSH, it will use the value as a host name. You may symbolically link the host name to the REMSH program. A typical BSD Unix implementation will have these links under the */usr/hosts* directory.

If you have made a symbolic link to the REMSH program that is the host name (that is in our examples, `ln -s /SYS/NET/REMSH taltos`), you could generate the same result as the first example with the following:

```
shell/iX>taltos -l cawti -n pwd
/u2/home/cawti
shell/iX>
```

Troubleshooting REMSH

These are the REMSH messages with an explanation of the meaning and suggested action, if any.

Message

```
remsh: MPE/iX/X version won't support rlogin or rexec
functionality
usage: remsh host -l login -n command
```

Meaning

Be sure to provide a command to execute.

Message

```
remshd: Login incorrect
```

Meaning

There is probably an invalid entry in remote `.rhosts` file. Be sure *host* name and *userid* are correct. *userid* must be in upper case. Be sure you provided an `-l userid` parameter, or that the remote system has a *userid* that matches your MPE/iX logon.

Message

```
Program requires more capabilities than allowed for the group, the user
of a temporary file, or the hierarchical directory user. (LDRERR 505)
Native mode loader message 505
Unable to load program to be run. (CIERR 625)
```

```
**** EXEC FUNCTION FAILED; subsys =517; info = 48
ABORT: REMSH.NET.SYS
NM SYS    a.00aa0270 dbg_abort_trace+$24
NM UNKN   150.00366f6c
NM UNKN   2dd.0004bbd8
[1] + Done (134) REMSH hpcsyn24 -l casc -n pwd
      262204      Abort    REMSH
```

Meaning

The first message is from running REMSH from MPE/iX name space, and the second is from running under the Posix Shell. The cause is typically lack of PM capability on the group where REMSH resides. Since REMSH is in `NET.SYS`, it is unlikely you will see this problem unless someone changes the capability of the `NET.SYS` group.

Message

```
shell/tcp: Unknown service
```

Meaning

The `shell` service specification is not present in the services file. Edit `/etc/services` or `SERVICES.NET.SYS` to fix.

Message

```
Can't establish stderr
```

Meaning

REMSH cannot establish secondary socket connection for stderr.

Message

```
Couldn't reopen stderr
```

Meaning

The remote command tried to reopen stderr. This is not allowed under REMSH.

Message

```
<system call>: ...
```

Meaning

Error in executing system call. Appended to this error is a message specifying the cause of the failure.

Implementation Differences

The full remote shell service typically consists of two parts: the REMSH client which allows a user on this machine to access remote hosts, and the remshd server which allows REMSH clients on other hosts to access the local host. Only the REMSH client functionality has been implemented on the MPE/iX system.

The HP-UX version of the REMSH client has an optional `-n` parameter that tells the client to not read from `STDIN`. Due to differences between MPE IO and Unix IO the `-n` parameter has been hard coded into the MPE/iX client.

The HP-UX REMSH client also allows `rlogin` and `rexec` functionality. Since this implementation was designed to address the needs of users attempting to access HP-UX commands and scripts from MPE/iX stream jobs, we chose not to implement any feature needing interactive input with the remote system.

Hewlett-Packard NetWorker Client for MPE/iX

by *Lalitha Pejavar and Alex Early*
Commercial Systems Division

Overview

There is now a new NetWorker ClientPak available for the HP 3000. NetWorker from Legato is a client/server application that provides advanced storage management capabilities to a heterogeneous environment of servers and desktop computers. The new ClientPak now accepts more TurboSTORE commands, like: ONLINE, LOGVOLSET, DATE, SHOW, PURGE, PROGRESS, NOTIFY, and VOLUME SET NAME (same as ONVS).

Benefits

These are the key benefits of using NetWorker:

- **Complete Solution for HP Environments**
NetWorker is the most widely-implemented backup utility in open system environments. It provides HP 3000 users with better integration in a multiplatform environment, allowing them to back up data to an UNIX, NT, or Netware server.
- **Support for HP's DLT Library System**
NetWorker is fully compatible with HP's Advanced DLT Library System enabling all server and desktop data to be automatically backed up, indexed, and policy-managed for either user-based file recovery or complete disaster recovery.
- **Centralized Enterprise Management**
NetWorker's client/server architecture and centralized storage model allow integration into network management frameworks. Legato NetWorker integration modules allows SNMP-based administration of NetWorker servers using HP OpenView, or complete enterprise administration using HP OpenView IT/Operations.
- **Superior Protection for On-Line Databases**
NetWorker supports on-line backup and restore operations for Oracle, Informix, and application data of SAP R/3, Oracle Financials and PeopleSoft HRMS.

Features

These are the key features of the NetWorker Client for MPE/iX:

- Provides an easy-to-operate graphical user interface and maintains a file index and media index to track data backed up and recovered.
- Supports a wide range of industry tape (DAT) and DLT libraries and furnishes a sophisticated media manager which allows for unattended backup and restore using autochange library.
- Provides for concurrent device support for backup and recovery operations using up to

16 backup devices simultaneously.

- Utilizes most of the features of 7x24 True-Online Backup since NetWorker uses TurboSTORE/iX 7x24 for backup. However, it will also work with FOS STORE and TurboSTORE/iX.
- Supports automatic backups of MPE volume sets. Also provides the ability to run two or more scheduled backups in parallel.
- Provides an optional Legato NetWorker Archive Application which gives the ability to take a snapshot of finished project files, directories, or MPE volume sets residing on primary media and safely stored on removable media.

Required Hardware and Software

Required hardware:

- HP 3000 any Series 9xx as a client
- HP 9000 server or Net Server
- DLT auto-library or DAT auto-changer
 - HP DLT 4/48, 2/28
 - STK 9714, 9710
- Networking connection (that is, FDDI, LAN, or 100VG-ANY LAN; 100VG ANY-LAN or FDDI LAN recommended)

Required software:

- NetWorker Client for MPE/iX
- NetWorker Server software (LEGNETWR), HP-UX Network Edition
- Auto-library license for the server (LEGAUTO0C)

HP Response Center Support

The NetWorker Client for MPE/iX currently has software supported through Legato, and HP Response Centers.

Documentation

The Hewlett-Packard Network Client Kit (B5475AA) contains the Legato Network Client software, *Legato NetWorker ClientPak for MPE/iX Installation Guide*, and *Legato NetWorker ClientPak for MPE/iX User's Guide*.

HP 3000 NetWorker Storage Node for MPE/iX

by Alex Early
Commercial Systems Division

The HP 3000 NetWorker Storage Node for MPE/iX is supported in MPE/iX 5.5 Express 7. The HP 3000 NetWorker Storage Node for MPE/iX allows the HP 3000 to support directly connected DLT7000 libraries. The Storage Node requires additional Legato software, NetWorker server software (NT or UNIX), and Autochanger license. With the Storage Node, the HP 3000 supports DLT 1/8, 2/15, 2/28, 3/30, 4/48, etc... A complete list can be found at <http://www.hp.com/go/3000>.

Configuring Libraries on MPE/iX

To configure the DLT Library on an HP 3000, perform the following steps:

Step 1. After booting, run ODE at the ISL prompt:

```
ISL> ODE
```

NOTE The MPE ISL ODE "RUN MAPPER" utility does not recognize and list fast-wide robotics devices.

Step 2. Run mapper to get device paths:

```
ODE> RUN MAPPER
***STARTING EXECUTION OF MAPPER***
Processor Identification:
...I/O Configuration:
Type HW SW Revisions
Path Component Name ID Mod Mod Hdwr Firm
...
/4/4 HP-PB Fast Wide SCSI . . .
/4/4.0.0 C1194F . . .
/4/4.1.0 DLT7000 . . .
/4/4.2.0 DLT7000 . . .
/4/4.3.0 DLT7000 . . .
/4/4.4.0 DLT7000 . . .
```

Step 3. Boot the system. At the MPE prompt, run sysgen and start the io section:

```
: sysgen
SYSGEN version E . . .
sysgen> io
** IO configurator commands **
```

Step 4. If not already configured, configure the differential card and the pseudo/target level of the SCSI path:

```
io> apath 10/4/4 id=HP28696A
io> apath 10/4/4.0 id=pseudo
```

```
io> apath 10/4/4.1 id=pseudo
io> apath 10/4/4.2 id=pseudo
io> apath 10/4/4.3 id=pseudo
io> apath 10/4/4.4 id=pseudo
```

Step 5. Configure the robotic transport/"picker" and DLT tape drives:

```
io> adev 30 id=HPC1194F path=10/4/4.0.0
io> adev 31 id=DLT7000 path=10/4/4.1.0 mode=autoreply
io> adev 32 id=DLT7000 path=10/4/4.2.0 mode=autoreply
io> adev 33 id=DLT7000 path=10/4/4.3.0 mode=autoreply
io> adev 34 id=DLT7000 path=10/4/4.4.0 mode=autoreply
```

Step 6. Verify the bindings between the PATH, LDEV number, ID, PMGR (device drivers), and LMGR attributes for each device configured.

- Verify the binding for the device adapter (the fw/differential dam):

```
io> lpath 10/4/4.0.0
PATH: 10/4/4 LDEV:
ID: HP28696A TYPE: DA
PMGR: FWSCSI_DAM PMGRPRI: 6
LMGR: MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- Verify the binding for the targets (the transparent dm):

```
io> lpath 10/4/4.0
PATH: 10/4/4.0 LDEV:
ID: PSEUDO TYPE: DA
PMGR: TRANSPARENT_MGR PMGRPRI: 6
LMGR: MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- Verify the binding for the picker (the pass-through driver):

```
io> lpath 10/4/4.0.0
PATH: 10/4/4.0.0 LDEV: 30
ID: HPC1194F TYPE: MOSAR_AC
PMGR: MO_SCSI_PTHRU_DM PMGRPRI: 10
LMGR: LOGICAL_DEVICE_MANAGER MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- Verify the binding for the tape drives (the differential tape dm):

```
io> lpath 10/4/4.1.0
PATH: 10/4/4.1.0 LDEV: 31
ID: DLT7000 TYPE: TAPE
PMGR: SCSI_TAPE2_DM PMGRPRI: 10
LMGR: LOGICAL_DEVICE_MANAGER MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.2.0, 4.3.0, and 4.4.0.

Configuring the Storage Node on the NetWorker Server

Complete the configuration process on the Storage Node on the NetWorker server.

Verify the ldev Specifications

```
io> ldev 30/34
LDEV: 30 DEVNAME: OUTDEV: 0 MODE:
ID: HPC1194F RSIZE: 128 DEVTYPE: MOSAR_AC
PATH: 10/4/4.0.0 MPETYPE: 24 MPESUBTYPE: 4
CLASS:
LDEV: 31 DEVNAME: OUTDEV: 0 MODE:
ID: DLT7000 RSIZE: 128 DEVTYPE: TAPE
PATH: 10/4/4.1.0 MPETYPE: 24 MPESUBTYPE: 8
CLASS: TAPE
...
LDEV: 34 DEVNAME: OUTDEV: 0 MODE:
ID: DLT7000 RSIZE: 128 DEVTYPE: TAPE
PATH: 10/4/4.4.0 MPETYPE: 24 MPESUBTYPE: 8
CLASS: TAPE
```

Save the Configuration Changes

- Hold the configuration changes:

```
io> hold
```

- Exit the io section:

```
io> exit
```

- If you have followed the local convention for backing up the configuration file, keep the changes:

```
sysgen> keep
keeping to group CONFIG.SYS
```

```
Purge old configuration (yes/no)?y
```

IMPORTANT Check with system management to make sure you can keep the changes to the configuration file.

- Exit sysgen and reboot according to local convention:

```
sysgen> exit
```

New Functionality Supported in DTS/TIO

*by Vivek Chopra and Selva Kumar R I
Commercial Systems Division*

Introduction

The Datacommunications and Terminal Subsystem (DTS) consists of host (HP 3000) based software and the DTC (Datacommunications and Terminal Controller) terminal server.

The DTC family of products supports X.25 communication and Telnet access to HP 3000 systems, and TCP/IP communication to HP 9000 and non-HP systems.

The DTS allows terminal, PCs in terminal emulation mode, serial printers, and other asynchronous devices to communicate with LAN-based hosts in HP-only and multivendor networking environments.

New Features

The DTS/TIO subsystem provides the following new functionality for MPE/iX starting with the 5.5 Express 2 release (C.55.02):

- Support of 400 DTCs.
- Support of 2000 device classes.
- Three new modem types for attached device. The new modem types are US modem In Out, European modem In Out, and Five wires modem.
- Data length/Parity list support. The DTS/TIO software has been enhanced to support two new parity types. The two new parity types are 8 bits data length with even parity and 8 bits data length with odd parity.

PowerPatch C.55.02 provided only part of the new functionality for the DTC 14.4 code support. The host DTC download files version 14.4 were installed with PowerPatch C.55.03. The host DTC download files version for MPE/iX 5.5 release was 14.2.

However, it should be noted that you do not need to run NMMGRVER on an existing NMCONFIG.PUB.SYS as no changes have been made to the NMCONFIG file.

Support of 400 DTCs

Users can now connect up to 400 DTCs to the HP 3000 host at a time. This is up from the earlier limit of 120 DTCs in MPE/iX 5.5 release (C.55.00). Thus the number of terminals that can be connected to a HP 3000 is significantly increased.

Support of 2000 Device Classes

A device class is a name that can be assigned to a single or a group of ldevs. This enables the user to refer to the ldev or the group of ldevs by a name. For example, the ldev associated with a tape drive is referred to as TAPE. Similarly, LP and DISC are the device classes for the system printer and disks respectively.

The number of device classes supported has been increased from 1000 to 2000. Increasing this limit has solved the problems of some customers who needed to add multiples of devices and were running into problem with the earlier limit.

Three New Modem Types for Attached Device

To give more flexibility, support has been added for three new modem types: US modem In Out, European modem In Out, and Five wires modem. However, these new modem types will be supported for the new types of DTCs only: DTC 72MX, DTC 16iX, and DTC 16MX.

Thus the complete list of supported modem types currently is:

- US modem In Out
- European modem In Out
- Five wires modem
- US modem
- European modem
- None (no modem)

Data Length/Parity List Support

Two more parity types have been added: 8 bits data length with even parity and 8 bits data length with odd parity. This was done as there are serial devices that need these settings. These need 8 bits which allow binary file transfer and also need to do parity checking.

These two new parity types are only supported for the newer DTCs: DTC 72MX, DTC 16MX, DTC 16iX and DTC 16RX. They are not supported for the DTC 48 or older DTCs.

The full list of supported parity settings is as given:

- 7 bits data length with even parity.
- 7 bits data length with odd parity.
- 7 bits data length with parity forced to 0.
- 7 bits data length with parity forced to 1.
- 8 bits data length with even parity.
- 8 bits data length with odd parity.
- 8 bits data length with none parity.

All the above enhancements are already supported on the 14.4 OpenView DTC manager. The required changes to support these enhancements in NMMGR were made in MPE/iX 5.5 Express 2 and later releases.

Telnet/iX Server—Full Functionality Release

by Cas Caswell
Commercial Systems Division

The version of the Telnet/iX Server released with MPE iX Release 5.5 had several functionality restrictions that were documented in the MPE/iX 5.5 *Communicator* article, “Telnet/iX Server Functionality Details.” The Telnet/iX Server included starting with PowerPatch (C.55.03) is fully functional. The purpose of this article is to update the information from the MPE/iX 5.5 *Communicator*.

Installation Verification

After installing PowerPatch (C.55.03) or later, you can verify whether your Telnet/iX Server installation was successful by running `NMMMAINT`. A sample output follows:

```
:nmmaint,72

NMS Maintenance Utility 32098-20014 B.00.09 (C)Hewlett Packard Co. 1984

TUE, AUG 7, 1997, 1:55 PM
Data comm products build version: N.55.15

Subsystem version ID's:

HP TELNET/iX Subsystem HP32040A module versions:

NM program file: TELNET.ARPA.SYS      Version: A5500000
NL procedure:    PTD_SM_VER           Version: A5500100
NL procedure:    PTD_HANDLER_VER      Version: A5500102
NL procedure:    PTD_PTID_VER         Version: A5500105
NL procedure:    PTD_PTOD_VER         Version: A5500105
NL procedure:    PTD_COMMON_VER       Version: A5500102

HP TELNET/iX Subsystem HP32040A overall version = A.55.00
```

Changes from the MPE/iX 5.5 Telnet/iX Version

- FControl and FDeviceControl behavior for this version will function as documented in the *Asynchronous Serial Communications Programmer's Reference Manual*.
 - All Block Modes and Binary Mode are now supported.
 - Type-ahead is now supported.
- The maximum number of concurrent Telnet Sessions has been raised from 250 to 2000.
- The `TLNETDOC.ARPA.SYS` file has been updated with information for the Telnet/iX Server, and is included in this patch.
- The Telnet/iX Server now supports all of the Telnet commands that require interaction with the Server.

In addition to the commands `open`, `send break`, `send AYT`, `send IP`, `send EC`, `send EL`, `quit`, and `close` that were supported with the MPE/iX 5.5 version, this version of the Telnet/iX Server also supports the `toggle` and `mode` commands.

You should be aware of the following points when using the `toggle` and `mode` options:

— `toggle`

The Server was written to assume the user is always right. This means that if you do a `toggle echo` to allow the client to do all the echoing, the Server stops echoing and leaves all echoing to the client. However, if you then run an application on the HP 3000 that enables echoing, there will be a double echo on your display.

— `mode`

1. Line mode for the HP 3000 server was implemented to be consistent with the HP-UX 9.0 Telnet product. Neither of these line modes comply with the RFC-1116 line mode standard.
2. We recommend that you do not use line mode when running block mode applications on the HP 3000. This may cause the applications to operate poorly.

4 Peripherals

This chapter contains the following articles related to peripherals supported in the 5.5 Express 7 release:

- [New Disk Devices Supported](#)
- [High Availability Disk Array \(Nike\)](#)

New Disk Devices Supported

by Rakesh Saha and Sam Boles
Commercial Systems Division

Overview

The HP 3000 supports the following disk devices on MPE/iX 5.5 Express 7.

Table 4-1. Supported Disk Devices

Product ID	New Disk Device Supported	Size/Description
A3304A	ST32272N	2 GB single-ended narrow
A3517A	ST32272WC	2 GB single-ended narrow
A3351A	ST32272WC	2 GB differential wide
A3318A	ST32272WC	2 GB differential wide
A3352A	ST34572N ST34573N	4 GB single-ended narrow) 4 GB SE
A3646A	ST34572WC ST34573WC	4 GB single-ended narrow 4GB SE
A3353A	ST34572WC XP34361W ST34573WC	4 GB differential wide 4 GB differential wide 4GB DF
A3647A	ST34572WC XP34361W DGHS04Y ST34573WC	4 GB differential wide 4 GB differential wide 4GB DF 4GB DF
C6390A C6391A	ST34573WC	4GB DF
C6386A C6387A	ST34573N	4 GB SE
A3628A	ST39173N	9 GB SE
C6392A C6393A	ST39173N	9 GB SE
A3629A	ST39173WC	9 GB DF
C6396A C6397A	ST39173N	9 GB DF

Table 4-1. Supported Disk Devices

Product ID	New Disk Device Supported	Size/Description
A5238A	ST39173WC DGHS09Y	9 GB DF 9 GB DF
A4909A	ST118273WC	18 GB DF
A5239A	ST118273WC	18 GB DF
A3629A	ST39175LC	9 GB WD
A4909A	ST318275LC	18 GB WD
A4910A	ST39175LC	9 GB WD
A4912A	ST39140N	9 GB SE
A5084A	ST318275LW	18 GB LVD
A5528A	ST136475LC	18 GB LVD
A5529A	ST136475LC	36 GB LVD
A5544A	ST139140N	9 GB SE
A5545A	ST318275LW	18 GB LVD
C6399A	ST318275LW	18 GB UWSE
C6400A	ST318275LC	18 GB WD
C6401A	ST318275LC	18 GB WD
C6402A	ST39175LW	9 GB UWSE
C6403A	ST39175LW	9 GB UWSE
C6404A	ST39175LC	9 GB WD
C6405A	ST39175LC	9 GB WD

Ambiguous Product ID

In the continuing effort to provide the price-performance advantage of the latest disk technology and, at the same, time protect existing customer investment, HP uses the same disk mechanism for both Single-Ended and Differential disks. However, there is a layer of transparent hardware that masks the electrical differences. This enables customers to continue to use both their existing Single-Ended and their existing Differential interface cards, but it requires some caution in connecting the disk device to the right interface.

Since an Inquiry by a utility such as `ODE MAPPER` returns the same Product ID (for example, `ST34573WC`) for both the Single-Ended and the Differential version of the disk, you must use the HP Model ID to distinguish the Single-Ended (for example, `A34646A`) from the Differential (for example, `A3647A`).

As a work-around for `SYSGEN`, use the “WC”-suffix ID (for example, `ST34573WC`) to bind to the Differential drivers; use the “N”-suffix ID (for example, `ST34573N`) to bind to the Single-Ended drivers.

CAUTION It is critical that you connect the disk drive to the right bus: Single-Ended to Single-Ended; Differential to Differential. Failure to do so will result in unexpected system behavior.

Table 4-2.

HP Model	
Single-Ended	Differential
A3517A	A3318A
A3646A	A3647A

The following table details the Product IDs and the SCSI interface IDs.

Table 4-3. Product ID for Configuring Disk Drives

Drive Cap.	Drive Type	Product ID			Product ID for Corresponding Device Adapter
		Raw Mech	Hot-Swap Module	SYSGEN	
2 GB	SE	ST32272N	ST32272WC	ST32272N	HP27251A(CIO) HP28642A-SCSI(NIO) A1703-60003-SCSI(NIO) A2372-60003-SCSI(NIO) A2372-60004-SCSI(NIO)
2 GB	DF	ST32272WC	ST32272WC	ST32272WC	HP28696A(NIO) A2372-60003-FWSCSI(NIO) A2372-60004-FWSCSI(NIO)
4 GB	SE	ST34572N ST34573N	ST34572WC ST34573WC	ST34572N ST34573N	HP27251A(CIO) HP28642A-SCSI(NIO) A1703-60003-SCSI(NIO) A2372-60003-SCSI(NIO) A2372-60004-SCSI(NIO)
4 GB	DF	ST34572WC ST34573WC NA	ST34572WC ST34573WC DGHS04Y	ST34572WC ST34573WC DGHS04Y	HP28696A(NIO) A2372-60003-FWSCSI(NIO) A2372-60004-FWSCSI(NIO)
9 GB	SE	ST39173N	ST39173N	ST39173N	HP28642A-SCSI(NIO) A1703-60003-SCSI(NIO) A2372-60003-SCSI(NIO) A2372-60004-SCSI(NIO)
9 GB	DF	ST39173WC NA	ST39173WC DGHS09Y	ST39173WC DGHS09Y	HP28696A(NIO) A2372-60003-FWSCSI(NIO) A2372-60004-FWSCSI(NIO)
18 GB	DF	ST118273WC	ST118273WC	ST118273WC	HP28696A(NIO) A2372-60003-FWSCSI(NIO) A2372-60004-FWSCSI(NIO)

High Availability Disk Array (Nike)

With MPE/iX 5.5 Express 7, there is support for 9 GB and 18 GB disk drives. Please note the following restrictions.

1. The 9 GB and 18 GB drives are supported as RAID 1 only (that is, NOT as RAID 5.)
2. The 9 GB and 18 GB drives may be used as the boot device; however, that is not recommended.

NOTE Using a 9 GB drive is NOT recommended because only 4 GB is allowed by IO DC in the current implementation. The 5 GB and 14 GB difference would be unusable capacity. The release marks the space beyond 4 GB as unusable so the OS updates can occur without violating the 4 GB limitation.

3. Flare code 9.55.01 (or later) and PROM code 0173 (or later) are required for the array controller.
4. Support is for Model 20 Differential only.
5. HPC2300WD is the SYSGEN ID.

The following table shows the supported configurations:

Table 4-4. Supported Configuration of Disk Arrays

Disk Capacity	RAID 1	RAID 5	Boot
4 GB	X	X	X
9 GB	X	NS	X*
18 GB	X	NS	X*
* NOT recommended because 5 GB or 14 GB unusable			

The following table shows the product numbers and descriptions of available disk drives.

Table 4-5. Product Numbers and Descriptions for Disk Drives

HP Product Number	Description
A3549A A3550A A3550AZ	#341 5 ea 9.1 GB DD
A3549A A3550A A3550AZ	#342 10 ea 9.1 GB DD
A3549A A3550A A3550AZ	#343 15 ea 9.1 GB DD

Table 4-5. Product Numbers and Descriptions for Disk Drives

HP Product Number		Description
A3549A A3550A A3550AZ	#344	20 ea 9.1 GB DD
A3549A A3550A A3550AZ	#351	5 ea 18.2 GB HH DD
A3549A A3550A A3550AZ	#352	10 ea 18.2 GB HH DD
A3549A A3550A A3550AZ	#353	15 ea 18.2 GB HH DD
A3549A A3550A A3550AZ	#354	20 ea 18.2 GB HH DD
A3549A A3550A A3550AZ	#361	5 ea 4 GB LP DD
A3549A A3550A A3550AZ	#362	10 ea 4 GB LP DD
A3549A A3550A A3550AZ	#363	15 ea 4 GB LP DD
A3549A A3550A A3550AZ	#364	20 ea 4 GB LP DD
A5132A		9.1 GB single disk
A5132AM		9.1 GB multi-pack disk
A5133A		18.2 GB single disk
A5133AM		18.2 GB multi-pack disk
A5169A		4 GB single disk
A5169AM		4 GB multi-pack disk

5 Technical Articles

This chapter contains the following technical articles:

- Documentation Changes for MPE/iX Languages
- DLT4000/7000 Differential Tape Support
- IMAGE/SQL Enhancement: P and Z Data Types
- New NPCONFIG Variable Added to NW Spooler
- ALLBASE/BRW JCWs for Year 2000
- New Features in ALLBASE/SQL Version G3
- Year 2000 Web Page
- Year 2000 Enhancements for MPE/iX
- New Date Intrinsic for MPE/iX
- Year 2000 and Other Enhancements for VPLUS
- Other Products
- RPG/iX 4-Digit Year Enhancement
- CI Enhancements
- FTP Enhancements
- Transact V and Transact/iX Enhancements
- Dictionary/3000
- COBOL II/iX Enhancements
- Inform/V
- HP ALLBASE/BRW
- Pseudo-Mapped Files Removed from ALLBASE/SQL
- QUERY/iX Enhancements
- IMAGE/SQL with TurboIMAGE/XL Enhancements
- TurboSTORE/iX II, TurboSTORE/iX 7x24 Patches

Documentation Changes for MPE/iX Languages

by Allan Hertling
SSG Group R&D

FORTRAN 77/iX

Please make the following corrections to the *FORTRAN 77/iX Reference Manual*.

This manual incorrectly states that a four-digit calendar year may be computed by adding 1900 to the YEAR parameter resulting from a `IDATE` subroutine call. As the year parameter is always in the range of 0 to 99, that calculation will not be correct after 1999.

The last sentence describing the four-digit calculation under the `IDATE` Subroutine discussion on page B-21 should be deleted.

Business BASIC

Please make the following corrections to the *Business BASIC Reference Manual*.

The `TIME` function documentation on page 18-8 should be changed as follows:

Under Parameters, `num_expr`, Three or greater:
change "Current year" to "Years since 1900."

Under Examples, add an example of getting the current year:

```
160 Year2 = TIME (3) MOD 100 ! Get the current year of the century
170 Year4 = TIME (3) + 1900  ! Get the current 4-digit year
```

Business BASIC/iX

Please make the following corrections to the *Business BASIC/iX Reference Manual*.

The `TIME` function documentation on page 5-98 should be changed as follows:

Under Parameters, `num_expr`, Three or greater:
change "Current year" to "Years since 1900."

Under Examples, lines 140 and 150:
change "the current year" to "years since 1900."

Add an example to get the current year:

```
160 Year2 = TIME(3) MOD 100 ! Get the current year of the century
170 Year4 = TIME(3) + 1900  ! Get the current 4-digit year
```

BASIC

Please make the following corrections to the *BASIC INTERPRETER Reference Manual*.

The `TIM` function documentation on page E-3 should be changed as follows:

For `x >= 3`, change "current year (0-99)" to "years since 1900."

Add an example of getting the current year:

```
150 REM -- Get the current year of the century
160 Y2 = TIM(3) MOD 100
170 REM -- Get 4-digit year
180 Y4 = TIM(3) + 1900
```

RPG/iX

Please make the following changes to the *RPG/iX Reference Manual*.

The following changes to the *RPG/iX Reference Manual* describe the new functionality:

In the Header Specifications chapter, make the following changes to UPDATE Source (Column 17):

- Add *DATE and *YEAR to the list of predefined fields whose initial value is set by the RPGUPDATE file.

- Change the second paragraph under F (Date Record) to:

You can enter the date (in the date record) in a flexible manner. The first number begins the date (the number does not have to start in column 1). Enter the date as six or eight consecutive digits (mmddy or mmddy) or in three sets of digits (mm, dd, and yy or yyyy). Enter the month (mm), the day (dd), and then the year (yy or yyyy).

- Add the following:

If the RPGUPDATE file contains a 2-digit year, *DATE and *YEAR will contain a 4-digit year based on a date window of 1940-2039. Thus, a yy of 39 will be taken as 2039, while a yy of 40 will be taken as 1940.

- Add the following examples using 4-digit years:

```
04101988
FORMAT OF DATE IS MMDDYYYY = 04101988
4/10/1988
MONTH IS 4; DAY IS 10; YEAR IS 1988
```

- Remove the invalid date example for 4/10/1988.

In the Output Specifications chapter, make the following changes to Field Description Fields (Columns 32-70):

- Add *DATE and *YEAR to the section on UDATE, UDAY, UMONTH, UYEAR:

Table 5-1. DATE Field Descriptions

Field Name	Contents	Unedited Example	Edited Example	Description
*DATE	Current date with 4-digit year	10111988	10/11/1988	October 11, 1988 (Domestic Format)
		11101988	11/10/1988	October 11, 1988 (United Kingdom Format)
		11101988	11.10.1988	October 11, 1988 (European Format)
*YEAR	Current 4-digit year	1988	19/88	1988

NOTE At the point that editing is done, there is no way for RPG to tell that the original field was a 4-digit year and not a truncated date. Therefore, the edited output for *YEAR will be of the form nn/nn, as described in the documentation for Edit Code (column 38).

In the Output Specifications chapter, make the following changes to Edit Code (Column 38):

- In the Description for the Y edit code field, change the maximum field length to 8, and add the specification for field lengths 7 and 8:

Slash marks can be used with fields having three to eight digits as follows:

Table 5-2. Edit Code Fields

Field length	Edited output
7	nn/nn/nnn
8	nn/nn/nnnn

Announcing DLT4000/DLT7000 Differential Tape Support on MPE/iX

*by Larry Nichoalds, CSY Labs
Jim Hawkins, SSD WTEC*

Beginning with Release 5.5 Express 7, MPE/iX supports the following stand-alone Differential DLT Tape drives:

- DLT4000 (C3690A) - F/W SCSI interface (not a true F/W device see “Product Overview”)
- DLT7000 (C6374A) - F/W SCSI interface

Software Requirements

Customers wishing to use these new DLT devices must be running on MPE/iX 5.5 or LATER version of MPE/iX. On MPE/iX 5.5 (Release C.55.00, MPE/iX 31900C.05.08) the patch MPEKX37 (version “D”) provides the critical software device driver enhancements necessary for the support of these DLTs. Again, these devices are NOT supported on MPE/iX 5.0 (Release C.50.00, 31900B.79.06) and there are no plans to support these devices on 5.0 in the future.

Upon the release of MPEKX37 there will not immediately be any patches for Predictive Support or Online Diagnostics that specifically support the new device IDs. In the short term Predictive and Diagnostic tools will likely flag these devices as “unknown” or “unsupported.” However, the SCSIDLTL diagnostic will function for these devices AND plans are in place to include Predictive and Diagnostics in the next open Express/PowerPatch Release for 5.5.

Hardware Requirements

On HP3000 S900 systems F/W SCSI Device Support is typically provided via the 28696A NIO F/W SCSI Device Adapter Card. At the time this article was written, there are two other possible F/W SCSI Device Adapter Cards.

NEITHER of these connection options is actually supported:

<p>Unsupported connection Option #1</p>	<p>The 9x9KS “Core I/O Card” A3453-69210 exports a F/W SCSI interface. However we do NOT, for performance reasons, support or recommend that a DLT be connected via this interface. The assumption is that this exported bus will also be shared with the system’s internal disks and unpredictable and unacceptable performance may be seen when disks and DLT are accessed simultaneously (as during STORE/RESTORE). (Please read additional information in the Product Overview section for details on device performance.</p>
<p>Unsupported connection Option #2</p>	<p>The HP-HSC F/W DA A2969A is not supported on HP3000 S900 systems. This card requires the existence of “Device Adapter Software” that has yet to be written for MPE/iX.</p>

Physical connection of these devices is accomplished via “Fast/Wide/Differential SCSI” Cables such as C2911A, C2924A, C2925A etc.

NOTE While DLT Libraries are available for purchase, support for these devices is very limited on HP3000 S900 systems. There are currently no plans for supporting the DLT Libraries for “normal” MPE/iX operations such as BOOT, FCOPY or STORE. DLT Libraries are supported only when used in conjunction with a third party software package, Legato’s “NetWorker”. Inquiries about DLT Library support should be made directly to Legato.

Product Overview

Product	Standard, Non-compressed Capacity with DLT IV	Average Maximum Data Transfer Rate to Tape	Average Maximum Data Transfer Rate on SCSI Bus	Maximum of Devices per Bus
DLT4000 (SE-SCSI)	20Gbtye	~2Mbyte/sec	~4Mbyte/sec	1
DLT4000 (FW-SCSI)	20Gbtye	~2Mybte/sec	~4Mybte/sec	2
DLT7000 (FW-SCSI)	35Gbtye	~4Mbyte/sec	~9Mybte/sec	1

The performance difference between the DLT4000 and DLT7000 Differential drives is due to data transfer characteristics. Specifically the DLT7000 is a “differential-wide” device, transferring two bytes at a time during the data phase. The DLT4000 (C3690A), though it is connected via a “differential-wide” cable, is actually a “differential-narrow” device, transferring only one byte at a time. From a native (non-data compression) perspective, the DLT4000 is capable of transferring data to tape at up to 2 Mb/Sec while the DLT7000 is capable of transferring data to tape at up to 4 Mb/Sec. When making use of the compression feature (Digital Lempel-Ziv, DLZ) the amount of data sent to the device can be significantly greater than the device’s ability to write to tape, depending on the

compressibility of data. However, there is an upper limit on the amount of data that the device can accept and the SCSI bus can transfer. This puts an upper limit on the number of devices that can be driven at peak I/O rates on a Bus. This upper limit is the “Maximum Number of Devices Per Bus.” Of course, these figures are approximate and are reached only on systems with sufficient available CPU resources AND Disk I/O bandwidth.

Both the DLT4000 and DLT7000 drives accept the new CompacTape IV cartridge. When this cartridge is used, the amount of data you can store on a tape can be up to 20.0 GB native, or an expected 40.0 GB of data using the compression mode for the DLT4000. The DLT7000 will hold 35.0 GB native, or 70.0 GB when employing data compression. The actual amount of data stored in compression mode is dependent on the nature of the data being stored. That is, text files tend to be highly compressible while code files are not. Both devices can also use the CompacTape III cartridge. The amount of data you can store on this tape cartridge can be 10.0 GB native capacity or 20.0 GB compressed.

IMPORTANT Tapes created on a DLT4000 can always be read by the DLT7000; however, DLT4000 drives are not capable of reading tapes created on DLT7000s. Since both drives use the same physical media type, shops with a mixture of DLT types will have to manage media created on DLT7000 separately so as not to attempt to read it on a DLT4000. Typically if a DLT7000 tape is put into a DLT4000, the “Use Cleaning Tape” indicator will be illuminated. If a DLT7000 tape is to be over-written by a DLT4000, just ignore the “Use Cleaning Tape” indicator and proceed overwriting the tape (do not clean the drive). The “Use Cleaning Tape” will go off automatically when the tape is overwritten or removed from the drive.

DLT is designed as a high-volume back-up solution. The tape media can endure approximately 500,000 passes and has a shelf life of 10 years. The DLT4000 has a head life of 10,000 tape motion hours and MTBF of 80,000 based on a 100% duty cycle. The DLT7000 has a head life of 30,000 tape motion hours and MTBF of 200,000 hours with a 100% duty cycle (per Quantum’s literature). Unlike DDS drives, you should only clean DLT devices when the cleaning light actually comes on. If you clean a DLT more often than is indicated, you will reduce the life of the heads.

Configuration

Here is an example of what the configuration should look like on the HP3000 for the DLT4000 and DLT7000.

DLT4000 Example

```
io> ld 90
  LDEV: 90  DEVNAME:          OUTDEV:  0          MODE:
  ID: DLT4000                RSIZE:  128         DEVTYPE: TAPE
  PATH: 4/4.2.0              MPETYPE: 24         MPESUBTYPE: 8
  CLASS: TAPE                DLTTAPE DDUMP

io> lp 4/4.2.0
PATH: 4/4.2.0                LDEV: 90
ID: DLT4000                  TYPE: TAPE
PMGR: SCSI_TAPE2_DM          PMGRPRI: 10 LMGR:
LOGICAL_DEVICE_MANAGER       MAXIOS: 0

io> lp 4/4.2
PATH: 4/4.2                  LDEV:
ID: PSEUDO                   TYPE: DA
PMGR: TRANSPARENT_MGR       PMGRPRI: 6
LMGR:                        MAXIOS: 0

io> lp 4/4
PATH: 4/4                    LDEV:
ID: HP28696A                 TYPE: DA
PMGR: SCSI_DAM               PMGRPRI: 6
LMGR:                        MAXIOS:
```

DLT7000 Example

```
io> ld 91
LDEV: 91  DEVNAME:          OUTDEV:  0          MODE:
ID: DLT7000                RSIZE:  128         DEVTYPE: TAPE
PATH: 4/4.3.0              MPETYPE: 24         MPESUBTYPE: 8
CLASS: TAPE                DLTTAPE DDUMP

io> lp 4/4.3.0
PATH: 4/4.3.0                LDEV: 90
ID: DLT7000                  TYPE: TAPE
PMGR: SCSI_TAPE2_DM          PMGRPRI: 10
LMGR: LOGICAL_DEVICE_MANAGER MAXIOS: 0

io> lp 4/4.3
PATH: 4/4.3                  LDEV:
ID: PSEUDO                   TYPE: DA
PMGR: TRANSPARENT_MGR       PMGRPRI: 6
LMGR:                        MAXIOS: 0

io> lp 4/3
PATH: 4/3                    LDEV:
ID: HP28696A                 TYPE: DA
PMGR: SCSI_DAM               PMGRPRI: 6
LMGR:                        MAXIOS: 0
```

IMAGE/SQL Enhancement: P and Z Data Types

by Dolly HU
 Commercial System Division

This IMAGE/SQL enhancement allows application programs using Image/SQL to enter unsigned data into TurboIMAGE/XL fields with P or Z data type.

Prior to this enhancement, Zoned Decimal and Packed fields, when written from an application using IMAGE/SQL, were always populated with signed numbers. This created a problem for some application programs reading the data. For example, a COBOL program with a data item defined as Z4 in TURBO IMAGE, and 9(4) in the COBOL program (note the absence of the “S”), a number of 942 gets stored as “094B” (signed), and to the COBOL program, it is an invalid numeric.

IMAGE/SQL SPLIT command and UPDATE TYPE command have been enhanced to allow SIGNED or UNSIGNED mapped type if the mapped type is DECIMAL. If UNSIGNED keyword is specified, then all positive values written from an application using IMAGE/SQL are unsigned. The default is SIGNED. If SIGNED/UNSIGNED key word is used with any mapped type other than DECIMAL, then “Syntax Error” is returned by IMAGE/SQL.

SP[LIT]

Divides a large mapped column into two or more smaller columns.

SYNTAX

```
SP[LIT] MappedTable.MappedColumn INTO
    NewMappedColumn:SourceType[:MappedType [SIGNED  ]] [, ...]
                                [UNSIGNED]
```

EXAMPLE

```
(i)  SPLIT TABLE1.COLUMN5 INTO NEWCOLUMN1:I4:CHAR(8), &
      NEWCOLUMN2:X20, &
      NEWCOLUMN3:K3:DECIMAL(15,0)

(ii) SPLIT TABLE2.COLUMN3 INTO NEWCOL1:I4:CHAR(8), &
      NEWCOL2:X20, &
      NEWCOL3:Z4:DECIMAL(4,0) UNSIGNED
```

UP[DATE] TYPE

Updates data type mapping information for a specified TurboIMAGE/iX data type or a specified Mapped Column.

SYNTAX

```
U[PDATE] TYPE {SourceType IN { * }}
              { { MappedTable}}
```

```
        {IN MappedTable.MappedColumn }  
    [TO NewMappedType [SIGNED  ]]  
        [UNSIGNED]
```

EXAMPLES

- (i) UPDATE TYPE I4 IN COMPOSER
- (ii) UPDATE TYPE IN COMPOSER.BIRTHDATE TO CHAR(18)
- (iii) UPDATE TYPE IN TABLE1.UNSIGNEDZ4 TO DECIMAL(4,0) UNSIGNED

New NPCONFIG Variable Added to NW Spooler

*By G. K. Rajani
Commercial System Division*

The network (NW) spooler behaves differently from serial spooler for %2nn series CCTLS. The new NPCONFIG item “serial_printer_simulation” is added to fix this problem.

Description of the New NPCONFIG Item

If you configure “serial_printer_simulation” to true, then the NW spooler behaves the same way as the serial spooler for CCTL %2xx series. That is, it sends LFs for %2nn series of CCTLS.

If you configure “serial_printer_simulation” to false, then there won’t be any change in the NW spooler’s behavior. That is, it sends <esc>&a#R. As a result, you find CCTL %2xx series is incompatible between the network and serial spooler. By default “serial_printer_simulation” is set to false.

Sample NPCONFIG File

```
75      (network_address = 15.10.44.112
        # One of the NW printer's ip addresses
        serial_printer_simulation = true)
```

ALLBASE/BRW JCWs for Year 2000

by Kelly Sznaider

Support Technology Lab

For year 2000 compliance, two JCWs were created in earlier versions of BRW. However, the defaults of these JCWs have been changed as of version A.01.57.

As year 2000 rapidly approaches, it is strongly recommended to use four-digit years instead of two-digits. If four-digit years are used in your files and databases, then these BRW JCWs can be ignored.

The remainder of this article provides information about the BRW JCWs which support the reading and writing of two-digit years. They describe how BRW should interpret these years, as 1900 based or 2000 based. As of version A.01.57, the defaults are 2000 based instead of 1900 based.

HP's MM II customers using ALLBASE/BRW should review these JCWs carefully and preset them accordingly.

This change in the product's behavior is specific to ALLBASE/BRW, not BRW/V.

1. Set the JCWs in session mode and also, in BRWJOB/BRWJ000 for batch processing.

The JCWs will map '00'..'49' to '2000'..'2049' or to '1900'..'1949' depending upon the settings. Two-digit years of '50' to '99' are mapped to '1950'..'1999' regardless of the setting of the JCWs.

2. If these JCWs are not set, then it is the same as setting these JCWs to 1. Setting these JCWs to 1 (or not setting them) assumes two-digit years with the century as "20" (for years '00' to '49' only). Setting the JCWs to 0 assumes two-digit years with the century as "19", which was the default prior to version A.01.56.

3. The JCWs can be set differently depending upon the desired results.

- ALLBASE/BRW versions A.01.56 and earlier set the JCWs as the following if not specified:

BRWCENTURYROUNDING = 0

BRWUSERCENTURYROUNDING = 0

- As of version A.01.57, the JCWs are defaulted as:

BRWCENTURYROUNDING = 1

BRWUSERCENTURYROUNDING = 1

BRWCENTURYROUNDING

The following apply to BRWCENTURYROUNDING:

- If set to 1 (or not set), a date range of 1950 - 2049 is assumed for all two-digit years in user parameters values, constants in calculated items and selection conditions, and in data files.

- If set to 0, a date range of 1900 - 1999 is assumed for all two-digit years in data files.

BRWUSERCENTURYROUNDING

The following apply to BRWUSERCENTURYROUNDING:

- If BRWCENTURYROUNDING is set to 0, then this JCW is examined.
- If set to 1 (or not set), a date range of 1950 - 2049 is assumed for all two-digit years in parameter values and for date constants appearing in calculated items or selection conditions. (This JCW excludes data files.)
- If set to 0, a date range of 1900 - 1999 is assumed for all two-digit years in parameter values and for date constants appearing in calculated items or selection conditions (excluding data files).

NOTE The date range can affect some reports which assume that 01/01/00 is the smallest possible year, or that 12/31/99 is the largest possible year.

For example, if the JCWs were set as the following for ALLBASE/BRW A.01.56:

```
BRWCENTURYROUNDING not set  
BRWCENTURYROUNDING = 1
```

Then for A.01.57, specify the JCW settings to get the same functionality as in A.01.56:

```
BRWCENTURYROUNDING = 0  
BRWCENTURYROUNDING not set (or = 1)
```

If either of these JCWs are currently specified, then you should specify both JCWs in your logon environments prior to version A.01.57. Then when ALLBASE/BRW is upgraded to version A.01.57 or later, the BRW application will continue to query correctly using 1900 as the base.

New Features in ALLBASE/SQL Version G3

by Doug Myers

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Overview

This article includes information on the following features of ALLBASE/SQL included with version G3:

- ALLBASE/SQL manual set is on Instant Information CD-ROM
- String functions are a new feature for ALLBASE/SQL G3
- Security features introduced with ALLBASE/SQL G2
- Year 2000 compatibility introduced with ALLBASE/SQL G2
- Manuals updated
- CAST Function introduced with G1.15

Instant Information CD-ROM

The entire manual set for ALLBASE/SQL is now available on the new CD-ROM documentation system, "Instant Information." You can now look up information quickly in the on-line documentation.

String Functions

With the G3 release of ALLBASE/SQL and IMAGE/SQL, the supported SQL syntax has been enhanced to include the following string manipulation functions: UPPER, LOWER, POSITION, INSTR, TRIM, LTRIM and RTRIM. These string functions allow you to manipulate or examine the CHAR and VARCHAR values within the SQL syntax, allowing for more sophisticated queries and data manipulation commands to be formed. These string functions were designed to be compatible with functions specified in the ANSI SQL '92 standard and functions used in ORACLE. In cases where the ANSI SQL '92 standard and the ORACLE functions were not compatible (such as the LTRIM and RTRIM in ORACLE versus TRIM in the ANSI standard), both versions were implemented. The specifications for each of these functions follows.

Function Specification

Lower

Converts all the characters in *stringexpr* to lower case

Syntax [LOWER (*stringexpr*)]

Upper

Converts all the characters in *stringexpr* to upper case

Syntax [UPPER (*stringexpr*)]

Position

Searches for the presence of the string *stringexpr1* in the string *stringexpr2* and returns a numeric value that indicates the position at which *stringexpr1* is found in *stringexpr2*

Syntax [POSITION (*stringexpr1*, *stringexpr2*)]

Instr

Searches *char1* beginning with its *n*th character for the *m*th occurrence of *char2* and returns the position of the character in *char1* that is the first character of this occurrence. If *n* is negative, Instr counts and searches backward from the end of *char1*. The value of *m* must be positive. The default values of both *n* and *m* are 1, meaning Instr begins searching at the first character of *char1* for the first occurrence of *char2*. The return value is relative to the beginning of *char1* regardless of the value of *n*, and is expressed in characters. If the search is unsuccessful (if *char2* does not appear *m* times after the *n*th character of *char1*) the return value is 0.

If *n* and *m* are not specified the function is equivalent to the ANSI SQL-92 POSITION function, except that the syntax is slightly different.

Syntax [INSTR (*char1*, *char2* [,*n* [,*m*]])]

Ltrim

LTRIM function trims the characters specified in *charset* from the beginning of the string *stringexpr*.

Syntax [LTRIM (*charset*, *stringexpr*)]

Rtrim

RTRIM function trims the characters specified in *charset* from the end of the string *stringexpr*.

Syntax [RTRIM (*charset*, *stringexpr*)]

Trim

TRIM function allows you to strip the characters specified in *charset* from the beginning and/or the end of the string *stringexpr*. If *charset* is not specified, then blank characters would be stripped from *stringexpr*.

Syntax

[TRIM ({ LEADING | TRAILING | BOTH } (,*charset* ,*stringexpr*)]

Examples:

Example 1

```
SELECT LOWER (OWNER) || '.' || LOWER (NAME)
```

```
FROM SYSTEM.TABLE  
WHERE NAME = UPPER ('vendors');
```

Returns "purchdb .vendors "

Example 2

```
SELECT POSITION ('world', 'hello world')  
FROM SYSTEM.TABLE  
WHERE NAME = UPPER('vendors');
```

Returns the numeric value 7

Example 3

```
SELECT INSTR ('hello world hello world', 'world', 5, 2)  
FROM SYSTEM.TABLE  
WHERE NAME = UPPER('vendors');
```

Returns the numeric value 18 (starting position of the second occurrence of the string 'world')

Example 4

```
SELECT * FROM SYSTEM.TABLE  
WHERE NAME = LTRIM ('?* ', 'VENDORS????*')  
AND OWNER = 'PURCHDB';
```

Returns the system table entry for PURCHDB.VENDORS

Example 5

```
SELECT TRIM (BOTH '?*' FROM '????*hello ?* world????*')  
FROM SYSTEM.TABLE  
WHERE NAME = 'VENDORS';
```

Returns 'hello?* world'.

Features in ALLBASE/SQL Version G2 and Later

ALLBASE/SQL, version G2, contains several major enhancements providing significant benefits in the following areas:

- Security
- Year 2000 compatibility
- CAST function (introduced in G1.15)

In addition, the following manuals were updated to fully document G1 and G2 features:

- *ALLBASE/SQL Reference Manual*
- *ALLBASE/SQL Database Administration Guide*
- *ALLBASE/SQL Message Manual*

Security

Two new authorities have been added to the G2 release of ALLBASE/SQL: `MONITOR` and `INSTALL`. These new authorities can be granted to users using the `GRANT` command, or can be revoked from users using the `REVOKE` command.

MONITOR Authority

`MONITOR` authority gives a user the ability to run `SQLMON`, an on-line diagnostic tool that monitors the activity of an ALLBASE/SQL DBEnvironment. Before this new authority, `SQLMON` could only be run by the creator of the DBEnvironment (also known as the DBECreator), someone who knows the maintenance word (maintword), or someone who has superuser capability. See the *ALLBASE/SQL Reference Manual* for more details.

INSTALL Authority

`INSTALL` authority gives a user the ability to use the SQL preprocessors to create an SQL module owned by someone other than themselves, or to use ISQL to install a module owned by someone other than themselves. This is an important capability for those needing to move modules from a development DBEnvironment to a production DBEnvironment. Before this new authority, only a DBA had this ability. See the *ALLBASE/SQL Reference Manual* for more details.

Year 2000 Compatibility

As the end of the century quickly approaches, there has been much concern about dates being handled correctly in the twenty-first century. This is particularly an issue for systems and applications that are using a two-digit year to express dates. ALLBASE/SQL has always stored dates in a four-digit year format which largely eliminates the year 2000 compatibility problem. ALLBASE/SQL applications can be coded using four-digit year dates, thus avoiding any ambiguity. However, for existing applications that may allow dates to be entered using a two-digit year format, there is still an issue as to how these dates get converted to the ALLBASE/SQL internal format using the `TO_DATE` function or `TO_DATETIME`. For example, what date value would the following functions return?

```
TO_DATE('12/31/35','MM/DD/YY')  
TO_DATETIME('351231235959','YYMMDDHHMISS')
```

Would these functions evaluate the year as 1935 or 2035?

Solution

When `YY` is specified in the format specification of either `TO_DATE` or `TO_DATETIME`, and if its value of the year specified is less than 50, then the century part of the `DATE` or `DATETIME` defaults to 20, otherwise it is set to 19. This behavior can be overridden by setting the `JCW HPSQLsplitcentury` to a value between 0 and 100. If the year specified is less than the value of the `JCW HPSQLsplitcentury` then the century part is set to 20, otherwise it is set to 19.

For the above example,

Case 1: `HPSQLsplitcentury` is not set

```
TO_DATE('12/31/35','MM/DD/YY') = 2035-12-31
```

```
TO_DATETIME('351231235959','YYMMDDHHMISS') = 2035-12-31 23:59:59
```

Case 2: HPSQLsplitcentury is set to 0

```
TO_DATE('12/31/35','MM/DD/YY') = 1935-12-31
```

```
TO_DATETIME('351231235959','YYMMDDHHMISS') = 1935-12-31 23:59:59
```

Case 3: HPSQLsplitcentury is set to 70

```
TO_DATE('12/31/35','MM/DD/YY') = 2035-12-31
```

```
TO_DATETIME('351231235959','YYMMDDHHMISS') = 2035-12-31 23:59:59
```

CAST Function

With the G1.15 release and later, the CAST function enhancement for ALLBASE/SQL and IMAGE/SQL became available to customers. The CAST function is used to explicitly convert data from one data type to another. The CAST function not only allows conversion between compatible data types, such as between CHAR and BINARY or between INTEGER and DECIMAL, but it will also allow conversion between certain normally incompatible types, such as between CHAR and INTEGER.

The CAST function is defined in the ANSI SQL2 standard. CAST in ALLBASE/SQL and IMAGE/SQL complies with that standard. In addition, several extensions to the standard specification have been added to make CAST even more powerful.

The CAST function can be used anywhere a general expression is allowed. Also, as a part of this enhancement, the SQL parser has been enhanced to allow general expressions in more of the SQL syntax. For example, general expressions including nested functions are now allowed in all the date/time functions and string functions. Therefore, CAST will be supported inside functions that support expressions including aggregate functions. CAST will also take general expressions including nested functions as input.

CAST Syntax

```
{CAST ({Expression NULL}{AS,}DataType[,FormatSpec] )}
```

Parameters

Expression Column, USER function, host variable, local variable, AddMonths function, aggregate function, date/time conversion function, dynamic parameter, or procedure parameter, constant, current function, long column function, string function, or any combination of these in an arithmetic or concatenation expression.

DataType ALLBASE/SQL data type: CHAR(*n*), VARCHAR(*n*), DECIMAL(*p*[,*s*]), FLOAT, REAL, INTEGER, SMALLINT, DATE, TIME, DATETIME, INTERVAL, BINARY(*n*), VARBINARY(*n*).

The LONG BINARY(*n*) and LONG VARBINARY(*n*) cannot be used in the CAST operations.

FormatSpec Format specification used for DATE, TIME, DATETIME, INTERVAL conversions. *FormatSpec* is the same as that used in the date/time conversion functions. See the *ALLBASE/SQL Reference Manual* for more details.

Year 2000 Web Page

For up-to-date information on the state of year 2000 readiness for specific HP products, refer to the web page, "HP Year 2000 Program," at the following URL:

<http://www.hp.com/year2000>

Year 2000 Enhancements for MPE/iX

by *M Gopalakrishnan*
Commercial Systems Division

Overview

Release 5.5 PowerPatch 5 and later of MPE/iX provides enhancements to the operating system for the year 2000 and beyond. The enhancements include the enhancements to the operating system commands, utilities, VPLUS and databases. This article explains the enhancements.

Background

The year 2000 issues stem from the ability to handle correctly the year 2000 and beyond. This is particularly an issue for systems and applications that are using a two-digit year to express dates. There are a few commands, utilities, and databases in MPE/iX which were designed to handle two-digit years and these had to be enhanced to support year 2000 and beyond.

The year 2000 is a leap year, and this also had to be addressed. The MPE/iX operating system uses the Gregorian calendar and its definition of leap year: any year that is exactly divisible by 400, or that is exactly divisible by 4 and not exactly divisible by 100.

Two-Digit Years Interpretation

One of the ways for handling two-digit year input is to interpret the years in the method called fixed window method. In this method, the two-digit years map as follows:

- 00 ... 49 maps to 2000 ... 2049
- 50 ... 99 maps to 1950 ... 1999

For example, both of the following `STREAM` commands will schedule the `JOBFILE` as January 21, 2001:

```
:STREAM JOBFILE;DATE=01/21/2001
```

```
:STREAM JOBFILE;DATE=01/21/01
```

Intrinsics

The `CALENDAR` intrinsic and `CALENDAR` date representation format are widely used in MPE/iX. There are many other intrinsics that accept or return dates in calendar format. The following discussion clarifies the interpretation of calendar format year value.

CALENDAR Intrinsic

The `CALENDAR` intrinsic returns the `CALENDAR` date, including the day of year and the year of century. The existing `CALENDAR` intrinsic documentation refers to the year as “year of century.” This should be interpreted as “year since 1900.”

The new definition of the `CALENDAR` intrinsic is as follows:

```
U16
date:=CALENDAR;
```

where *date* is a 16-bit unsigned integer (assigned functional return).

This returns the `CALENDAR` date in the following format:

Table 5-3.

Bits	Value/Meaning
7:9	day of year
0:7	year since 1900

Description

For the year 2000, the `CALENDAR` intrinsic will return the year as 100, for 2001 as 101, and so on. With this current interpretation, `CALENDAR` format can handle years through 2027.

All intrinsics accepting or returning dates in `CALENDAR` format will behave the same way as the `CALENDAR` intrinsic.

NOTE If your application uses the `CALENDAR` intrinsic or `CALENDAR` format, it may be required to verify the source for conformance to the above interpretation.

HPFOPEN/FOPEN Intrinsic

HPFOPEN item 31 (labeled tape expiration parameter) and FOPEN (*formmsg* label tape parameter) will accept both two- and four-digit years as the labeled tape expiration date. This is the same as the `FILE` command expiration date parameter. For an interpretation of two-digit years, refer to the section, “Two-Digit Years Interpretation,” in this article.

New Date Intrinsics

Release 5.5 PowerPatch 5 of MPE/iX has new intrinsics added to manipulate dates in various formats. For more information, refer to the article, “New Date Intrinsics for MPE/iX,” in the *Read Before Installing*.

Commands

The following commands are enhanced to support both two- and four-digit years. For an interpretation of two-digit years, refer to the section, “Two-Digit Years Interpretation.” New syntax for the commands with parameters accepting years follows:

- `STREAM` command

```
:STREAM jobname;DATE=datespec
```

where *datespec* is the date for streaming the job in the format *mm/dd[yy]yy*. If omitted, the current date is used.

- `FILE` command

```
:FILE [;LABEL=[[valid][,[IBM][,[expdate][,seq]]]]]
      [ [ [ANS] ] ] ]
```

where *expdate* is the expiration date in the format *mm/dd/[yy]yy*.

- SETCLOCK command

```
:SETCLOCK ;DATE=datespec
```

where *datespec* is the local date in the form *mm/dd/[yy]yy*.

- LISTSPF/SPOOLF command

```
:LISTSPF/SPOOLF ;SELEQ=[DATE=mm/dd/[yy]yy]
```

- STORE command

```
:STORE [ {;DATE<=accddate}
        [ {;DATE>=moddate} ]
```

where *accddate* and *moddate* are the accessed and modified dates in the form *mm/dd/[yy]yy*.

CI Variables

The available HPYEAR variable is corrected to return the last two digits of the current system year, and a new CI variable is added to have the four-digit current system year.

Existing variable:

HPYEAR is a global variable used by the CI that shows the last two digits of the current year; the initial value is the year at logon. Type= R I

For example, HPYEAR will have 0 for year 2000 and 5 for year 2005.

New four-digit year variable:

HPYYYY is a global variable used by the CI that shows the current year; the initial value is the year at logon. Type= R I

For example, for year 2000, HPYYYY will have 2000.

HPSPILITYEAR is a global variable used by the CI that shows the current century split year; the initial value is 50. Type=W I

This variable is used in the new date intrinsics to manipulate dates in various formats.

Utilities

CLKUTIL and START utilities/commands available in ISL (Initial System Loader) are enhanced to accept dates both in two- and four-digit years.

VPLUS

VPLUS version B.06.07 (and later) contains enhancements to handle the year 2000 and beyond in applications. Refer to the article, "Year 2000 and Other Enhancements in VPLUS," in this *Communicator 3000*.

HP MPE/iX Databases

The ALLBASE/SQL functions `TO_DATE` and `TO_DATETIME` are enhanced to handle two-digit years appropriately. For more information, refer to the article, “New Features in ALLBASE/SQL Version G3,” in this *Communicator 3000*.

In SQLUtil, the `SETUPRECOVERY` command is used for roll-forward recovery. `SETUPRECOVERY` accepts two-digit years as part of the date specification. These two-digit years are interpreted as discussed in the section, “Two-Digit Years Interpretation,” in this article.

New Date Intrinsic for MPE/iX

by *M Gopalakrishnan*
Commercial Systems Division

Release 5.5 PowerPatch 5 and later of the MPE/iX operating system has enhanced intrinsic for handling date formats. These intrinsic are targeted to support widely used existing date formats in MPE/iX and three new date formats.

The date intrinsic are broadly categorized as follows:

- `HPDATECONVERT`—Converting dates from one supported format to another.
- `HPDATEFORMAT`—Converting the supported format dates to the display formats desired by the user.
- `HPDATEDIFF`—Determining the number of days that separate two given dates.
- `HPDATEOFFSET`—Adding/subtracting an offset (days) to/from the given date.
- `HPDATEVALIDATE`—Validating the given date for conformance to supported date format.
- `HPCALENDAR`, `HPFMTCALENDAR`—Using the new 32-bit `HPCALENDAR` format.

The following sections discuss various date formats and syntax and semantics of new date intrinsic. COBOL and Pascal programs using these intrinsic are provided as examples.

Existing Date Formats

Existing date formats that are widely used are summarized in the following table, “Existing Date Formats.” The column “Sortable?” indicates whether the dates can be sorted (either numerically or lexicographically depending on how they are stored). The last column “Y2K Ready?” indicates whether dates in the format under consideration can be used to represent dates beyond 1999-12-31. The column “#Bytes” represents the number of bytes required to store the date format.

Table 5-4. Existing Date Formats

Storage Type	# Bytes	Explanation	Sortable?	Y2K Ready?
<code>longint</code> ^a	8	Microseconds since 1970-01-01 (MPE time-stamp)	yes	yes
<code>integer</code>	4	Upper 2 bytes: year next byte: month of year bottom byte: day of month	yes	yes
<code>integer</code>	4	Upper 2 bytes: year bottom 2 bytes: day of year	yes	yes
<code>integer</code>	4	Seconds since 1970-01-01	yes	yes

Table 5-4. Existing Date Formats

Storage Type	# Bytes	Explanation	Sortable?	Y2K Ready?
		(POSIX.1 time() format; valid through 2038-01-18)		
shortint	2	Upper 7 bits: #years since 1900 Lower 9 bits: day of the year (CALENDAR format; valid up to 2027-12-31)	yes	yes
integer	4	YYMMDD date	yes	no
integer	4	MMDDYY date	no	no
integer	4	DDMMYY date	no	no
ASCII ^b	6	YYMMDD date	yes	no
ASCII	6	MMDDYY date	no	no
ASCII	6	DDMMYY date	no	no
ASCII	6	YYMMDD date YY:MM3000 date ^c	yes	yes
ASCII	6	MMDDYY date YY:MM3000 date	no	yes
ASCII	6	DDMMYY date YY:MM3000 date	no	yes

- a. "integer" and "longint" are binary values.
- b. "ASCII" means ASCII character code.
- c. MM3000 dates are represented as in the MM3000 product which used the ASCII letters "A" - "Z" for decades starting with the year 2000.

New Date Formats

Three new date formats are listed in the table, "HP Standard Formats." The first format is an integer representation of the ISO 8601 date format. The second is an ASCII representation of the same. The last date format is an extension of the existing 16-bit CALENDAR date format to a 32-bit format. These date formats are referred to as "HP Standard Formats."

Table 5-5. HP Standard Formats

Storage Type	# Bytes	Explanation	Sortable?	Y2K Ready?
integer	4	YYYYMMDD date	yes	yes
ASCII	8	YYYYMMDD date	yes	yes
integer	4	Upper 23 bits: #years since 1900 Bottom 9 bits: day of the year. (Extension of the existing CALENDAR format.)	yes	yes

Supported Date Formats

The “HP Standard Formats” and “Existing Date Formats” are combined in the following table, “Supported Date Formats.” Each date format is assigned a date type code. The date intrinsics support these date formats and date type codes.

Table 5-6. Supported Date Formats

Date Type Code	Storage Type	# Bytes	Explanation	Sortable?	Y2K Ready?
1	longint	8	MPE time-stamp (microseconds since 1970-01-01)	yes	yes
2	integer	4	Upper 2 bytes: year next byte: month of year bottom byte: day of month	yes	yes
3	integer	4	Upper 2 bytes: year bottom 2 bytes: day of year	yes	yes
4	integer	4	Upper 23 bits: #years since 1900 bottom 9 bits: day of the year. (analogous to the existing CALENDAR format.)	yes	yes
10	integer	4	Seconds since 1970-01-01 (POSIX.1 time() format; valid through 2038-01-18)	yes	yes
14	shortint	2	Upper 7 bits: #years since 1900 Lower 9 bits: day of the year (CALENDAR format; valid up to 2027-12-31)	yes	yes
15	integer	4	YYMMDD date	yes	no
16	integer	4	MMDDYY date	no	no
17	integer	4	DDMMYY date	no	no
18	integer	4	YYYYMMDD date	yes	yes
25	ASCII	6	YYMMDD date	yes	no
26	ASCII	6	MMDDYY date	no	no
27	ASCII	6	DDMMYY date	no	no
35	ASCII	6	YYMMDD date YY:MM3000 date ^a	yes	yes
36	ASCII	6	MMDDYY date YY:MM3000 date	no	yes

Table 5-6. Supported Date Formats

Date Type Code	Storage Type	# Bytes	Explanation	Sortable?	Y2K Ready?
37	ASCII	6	DDMMYY date YY:MM3000 date	no	yes
38	ASCII	8	YYYYMMDD date	yes	yes

a. MM3000 dates are represented as in the MM3000 product which used the ASCII letters "A" - "Z" for decades starting with the year 2000.

Special Date Values

Special date values to represent UNKNOWN, INVALID, NEVER, NEEDED, EXPIRED, and ILLEGAL dates are defined for dates in "HP standard formats." The following table captures this date value information. The other date formats have been in existence for some time and hence the special date values are not defined for them. These special dates, when passed to the HPDATEFORMAT intrinsic, will result in a corresponding output string. For example, passing "00000103" to HPDATEFORMAT will result in the output string: "NEEDED".

When special dates are passed to HPDATECONVERT, HPDATEOFFSET, and HPDATEDIFF intrinsics as input dates, an error status is returned and the output date is initialized to a binary zero value or a blank string, depending on the date type of the output date.

Table 5-7. Special Date Values

Data Type	Format	Un-known	Invalid	Never	Needed	Expired	Illegal
4	YYYYDDD	0	0000367	0000368	0000369	0000370	0000371
18	YYYYMMDD	0	00000101	00000102	00000103	00000104	0000105
38	YYYYMMDD	"blank"	"0000010"	"00000102"	"00000103"	"00000104"	"0000105"

New Date Intrinsic

The date intrinsics support dates in the range 0001-01-01 through 9999-12-31. They use the Gregorian calendar for all calculations beyond 1753. The calendar followed by the intrinsics ignores the fact that calendars in different countries changed at different times and some dates were dropped from the calendar (around the year 1753). The validity of dates prior to 1753 cannot be guaranteed. All intrinsics accept byte-aligned input/output date parameters, and all these intrinsics are NM callable.

On an error, the intrinsics initialize the output parameters to either a binary zero or a blank string depending on the type of the parameter.

Though the date type "4" can represent years beyond 9999, a year beyond 9999 (which needs five digits/characters) is considered an error.

It is recommended that character array based output date parameters are initialized to blanks before passing them as arguments to these intrinsics.

New errors and warnings are documented in the System Message Catalog, SYSCAT.PUB.SYS, under the date intrinsic subsystem number 529.

HPDATECONVERT

This intrinsic converts the dates from one supported format to another.

Syntax

```

                I32V      *      I32V      *      I32  I32V
HPDATECONVERT(inputcode, inputdate, outputcode, outputdate, status, cutoff)
    
```

Parameters

- inputcode* is a 32-bit signed integer by value.
The value should be one of the date type codes listed in the table, "Supported Date Formats."
- inputdate* varies for type by reference.
The interpretation depends upon the value of *inputcode*. See the table, "Supported Date Formats," for the supported date codes and their layouts.
- outputcode* is a 32-bit signed integer by value.
The value should be one of the date type codes listed in the table, "Supported Date Formats."
- outputdate* returns the date as per the format chosen by the *outputcode* parameter.
See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- status* is the HPE_STATUS parameter through which the error codes are returned.
A value of 0 indicates no error and no warnings.
- cutoff* is a 32-bit signed integer by value (optional).
This is used in validating the input parameter when the input date has two-digit year. This is a required parameter for dates with two-digit years. In all other cases, this parameter is ignored.
If the *cutoff* parameter is given as -1, the value of the CI environment variable HPSPLITYEAR is used as the cutoff year.
This parameter's value should be in the range 0 .. 100. If the value of the parameter is 50, two digit years in the range 0 .. 49 will translate to 200 .. 2049 and those in the range 50 .. 99 will be translated to 1950..1999. If you specify the *cutoff* year as 70, the mapping will be 0 .. 69 as 2000 .. 2069 and 70 .. 99 as 1970 .. 1999.

HPDATEFORMAT

You can use this routine to format the dates that can be combinations of display formats as explained below. Many of these elements are taken from ALLBASE/SQL date formats.

You can convert dates in the "Supported Date Formats" to a display string of your choice (with restrictions). The HPDATEFORMAT intrinsic will accept these format strings. The

format specification strings can have the following syntax:

Syntax

[{*FormatElement*} {*Punctuation*}]

Table 5-8. Valid Parameters for *FormatElement*

CC	Century (01 to 99)
YYYY	Year (0001 to 9999)
YY	Year of century (00 to 99) with leading zeros suppressed (0 to 99)
Q	Calendar quarter of the year (1 to 4)
MM	Month of the year (01 to 12)
ZMM	Month of the year with leading zeros suppressed (1 to 12)
DD	Day of the month (01 to 31)
ZDD	Day of the month with leading zero suppressed (1 to 31)
DDD	Day of the year (001 to 366).
ZDDD	DDD with leading zeros suppressed (1 to 366)
D	Day of the week (1 to 7 where Sunday is 1, Monday is 2,...)
WW	Week of the year (01 to 53)
ZWW	Week of the year with leading zero suppressed (1 to 53)
Mon	Month of the year in ASCII format (Jan, Feb,...)
Day	Day of the week in ASCII format (Sun, Mon,...)
MON	Month of the year in ASCII (uppercase) format (JAN, FEB,...)
DAY	Day of the week in ASCII (uppercase) format (SUN, MON,...)

Table 5-9. Valid Characters for *Punctuation*

-	Hyphen
/	Slash
.	Dot
	Blank
,	Comma
	Null (or no delimiter)

Thus, YYYY.MON.DAY, YY/MM/DD, DDMONYY, and DD-ZMM-YYYY are valid date formats. For example, “31 Jan 1997” when formatted through DD-ZMM-YYYY results in “31-1-1997,” formatted through YYYY.MON.DAY results in “1997.JAN.FRI,” while YYYYMMDD results in “19970131.”

NOTE Mixing the NULL punctuation character with other punctuation characters is *not* allowed. Thus, YYYY/MM/DD is a valid format, while YYYYMM/DD is not. *fmtdate* parameter is length of *formatspec* parameter including the null termination character.

Syntax

```

          I32V      *          CA          CA      I32      I32      I32V
HPDATEFORMAT(datecode, inputdate, formatspec, fmtdate, fmtdatelen, status, cutoff)
    
```

Parameters

- datecode* is a 32-bit signed integer by value.
This value should be one of the date type codes listed in the table, "Supported Date Formats."
- inputdate* is the input date.
The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- formatspec* is a character array (required).
This should be a NULL terminated string as per the syntax explained above in the table, "Format Specification Strings."
- fmtdate* is a character array (required).
This array size should be at least that of *formatspec*. On return, it will contain the date formatted as per the *formatspec*.
If an invalid date is passed, on return from the intrinsic its contents will be UNKNOWN. For the "HP Standard Formats," if special values in the table, "Special Date Values," are passed for date parameter, on return from the intrinsic, the value of the string will be appropriately initialized. For example, for the date type 18, the initialized values for different special date values are as follows:

Table 5-10.

Date Value	Returned Contents
00000000	"UNKNOWN"
00000101	"INVALID"
00000102	"NEVER"
00000103	"NEEDED"
00000104	"EXPIRED"
00000105	"ILLEGAL"

If the character array passed does not have enough space to hold the

- special values or the formatted date, the behavior is undefined.
- fmtdate**len* is a 32 bit integer by reference (required).
On input, it is the length of the *formatspec* parameter.
On return, it represents the number of characters HPDATEFORMAT placed into *fmtdate*.
- status* is the HPE_STATUS parameter through which the error codes are returned. A value of 0 indicates no error and no warnings.
- cutoff* is a 32-bit signed integer by value (optional).
This is used in validating and converting from two-digit to four-digit years. (See HPDATECONVERT documentation for more information on the *cutoff* parameter).

HPDATEDIFF

This intrinsic determines the number of days that separate two given dates.

Syntax

```
HPDATEDIFF(I32Vdatecode, *firstdate, *seconddate, I32diffindays, I32status, I32Vcutoff)
```

Parameters

- datecode* is a 32-bit signed integer by value.
This value should be one of the date type codes listed in the table, "Supported Date Formats."
- firstdate* is the first input date. The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- seconddate* is the second input date. The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- diffindays* is the number of days difference between the two dates, computed as: *seconddate* minus *firstdate*. Thus, if *seconddate* is earlier than *firstdate*, *diffindays* will be negative.
- status* is the HPE_STATUS parameter through which the error codes are returned. A value of 0 indicates no error and no warnings.
- cutoff* is a 32-bit signed integer by value (optional).
This is used in validating and converting the two-digit years to four-digit years before computing the difference. (See HPDATECONVERT documentation for more information on *cutoff* parameter.)

HPDATEOFFSET

This intrinsic adds or subtracts a specified offset to or from the given date.

Syntax

```
I32V      *      I32V      *      I32  I32V
HPDATEOFFSET(datecode, inputdate, offset, outputdate, status, cutoff)
```

Parameters

- datecode* is a 32-bit signed integer by value
This value should be one of the date type codes listed in the table, "Supported Date Formats."
- inputdate* is the input date. The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- offset* is a 32-bit signed integer by value.
The number of days to be added to the input date. A negative value will result in a subtraction.
- outputdate* is the output date. The result of the date offset operation. The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- status* is the HPE_STATUS parameter through which the error codes are returned. A value of 0 indicates no error and no warnings.
- cutoff* is a 32-bit signed integer by value (optional).
This is used in validating and converting the two-digit years to four digit ones before computing the difference. (See HPDATECONVERT documentation for more information.)

HPDATEVALIDATE

This intrinsic checks the validity of the given date with respect to the supported formats given in the table, "Supported Date Formats."

Syntax

```
I32      I32V      *      I32V
result := HPDATEVALIDATE(datecode, inputdate, cutoff)
```

Parameters

- datecode* is a 32-bit signed integer by value.
This value should be one of the date type codes listed in the table, "Supported Date Formats."
- inputdate* is the input date.
The interpretation depends upon the value of *datecode*. See the table, "Supported Date Formats," for the supported datecodes and their layouts.
- cutoff* is a 32-bit signed integer by value (optional).

This is used in validating dates with two digit years. (See HPDATECONVERT documentation for more information on *cutoff* parameter).

result is a 32-bit signed integer (assigned functional return).

This value will be 0 if the *inputdate* conforms to the date format represented by *datecode*. If it is not so, its value will be positive. If an error has occurred in evaluating the conformance, its value will be negative. This return value ranges from -999 to 1.

HPCALENDAR

The new HPCALENDAR intrinsic returns the date in the supported date type code 4 listed in the table, "Supported Date Formats." (This is also a HP standard format.)

Syntax

```
I32
date := HPCALENDAR ;
```

where *date* is the 32-bit unsigned integer (assigned functional return).

This returns the calendar date in the following format:

Table 5-11.

Bits	Value/Meaning
23:9	Day of year
0:23	Year since 1900

HPFMTCALENDAR

This a new routine to handle HPCALENDAR format. It does the same job as FMTCALENDAR except that it accepts the 32-bit integer returned by HPCALENDAR intrinsic.

Syntax

```
I32V CA
HPFMTCALENDAR(date, formatdate)
```

Parameters

date is a 32-bit signed integer by value

This holds the calendar date, in the same format as the HPCALENDAR intrinsic (that is, date type 4).

formatdate returns the formatted calendar date in a 17-character array. If the day of the month is less than 10, a blank precedes it. For example,

```
FRI, JAN 6, 1989
```

Examples

Following are two examples:

- The Pascal program example uses most of the new date intrinsics.
- The COBOL program example uses the HPDATECONVERT intrinsic.

Pascal Example of New Date Intrinsic

```

$standard_level 'hp_modcal'$

Program dateintr(input,output);

    {Constants for the different date types.}
const
    hp_dt_mpe_time_stamp_fmt      = 1;
    hp_dt_packed_yymmdd_fmt      = 2;
    hp_dt_packed_yydddd_fmt      = 3;
    hp_dt_new_calendar_fmt       = 4;

    hp_dt_posix_time_stamp_fmt   = 10;

    hp_dt_calendar_fmt           = 14;
    hp_dt_int_yymmdd_fmt         = 15;
    hp_dt_int_mmddyy_fmt         = 16;
    hp_dt_int_ddmmyy_fmt         = 17;
    hp_dt_int_yyyymmdd_fmt       = 18;

    hp_dt_ascii_yymmdd_fmt       = 25;
    hp_dt_ascii_mmddyy_fmt       = 26;
    hp_dt_ascii_ddmmyy_fmt       = 27;

    hp_dt_mm3000_yymmdd_fmt      = 35;
    hp_dt_mm3000_mmddyy_fmt      = 36;
    hp_dt_mm3000_ddmmyy_fmt      = 37;
    hp_dt_ascii_yyyymmdd_fmt     = 38;

    {Type definitions for the program}
type
    pac_20      = packed array [1..20] of char;
    iptr_type   = ^integer;

VAR
    date2_pac      : pac_20;          {Dates in packed character arrays.}
    fmt_pac        : pac_20;
    print_pac      : pac_20;

    cutoff         : integer;        {To represent cutoff date.}
    date1          : integer;        {Working dates.}
    date1_18       : integer;
    date2_18       : integer;
    date3_18       : integer;
    i              : integer;        {temp variables.}
    inptype        : integer;
    j              : integer;
    outtype        : integer;
    print_len      : integer;        {Length of formatted date.}
    temp_date      : integer;        {Another temp variable}

    status         : integer;

```

```

function HPCALENDAR : integer; intrinsic;
procedure HPFMTCALENDAR; intrinsic;
function HPDATEVALIDATE : integer; intrinsic;
procedure HPDATEFORMAT ; intrinsic;
procedure HPDATECONVERT ; intrinsic;
procedure HPDATEOFFSET ; intrinsic;
procedure HPDATEDIFF ; intrinsic;

begin
  {Initialize the variables.}
  cutoff := 50;
  inptype := hp_dt_int_ddmmyy_fmt;

  date2_pac := '960121'; {The YYMMDD date in Supported format '25'.}
  date1     := 230196;   {The DDMMYY date in Supported format '17'.}

  {conversion from one non standard formatto another}
  HPDATECONVERT(inptype,date1,hp_dt_ascii_yymmdd_fmt,fmt_pac,
                status,cutoff);
  if( status <> 0) then
    writeln('HPDATECONVERT intrinsic returned error',status);

    {Convert 'date1' to the YYYYMMDD integer format. With 50}
    {as the cutoff year.}
    outtype := hp_dt_int_yyyymmdd_fmt;
    HPDATECONVERT(inptype,date1,outtype,date1_18,status,cutoff);
    if( status <> 0) then
      writeln('HPDATECONVERT intrinsic returned error',status);

    {Convert the 'date2_pac' to a YYMMDD integer format.}
    {Default cutoff is assumed (i.e., 50)}
    HPDATECONVERT(hp_dt_ascii_yymmdd_fmt,date2_pac,
                  outtype,date2_18,status);
    if( status <> 0) then
      writeln('HPDATECONVERT intrinsic returned error',status);

    {compute the difference between the two dates}
    HPDATEDIFF(outtype, date1_18,date2_18,temp_date,status,cutoff);

    if( temp_date < 0) then
      writeln(date1,' is #',temp_date,
              'days later compared to ',date2_pac)
    else if (temp_date > 0) then
      writeln(date2_pac,' is #',temp_date,
              'days later compared to ',date1)
    else writeln(date1,' is same as ',date2_pac);

    {offset date1_18 by the difference to get the }
    {value of date2_18 through HPDATEOFFSET intrinsic.}
    HPDATEOFFSET(outtype,date1_18,temp_date,date3_18,status,cutoff);
    if( (date3_18 <> date2_18 ) and (status = 0)) then
      writeln('Error Malfunction of HPDATEOFFSET intrinsic');

    {Use the flexibility in converting the date to a display }
    {string. Use '#0' to NULL terminate the format }

```

```

        {specification string.                                }
fmt_pac := 'YY.ZMM.ZDD'#0;
print_len := 11; { 11 characters including #0 in fmt_pac }
HPDATEFORMAT(outtype,datel_18,fmt_pac,print_pac,print_len,status);
if( status <> 0) then
    writeln('HPDATEFORMAT intrinsic returned error',status);

writeln('The converted date is: ',print_pac);

        {The following demonstrates how a byte array can be      }
        {passed in place of an integer. We are storing the      }
        {integer 230196 in a packed array of characters, which is}
        {an equivalent of a byte array. We subsequently cast the }
        {address of this array to an integer pointer to read the }
        {integer value out of it.                                }
HPDATECONVERT( hp_dt_int_yyyyymmdd_fmt,datel_18,
    hp_dt_int_ddmmyy_fmt,fmt_pac,status);

$push, type_coercion 'storage'$
if( iptr_type (addr(fmt_pac))^ = datel ) then
    writeln( 'Program worked fine! ')
else writeln( 'Error, in using byte array parameters !');
$pop$

end.

```

The expected output from the program is:

```

230196 is #      2days later compared to 960121
The converted date is : 96.1.23
Program worked fine!

```

COBOL Example of HPDATECONVERT

```

IDENTIFICATION DIVISION.
PROGRAM-ID.    DATEINTR.
REMARKS. SAMPLE PROGRAM USING DATE INTRINSICS
DATA DIVISION.
WORKING-STORAGE SECTION.
*Date code for YYMMDD is 25, for YYYYMMDD is 38
01 INDATE-CODE          PIC S9(9) VALUE 25.
01 OUTDATE-CODE        PIC S9(9) VALUE 38.
01 SPLITYEAR           PIC S9(9) VALUE 70.
01 OUTDATE-YYYYMMDD    PIC X(8) VALUE SPACES.
01 INDATE-YYMMDD       PIC X(6) VALUE SPACES.
01 STATUS-VAR.
    05 S-INFO           PIC S9(4) COMP VALUE 0.
    05 S-SUBSYS        PIC S9(4) COMP VALUE 0.

PROCEDURE DIVISION.
CONVERT-DATE-PARA.
    DISPLAY 'Enter the date in YYMMDD format:'
    ACCEPT INDATE-YYMMDD
    CALL INTRINSIC "HPDATECONVERT" USING
        INDATE-CODE
        INDATE-YYMMDD
        OUTDATE-CODE

```

```
                                OUTDATE-YYYYMMDD
                                STATUS-VAR
                                SPLITYEAR

IF S-INFO NOT = 0
    PERFORM DISPLAY-ERROR
ELSE
    DISPLAY "Convert Date in YYYYMMDD = " OUTDATE-YYYYMMDD
END-IF
STOP RUN.

DISPLAY-ERROR.
DISPLAY "HPDATECONVERT FAILED. ERROR = " S-INFO.
```

Year 2000 and Other Enhancements in VPLUS

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Introduction

This article provides information on the following VPLUS enhancements available in version B.06.07.

- Turn-of-century enhancement
- Ability to define default Field Type and Data Type for a Form
- Ability to define more than 52 single character fields per Form
- New intrinsics to get and set Save Field values programmatically
- Ability to Renumber a Form with Interactive FORMSPEC

A description of these features follows.

Turn-of-Century Enhancement

VPLUS version B.06.07 contains enhancements to handle Year 2000 and beyond in applications. These enhancements can be grouped into three segments as follows:

- Intrinsic enhancements
- FORMSPEC enhancements
- Processing enhancements

Intrinsic Enhancements

Two new intrinsics have been added to VPLUS to handle dates in the next century. These are VGETYYYYMMDD and VPUTYYYYMMDD. These intrinsics are similar in structure and function to the existing intrinsics VGETYYMMDD and VPUTYYMMDD respectively. The difference is that the date values handled by the new intrinsics contain 4-digit year components.

Intrinsic VGETYYYYMMDD

Converts data in the data buffer to a eight-byte character value and copies it to an application.

Syntax

```
VGETYYYYMMDD {comarea, fieldnum, variable}
```

Parameters

comarea must be *comarea* name specified when the forms file was opened with VOPENFORMF. If not already set, the following *comarea* items must be set before calling VGETYYYYMMDD:

cstatus set to zero.

comarealen set to total number of two-byte words in *comarea*. Must be at least 70 words in length.

VGETYYYYMMDD may set the following *comarea* item:

cstatus set to nonzero value if call is unsuccessful or requested field has an error.

fieldnum is a two-byte integer variable which specifies the number assigned to the field by FORMSPEC

variable is a character string in the application into which the converted value is placed

Discussion

VGETYYYYMMDD transfers the contents of the field specified by *fieldnum* to a variable in an application. The contents of the field are stored in a data buffer from which the value is taken. This value is converted to YYYYMMDD format and the converted value is placed in the application variable. The YYYYMMDD format is an 8-byte ASCII value, for example, 19961225.

If errors occur during conversion, *cstatus* is set to an error code. If the requested field has an error, its value is moved to the variable but *cstatus* is set to an error code.

Refer to the VGETtype intrinsic description in the *Data Entry and Forms Management System VPLUS Reference Manual* for related information.

Example

```
COBOL  
CALL "VGETYYYYMMDD" USING COMAREA FIELDNUM VARIABLE .
```

```
SPL  
VGETYYYYMMDD ( COMAREA , FIELDNUM , VARIABLE ) ;
```

These calls will convert the contents of the data buffer corresponding to the field specified by FIELDNUM and place the converted value into VARIABLE.

Intrinsic VPUTYYYYMMDD

Converts a numeric value representing a date from an application and copies the converted value to a field in the data buffer in memory.

Syntax

```
VPUTYYYYMMDD { comarea, fieldnum, variable }
```

Parameters

comarea must be *comarea* name specified when the forms file was opened with VOPENFORMF. If not already set, the following *comarea* items must be set before calling VPUTYYYYMMDD:

cstatus set to zero.

comarealen set to total number of two-byte words in *comarea*. Must be at least 70 words in length.

VGETYYYYMMDD may set the following *comarea* item:

<i>cstatus</i>	set to nonzero value if call is unsuccessful or requested field has an error.
<i>numerrs</i>	may be decremented if the new value replaces the value of a field with an error.
<i>fieldnum</i>	is a two-byte integer variable which specifies the number assigned to the field by FORMSPEC.
<i>variable</i>	is a character string in the application which contains the value to be converted.

Discussion

VPUTYYYYMMDD converts the contents of the application variable to the date order of the field specified by *fieldnum* and copies the converted value into the corresponding field in the data buffer, right justified. The application variable should contain a numeric value in YYYYMMDD format. The YYYYMMDD format is an 8-byte ASCII value, for example, 19961225. If errors occur during conversion, *cstatus* is set to an error code.

Refer to the VPUTtype intrinsic description in the *Data Entry and Forms Management System VPLUS Reference Manual* for related information.

Example

```
COBOL
CALL "VPUTYYYYMMDD" USING COMAREA FIELDNUM VARIABLE.
```

```
SPL
VPUTYYYYMMDD ( COMAREA , FIELDNUM , VARIABLE ) ;
```

These calls will convert the contents of VARIABLE to a date value and place the converted value in the data buffer corresponding to the field specified by FIELDNUM.

FORMSPEC Enhancements

FORMSPEC Application Ready Buffer (ARB) processing has been enhanced with the addition of a new ARB data type. This data type can be specified on the DTC Menu for Data Type Conversions from Screen Type to Application Type. The new ARB Type is YYYYMD and is defined as a 8-byte ASCII field containing a date value in YMD order with no separators. Also the year component in the date value has 4 digits. Note that FORMSPEC will ensure a length of 8 for the data type YYYYMD in the ARB. In essence, the value is of the form YYYYMMDD (8 bytes) even though the Type designator on the DTC Menu has been abbreviated to YYYYMD.

For more details on ARB Types and how to use them, refer to the "ARB Data Types" section in the *Data Entry and Forms Management System VPLUS Reference Manual*.

Processing Enhancements

Date processing in VPLUS has been enhanced to handle date values with 4-digit year components. Specifically, the following additions have been made.

Date output will be formatted with 4-digit years if the target field is wide enough to receive the date, and the user requests this action. Examples of such output include the SET statement in FORMSPEC. The target field should be at least 10 characters in length to have

a 4-digit year output.

VPLUS, by default, will format date output with 2-digit years. To change the behavior as described above, define a JCW called `VSETNEXTCENTURY` and set bit 15 to 1 (bits are numbered from 0 through 15). It should be noted that this option will be active for fields wide enough to hold the 4-digit year date. For other fields, 2-digit years will be used.

Existing 2-digit years can be interpreted differently to handle dates in the next century. Currently VPLUS handles year components 00-99 as 1900-1999. This scheme of interpretation can be changed. In the new scheme, 00-49 is interpreted as 2000-2049 and 50-99 is interpreted as 1950-1999. This interpretation will be valid through all processing done by VPLUS. For example, this scheme will allow the user to enter 02/29/00 (MDY order) in an existing application and have it processed correctly.

To invoke the above method of date interpretation, define a JCW called `VSETNEXTCENTURY` and set bit 14 to 1. Note that this method is used for processing only 2-digit year dates and not 4-digit year dates. Note also that the display of 2-digit year dates is not affected by this enhancement. This means that 12/11/10 (MDY order) can refer to 1910 in one application and 2010 in another application.

NOTE When defining the JCW `VSETNEXTCENTURY`, set all unused bits to 0.

Programmable Defaults for Field and Data Types in FORMSPEC

FORMSPEC version B.06.07 has been enhanced to provide the capability to set the default Field Type and Data Type of a form. This capability can be used to reduce the time taken to complete the design of a new form.

Two new fields for user input have been added to the Form Menu screen of FORMSPEC. One is for the default Field Type, and the other is for the default Data Type.

On the Form Menu, the user typically specifies the name of the form and other characteristics of the form. In addition now, the user can specify the default Field Type and Data Type for the form. For a list of the allowable values for the Field Type and Data Type, refer to the *Data Entry and Forms Management System VPLUS Reference Manual*. All fields created newly for the form will have the Field Type and Data Type set to the default values supplied on the Form Menu.

Notes

- The Field Type and Data Type values supplied on the Form Menu are applicable only to fields created for the form thereafter. This means that if these default values are changed for an existing form, the types of the existing fields are not changed. For a new form, the default values apply to all the fields created for the form.
- Cloned forms have their screen already designed; hence, the values on the Form Menu do not apply to such forms.
- The Field Type and Data Type can be specified independently. This means that either, or both, fields on the Form Menu can be blank.

- If the Field Type is blank, all newly created fields for the form will have a Field Type of “O.”
- If the Data Type is blank, all newly created fields for the form will have a Data Type of “CHAR.”

Ability to Define More than 52 Single Character Fields per Form

This enhancement allows more than 52 single character fields to be defined for a Form. Currently the field tag which is defined for a field at screen design (creation) time should begin with an alphabetic character. This enhancement will allow several other characters to be used for the field tag, thus increasing the number of single character fields that can be defined for a Form.

The following are the other characters which can be used for the field tag (defined at screen creation time):

Digits	0,1,2,3,4,5,6,7,8,9
Specials	@,#,\$,%,&,*,-,+,<,>/, \,!, ,=,?,;,_

Field Menu Initialization

In the case where one of the characters listed above (a Digit or a Special) is used in a single character field, the Field Name will be blanked out when the Field Menu is invoked for the field the first time. The user should input a new name for the field in this case. With this enhancement, a maximum of 80 single character fields can be defined for a Form.

Compatibility issues

Forms created with previous versions of FORMSPEC can be used with this version without any modifications.

Forms created with this version of FORMSPEC can be used with existing applications without any modifications.

Forms created with this version of FORMSPEC can be used with previous versions of FORMSPEC. However, some extra characters may appear near the bottom of the Form Menu screen which should be ignored. These extraneous characters appear only once, the first time the Form Menu is invoked for the form, and they do not affect the functionality in any way.

New Intrinsic to Get and Set Save Field Values

Two new intrinsics have been added to VPLUS to enable applications to access Save Fields. They are VGETSAVEFIELD and VPUTSAVEFIELD. The values of Save Fields can be accessed/changed using the new intrinsics. It is important to note that the values of the Save Fields cannot be modified in the forms file by these intrinsics.

Intrinsic VGETSAVEFIELD

Copies contents of the specified save field from save field buffer in memory to an application.

Syntax

VGETSAVEFIELD {*comarea*, *sfname*, *sdbuf*, *buflen*, *actalen*}

Parameters

comarea must be *comarea* name specified when the forms file was opened with VOPENFORMF. If not already set, the following *comarea* items must be set before calling VGETSAVEFIELD:

cstatus set to zero.

language set to the code identifying the programming language of the calling program.

comarealen set to total number of two-byte words in *comarea*. Must be at least 70 words in length.

VGETSAVEFIELD may set the following *comarea* item:

cstatus set to nonzero value if call is unsuccessful.

sfname is a character string in the application which contains the name of the save field.

sdbuf is a character string in the application to which the contents of the save field is copied.

buflen is a two-byte integer variable which specifies the number of bytes in *sdbuf*.

actalen is a two-byte integer variable which specifies the number of bytes actually moved to *sdbuf*.

Discussion

VGETSAVEFIELD transfers the contents of the save field specified by *sfname* to a variable in an application.

If the number of bytes specified by *buflen* is less than the length of the save field, the rightmost bytes are truncated. Following a successful transfer, *actalen* is set to the actual number of bytes transferred to *sdbuf*.

VGETSAVEFIELD does not convert the data moved to the application variable.

Example

```
COBOL  
CALL "VGETSAVEFIELD" USING COMAREA SFNAME SDBUF BUFLLEN ACTLEN.
```

```
SPL  
VGETSAVEFIELD(COMAREA, SFNAME, SDBUF, BUFLLEN, ACTLEN);
```

These calls will transfer the contents of the save field specified by SFNAME to SDBUF. If the call is successful, ACTLEN will contain the exact number of bytes transferred.

Intrinsic VPUTSAVEFIELD

Copies data from an application to the specified save field in memory.

Syntax

VPUTSAVEFIELD { *comarea*, *sfname*, *sfbuf*, *buflen*, *actualen* }

Parameters

- comarea* **Must be *comarea* name specified when the forms file was opened with VOPENFORMF. If not already set, the following *comarea* items must be set before calling VPUTSAVEFIELD:**
- cstatus* **set to zero.**
 - language* **set to the code identifying the programming language of the calling program.**
 - comarealen* **set to total number of two-byte words in *comarea*. Must be at least 70 words in length.**
- VPUTSAVEFIELD may set the following *comarea* item:
- cstatus* **set to nonzero value if call is unsuccessful.**
- sfname* **is a character string in the application which contains the name of the save field.**
- sfbuf* **is a character string in the application whose contents are copied to the save field in memory.**
- buflen* **is a two-byte integer variable which specifies the number of bytes in *sfbuf*.**
- actualen* **is a two-byte integer variable which specifies the number of bytes actually moved to the save field in memory.**

Discussion

VPUTSAVEFIELD transfers the contents of the application variable specified by *sfbuf* to the save field in memory specified by *sfname*.

If the length of the save field is less than the length specified by *buflen*, the rightmost bytes are truncated. Following a successful transfer, *actualen* is set to the actual number of bytes transferred to the save field in memory.

Note that the contents of the save field as recorded in the forms file is not changed by a call to VPUTSAVEFIELD. Also VPUTSAVEFIELD does not convert the data moved to the save field in memory.

Example

```
COBOL
CALL "VPUTSAVEFIELD" USING COMAREA SFNAME SFBUF BUFLLEN ACTLEN.
```

```
SPL
VPUTSAVEFIELD( COMAREA , SFNAME , SFBUF , BUFLLEN , ACTLEN ) ;
```

These calls will transfer the contents of the application buffer *SFBUF* to the save field in memory specified by *SFNAME*. If the call is successful *ACTLEN* will contain the exact number of bytes transferred.

Renumbering a Form with Interactive FORMSPEC

FORMSPEC provides an option to renumber forms interactively. A new command has been added to the Interactive FORMSPEC to renumber forms. This command is invoked by selecting option “N” on the Main Menu. The form to be renumbered should be specified in the field next to the keyword “N”. (This field is the same as where you would specify a form when also selecting the “D” option.) This option is equivalent to the RENUMBER command in batch mode FORMSPEC.

Other Products

Predictive

Hardware predictive (HP50779) has been modified to be year 2000 safe by modifications to internal date comparison routines and database access methods. Various other defect fixes which have been made since the release of MPE release 5.5 are also rolled into the 6.0 version of hardware predictive.

HP MPE/iX Databases

ALLBASE/SQL

The ALLBASE/SQL functions `TO_DATE` and `TO_DATETIME` are enhanced to handle two-digit years appropriately. For more information, refer to the article, "New Features in ALLBASE/SQL Version G3," in the chapter, "Technical Articles."

In SQLUtil, the `SETUPRECOVERY` command is used for roll-forward recovery. `SETUPRECOVERY` accepts two-digit years as part of the date specification. These two-digit years are interpreted as discussed in the section, "Two-Digit Years Interpretation," in the article, "Year 2000 Enhancements for MPE/iX."

IMAGE/SQL and TurboIMAGE/XL

IMAGE/SQL and TurboIMAGE/XL use the ALLBASE/SQL `TO_DATE` and `TO_DATETIME` functions to handle the two-digit years appropriately.

HP Stage/iX

HP Stage/iX can now handle dates with year greater than or equal to 2000 correctly (when the `LIST` command is used). It is now Y2K compliant.

RPG/iX 4-Digit Year Enhancement

*by Sue Meloy
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***DATE and *YEAR**

RPG/iX version A.00.18 contains support for new predefined fields that return a 4-digit year. *DATE is analogous to UDATE, except that the year is 4 digits instead of 2 digits. In the same way, *YEAR is analogous to UYEAR.

RPGUPDATE

The RPGUPDATE file format has also been changed to allow a 4-digit year.

Documentation Changes

There are a number of changes to the *HP RPG/iX Reference Manual* that describe the new functionality. See the article, “Documentation Changes for MPE/iX Languages” in Chapter 9 for more information.

Compatibility with Previous Versions

If 4-digit years are used in the RPGUPDATE file, RPG/iX programs must be run using the new RPG/iX library.

Programs that reference the new *DATE and *YEAR fields must be compiled with the new RPG/iX compiler and run with the new RPG/iX library.

Programs that were compiled with previous versions of the RPG/iX compiler can be run using the new RPG/iX library without recompilation.

CI Enhancements

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Introduction

This article describes the CI enhancements introduced in MPE/iX Release 5.5. The most notable enhancement is that POSIX filenames support additional special characters. The COPY command has been enhanced and several new CI evaluator functions have been added.

POSIX Filenames

Prior to this enhancement, characters in POSIX filenames were restricted to upper and lower case letters, numbers, dash, underbar and dot. Now, a POSIX filename can contain the following additional characters:

A POSIX filename may begin with any supported character except a dash. There are no changes to MPE filename rules.

Example

```
BUILD ./ab$cd:ef
LISTFILE ./ab$cb:ef,6
/SYS/PUB/ab$cd:ef

COPY ./ab$cd:ef ./~anew%
LISTFILE ./[a~]@
ab$cd:ef ~anew%
```

Enhancements to the COPY Command

The COPY command has been enhanced to accept MPE-syntax and POSIX-syntax directory names for the TO= parameter. Additionally, a space is an accepted delimiter between the FROM= and TO= arguments.

For example (assume the CWD is /SYS/PUB):

```
NEWDIR mydir
NEWDIR ./mydir
BUILD ./foo

COPY ci,   boo      creates BOO.PUB.SYS, as always
COPY ci,   mydir    creates /SYS/PUB/MYDIR/CI
COPY ci,   ./mydir  creates /SYS/PUB/mydir/CI
COPY ci,   /SYS     creates /SYS/CI
COPY ./foo mydir    creates /SYS/PUB/MYDIR/foo
COPY ./foo ./mydir/ creates /SYS/PUB/mydir/foo
```

File equations are supported for both the FROM= and TO= parameters. However, the TO= name cannot be a back reference to a file equation who's actual filename is a directory. As before, symbolic links are accepted as the source and/or target filenames.

New Evaluator Functions

ANYPARM() returns any combination of characters as a string. String function.

Syntax

ANYPARM(*anything*)

This new function accepts all characters, including, commas, quotes, right parentheses, etc. and treats them as a single string value. This is handy when used in conjunction with the ANYPARM parameter type. The one exception is that the "!" character, which introduces a CI variable.

The ANYPARM() function has two important restrictions:

- It must be the last (right-most) or only function on a command line
- It may not be nested inside other function arguments. For example, `lft(anyparm(...),1)` is not supported, nor is `quote(anyparm(...))`.

These constraints are necessary since ANYPARM() accepts all characters as its argument, including right parentheses.

Examples

Assume the script is named "doit":

NOTE In the last example, if one of the characters is a "!" then the CI will attempt to reference a variable that follows the "!". For example, if the "f" is replaced by a "!" then the CI will try to reference a variable named HI. If this variable is not found a CI warning is reported.

BASENAME()—returns the filename component of a POSIX or MPE filename. String function.

Syntax

BASENAME(*str*[, *suffix*])

This new function returns the base component (file part only) for the passed filename. *str* can be any filename in MPE or POSIX syntax. *suffix* is an optional string, that if supplied and the filename base ends in *suffix* then the *suffix* is removed from the BASENAME. *suffix* applies to MPE and POSIX names. The *suffix* portion of the BASENAME will not be deleted if this results in deleting the entire basename.

Examples

```
CALC basename('a.b.c')
A
```

```
CALC basename('/a/b/c')
c
```

```
CALC basename('./a/b')
b
```

```
CALC basename("./a.sl",".sl")
a
```

```
CALC basename('/')  
/  
  
CALC basename("*feq")  
*FEQ  
  
CALC basename('$null')  
$NULL  
  
CALC basename('abc.g','c')  
AB  
  
CALC basename('/usr/lib/liby.a','.a')  
liby  
  
CALC basename('/usr/lib/liby.a','liby.a')  
liby.a
```

DECIMAL() returns a string value of an integer. String function.

Syntax

```
DECIMAL(int)
```

This new function behaves analogously to the existing `hex()` and `octal()` functions. It accepts a single integer argument and functionally returns the decimal string equivalent.

Examples

```
CALC decimal(255)  
255 < - - as a string  
  
CALC len(decimal($ff))  
3, $3, %3  
  
setvar i 0  
while setvar(i,i+1) < 10 and      finfo("FILE"+DECIMAL(i), 'exists') do  
...
```

The last example is significant since this is the only case where explicit variable substitution (!*varname*) does not work as an alternative to `decimal`. If the `finfo()` line was written as:

```
finfo("FILE"+"!i", 'exists') do
```

Then the first iteration would call `FINFO` on a file named 'FILE0' rather than a file named 'FILE1'. This is because explicit variable dereferencing is performed early by the CI, well before the `setvar()` function is called.

DIRNAME()—returns the directory components of a POSIX or MPE filename. String function.

Syntax

```
DIRNAME(str)
```

This new function returns the directory components for the passed filename. *str* can be any filename in MPE or POSIX syntax. MPE filenames are converted to POSIX names before extracting the directory portion of the name.

Examples

```

CALC dirname('a.b.c')
/C/B

CALC dirname('/a/b/c')
/a/b

CALC dirname('./a/b')
./a

CALC dirname("./a.sl")
.

CALC dirname('/')
/

CALC dirname("*feq")
[empty string]

CALC dirname('$null')
[empty string]

CALC dirname('abc.g')
/SYS/G

CALC dirname(fqualify('./a'))
/ACCOUNT/GROUP      # when the CWD is your logon group   or
/CWD                 # when the CWD is a directory

```

FQUALIFY() returns a fully qualified filename. String function.

Syntax

```
FQUALIFY(str)
```

This new function returns the qualified filename for the passed filename in *str*. *str* can be any filename in MPE or POSIX syntax. *str* is first attempted to be translated into an MPE name. If that fails it is converted into a POSIX name. POSIX names are prepended with the CWD for relative pathnames.

Examples

```

CALC fqualify('a')
A.GROUP.ACCOUNT      # when the CWD is your logon group   or
/CWD/A              # when the CWD is a directory

CALC fqualify('a.b')
A.B.ACCOUNT

CALC fqualify('a.b.c')
A.B.C

CALC fqualify('./a')
/ACCOUNT/GROUP/a

CALC fqualify('./A')
A.GROUP.ACCOUNT      # when the CWD is your logon group   or
/CWD/A              # when the CWD is a directory

```

```
CALC fqualify('/a/b/c')  
/a/b/c
```

```
CALC fqualify('*a')  
*A
```

```
CALC fqualify('$null')  
$NULL
```

```
CALC dirname(fqualify('./a'))  
/ACCOUNT/GROUP      # when the CWD is your logon group   or  
/CWD                 # when the CWD is a directory
```

FSYNTAX() returns the syntax of the passed filename argument. String function.

Syntax

```
FSYNTAX(filename_str)
```

This new function accepts an MPE or POSIX style filename and evaluates the filename's syntax, if wildcard characters are present, lockwords, back reference to a file equation, remote environment IDs and system defined files. If an error occurs, the error number following the word "ERROR" is returned. Possible return values are:

- "MPE" "MPE;WILD" "MPE;LOCK" "MPE;FEQ" "MPE;\$FILE" "MPE;REMOTE" and combinations where appropriate, for example, "MPE;LOCK,REMOTE"
- "POSIX" "POSIX;WILD"
- "ERROR=nnn" for syntax error nnn

Examples

```
fsyntax('a.b.c')  
MPE  
fsyntax('/a/b/c')  
POSIX  
fsyntax('./ab@/c')  
POSIX;WILD  
fsyntax('$null')  
MPE;$FILE  
fsyntax('a.b.c.d')  
ERROR=426
```

```
if word(setvar(_error, FSYNTAX(myfile))) = "ERROR" then  
    echo Syntax error: ![word(_error,, -1)]  
endif
```

```
if word(FSYNTAX(a_file)) = "MPE" then  
    # MPE filename  
elseif word(FSYNTAX(a_file)) = "POSIX" then  
    # POSIX filename  
else  
    # error
```

```
if pos("WILD", FSYNTAX(another_file)) > 0 then  
    # wildcarded MPE or POSIX filename
```

QUOTE()—returns the input string with all quotemarks doubled. String function.

Syntax

```
QUOTE(str)
```

This new function scans *str* and doubles all single and double quote characters found. This is useful when *str* is passed to CI parameter that requires its own quotes, like an `INFO= string`, or a quoted string value in the `SETVAR` command.

Examples

```
calc QUOTE('abc"de"'f')
abc""de""""f
```

```
calc QUOTE("xyz'z'y'")
xyz''z''y''
```

```
calc anyparm(abc'def"ghi)k)
abc'def"ghi)k
calc QUOTE(hpresult)
abc''def""ghi)k'
```

```
setvar x quote('ab"c')
showvar x
X = ab""c
setvar x "!x"
showvar x
X = ab"c
```

The last example shows that the CI does quote folding in expressions, for example, `"ab""c"` is folded to the string.

`XWORD()`—returns a string less 'word'. String function.

Syntax

```
XWORD(str[,delims][,nth][,end_var][,start])
```

This new function locates the *nth* word from *str* beginning at *start*, delimited by one of the characters in *delims*, and places the index of the delimiter that terminated the word in a CI variable named by the *end_var* argument. It returns *str* minus the located word and minus the word delimiter. It is syntactically equivalent to `word()`, but opposite in semantics.

The arguments for `xword()` are identical to the `word()` parameters. Please refer to `word()` for details. `HELP word` and `HELP xword` are available.

`xword()` is useful for removing a token from a command line string since the token and its delimiter are not returned.

The same examples used for the `word()` function in an earlier article are repeated below for `xword()`:

```
xword('file a=bb,old;rec=40,,f,ascii') returns:
'a=bb,old;rec=40,,f,ascii'
```

```
xword('file a=bb,old;rec=40,,f,ascii',,2) returns:
'file bb,old;rec=40,,f,ascii'
```

```
xword('file a=bb,old;rec=40,,f,ascii',';',",,j,8) returns:
'file a=old;rec=40,,f,ascii' and J=10
```

```
xword('file a=bb,old;rec=40,,f,ascii',,-4,j) returns:  
      'file a=bb,old;rec=,f,ascii' and J=18
```

It may be illustrative to execute the above examples substituting `word` in place of `xword()`, or refer the `word()` examples referenced above.

Summary of CI Enhancements in C.55.03 and Later

- The `LISTF` and `LISTFILE` commands allow users to discover who is accessing files on their system, including remote accessors. `LISTFILE` output can now be filtered by selecting files based on access type or file code.
- Two new CI variables were added: `HPLASTSPID` and `HPSPoolID`. Both contain the spoolfile ID in the form: `Onnnnnnn`.
- The `FLABELINFO` intrinsic and `FINFO()` function are able to return the number of sectors and extents a file occupies, file creation time, and the number of accessors to a file.
- The `PAUSE` command can now wait for one or more jobs to complete, to change state from waiting to executing, or to begin execution.
- The `INPUT` command allows the number of characters to read from `$STDIN` to be specified.
- The `PRINT` command is now able to display all data in a file, even if this data appears to be line numbers. The new `NONUM` option enables this feature.

LISTF/LISTFILE Enhancements

Syntax

```
LISTF [fileset][,listlevel][;listfile]  
  
LISTFILE [fileset[,fileset[,...]]]  
[[;FORMAT=]format_opt]  
[[;SELEQ=]select_eq indir]  
[[;NAME=] pattern]  
[;PASS]  
[;{PERM} {TEMP} {PERMTEMP}]  
[;USERNAME][;TREE][;NOTREE]
```

The `LISTF` and `LISTFILE` commands allow users to discover who is accessing files on their system, including remote accessors. The existing syntaxes remain the same; however, new format numbers, format mnemonics, and selection equations can be specified as a result of this enhancement.

New Formats

Two new formats have been added: format 8 or "access," and format 9 or "locks." Both the `LISTFILE` and `LISTF` commands support these formats, although only `LISTFILE` is able to use the format mnemonic. Format 8 shows greater access-related details compared to the existing format 3, as well as displaying individual file accessors. Format 9 is a superset of format 8. All of the format 8 data is shown with specific details about each process accessing the file, including information about which locks a process owns or is waiting for. A detailed description of the items displayed for the two new formats and examples are

shown below.

The selection equation parameter of the LISTFILE command is also enhanced. The new SELEQ= choices allow selection of only files that are currently opened, in use, locked, or opened exclusively. If a file is not opened as specified in the selection equation, it is skipped. Also, files can be selected based on their file code number or mnemonic. The file code mnemonic PRIV includes all privileged files, that is, those files with a negative file code. More details on the access SELEQ choices appear later in this article.

Format 8 Both formats 8 and 9 show the fully qualified filename or absolute pathname followed by the accessor summary line (described below). After the accessor summary line, there is one line of output per file accessor, consisting of:

- job/session number
- user name
- number of processes accessing, locking, writing and reading the file
- IP address for remote sessions, or the \$STDLIST spoolfile ID for job accessors, or the LDEV number for local session accessors

Following is a format 8 example:

```
:listfile hppxudc.pub.sys,8
*****
FILE: HPPXUDC.PUB.SYS
15 Accessors(O:15,P:15,L:0,W:0,R:15),Share
#S265 MIKEP.HPE P:2,L:0,W:0,R:2 LDEV: 49
#S263 JEFFV,MGR.JVNM P:3,L:0,W:0,R:3 LDEV: 47
#S261 KROGERS.MPENT P:2,L:0,W:0,R:2 LDEV: 50
#S231 SUSANC.MPENT P:2,L:0,W:0,R:2 LDEV: 46
#S219 FAIRCHLD.MPENT P:2,L:0,W:0,R:2 LDEV: 39
#S214 CATHY,MGR.BOSS P:2,L:0,W:0,R:2 REM : 15.14.16.198
#J434 FTPMON,FTP.SYS P:2,L:0,W:0,R:2 SPID: #O21905
```

Analyzing the above format 8 example:

1. The filename shown is always fully qualified as it appears in format 6.
2. The line beginning with "15 Accessors..." is the accessor summary line, which shows the total number of accessors of the file across all jobs and sessions. This total includes all processes that have formally opened the file and all processes that have pseudo-opened the file. This is the same number seen in the FLAGS field when executing LISTF, 3. The total number of accessors may not necessarily be derived by adding up the individual accessors displayed. This is because certain file accesses are done without using the file system and these accesses are transient and difficult to detect. An example of this kind of access is when STORE pseudo-opens a file to read its contents to backup.

The "O:" field is the actual number of processes that formally opened the file (for example, called FOPEN, HPFOPEN, OPEN, or others). The O: number can be lower than the total number when the file has been pseudo-opened, as done by STORE. Another factor is that the system protects certain files at boot time by pseudo-opening them, as is done on NL.PUB.SYS. Also, a LISTF, 8 done at the same time on the same file as a LISTF, 2 (for instance) will show the LISTF, 2 users as an accessor that has not formally opened the file. Typically, however, the O: count and total number of accessors match.

The total number of processes (P:) accessing the file should generally match the O: count.

The number of processes that have the file locked (L:) is seen next. The number of lockers includes all file system locks (semaphores) held by all detectable processes that are accessing the file. A single process can obtain multiple locks, and each time the count is incremented. When a process releases a lock, the count is decremented. The locks that are considered are the FLOCK semaphore (used by the FLOCK intrinsic), the OPEN semaphore (used by the file system), and the GUFD semaphore (used to control I/O).

The number of writers (W:) and readers (R:) are displayed next. The writer and reader counts can be greater than the number of accessors since a single process can open the same file multiple times. Also, when a process opens a file for append, update, or save (read/write) access both the writer and reader counts are incremented.

After all of the counts are shown, the file-sharing mode is displayed. This is either "Share" for files opened shared, or "Exclusive" for files opened exclusively. Typically when a file is opened exclusively there is only a single accessor; however, the POSIX `fork()` and `dup()` functions are exceptions.

The last item displayed in the access summary is the backup state. If the file is being stored, then "Storing" is shown. If the file is being restored, then "Restoring" is seen. If the file is being concurrently backed up, then "ConcurrBackup" is displayed. Otherwise, nothing additional is shown.

3. The lines after the accessor summary line reflect each job and session accessing the file. There is one line displayed for each job and session accessing the file, even if there are multiple processes within the job accessing the same file.

The first field shown is the job/session number. If the accessor is a system process then "system" is seen instead of a job ID. Following the job ID is the user name associated with the job. This consists of the `USER.ACCOUNT` preceded with an optional job name. The logon group name is not seen.

The same counts displayed in the accessor summary line are shown for each individual job accessor. The definitions are identical. Unlike the summary line, the reader and writer fields are truncated if the process and locker counts are extremely high. In this event the right-most field is the first to be truncated and an "\$" indicates that truncation occurred.

The last field displayed depends on whether the accessor is a job, a remote session or a local session. For jobs, the spoolfile ID is shown. For local sessions, the LDEV number is displayed. If the accessor is remote, the IP address is shown.

Format 9 In addition to the format 8 data, format 9 shows more details such as:

- PIN number
- program name
- access method (for example, read, execute, or others)
- share mode (for example, `multi`, `gmulti`)
- current record number being accessed

- file number
- locks the accessing process owns and is waiting on

Following is a format 9 example:

```
:listfile hppxudc.pub.sys,9
*****
FILE: HPPXUDC.PUB.SYS
5 Accessors(O:5,P:5,L:5,W:0,R:5),Share
#S263  JEFFV,MGR.JVNM          P:3,L:3,W:0,R:3      LDEV: 47
#P147  (LFCI.PUB.SYS)
  ACCESS: R-excl          REC#: 0          FNUM: 13
  LOCKSowner  Waiter
  FLOCK
  OPEN
#P154  (CI.PUB.SYS)
  ACCESS: R-excl          REC#: 0          FNUM: 13
  LOCKS: none
#P86   (JSMAN.PUB.SYS)
  ACCESS: R-excl          REC#: 336         FNUM: 16
  LOCKSowner  Waiter
  FLOCK

#J434  FTPMON,FTP.SYS          P:2,L:2,W:0,R:2      SPID: #021905
#P79   (CI.PUB.SYS)
  ACCESS: R-excl          REC#: 0          FNUM: 14
  LOCKS: none
#P47   (JSMAN.PUB.SYS)
  ACCESS: R-excl          REC#: 336         FNUM: 15
  LOCKSowner  Waiter
  OPEN        FLOCK
```

Analyzing the above format 9 example:

1. All of the format 8 data is seen.
2. The PIN (Process ID Number) begins the next line, followed by the process filename.
3. The next line shows the type of access which includes: "R" for read, "W" for write, "X" for execute, "A" for append, "L" for lock, "S" for save, "U" for update, "RD" for directory read access. The file-sharing mode is next. Values include: "sysexcl" for system exclusive (rarely seen), "excl" for exclusive, "ear" for semi-exclusive (exclusive-allow-read), "shr" for shared, "multi" for shared job, or "gmulti" for system shared. Next the current record number is seen, and last is the file number.
4. If the process does not have any locks then "NONE" is displayed. If the PIN owns or is waiting on one or more of the relevant semaphores, then the semaphore name is shown under either the "Owner" or "Waiter" column. There are three semaphores (locks) considered.
 - The FLOCK semaphore is obtained when a processes calls the FLOCK intrinsic. This lock is exclusive; meaning that only one process at a time can own the FLOCK semaphore for a file. Occasionally the FLOCK semaphore is used by the file system to synchronize directory access.
 - The OPEN semaphore is locked by the file system when a file is being formally opened. In this usage the OPEN semaphore is locked exclusively. It is also used by the

operating system to protect certain file system data structures when they are being read. This usage allows the `OPEN` semaphore to be locked in a shared fashion. The `OPEN` semaphore can be locked shared by multiple processes, but once it is locked exclusively all other PINs trying to lock it will wait.

- The `GUFD` semaphore is locked by the file system when it does I/O on the target file. It is locked exclusively.

Phantom Accessors It was mentioned earlier about processes that pseudo-open (call `sm_open`) a file. `STORE` and `PROGEN` are examples of processes that bypass the file system by not calling `FOPEN` or `HPFOPEN` to open a file. This type of access is usually only evident by noticing that the total accessors count is greater than the open count (O:), and format 9 output typically will not show these phantom accessors.

There are also cases where a process does not open the file in any way at all, yet this process can lock one or more of the semaphores, and thus needs to be accounted for. `LISTFILE` and `MPEX` (when calling `AIFSYSWIDEGET` item 2065 to obtain a file's accessors) are examples of these kinds of phantom accessors. In this case the total accessor count is lower than what may be revealed by counting individual accessors shown in format 9.

If any of these phantom accessors lock one of the three important semaphores, then `LISTFILE` can detect the process and report reduced information about the access. If the phantom accessor process does not lock either the `FLOCK`, `OPEN`, or `GUFD` semaphores, then its access is undetected. Following is a format 9 example of a file that another user is also executing a `LISTF, 3` against. Notice that the total accessor count is one, yet we see two accessors. `PIN 58` is the process that is doing the `LISTF, 3` and thus is seen as a phantom accessor.

```
FILE: GOPI.PUB.SYS
1 Accessor(O:1,P:2,L:2,W:0,R:1),Share
#S3      JVREM,MANAGER.SYS          P:1,L:1,W:0,R:1    REM : 15.28.88.18
#P62     (LOCKP.PUB.SYS)
ACCESS: R-excl          REC#: 0          FNUM: 11
LOCKSOwner Waiter
        FLOCK

#S2      JVREM,MANAGER.SYS          P:1,L:1,W:0,R:0    REM : 15.28.88.18
#P58     (CI.PUB.SYS)
ACCESS: n/a            REC#: n/a         FNUM: n/a
LOCKSOwner Waiter
        OPEN
```

Restrictions Formats 8 and 9 are available to all users, however only more privileged users get to see individual accessor information. The user having `SM` or `OP` capabilities can see all accessors of a file—assuming the user has `TD` access to the file itself. If the user does not have `SM` or `OP` capabilities, but does possess `AM` capability, and the file's `GID` matches the user's `GID`, then all accessors are displayed. If the user lacks `SM`, `OP` and `AM` capabilities, but is the owner of the file being listed, then the individual accessors are displayed. Otherwise only the accessor summary line is visible.

Even if the user is able to see individual accessors, certain format 9 fields have additional restrictions for security concerns: the program name and IP address are protected.

To see the program name the user must meet the same rules that apply to the `SHOWPROC` command. Specifically, one or more of the following applies:

- process is within the user's logon job/session.
- process' user and account names match the user's user and account names and the system's `JOBSECURITY` is set to `LOW`.
- user has `OP` or `SM` capability.

To see the IP address the user must meet the `SHOWCONN` utility rules, namely: the user must have `SM`, `OP`, `PM`, `NA`, or `NM` capabilities.

Selection Equations for LISTFILE

Selection equations for the `LISTFILE` command have been expanded. It is now possible to select files by whether and how a file is accessed, and by file code. The `ACCESS=` criteria supports 4 types of access, as shown below:

```
SELEQ=[ ACCESS = INUSE | OPEN | LOCK[ed] | EXCL[usive] ]
```

<code>INUSE</code>	is true if any processes are accessing the file. This includes normal <code>FOPEN</code> -like accessors and <code>sm_open</code> accessors. Phantom accessors (like <code>LISTF, 2</code>) that don't open the file at all are not noticed and thus <code>INUSE</code> evaluates to false. <code>INUSE</code> examines the total number of accessors field described above.
<code>OPEN</code>	is true if there are any processes that have formally opened the file by calling <code>FOPEN</code> , <code>HPFOPEN</code> , <code>RESET</code> , <code>OPEN</code> , or others. <code>OPEN</code> uses the same field that the "O:" count is derived from.
<code>LOCK</code>	is true if any process has locked (even if they are waiting) the <code>FLOCK</code> , <code>OPEN</code> or <code>GUFD</code> semaphores, or has called the <code>HPFLOCK</code> pseudo intrinsic (for POSIX record level locking).
<code>EXCL</code>	is true if the file was opened for exclusive access. <code>EXCL</code> is true when <code>LISTF, 3</code> shows <code>EXCL</code> or <code>LISTFILE, 8</code> shows "Exclusive."

The `CODE=` criteria supports file code numbers and mnemonics as shown below:

```
SELEQ=[ CODE = number | mnemonic | PRIV ]
```

The number can be positive or negative. `PRIV` will match all files with negative file codes.

NOTE A new `FINFO` item 61 ("accessors") returns the number of accessors for a file. This represents the total number of accessors, including all processes that open the file in any manner. This is the first value seen in the accessor summary line, which is described under the Format 8 description. It is also the same value shown in the `FLAGS` field of a `LISTF, 3`.

New Variables

Two new variables were added to MPE/iX CI:

- HPLASTSPID
- HPSPOOLID

HPLASTSPID is a read-only string variable. It contains the \$STDLIST spoolfile ID for the job defined by the HPLASTJOB variable, typically the job most recently streamed in the session or job. Since HPLASTJOB allows write access, it can be set to any job number, and then HPLASTSPID will contain that job's \$STDLIST spoolfile ID.

HPSPOOLID is a read-only string variable. It contains the \$STDLIST spool ID of the currently streamed job. This variable is useful only in jobs—in a session it is an empty string.

FLABELINFO and FINFO Enhancements

The FLABELINFO intrinsic returns information from the file label of a disk file and the FINFO function is a CI interface to FLABELINFO. These APIs have been enhanced to return four new items:

- number of sectors occupied by a file
- number of extents occupied by a file
- file creation time
- number of accessors to a file

FLABELINFO

Table 5-12. Valid Characters for Punctuation

Item Number	Type	Item Description
58	I16	Number of sectors occupied by the file.
59	I16	Number of extents occupied by the file.
60	I32	File creation time (CLOCK format).
61	I32	Number of accessor of the file.

FINFO accepts the following numbers and aliases:

Table 5-13. Valid Characters for Punctuation

FINFO Number	Mnemonic	Return Type
58	SECTORS NUM SECTORS	Integer
59	EXTENTS NUM EXTENTS	Integer

Table 5-13. Valid Characters for *Punctuation*

FINFO Number	Mnemonic	Return Type
60	CREATETIME FMTCREATETIME CREATION TIME	String
-60	INTCREATETIME CREATION TIME INTEGER	Integer
61	ACCESSORS NUM ACCESSORS	Integer

Footnote: this is the same value as the total number of accessors in the LISTF format 8 summary line.

Examples

```

finfo('CI.PUB.SYS',"sectors")      = 192
finfo('CI.PUB.SYS',"extents")     = 2
finfo('CI.PUB.SYS',"createtime")  = 11:08 AM
finfo('CI.PUB.SYS', -60)          = 110808
finfo('CI.PUB.SYS', "accessors")  = 124

```

PAUSE Enhancement

Syntax

```

PAUSE [num_seconds]
[[;JOB=]jobid]
[[;INTERVAL=]interval_secs]
[;EXIST | WAIT | NOTEXIST]

```

The PAUSE command allows the current task to be suspended or "sleep" for a specified number of seconds. PAUSE now supports sleeping until one or more jobs reach a certain state. For example, a script can pause while selected jobs or sessions are executing (EXIST). Or, a job can sleep while another job is suspended or waiting (WAIT), and as soon as the job starts executing or terminates the pause completes. A session can pause while no jobs exist (NOTEXIST) and wake up as soon as the first job is launched.

In its simplest form, the PAUSE command sleeps for *num_seconds*, or less if **Break** is pressed. In this simple case no *jobid* is specified and all other command arguments are ignored. If the *jobid* parameter is specified, then *interval_secs* and the remaining command parameters have meaning. When *jobid* is supplied, PAUSE typically sleeps until the jobs or sessions matching *jobid* have terminated.

Options

EXIST (default) means to pause while all jobs and sessions matching *jobid* exist. These jobs can be scheduled, waiting, executing, and other states; but, as long as the system's global job table (JMAT) contains an entry for any of

the selected jobs and sessions, the PAUSE command will continue to sleep.

WAIT

means to pause while the selected job or jobs are waiting. As soon as all the matching jobs are no longer waiting (meaning all the job states are no longer "introduced," "waiting," or "scheduled") the pause ends. The life cycle of a job is typically:

```
[sched or waiting->] intro-> initializing->  
exec-> [susp-> exec->] terminate
```

Waiting jobs are considered all job states left of and excluding "initializing." Non-waiting jobs are all jobs right of and including "initializing."

NOTEXIST

means to pause while the matching job or jobs do not exist. As soon as any jobs matching *jobid* exist (in any state) the pause completes. PAUSE might miss finding very fast jobs. This is particularly true for a match on a single job/session number. A more practical use might be:

```
PAUSE job=@J:notexist
```

which means to sleep while no jobs exist. As soon as the first job is streamed the above pause stops.

Collectively EXIST, WAIT, and NOTEXIST are referred to as the "while_state," since PAUSE sleeps "while" the specified state condition is true.

Parameters

num_ seconds if *num_seconds* is specified without *jobid*, PAUSE sleeps for that many seconds, or until the process issuing the PAUSE is interrupted by the break signal.

If *jobid* is also supplied then *num_seconds* has a different meaning. In this case it indicates the maximum duration for the PAUSE command, such that PAUSE should continue while the selected jobs are in their "while_state" or when *num_seconds* has expired, WHICHEVER IS SHORTEST. Thus, *num_seconds* represents the maximum length of the pause. If PAUSE completes but the one or more jobs are still in their "while state" a CIWARN is reported. Note: to pause while a job is in its "while_state" or until *num_seconds* has expired, whichever is LONGEST, execute the following two commands:

```
PAUSE x  
PAUSE job=y ;z
```

If after X seconds job Y is still in state Z, then the second PAUSE continues while state Z applies. On the other hand, if after X seconds job Y is not in state Z then the pause is complete.

jobid

can be one of: [#]Jnnn, [#]Snnn, [*jobname*,]*user.acct*, @, @J, @S. Note if *jobname* is included then the *jobid* must be quoted since the comma is a command token delimiter.

If the JOB= parameter is specified then PAUSE sleeps while *jobid* is in its "while_state." *jobid* can be an executing, waiting, scheduled job, or a session. *jobid* can also name many jobs or sessions. Wildcarding is

supported, and a non-wildcarded [*jname*, *juser.acct* can match several jobs or sessions. The job name can be "," or "@," to match all jobs or sessions without a job name. When more than one job or session matches *jobid*, PAUSE sleeps while all matching jobs are in their "while_state." If the job executing PAUSE matches *jobid* it will not be selected.

interval_ secs if specified, PAUSE sleeps for this many seconds between attempts to see if *jobid* is still in its "while_state." Otherwise, PAUSE sleeps a variable amount of seconds depending on the job state and the number of previous times a particular job has been polled. This computed method favors executing jobs that terminate quickly.

Examples

The following pauses while job #J20 is in any of the JOB states such as INTRO, SCHED, and EXEC until the job terminates:

```
:PAUSE JOB=#J20;EXIST
```

The following pauses while job #J24 is in INTRO, WAIT, or SCHED state. PAUSE ends when #J24 is no longer in any of these states.

```
:PAUSE JOB=#J24;WAIT
```

INPUT Enhancement

The INPUT command was enhanced to accept the number of characters to read from \$STDIN. INPUT optionally writes *prompt* to \$STDLIST then reads *numchars* from \$STDIN into *varname*, optionally waiting *seconds* for the user to enter the data.

Syntax

```
INPUT [NAME=]varname
[[;PROMPT=]prompt]
[[;WAIT=]seconds ]
[[;READCNT=]numchars]
```

The READCNT parameter is new. If *numchars* characters are specified then up to *numchars* bytes will be read from \$STDIN. Of course the user can press the Return key at any time to complete the read. *numchars* is most useful for reads of only a few characters and exempts the user from being required to press the Return key. The default *numchars* is the maximum size of the CI's command buffer, currently 511 bytes. If *numchars* is specified and less characters are supplied as input, the user must still press the Return key to send the data.

Example

```
INPUT myvar,'Do you want to continue (Y/N)?', 10, 1
```

prompts to \$STDLIST, and does a 10 second timed read on \$STDIN of one character. When the user types the first character the read will complete and the read byte will be stored in the variable named MYVAR.

PRINT Enhancement

The PRINT command prints truncated records when an UNNUMBERED file contains the

trailing eight characters as digits. The PRINT command is not displaying the trailing eight characters as it assumes those digits as line numbers.

NOTE This is the existing rule as of MPE/iX 5.5 for determining whether a file is a numbered file:

If the trailing 8 characters of at least 10 records of a file or all records (in the case of <10 records) are digits, then that file is considered as a numbered file, provided the record line numbers (trailing 8 character digits) are in ASCENDING order.

With this new option NONUM, the contents of the file would be displayed as it is, without assuming the trailing 8 characters as line numbers.

With this enhancement, the PRINT command syntax is

```
PRINT [ [FILE=] filename]
[ [;OUT=] outfile]
[ [;START=] m]
[ [;END=] n]
[ [;PAGE=] p]
[;UNN | NUM ]
[;NONUM]
```

- With this new option, to print the line numbers as in the case of UNNUMBERed files (that is, line numbers starting from 1 for the first record and so on), use this command:

```
:PRINT infile;NUM;NONUM
```

- To consider the file as UNNUMBERed file even when the file is a NUMBERed file and then print the contents as it is in the file, use this command:

```
:PRINT infile;UNN;NONUM
:PRINT infile;NONUM
```

Examples

In this example, UFILEYES is an unnumbered file with trailing 8 characters as digits.

```
:PRINT UFILEYES
aaaaaaaaaaaaa
bbbbbbbbbbbbbb
cccccccccccccc
dddddddddddddd
eeeeeeeeeeeeee
fffffffffffffff
gggggggggggggg
hhhhhhhhhhhhhh
iiiiiiiiiiiiiii
jjjjjjjjjjjjjj
kkkkkkkkkkkkkk
llllllllllllll
```

NOTE The above file was considered by PRINT to be a numbered file and thus the

trailing 8 bytes are truncated.

```
:PRINT UFILEYES;NONUM  
aaaaaaaaaaaa00010001  
bbbbbbbbbbbb00010002  
cccccccccccc00010003  
dddddddddddd00010004  
eeeeeeeeeeee00020001  
ffffffffffff00020002  
gggggggggggg00020003  
hhhhhhhhhhhh00020004  
iiiiiiiiiiii00030001  
jjjjjjjjjjjj00030002  
kkkkkkkkkkkk00030003  
llllllllllll00030004
```

In the above example, `NONUM` option displays all the data in the file.

FTP Enhancements

*by Raghuram B.
Commercial Systems Division*

The following feature is available from Express 7.

Support for Non-Default Ports

Until now, the FTP client on MPE could only connect to an FTP server running on a default port, namely port 21. If an FTP server was running on a non-default port (for example, port 1050), the MPE FTP client couldn't make a connection to that system.

This problem has been solved by enhancing the syntax of the `OPEN` command of FTP client, to accept the port number, as an optional second parameter, after the hostname (which is the first parameter).

The new syntax of `OPEN` command is:

```
OPEN remote-host [ port ]
```

You can now use the `OPEN` command to establish a connection to the specified host FTP server. The remote-host can be a domain-name, an MPE/XL NS node-name or an IP address. The port number of the remote-host can be optionally specified. The default is 21.

For example, if the FTP server on the system "testmpe" is running on port 543, the following command can be issued to connect to the system.

```
ftp>OPEN testmpe 543  
...
```

Omitting the port number causes the FTP client to connect to the default port 21.

There is no configuration change to the client to make use of this feature.

NOTE The MPE `FTPSRV`, started by `FTPMON`, can still run only on port 21.

Support for Non-Standard MPE/iX File Types

The following is a description of the new features available with FTP/iX from PowerPatch 5.

The following types of MPE/iX files can be transferred to a remote host using FTP.

- Standard MPE files with fixed, variable or bytestream format.
- Files with either binary or ASCII data types.

In addition, the latest enhancements enable the transfer of the following types of non-standard types between two HP3000 machines.

- Privileged files (files with `PRIV` file code)
- Circular files

- Message files
- RIO files
- CM KSAM files
- NM KSAM files
- HPSPPOOL files

The type of the file is transparent to the user. The user need not specify the file type being transferring.

Of these, SPOOL files are transferred as fixed ascii files. The above non-standard file transfers are not possible between an MPE and an non-MPE system. However, SPOOL files can be transferred as fixed ascii files from an MPE to a non-MPE system.

The client (FTP) and server (FTPSRVR) must be compatible to take advantage of this feature. The above file types can be transferred between like FTP/iX systems without the need for buildparms on the command line. Buildparms included on the command line are ignored if the file is a non-standard file type. The use of buildparms is accepted only for standard file types (file code of zero).

Non-standard file type transfers to incompatible FTP/iX versions result in a data transfer failure message. You cannot append to non-standard MPE/iX file types with the use of this new feature. Non-standard file transfers to non-MPE/iX systems also result in a data transfer failure. Non-compatibility of client and server file transfer requests result in appropriate error messages.

Example

```
FILENAME  CODE  -----LOGICAL RECORD-----  ----SPACE----
          SIZE  TYP      EOF      LIMIT R/B  SECTORS #X MX
DB000    PRIV   128W  FB      6        6    1    16  1  1
```

```
ftp> get db000
200 PORT command okay
150 File: db000 opened; data connection will be opened
2816 bytes received in 0.02 seconds (130.95 Kbytes/sec)
ftp>
```

```
FILENAME  CODE  -----LOGICAL RECORD-----  ----SPACE----
          SIZE  TYP      EOF      LIMIT R/B  SECTORS #X MX
BIGRIO1   128B  FAR     8193     8192   3    4128  1  8
```

```
ftp> get bigriol
200 PORT command okay
150 File: bigriol opened; data connection will be opened
1054934 bytes received in 3.69 seconds (279.27 Kbytes/sec)
ftp>
```

The Configurable Server Time-Out

Current patch releases of FTP/iX 5.0 and 5.5 have a hard-coded infinite time-out value applied to the data connection timer of the FTP/iX server. The FTP/iX client, which shares this data connection, has a configurable time-out which is user-controlled through the `TIMEOUT` command.

The latest enhancements provide a configurable server time-out. This allows the client side to control the time-out value that the server applies to its data connection timer. To set the time-out value, execute the `SITE TIMEOUT` command with a value from 0 (infinite) to 3000 seconds.

Syntax

```
SITE TIMEOUT [num-secs]
```

The time-out value indicates how long the FTP server should wait for a message from the remote FTP client before giving up. The allowable range is 0 to 3000. A value from 1 to 3000 indicates a time-out value in seconds. A value of 0 means no time-out (that is, wait forever). If `num-secs` is not specified, the current remote time-out value is displayed. Otherwise, this command sets the connection time-out to `num-secs` seconds.

Example

Command for the server to time out after 5 minutes (300 seconds).

```
ftp>site timeout 300
200 TIMEOUT command ok.
ftp>
```

Hash Command

While transferring files, if the user desires to receive progress status during file transmission, the hash command provides this capability. This is a user command at the client end, which allows the user to toggle state of the hash command. If the toggle state is `'on'` a hash symbol (`#`) is displayed every 1024 characters transferred. The default is set to `'off'`.

Example

```
ftp> hash
Hash mark printing on (1024 bytes/hash mark).
ftp> get TESTFILE
200 PORT command successful.
150 Opening BINARY mode data connection for TESTFILE (145915 bytes)
#####
#####
#####
226 Transfer complete
145915 bytes received in 0.32 seconds (438.45 Kbytes/sec)
```

Transact V and Transact/iX Enhancements

by Kelly Sznaider
Support Technology Lab

Overview

Two new enhancements have been added to Transact/V version A.11.00 and also to Transact/iX version A.06.00

- Literal strings and numeric constants can now be passed as parameters in the PROC verb.
- Transact now provides a method for increased decimal precision in arithmetic expressions.

New Parameter Types

The parameter list for the PROC statement has two additional types of parameters. A programmer-defined character string can be passed by placing the string within quotes, similar to other languages. The default is to pass this literal as a 16-bit address. To change the literal to a byte address, precede the string with a "%", the same as with variables. The other parameter type is to pass a numeric value. The numeric constant is passed by value.

Examples

```
PROC ASCII (65, 10, %"abc", &(numchar));  
PROC FWRITE (#FILEID(TRANOUT), "Hello", -5, 0);
```

Increased Decimal Precision

The second Transact enhancement increases decimal precision in arithmetic expressions (IF, LET, REPEAT, and WHILE verbs) via the new !PRECISION compiler command. A specified minimum number of decimal places is maintained for all packed-decimal intermediate results when calculating the value of an arithmetic expression. This minimum number is used only if the expression's default evaluation method would have maintained fewer decimal places.

Example

```
!PRECISION(5) maintains at least five decimal places.
```

Documentation

The detailed information for these enhancements has been included in the *HP Transact Documentation Update Notice*, which is also included in the latest edition of the *HP Transact Reference Manual*. A revised *HP Transact Quick Reference Guide* is also available.

Dictionary/3000

by Kelly Sznaider
Support Technology Lab

Overview

Dictionary/3000 version A.03.00 offers two new enhancements in the `DICTDBM` utility:

- The capability of copying entities with the new `COPY` command.
- The ability to enter elements multiple times within an HP Inform group.

COPY Command for Entities

For the `COPY` command, a category, class, element, file, group, location, or procedure is copied to a new like entity with a different name. The entity's associated child entities and/or its related entities can also be copied if desired. This enhancement adds productivity improvements for the user.

Multiple Entries for HP Inform

The same element can now be added to an HP Inform group more than once, as long as the physical file designation or the parent file is different making the record unique. This makes elements in HP Inform groups easier to use and more straightforward. (Inform/V version A.11.00 or later is needed with this enhancement.)

Documentation

The detailed information for these enhancements has been included in the *Dictionary/3000 Documentation Update Notice* which is also included in the latest edition of the *Dictionary/3000 Reference Manual*.

COBOL II/iX Enhancements

*by Walter Murray
 Support Technology Lab*

Overview

COBOL II/iX with PowerPatch 5 on MPE/iX 5.5 provides several enhancements that were requested by Interex SIGCOBOL. Some of these enhancements have already been made available in various patches to MPE/iX 5.5.

Secondary Entry Points

COBOL II/iX now supports secondary entry points in a main program. To specify a secondary entry point, use the `ENTRY` statement, and give a nonnumeric literal with the desired entry point name. Specifying that entry point on the MPE/iX `RUN` command will cause execution to begin at that `ENTRY` statement. Any number of `ENTRY` statements may appear, as long as they specify different entry point names. The `ENTRY` statement is a nonstandard HP extension to the COBOL language.

The following sample program demonstrates the use of a secondary entry point.

```

IDENTIFICATION DIVISION.
PROGRAM-ID. UPDATE-MASTER.
DATA DIVISION.
WORKING-STORAGE SECTION.
01 SW-CLEAR-YTD-TOTALS    PIC X    VALUE "F".
PROCEDURE DIVISION.
0000-BEGIN.
*   Enter here for routine processing.
    GO TO 1000-MAIN.
ENTRY "YEAREND".
*   Enter here for year-end processing.
    MOVE "T" TO SW-CLEAR-YTD-TOTALS.
1000-MAIN.
*   Update master file, optionally resetting
*   year-to-date totals, etc.
    DISPLAY "Begin UPDATE-MASTER:  SW-CLEAR-YTD-TOTALS = ",
           QUOTE, SW-CLEAR-YTD-TOTALS, QUOTE
*   ...
    STOP RUN.
END PROGRAM UPDATE-MASTER.

```

Suppose this program is compiled and linked into an executable program named `UPDATE`. The usual way to invoke it would be with this command:

```
RUN UPDATE
```

Alternately, it may be invoked through its alternate entry point, using this command:

```
RUN UPDATE, YEAREND
```

CALL by plabel

This enhancement provides an alternate way to achieve execution-time binding with the CALL statement. In standard COBOL, the CALL statement can use an identifier that specifies a nonnumeric data item containing the name of the desired subprogram. COBOL II/iX generates a call to the HPGETPROCPLABEL intrinsic to dynamically load the specified procedure, and that procedure is then executed. The XLs searched in this case are those in the binding sequence of the calling process.

There are situations where it may be desirable for the programmer to call HPGETPROCPLABEL explicitly, for example, when the XL to be searched is not known at load time or is not in the calling program's binding sequence. It is now possible to code your own call to HPGETPROCPLABEL, save the returned procedure label in a numeric data item, and then use that plabel in a CALL statement.

As an example, suppose that the following subprogram has been compiled and placed in an executable library named TESTXL.

```
IDENTIFICATION DIVISION.  
PROGRAM-ID. COBOLSUB INITIAL.  
PROCEDURE DIVISION.  
BEGIN.  
    DISPLAY "In COBOLSUB"  
    EXIT PROGRAM.  
END PROGRAM COBOLSUB.
```

Using the functionality of call by label, this subprogram can now be dynamically loaded and invoked as follows.

```
IDENTIFICATION DIVISION.  
PROGRAM-ID. COBOL-MAIN.  
DATA DIVISION.  
WORKING-STORAGE SECTION.  
01  PROCNAME      PIC X(10)    VALUE "-COBOLSUB-".  
01  PLABEL        PIC S9(9)    COMP.  
01  FIRSTFILE     PIC X(8)     VALUE "-TESTXL-".  
PROCEDURE DIVISION.  
BEGIN.  
    CALL INTRINSIC "HPGETPROCPLABEL" USING  
        PROCNAME, PLABEL, \\", FIRSTFILE  
    CALL PLABEL  
    STOP RUN.  
END PROGRAM COBOL-MAIN.
```

The ability to use a numeric data item in a CALL statement is a nonstandard HP extension to the COBOL language.

New Routines for Boolean Operations

There are six new routines for performing boolean operations:

- HP_BYTE_AND
- HP_BYTE_OR
- HP_BYTE_XOR
- HP_BYTE_NOT

- HP_BYTE_UNPACK
- HP_BYTE_PACK

These procedures reside in the COBOL II run-time library in XL.PUB.SYS, but may be called from any program running in Native Mode.

The routines HP_BYTE_AND, HP_BYTE_OR, and HP_BYTE_XOR perform bitwise AND, bitwise inclusive OR, and bitwise exclusive OR. The two operands and the result may be any length, but must be the same length, and must be an integral number of bytes. The three routines have identical calling sequences. The first two parameters are the two operands, passed by reference. The third parameter is the result, also passed by reference. The final parameter is the length, in bytes, of the operands, and is passed by value. The first three parameters may not overlap, except in the case where two of them, or all three, are the same data item.

Examples

```
CALL "HP_BYTE_AND" USING OPERAND-1, OPERAND-2, RESULT, \4\.  
CALL "HP_BYTE_OR"  USING DATA-ITEM, MY-BIT-MASK, RESULT, \2\  
CALL "HP_BYTE_XOR" USING INPUT-BUFFER (J:1), RUNNING-XOR,  
                        RUNNING-XOR, \1\.
```

Note that in COBOL II/iX, backslashes ("\") are used to indicate that a parameter is passed by value. If the parameter is a literal, the backslashes are optional.

The routine HP_BYTE_NOT has the same calling sequence, except that there is only one operand rather than two. The result is computed as the bitwise complement of the operand. The operand and the result must be the same length, and must be an integral number of bytes. They may not overlap, except that the same data item may be used for both.

Example

```
CALL "HP_BYTE_NOT" USING OPERAND, RESULT, \4\.
```

The routine HP_BYTE_UNPACK takes three parameters: an operand, a result, and the length of the operand in bytes. The bits of the operand are unpacked into the result, left to right. Each "zero" bit of the operand becomes an ASCII "0" byte in the result; each "one" bit becomes an ASCII "1" byte. The length specified is the byte length of the operand. The byte length of the result must be 8 times the byte length of the operand.

Example

```
01 FIELD-A    PIC S9(4)    COMP.  
01 RESULT    PIC X(16).  
...  
MOVE 5 TO FIELD-A.  
CALL "HP_BYTE_UNPACK" USING FIELD-A, RESULT, \2\  
DISPLAY RESULT.  
* Results in "0000000000000101".
```

The routine HP_BYTE_PACK is similar. The first parameter, the operand, is a sequence of ASCII bytes. Each byte of the operand is converted to a bit in the result, left to right. An ASCII "0" becomes a "zero" bit; anything other than an ASCII "0" becomes a "one" bit. The length specified is the length of the result in bytes. The byte length of the operand must be 8 times the byte length of the result.

Example

```
01 BYTE-STRING      PIC X(16).
01 RESULT-N        PIC S9(4)    COMP.
...
MOVE "0000000000001111" TO BYTE-STRING.
CALL "HP_BYTE_PACK" USING BYTE-STRING, RESULT-N, \2\.
DISPLAY RESULT-N.
* Results in +15.
```

Compiling Larger Programs

Internal data structures of the compiler have been expanded to permit compiling significantly larger programs. While there is no specific limit on the number of lines permitted in a source program, this version of the compiler should be capable of processing programs well in excess of 200,000 lines.

DISPLAY Index-name

The compiler has been enhanced to permit an index-name to be used as an operand of a DISPLAY statement. This is an ANSI extension, and if this feature is used and \$CONTROL STDWARN is specified, the compiler will display warning 517, DISPLAY of index-name is nonconforming nonstandard (HP extension).

New Qedit Diagnostic

The compiler is now able to detect when a source file is in Qedit format and the Qedit product has not been properly installed on the system. Qedit is a full-screen text editor from Robelle Consulting Ltd. In the past, Qedit users have sometimes encountered problems when updating to a new release of MPE/iX and forgetting to reinstall Qedit. COBOL II/iX now detects this condition and produces error 472, QEDIT FORMAT ENCOUNTERED FOR FILE.

Inform/V

by Kelly Sznaider

Support Technology Lab

Inform/V has been enhanced to support the Dictionary/3000 version A.03.00 enhancements. Version A.11.01 of Inform/V is now capable of handling multiple items with the same primary name in an HP Inform group. The alias names for the same primary item must be unique.

The Dictionary/3000 enhancement allows the definition of duplicate primary items in an HP Inform group within the dictionary. Whereas the Inform/V enhancement allows these group items to be selected and reported on as defined by the dictionary. Recompilation of Inform reports is not needed for this Inform/V release.

HP ALLBASE/BRW

*by Kelly Sznaider
Support Technology Lab*

The last few revisions of HP ALLBASE/BRW have concentrated on the integration of TurboIMAGE Third Party Indexing (TPI) with BRW. BRW version A.01.54 introduced the support of TPI. In BRW version A.01.55, more TPI enhancements were provided, as well as several defect repairs. In the latest version of BRW, A.01.56, the main focus is a TPI defect repair.

This version of HP ALLBASE/BRW, A.01.56, fixes a TPI problem that was introduced in version A.01.55. When using wildcard characters for the Selection Set, the result shows that no records are found when data actually exists. The TPI tracing mechanism shows the incorrect DBFIND mode being used.

The other repair for version A.01.56, not related to TPI, corrects the continuation spoolfile number when a report is split between multiple spoolfiles.

In the previous version of HP ALLBASE/BRW, A.01.55, three enhancements and miscellaneous defect repairs were included. Among these enhancements were two new JCWs: BRWSQLTIMEOUT and BRWTPITRACE. BRWSQLTIMEOUT is given a value that is the number of minutes the BRW SELECT statement waits before timing out. A special value of 65535 causes BRW to wait indefinitely. BRWTPITRACE displays the TPI tracing information to \$STDLIST. The third enhancement in A.01.55 was to enhance the TPI selection algorithm. If more than one BRW condition matches a TPI key, the BRW condition that appears first in the compiler listing is used. If two TPI keys start with the same BRW condition, the longer key is used.

Pseudo-Mapped Files Removed from ALLBASE/SQL

by Poongodi R and Doug Myers
Commercial Systems Division

Introduction

This article provides information regarding the handling of pseudo-mapped files when installing ALLBASE/SQL. Pseudo-mapped files in MPE XL are disk files that are accessed without the usual file mapping by the operating system.

Pseudo-mapped files are no longer supported by ALLBASE/SQL. If the pseudo-mapped files already exist in the system, they will not be supported on the G.0 (or later) versions. Serious system problems may occur because of the use of pseudo-mapped files.

NOTE The conversion from pseudo-mapped to mapped **MUST** be done on an F.0 version before updating to G.x. You cannot do the conversion after the system has been updated.

Converting Pseudo-Mapped Files to Mapped Files

ALLBASE/SQL files in pseudo-mapped mode must be converted into mapped mode using the `MOVEFILE` command in SQLUtil. Use the `SHOWACCESS` command in SQLUtil to show which files are pseudo-mapped. Use the following procedures:

1. Check for pseudo-mapped files as shown in this example:

```
:sqlutil

>> showaccess
DBEnvironment Name: mydbe
Maintenance Word:
GGF0           mapped
MYF1           pseudo-mapped
MYF2           pseudo-mapped
>>
```

2. Disable the pseudo-mapped feature using the SQLUtil `MOVEFILE` command as shown:

```
>> movefile
DBEnvironment Name: mydbe
File Name: MYF1
Current Device: LDEV#2
New Device (opt):LDEV#
Access Mode (Mapped) (opt): mapped

File moved.
```

Repeat for other pseudo-mapped files listed by `SHOWACCESS`. The pseudo-mapped files are converted into mapped mode. Hence, there is no problem involved with the converted files during the upgrade.

QUERY/iX Enhancements

by James Overman
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Overview

The following topics in this article review the new enhancements for QUERY/iX and some limitations on their use:

- B-Tree Enhancement
- Dynamic Dataset Capacities
- Wildcard Retrievals
- Wildcard Character Limitations
- B-Tree Limitations
- "NO MATCH" Enhancement

B-Tree Enhancement

The latest B-Tree enhancement to TurboImage/XL has required some enhancements to the QUERY product to utilize the new features. With the HP32216D.03.11 and N.03.11 releases of QUERY, the new B-Tree access capabilities will be supported within QUERY on systems with the B-Tree software release. QUERY is fully backward compatible with the prior releases of TurboIMAGE/XL and QUERY.

New messages will be seen when B-trees are utilized by a database and the FORM command is entered. The number of indexed sets, the wildcard character, the status of the BTREEMODE1 flag when OFF, and the individual sets and items that have been indexed will be reported as shown in the following example:

Figure 5-1. FORM Example

```
>FORM

DATA BASE: TOYDB                               MON, MAY 30, 1997, 10:48 AM
DATA BASE LANGUAGE ATTRIBUTE: NATIVE-3000
DATA BASE HAS 2 INDEXED SETS WITH WILDCARD CHARACTER= "~"      NEW
WARNING! DATA BASE BTREEMODE1 IS OFF.  WILDCARD DISABLED.    NEW

SET NAME:
  CUSTOMERS ,MANUAL/ INDEXED                               NEW

  ITEMS:
    CUSTOMER-NO ,           X6                             NEW
    CUSTOMER-NAME ,        X30

  CAPACITY: 50                               ENTRIES: 8

SET NAME :
```

```

ORDER-MASTER ,AUTOMATIC/INDEXED                                NEW

  ITEMS:
    ORDER-NO ,                X8                                NEW

    CAPACITY: 503                ENTRIES: 16

SET NAME:
  INVOICES ,DETAIL

  ITEMS:
    INVOICE-NO ,                X6
    CUSTOMER-NO ,                X6                                NEW
    ORDER-NO ,                X8                                NEW
    AMOUNT ,                    P12

    CAPACITY: 5016                ENTRIES: 5000
  MAXIMUM CAPACITY: 5016    INITIAL CAP.: 38    INCREMENT: 38    NEW
  
```

Dynamic Dataset Capacities

The last line above shows another enhancement to QUERY that reflects the Dynamic Dataset Capacity Expansion capability. When a dataset has utilized the Dynamic Expansion feature, QUERY will display the CURRENT, MAXIMUM, and INITIAL capacities and the INCREMENT amount. The FORM SETS output has been slightly modified such that the heading reflects that the Current capacity is being reported rather than the Maximum capacity.

Wildcard Retrievals

QUERY will automatically invoke the B-Tree retrieval feature for the FIND, LIST, SUBSET, and MULTIFIND commands when a wildcard character is used in the search value. As QUERY may have up to ten databases open and each could have a different wildcard, the wildcard for the DEFINED database will be used when specified, else the first wildcard specified by an open database will be used. QUERY uses modes 21 or 24 for B-Tree DBFIND for best performance.

Wildcard Character Limitations

Certain possible wildcard characters are used by QUERY for syntax scanning and are limited in their usage. These special characters may be utilized when the data values are delimited by double quotes (for example, tilde, carat, comma, and parenthesis).

Figure 5-2. Wildcard Examples

```
>FIND CUSTOMERS.CUSTOMER-NO=01540~           Tilde is a limited wildcard
EXPECTED A CONNECTOR OR 'END'
INVALID CONNECTOR OR TERMINATOR!

>FIND CUSTOMERS.CUSTOMER-NO="01540~"         Tilde enclosed in quotes works
8 ENTRIES QUALIFIED

>FIND CUSTOMERS.CUSTOMER-NO=01540"         Double-quote will not work..
EXPECTED A CONNECTOR OR 'END'

>>
INVALID CONNECTOR OR TERMINATOR

>FIND CUSTOMERS.CUSTOMER-NO="01540""         Unless doubled in quotes and
                                           double-quote is wildcard
8 ENTRIES QUALIFIED

>FIND CUSTOMERS.CUSTOMER-NO=01540*         If asterisk is NOT the wildcard for this
                                           datab
ase, then no match unless
                                           the value 01540* is in dataset.
0 ENTRIES QUALIFIED
```

B-Tree Limitations

QUERY will utilize the B-Tree functionality when possible for both character and binary data types. The wildcard feature is only implemented by TurboIMAGE/XL for character data types (X and U) and not for binary data types. Neither has the Not Equal operator been implemented for B-trees and so QUERY will continue to use the older access methods (normally serial reads) for Not Equal retrievals. Note that the LIST command always uses a serial read but will apply the wildcard search character for relations.

When a database has the BTREEMODE1 flag set to OFF, QUERY will not attempt to use the B-Tree functionality for Wildcard retrievals. This condition is reported by all forms of the FORM command.

“NO MATCH” Enhancement

The FIND, MULTIFIND, and SUBSET commands have been enhanced to accept a NO MATCH alternative such that all data records NOT MATCHING the pattern provided are returned by the commands. The new form of the FIND command is:

```
FIND [#LIMIT=I;] RELATION/ITEM IDENTIFIER [NO]
M[ATCHING] "PATTERN"[AND/OR RELATION/ITEM IDENTIFIER
[NO] M[ATCHING] "PATTERN"]... [END]
```

The MULTIFIND and SUBSET command syntax are similarly enhanced.

The NO may be followed by additional characters such that all of the following examples are accepted:

```
FIND PRODUCTS.NAME NO MATCH "ABC?*"
```

```
FIND PRODUCTS.NAME NOT MATCHING "ABC?*"
```

```
FIND PRODUCTS.NAME NONE M "ABC?*"
```

This NO Matching enhancement is NOT related to the B-Tree functionality and does not utilize the B-Tree retrieval mechanisms.

IMAGE/SQL with TurboIMAGE/XL Enhancements

by *IMAGE/SQL Team*
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Overview

This article discusses enhancements as well as other important information commencing with the Express 3 release of MPE/iX 5.5. Express 3 (and later releases) also includes the revised editions of some selected manuals.

Highlights

Highlights of this release of IMAGE/SQL, version B.G3.00 or later, and TurboIMAGE/XL, version C.07.14 or later, are the following:

- Dynamic data set expansion for master sets (MDX or DDXM)
- Performance enhancement for databases with third-party indices
- 80 GB data sets
- Predicate locks when updating manual masters
- DBSCHEMA and P type with odd sub-item length
- B-Tree indices enhancement
- New 16-bit and 32-bit ODBC driver, ODBCLink/SE, bundled with IMAGE/SQL
- Support for third-party composite indices in IMAGE/SQL
- Scalability for DBPUT, DBDELETE, and DBUPDATE (CIU on)
- Dynamic detail data set expansion (DDX) fix

Manuals Bundled with IMAGE/SQL

The following manuals are included with IMAGE/SQL:

- *HP IMAGE/SQL Administration Guide* (Revised August 1997)
- *Getting Started With HP IMAGE/SQL*
- *TurboIMAGE/XL Database Management System Reference Manual* (Revised August 1997)
- *ALLBASE/SQL Database Administration Guide*
- *ALLBASE/SQL Reference Manual*
- *ALLBASE/SQL Message Manual*
- *ALLBASE/SQL Performance and Monitoring Guidelines*
- *ISQL Reference Manual for ALLBASE/SQL and IMAGE/SQL*
- *ODBCLink/SE Reference Manual* (Revised June 1998)

Updating IMAGE/SQL

If you are updating from an earlier release of IMAGE/SQL and you have databases which are already ATTACHED to one or more DBEnvironments, you must DETACH and ATTACH again in order to benefit from the enhancements. Also, it is recommended that you issue the UPDATE STATISTICS command of ISQL for each of the tables you access frequently. This may enable you to attain performance improvement.

Furthermore, if you have created SQL data using an earlier release of IMAGE/SQL and are now updating to a latter release, you must perform the ALLBASE/SQL migration using SQLINSTL or SQLMigrate. For more information, refer to the *ALLBASE/SQL Database Administration Guide* and the *Read Before Installing* for this release.

TurboIMAGE/XL Enhancements

The following are TurboIMAGE/XL enhancements, independent of SQL access:

- Dynamic data set expansion for masters (MDX or DDXM)
- 80 GB data sets
- Performance Enhancement for databases with third-party indices
- DBSCHEMA and P type with odd sub-item length
- B-Tree indices
- Scalability for DBPUT, DBDELETE, and DBUPDATE (CIU on)

Dynamic Data Set Expansion for Masters

Dynamic data set expansion feature for non-jumbo (file size within 4 GB limit) detail data sets (DDX) was first released in MPE/iX 5.0. With 5.5 PowerPatch 5 and later, this feature is available for non-jumbo master data sets (MDX or DDXM) as well. The feature allows dynamic expansion of a data set during DBPUT when the data set has approximated its current capacity and DBPUT would fail unless the data set is expanded. As in DDX, the capacity parameters which are maximum capacity, initial capacity, and increment (optional), used for dynamic expansion, must be set prior to the actual expansion. For new databases, these parameters can be specified in the CAPACITY statement of the schema definition to be processed by DBSCHEMA. For existing databases, third-party tools which support MDX need to be employed.

The capacity parameters are:

- maximum capacity
is a required parameter and is a maximum number of entries the data set can contain. It must be less than or equal to $2^{31}-1$ (2,147,483,647). The maximum capacity is adjusted by TurboIMAGE/XL to represent a multiple of the blocking factor.
- initial capacity
is a required parameter and is the initial, primary, or hashing capacity for the data set. It is the number of entries for which space will be allocated and initialized when the data set is created. More importantly, the initial capacity, and not the current capacity

(initial capacity with expansions included), will be used in the hashing algorithm to calculate the primary address of the new entry being added. If initial capacity is very low, there can be frequent expansions which could result into both long synonym chains which degrade the performance of some TurboIMAGE intrinsics and disk fragmentation. Therefore, this number should be derived after giving consideration to the expected volume of current data, anticipated growth, and synonym chain lengths. It should be such that a minimum number of expansions are necessitated. The initial capacity must be between 1 and $2^{31} - 1$ inclusive but must be less than or equal to the maximum capacity. If it is not specified, or if it is either zero or equal to the maximum capacity, dynamic capacity expansion is not enabled for the data set, and maximum capacity is used for the data set file creation and primary address calculation. The initial capacity is adjusted to represent a multiple of the blocking factor.

- increment

is an optional parameter and is either the number of entries or the percentage of the initial capacity by which the data set needs to be expanded each time. If a percentage is used, the percent sign (%) must follow the incremental amount. The increment is adjusted (reduced) for the last expansion so that it does not exceed the maximum capacity. This increment parameter can only be used if a valid initial capacity parameter is also specified. This number must be 1 to 100 inclusive for percent, or 1 to $2^{31} - 1$ (2,147,483,647) inclusive for number of entries. If it is very low, there can be frequent expansions leading to severe disk fragmentation and performance degradation. If it is very high, DBPUT that triggers the expansion may take long time to complete which could impact other database users.

If the increment is not specified for the data set, or is zero, but the initial capacity is greater than zero and not equal to the maximum capacity, the increment for each expansion defaults to ten percent (10%) of the initial capacity for the data set. If the initial capacity is equal to the maximum capacity, or the initial capacity is zero, it indicates that the data set cannot be expanded and increment is ignored.

The enhanced syntax for the CAPACITY statement of DBSCHEMA is same for both DDX and MDX, and is as follows:

```
{CAPACITY: | C:} maximum capacity [(blocking factor)]
[,initial capacity [,increment]];
```

Dynamic Expansion and Placement of a New Entry

The instant when the expansion is triggered and how record address is assigned to the new entry in a master data set varies greatly from detail data set. In a detail data set, expansion takes place during DBPUT when the free entry count for the set is zero. In case of a master data set, expansion is triggered during DBPUT when there is no free (unoccupied) entry in the close proximity (within an internally-maintained number of blocks) of the calculated primary address of the new entry and the set is expandable. This means that an expansion takes place even when the free entry count is greater than zero.

Following the first expansion, the master data set can be perceived as having two areas, original area and expanded area, managed differently. The original area is managed in the same way as in releases prior to MDX, that is, the primary address for the new entry is calculated using the hashing algorithm and the secondary address is assigned according to

the availability of the free entry, but with modifications in searching for a free entry. The use of the expanded area is controlled using the pointer to a delete chain head and the last entry used in the file (high-water mark) as in detail data sets. Subsequent expansions belong to the expanded area. The original area can have primary entries and secondary entries, while the expanded area can only have the secondary entries. Note that the primary capacity (also hashing or initial capacity) used to calculate the primary address does not change. In essence, the dynamic expansion results in allocating additional space for secondary entries which implicitly makes room for additional primary entries in the original area. The primary address of a new entry is calculated using the value of the entry's key item and primary capacity in the hashing algorithm. The new entry can reside either at its primary address in the original area, or in the close vicinity of the primary address in the original area, or in the expanded area.

To elaborate further, when a `DBPUT` for a manual master, or implied `DBPUT` to an automatic master, is processed, the address where the new entry resides is based on the following:

1. If the primary address in the original area is not occupied, the new entry resides there. The new entry also becomes a synonym chain head with a count of one.
2. If the primary address is already occupied by a primary entry which hashed to the same address, TurboIMAGE/XL scans a few blocks (predetermined based on internal values, also known as quick search) in the close proximity of the primary address to find a free entry (empty entry). If found, the new entry resides at this secondary address in the original area. Otherwise, search for a free entry is directed towards the expansion area. At this point, if the set has not been expanded at all and can be expanded, expansion will take place and the new entry will reside at the first entry address in the new expanded area.

If prior expansion has already taken place, the pointer to the delete chain head and the last entry used in the file for the expansion area are interrogated to determine the secondary address in the expansion area for the new entry. When there is room, the new entry is assigned a secondary address in the expanded area, and the new entry becomes the last entry in the synonym chain. If the expanded area is full and can be expanded, it is further expanded to accommodate the new entry.

When there is no room in the expanded area and cannot be expanded further, however, there is room in the original area based on the free entry count, the original area is scanned once again (long search) to find a secondary address for the new entry. If a free entry is found, the new entry resides there, and it becomes the last entry in the synonym chain. Otherwise, the set is full and `DBPUT` will fail.

3. If the primary address is occupied by a secondary entry, the secondary entry is relocated to another secondary address in either the original area or the expansion area. A free entry is searched as described in item 2 above. The new entry (primary) becomes a synonym chain head with a count of one. TurboIMAGE/XL performs synonym chain maintenance for the secondary entry which relocates.

Following the expansion, TurboIMAGE/XL updates various fields related to the expansion such as current capacity, including the expansion, in the root file. Also, the data set user label is updated for the last entry used in the file (high-water mark), free entry count, and pointer to the put-delete chain head.

Intrinsics and utilities The following intrinsics and utilities are enhanced to support MDX:

- DBINFO modes 205 and 208 (new for MDX) give detailed information pertaining to dynamic expansion. The buffer layout for mode 205 remains the same as that of DDX except that it is relevant to MDX. The buffer layout for new DBINFO mode 208 is in the following table.

Buffer must be at least a 64-byte record and returns the following (each element is a 32-bit word):

Table 5-14. DBINFO Mode 208

Element	Contents
1	Primary (hashing) capacity for masters, 0 for details
2	Current capacity, including expansions
3	Maximum capacity
4	Expansion threshold: -1 ... 100 percentage -1 this value means expansion is not triggered by percentage, or it is a non-expandable set.
5	Delete chain free head (0 for non-expanded masters)
6	high-water mark (0 for non-expanded masters)
7	Expansion threshold: -1 ... 2 billion blocks -1 this value means expansion not triggered by traversing 3 blocks without success, or it is a non-expandable set.
8...16	Reserved; 0 is returned

DBINFO mode 208 returns information about internals which will be meaningful to only a few customers.

- DBUTIL SHOW *database* ALL command shows the presence of MDX. The SHOW database CAPACITY command gives detailed information pertaining to capacity parameters and identifies sets enabled for dynamic expansion.

For more information, refer to the sixth edition of the *TurboIMAGE/XL Database Management System Reference Manual*.

NOTE Select master data sets which need dynamic expansion based on anticipated growth and specify the capacity parameters (in particular the initial capacity) very carefully. Specifying low initial (primary/hashing) capacity and increment leading to frequent expansions may result into long synonym chains, which degrade the performance of some TurboIMAGE intrinsics, and disk fragmentation. Select initial capacity such that expansions are minimal.

80 GB Data Sets

TurboIMAGE/XL version C.07.14 includes an enhancement which allows jumbo data sets to be up to 80 GB in size, twice as big as the old limit. There are no new externals/options added for this enhancement. For new databases, DBSCHEMA allows data sets to be up to 80 GB in size. As for jumbo data sets, the control option '\$CONTROL JUMBO' is required prior to specifying a data set greater than the default of 4 GB. For existing databases, use third-party tools which support this feature. If you use third-party indexing software, you may need the version of the software which supports this feature.

When creating a jumbo data set of this magnitude using DBUTIL, you will experience some delay.

Performance Enhancement for Databases with Third-party Indices (TPI)

TurboIMAGE/XL intrinsics DBGET and DBFIND are enhanced for improved performance in the following circumstances when the database is enabled for TPI:

- DBFIND and DBGET when the set does not have TPI and the trace facility, if applicable, is turned off.
- Serial DBGET (modes 2 and 3) for a set with TPI when the mode need not be promoted to other mode (possibly a chained mode) by the third-party software.
- Chained DBGET (modes 5 and 6) for a DBFIND of an IMAGE search item or a B-Tree item for a set with TPI.

In order to attain the performance gain, you must obtain the version of the third-party software which supports this enhancement. In the absence of either one of the needed software products (TurboIMAGE/XL or third-party product), DBFIND and DBGET continue to work as they do in the absence of this enhancement. That is, TurboIMAGE/XL and the third-party products are backward compatible for this enhancement.

DBSCHEMA and P Type with Odd Sub-Item Length

DBSCHEMA is enhanced to generate an error when the sub-item length of the datatype P is odd, even if the product of sub-item count and sub-item length is divisible by 4. For example, DBSCHEMA will flag the data items 4P1 or 8P3 as invalid. Although syntactically correct, none of the major languages can use them. This change does not affect existing databases. That is, if you currently have databases with P type defined using odd sub-item length and sub-item count such that their product is divisible by 4, you may continue to use it without any problem when creating a new database. The default for DBSCHEMA is to generate an error in this situation. If you want to create a new database with P data type having odd sub-item length, you need to use the new CONTROL option, \$CONTROL ODDALLOWED.

B-Tree Indices

You can create a B-Tree index on the master data set's key item and perform B-Tree index searches using the key item as well as all of its corresponding detail data set search items. The B-Tree index searches are done using DBFIND with a master or detail data set and its key or search item respectively. The qualified entries can be retrieved using DBGET mode 5 or 6.

Key Features of B-Tree Indices

Following are key features of B-Tree indices:

1. B-Tree index can be created only on the key item of the master data set.
2. B-Tree searches using the search items of all of its corresponding detail paths can be done.
3. You may create B-Tree indices for zero, one, or more master data sets.
4. DBSCHEMA has a new option, INDEXED, for the SET specification.

New syntax

```
NAME: setname, {M[ANUAL] | A[UTOMATIC]}[/INDEXED]  
[(read class list)/(write class list)][,device class];
```

5. DBUTIL has new commands and options.
 - New ADDINDEX, DROPINDEX, and REBUILDINDEX commands (to be used for one, more than one, or all masters).

Syntax

```
{ADDI[NDEX] | DROPI[NDEX] | REBUILDI[NDEX]}  
database name[/maintword] FOR {ALL | setnamelist | setnumlist}
```

Parameters

setnamelist is the list *setname*[,...]

setnumlist is the list *setnum*[,...]

ALL means all master data sets for the database.

- The SET command has a new BTREEMODE1 option to set DBFIND mode 1 access ON or OFF for a B-Tree wildcard search for X and U types. The default is OFF. The ON setting allows you to use B-Tree indices for generic search without making application changes. Also, it allows you to define your own database-wide wildcard character.

New Syntax

```
SET database name[/maintword]  
BTREEMODE1={ON | OFF}[, [WILDCARD=]c]
```

where *c* is any printable ASCII character, and the default character is @.

- The SHOW command has a new INDEX, INDEXES, or INDICES option.

New Syntax

```
SHOW database name[/maintword]
{INDEX | INDEXES | INDICES}
```

- CREATE, ERASE, PURGE, SECURE, RELEASE, and SHOW commands include B-Tree index files in their operation.
 - The MOVE command does not allow moving the index file.
6. DBCONTROL has these modes pertaining to B-Tree indices:
- 13 is for B-Tree index file control. That is, to ADD, DROP, REBUILD, ATTACH, or DETACH a B-Tree index file. This mode requires PRIVILEGED mode, and hence, must be used carefully as improper use may damage your system.
 - 14 is used to obtain and control database-wide B-Tree information. This mode requires PRIVILEGED mode, and hence, must be used carefully as improper use may damage your system.
 - 15 sets BTREEMODE1 ON, and optionally allows the wildcard character to be set for the current DBOPEN.
 - 16 sets BTREEMODE1 OFF for the current DBOPEN.
7. DBINFO has these modes pertaining to B-Tree indices:
- 209 informs whether or not a B-Tree index exists for a master.
 - 113 gives BTREEMODE1 setting and the wildcard character for the database as well as current DBOPEN.
8. DBFIND has these features pertaining to B-Tree indices:
- Can be used for details as well as masters to specify B-Tree index searches.
 - Introduces a new fixed-format structured argument.
 - DBFIND modes with added functionality pertaining to B-Tree indices:
- 1 can continue to work as it does in releases prior to the release of B-Tree index feature (C.07.00), despite the presence of a B-Tree index, or it can be used for a B-Tree search if BTREEMODE1 is ON. Uses the classic mode 1 argument format.
 - 4 used for B-Tree index searches on numeric as well as ASCII types and, for details, it returns accurate chain (super-chain, that is, multiple qualified chains) counts. Requires a new structured argument.
 - 10 allows you to simulate DBFIND mode 1 as if there were no B-Tree index. This is the same as TPI mode 10. Requires the classic mode 1 argument format.
 - 21 is the same as B-Tree index search using DBFIND mode 1, except it is a faster version and does not return accurate chain counts. Requires the classic mode 1 argument format.
 - 24 is the same as B-Tree index search using DBFIND mode 4, except it is a faster version and does not return accurate chain counts. Requires a

new structured argument.

Allows wildcard search, as well as range search (<, <=, >, >=, "PK" for partial key, or [] for between).

9. DBGET modes 5 and 6 can be used for B-Tree index retrieval for masters or details. Super-chains are traversed for detail data sets.

10. KSAM/iX files are used for B-Tree index files. These are KSAM related key points:

- There is one KSAM/iX privileged file with a filecode of -412 for each B-Tree index file. The size limit for this B-Tree index file is 4 GB. A jumbo master (larger than 4 GB) can have a B-Tree index file provided the B-Tree index file remains within its 4 GB limit.
- KSAM/iX B-Tree index file is named using the POSIX file format with the "idx" extension (lowercase). For example:

```
/ACTSALES/GRPSALES/ORDERS03.idx
```
- The KSAM file has the Native Language Support language specified to match the language of the database, if the key is an ASCII type.

11. Third-party index can coexist with B-Tree index, that is, on the same item of the data set.

Quick Start for Using B-Tree Indices

If you are interested in generic trailing-@ searches only and want to get started quickly without making any application changes, you may use the following steps.

1. Identify the masters with ASCII key item that can benefit from B-Tree indices.
2. Create B-Tree indices using either of these methods:
 - a. Use the INDEXED option of DBSCHEMA for new databases.
 - b. Use the ADDINDEX command of DBUTIL for existing databases.
3. Set the BTREEMODE1 option ON using DBUTIL as follows:

```
:Run DBUTIL.PUB.SYS
```

```
>SET database name [/maintword] BTREEMODE1=ON
```

If your database is new, you will need to add data. You are now ready to perform B-Tree index searches. You can include the wildcard character in your DBFIND argument and observe the results.

Scalability

Prior to this enhancement, the modification intrinsics, DBPUT, DBDELETE, and DBUPDATE (Critical Item Update feature ON) were serialized for the database. That is, only one such intrinsic could execute at a time for the database. In order to scale with the high-end machines, TurboIMAGE/XL is enhanced to increase the concurrency of these modification intrinsics.

The increased concurrency is based strictly on the database design. The database is

internally grouped into independent SUB-DATABASES based on the physical relationships of master and detail data sets. Subsequently, the modification intrinsics can execute concurrently for these independent subdatabases. The throughput is dependent on the number of subdatabases, the more the better. The worst case is a database with only one subdatabase, one detail linked to 16 masters. The best case is when there are numerous stand-alone masters or details.

To use this enhancement, your database must be activated to use the Dependency Semaphore. To achieve this, the `ENABLE` and `DISABLE` commands of `DBUTIL` introduce a new option, `DSEM`. The default for `DSEM` is `DISABLED`.

New syntax

```
EN[ABLE] database name[/maintword] FOR DSEM
DI[SABLE] database name[/maintword] FOR DSEM
```

After enabling your database for `DSEM`, if you feel that your database design cannot attain expected concurrency, you may `DISABLE` the feature as there is some overhead when the database is enabled for `DSEM`.

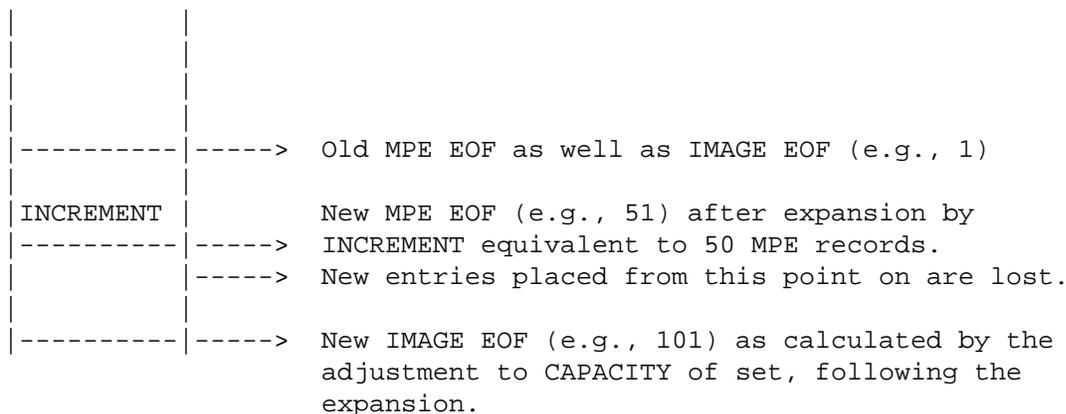
Dynamic Detail Dataset Expansion (DDX) Fix

(SR# 5003-367607)

The DDX feature of TurboIMAGE/XL has a known problem which *may* cause you to lose *some* of your new data entries added following the dynamic detail dataset expansion. This defect has been in the feature since its introduction, but has surfaced recently and has been reported by a few customers. The problem has been fixed both for MPE/iX 5.0 and MPE/iX 5.5. The patch ID for MPE/iX 5.5 is TIXKX62 (or superseded patch id) and the TurboIMAGE/XL version is C.07.10. This patch is contained in this release.

Problem Description

The problem is that, following a dynamic expansion, the addition of the new data entries (`DBPUTS`), which *exceed* the `INCREMENT` in number, are written to the data set beyond the physical end-of-file (MPE EOF). When the database is closed and reopened, those new entries exceeding the `INCREMENT` are inaccessible. If a program attempts to read that data or add more data entries in that area, it gets an error -212, Database is Corrupt. The following diagram illustrates the problem.



The real problem is that, for certain expansions, the new `CAPACITY` is inadvertently adjusted by adding the `INCREMENT` *more than once* instead of adjusting only *once*. This results in incorrect calculation of IMAGE EOF and subsequently allows new data entries to be placed in the area which really does not belong to the data set file. Therefore, when the data set is closed, the new entries added beyond the MPE EOF are not retained as part of the data set file by the MPE file system and are subsequently lost.

The circumstances in which such an erroneous adjustment could take place are as follows:

- While an actual DDX is being performed by `DBPUT` for one process, a second process (user) accessing the same data set for the first time causes execution of IMAGE's open data set module. In a narrow timing window, the result will be incorrect extraneous adjustment of the `CAPACITY` by adding the `INCREMENT`! Specifically, the `CAPACITY` has been incremented *twice*, while the MPE EOF has been correctly incremented—only *once*.

How to tell if you already have this problem. If you use DDX, check each detail data set enabled for DDX. Remember, the problem is associated only with the detail data sets which have undergone dynamic expansion.

You can check for this condition as follows:

1. Use the `FORM SETS` command of `QUERY`, which gives the Current Capacity (CC) and Blocking Factor (BF) of each data set.

```
:query
HP32216D.03.11  QUERY/3000  TUE, NOV  4, 1997,  3:20 PM
COPYRIGHT HEWLETT-PACKARD CO. 1976

>b=dbusa
PASSWORD = >>
MODE = >>1
>form sets

DATA BASE: DBUSA                                TUE, NOV  4, 1997,  3:20 PM

DATA BASE LANGUAGE ATTRIBUTE: NATIVE-3000

          ITEM   CURRENT   ENTRY   ENTRY   BLOCKING
SETS:     TYPE  COUNT   CAPACITY  COUNT   LENGTH  FACTOR

      PEPU01  D       3       1010     11      12      10
```

2. Calculate the IMAGE EOF of a DDX data set using the following formula:

$$(CC + (BF-1))/BF$$

For example:

$$\text{IMAGE EOF} = (1010 + (10-1))/10 = 101$$

3. Verify this calculated EOF with the MPE EOF given by the command `:LISTF dbnamenn,2` where `dbnamenn` is the file name of that DDX data set.

```
:listf dbusa01,2

ACCOUNT= TESTACCT      GROUP= DDX
```

```

FILENAME  CODE  -----LOGICAL RECORD-----  ----SPACE----
          SIZE  TYP          EOF          LIMIT R/B  SECTORS #X MX
DBUSA01  PRIV  256W  FB          51          200   1   112   2   4

```

4. If the two EOFs do not match, there is a problem.

In the example, MPE EOF of 51 and IMAGE EOF of 101 do not match—the problem exists.

The `SHOW DBUSA CAPACITY` command of `DBUTIL` gives capacity parms:

```

          No. of  %Max -----Capacity-----  Dyn
Data Set Name Type Entries Cap Maximum Current Initial Increment Exp:
PEPU01      D    11      1  2000   1010   10     500     YES

```

Based on the above formula for calculating MPE records, the initial capacity was 1 MPE record ((10+9)/10), and the increment was 50 MPE records ((500+9)/10). The correct physical EOF should be 51 (1+50). However, IMAGE EOF as shown by `QUERY` is 101 (1+50+50). This establishes that the IMAGE EOF was adjusted twice.

If you use one of the IMAGE/SQL structure maintenance tools (such as `Adager`, `DBCPLUS`, or `DBGGENERAL`), it may have the capability to locate instances of this problem, and if you discover that one of your data sets is so afflicted, it may be possible to correct the problem using the same tool. (See the documentation for your tool.)

How to avoid experiencing this problem on your IMAGE database. The simplest answer is to install and use the TurboIMAGE/XL patch mentioned above. This is the option that HP recommends.

However, if you are unable to acquire and install the patch immediately, consider the following alternative:

- Until you install the patch, avoid opening a data set from one process while another is expanding it!

Here are some ways you might accomplish this; each way is independent of the others:

1. Preallocate and pre-expand DDX data sets which are *nearly-full* by adding, in exclusive mode, many new dummy entries. Add more than your actual processing will add. Then delete them before your real processing begins.
2. Open all DDX-enabled data sets needed from each process which accesses them before allowing any process to add data to any of these sets.
3. Access the database exclusively, if possible, until the expansion has completed.
4. Disable DDX on any nearly-full data set, using an HP or third-party tool.

Important Information

1. The default for Critical Item Update option was changed from `DISALLOWED` to `ALLOWED` starting with Express 3 for 5.5.

2. A jumbo data set cannot be enabled for dynamic expansion.
3. PURGE and ERASE commands of DBUTIL are enhanced to prompt the user in session mode only (not batch) for confirmation (starting with version C.07.07).
4. If you want the TPI performance enhancement, you also need to get the third-party indexing software which supports this enhancement.

IMAGE/SQL Enhancements

Information regarding enhancements to IMAGE/SQL for SQL access is described in this section:

- Predicate level lock when updating masters
- Support for B-Tree indices
- Support for third-party composite indices
- New ODBC driver, ODBCLink/SE

Predicate Locks when Updating Manual Masters

IMAGE/SQL version B.G2.07 is enhanced to apply predicate level locks (row level locks), instead of a set level lock as in prior versions, when updating selected entries in the manual master data set.

When IMAGE/SQL is used as the SQL interface to TurboIMAGE/XL database, the responsibility of enforcing appropriate locks rests with IMAGE/SQL. These locks should conform to the locking schemes present in TurboIMAGE/XL. Accordingly, locks are set by IMAGE/SQL depending on the `DBOPEN` modes and isolation level requirements. At present, for a master dataset, for all modify intrinsics, that is, insert, delete and updates, and for `DBOPEN` modes 1 to 4, IMAGE/SQL puts a set level lock (or a pseudo set level lock covering all the rows in the set). But for update function in `DBOPEN` mode 1, setting a set level lock (or pseudo set lock) is not mandatory, a row level lock would be sufficient. Therefore, IMAGE/SQL will now lock at the predicate level if a 'where' clause is specified, otherwise a set lock will be given. This feature is actually transparent to the user.

Benefits

When multiple users are operating on the same data set, it is difficult to update different entries with set level lock in place. But when a predicate level lock is in effect, the unnecessary wait time is avoided, thus allowing multiple updates of different entries on the same data set.

For an example, User A has an update statement:

```
UPDATE Music.Albums set RecordingCo='ABC Music Ltd.' where Medium='ca' ;
```

The kind of lock that is placed can be seen by invoking `DBUTIL` as shown:

```
:DBUTIL
```

```
HP30391C.07.04 TurboIMAGE/XL:  DBUTIL (C) COPYRIGHT HEWLETT-PACKARD COMPANY  
1987
```

```
>>show Music locks
```

```
For database MUSIC
```

LOCKED ENTITY	/	(- waiting process)	PIN/ PATH	PROGRAM NAME	JOBNUM
ALBUMS: MEDIUM = ca	.	.	41/1	ISQL	#S18

Now, User B wants to update row(s) in the same data set via an update statement:

```
UPDATE Music.Albums set RecordingCo='California Music' where
Medium='cd' ;
```

The kind of lock that is applied by User B (JOBNUM #S21) is shown in the following example:

```
:dbutil

HP30391C.07.04 TurboIMAGE/XL:  DBUTIL (C) COPYRIGHT HEWLETT-PACKARD
COMPANY 1987

>> show Music locks
    For database MUSIC

                LOCKED ENTITY / ( - waiting process )      PIN/      PROGRAM
                /                                     PATH      NAME      JOBNUM

ALBUMS: MEDIUM = cd . . . . .                56/1      ISQL      #S21
ALBUMS: MEDIUM = ca . . . . .                41/1      ISQL      #S18
```

In this example, User A updates 2 entries and User B updates 5 entries simultaneously.

Impact on current IMAGE/SQL applications

With this enhancement, the locking scheme in IMAGE/SQL is exactly as required by TurboIMAGE/XL (as described in TurboIMAGE/XL Database Management System Reference Manual, Aug 1997). All applications conforming to this will not have any problems, and may actually see improvements in performance, when updating manual masters.

Support for B-Tree Indices

The B-Tree indices can be created using DBUTIL for existing databases and DBSCHEMA for new databases. More details about creating B-Trees indices is given under the heading, "TurboIMAGE/XL Enhancements," earlier in this article.

In order to realize the benefit of the B-Tree indices for SQL access, you must first DETACH the database, if already attached, and ATTACH the database for the DBEnvironment. IMAGE/SQL enters definitions for the B-Tree indices in the system catalog of the DBEnvironment. The index on the key item of the master, except for P and Z types, is entered as 'unique' index. Other definitions, by default, are non-unique.

Although the B-Tree index on the related search item of the detail set is not explicitly created using DBUTIL or DBSCHEMA, its definition is entered in the SQL catalog. For example, if a B-Tree index is created on a key item with paths to 16 detail data sets, a definition for a B-Tree index for all 16 data sets will be entered as well. That is, this will result into 17 (1+16) definitions, one for each data set.

If your key item or its related search item is split using the SPLIT command of IMAGESQL, the definition for a B-Tree index on the split item will not be entered. For an example, if a key item is split but the related search item is not, the definition for the key item of the master data set will not be entered, but the one for the search item will be.

The B-Tree indices can be viewed in the views, `SYSTEM.INDEX` and `CATALOG.INDEX`, of the system catalog of the DBEnvironment.

Multiple index definitions on the same column can coexist and the SQL optimizer derives the access plan based on the statistics present in the system catalog. In other words, the key or search item of the set can have a maximum of three index definitions. One will be a hash index (only “=” operator permitted) automatically done by `IMAGESQL` at `ATTACH` time, another can be a B-Tree index, and the third can be a third-party index. It is recommended that both B-Tree index and third-party index be not created on the same item as it will unnecessary impact the performance (Optimizer calculates cost for each index).

The Optimizer derives an access plan and decides which index to use and the proper order of operations.

The version of third-party software that supports the new B-Tree index modes for `DBFIND`, `DBCONTROL`, and `DBINFO`, is required from both third parties.

Third-Party Composite Indices

`IMAGESQL` is enhanced to enter definitions for third-party composite indices in the system catalog of the DBEnvironment at `ATTACH` time. These composite indices can be on mixed data types, but must be on `FULL` items. Information about all third-party indices, including composite, is obtained from the third-party product, which is subsequently used during `ATTACH`. Both `SUPERDEX` and `OMNIDEX` do not provide information on the composite indices on substrings (partial item) of items to `IMAGE/SQL`.

These indices can be viewed in `SYSTEM.TPINDEX` along with other third-party indices.

At run-time, `IMAGE/SQL` may employ `DBFIND` mode 1 with “@;” appended to the argument, or mode 11 with start and stop values, as deemed appropriate.

Note that if you have multiple indices for the table, the SQL optimizer has the control on the type of access, and the specific index to be used.

For SQL access, the only step necessary to use the above enhancements pertaining to relational access, is to perform `DETACH`, if attached, and `ATTACH`.

Important Information

1. If you have third-party indexing (TPI) enabled for the database and want to create B-Tree indices, obtain the correct version of the third-party software which recognizes this coexistence. Otherwise, you will get run-time errors returned by third-party software for new modes of `DBFIND`, `DBINFO`, and other utility commands.
2. The Optimizer derives an index scan based on the current statistics for the data set. Hence, it may select an index on the column not used in the SQL statement.

ODBCLink/SE

In this release, `IMAGE/SQL` is bundled with a new 16-bit and 32-bit ODBC driver, `ODBCLink/SE`, which is a replacement for the ODBC driver HP PC API. `ODBCLink/SE` is an implementation of Microsoft's Open Database Connectivity (ODBC) interface that enables Microsoft Windows based applications and tools to access TurboIMAGE/XL data

on the HP3000 in a client/server environment. In such an environment, the application developers and end-users can take advantage of the PC's graphical user interface (GUI) and processing power, while relying on the security, integrity, and database management capabilities of IMAGE/SQL. The client can run under Microsoft Windows 3.1 or 3.11, Windows95, or Windows NT V3.51 or V4.0. Connection via Winsock is available in 16-bit and the new 32-bit version. The driver can be used in two ways: either by direct calls from a Windows program or through an ODBC-compliant application such as Microsoft Access and Visual Basic.

A data migration tool is provided to migrate data sources created for the current HP PC API to ODBCLink/SE. Once the data sources have been identified, the translation is performed automatically.

To facilitate the transition to the new driver, HP PC API is also included in the product. HP PC API with Gupta can co-exist with ODBCLink/SE but will no longer be enhanced.

The ODBCLink/SE server runs on MPE/iX 5.0 or later releases. ODBCLink/SE is ODBC Level 2 compliant with a few exceptions. For more information, refer to the article, "Introducing ODBCLink/SE," in Release 5.5 PowerPatch 5 *Communicator 3000*. The *ODBCLink/SE Reference Manual* is bundled with IMAGE/SQL.

TurboSTORE/iX II, TurboSTORE/iX 7x24 Patches

by Jim Nissen

Commercial Systems Division

When we shipped MPE/iX Release 5.5, we inadvertently included TurboSTORE/iX 7x24 True Online, P/N B5152AA. The inclusion of this version of TurboSTORE was in error. Hewlett-Packard Company apologizes for any inconvenience and confusion this may have caused you.

If you do not have a license to use this version, please use it as a short term demonstration copy. The demonstration period ended July 15, 1997.

If you are interested in purchasing a license to use this product, contact your HP Sales Representative or your Authorized HP Reseller and be sure to ask about the current High Availability Promotion (code named "Bridge").

Users of TurboSTORE/iX II or TurboSTORE/iX 7x24 should have installed either the SUBSYS or the appropriate XL from the MPE/iX 5.5 Express 2 (C.55.02) SUBSYS tape prior to July 15, 1997. Installing the MPEJXD4B patch requires the installation of the MPE/iX 5.5 Express 2 (C.55.02) SUBSYS or later. Failure to install either the SUBSYS or the appropriate XL will remove TurboSTORE/iX II or TurboSTORE/iX 7x24 from your system, leaving you with FOS STORE functionality.

If you do not want to install the entire SUBSYS, you may install only the appropriate XL from the SUBSYS tape. Users of TurboSTORE II (B5151AA) will install STORXL51 and users of TurboSTORE/iX 7x24 (B5152AA) will install STORXL52 using the following procedure:

Log on as MANAGER.SYS and issue the following commands:

```
:NEWGROUP USL
:FILE TAPE;DEV=TAPE
:RESTORE *TAPE;STORXL5#.USL.SYS;SHOW
:COPY STORXL51.USL.SYS,STORXL51.PUB.SYS;YES
OR
:COPY STORXL52.USL.SYS,STORXL52.PUB.SYS;YES
```

Removing TurboSTORE from Your System

If you determine that this product is not required, please remove it from your system. To remove TurboSTORE/iX 7x24, you need to remove STOREXL.PUB.SYS from your system. The following procedure will do this

```

:purge STOREXL.PUB.SYS
:sysgen
SYSGEN version E.02.00:catalog version E.02.00 THU,JAN 23,1997,11:51 AM
Copyright 1987 Hewlett-Packard Co. All Rights Reserved.

  **warning** no NMCONFIG file in this configuration.
  **warning** NMCONFIG.PUB.SYS is now the NMCONFIG file.
  **note** Retrieving NMMGR configuration data...

  ** First level command **
io              log (lo)          misc (mi)       spu (sp)
sysfile (sy)
basegroup (ba)  keep(ke)           permyes (pe)    show (sh)
tape (ta)
clear (cl)(c)   exit (ex)(e)   help (he)(h)    oclose (oc)
redo

sysgen> sys

  ** SYSFILE configurator commands **
aauto (aa)      aboot (ab)      acmsl (ac)      asprog (as)
cmsl (cm)       dauto (da)      dboot (db)      dcmsl (dc)
dsprog (ds)     lcmsl (lc)      rauto (ra)      rboot (rb)
rcat (rc)       rcmsl (rcm)     rdcc (rd)       ripl (ri)
rnmlib (rn)     rsprog (rs)     show (sh)
clear (cl)(c)   exit (ex)(e)   help (he)(h)    hold (ho)

sysfile> dsprog prog=STOREXL.PUB.SYS
sysfile> hold
sysfile> exit
sysgen> keep
        keeping to group CONFIG.SYS

        Purge old configuration (yes/no)?yes
        ** configuration files successfully saved **

sysgen> exit

```

6 Product List—How to Order

You can order subsystem products through your HP Sales Representatives.

- To order products in the U.S., call HP Computer Organization Order Fulfillment Center at 1-800-386-1117 option 3.
- To order learning products manuals in the U.S., call HP Parts Director Ordering at 1-800-227-8164.
- To order products and/or manuals in countries outside the U.S., call your local Trade Parts Sales Organization.

You must specify the product number and release base (for this release, Release 5.5) when ordering. Installing the PowerPatch tape updates your system with the FOS enhancements, as well as subsystems that have patches.

You may order only the PowerPatch tape. However, installing the PowerPatch ONLY, updates your system only with the FOS enhancements—the subsystem products **must** be ordered and installed via the SUBSYS tape from MPE/iX-Express 7 based on Release 5.5. Customers with Response Center Support can contact the Response Center to order the PowerPatch tape.

NOTE MPE/iX Express 3 based on Release 5.5 can be ordered only by mailing or faxing the order form sent to those customers with an appropriate support contract. It cannot be ordered by phone.

To install MPE/iX Express 7 based on Release 5.5, you will need the following:

Release On Your System	What You Need
MPE/iX General Release C.50.xx (any version)	FOS C.55.00 SUBSYS C.55.07 PowerPatch C.55.07
MPE/iX Release C.55.00, C.55.01, C.55.02	SUBSYS C.55.07 PowerPatch C.55.07
MPE/iX Release C.55.03 with PowerPatch 3, 4, 5 or 6	PowerPatch C.55.07

7 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 5.0 and 5.5 releases.

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 7-1. MPE/iX Product Releases

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.50.00		R3504	MPE/iX Release 5.0 (Core Software Release) Workload Manager (B3879AA) Shared Globals ARPA Bundling
	C.50.02	R3513	MPE/iX-Express 2 based on General Release 5.0 MOVER Utility Information Access SQL/iX LASERRX/MPE ALLBASE/4GL Developer and Runtime
	C.50.03	R3538	MPE/iX-Express 3 based on General Release 5.0 Information Access Server/iX Symbolic Debug/iX ALLBASE/SQL G.1 IMAGE/SQL G.1 New Systems: HP 3000 Series 969KS/x00 (x = 1- 4) HP 3000 Series 996/80, 996/x00 (x = 1- 8) New SCSI Disks: ST31200N (1 GB Single-Ended) ST31230N (1 GB Single-Ended, Low Profile) ST32550N (2 GB Single-Ended) ST15150N (4 GB Single-Ended) ST32550W (2 GB Fast/Wide) ST15150W (4 GB Fast/Wide)

Table 7-1. MPE/iX Product Releases

Release	SUBSYS	Date Code	Product(s) Introduced/Added
C.55.00		R3628	MPE/iX Release 5.5 (Major Software Release) HP Loader Dependent Libraries Subsystem Dump Facility HP Stage/iX HP Patch/iX TurboSTORE/iX 7x24 True-Online Backup HP Optical Disk Libraries: C1150B - 40GB C1160B - 80GB C1170B - 100GB TCP/IP Network Printer Support Telnet/iX Server DTS/TIO Dynamic Configuration Online System Device Configuration
	C.55.01	R3638	PowerPatch 1 based on Release 5.5 ALLBASE/SQL CAST function HP Telnet/iX—full functionality CCSY Access Server 979/x00KS support High Availability Disk Array support
	C.55.02	R3715	Express 2 based on Release 5.5 CI enhancements VPlus enhancements DTS/TIO new functionality
	C.55.03	R3732	Express 3 based on Release 5.5 COBOL II/iX enhancements 100VG-AnyLAN Network Adapter introduced 100Base-T Network Adapter introduced ALLBASE/SQL release G2 ODBCLink/SE ODBC driver introduced TurboIMAGE/XL B-Tree and scalability enhancements IMAGE/SQL B-Tree enhancement 9 GB Disk Drive NMMGR Node Maintenance Manager enhancements New SCSI Disks: ST32272N, ST32272WC (2 GB) ST34572N, ST34572WC (4 GB) XP34361W (4 GB)

Table 7-1. MPE/iX Product Releases

Release	SUBSYS	Date Code	Product(s) Introduced/Added
	C.55.04	R3748	Express 4 based on Release 5.5 Year 2000 enhancements MPE/iX new date intrinsics 997/100-500 support Enhancements for: Transact V and Transact/iX Dictionary/3000 COBOL II/iX Inform/V HP ALLBASE/BRW QUERY/iX
	C.55.05	R3813	PowerPatch 5 based on Release 5.5 989/100, 989/200, 989/400, 989/600 support 997/600, 997/800 support A3699A - HP-IB I/O Bus Converter New SCSI Disks: A4909A - 18GB, WD A5239A - 18GB, WD Enhancements for Image/SQL and TurboIMAGE/XL: Dynamic data set expansion for master sets Performance enhancement for TPI Image Row level locking 80 GB Image data sets ODBCLink/SE E.56.12
	C.55.06		PowerPatch 6 based on Release 5.5 Bug Fixes only
	C.55.07	R3910	Express 7 based on Release 5.5 989/150, 989/250, 989/450, 989/650 support 997/1000, 997/1200 support ALLBASE/SQL Release G3 New String Functions ALLBASE/BRW JCWs for year 2000 DLT4000/DLT7000 Differential Tape Support IMAGE/SQL Enhancement Entering data with P and Z data types SPLIT and UPDATE commands allow mapped type Legato NetWorker Storage Node NPCONFIG variable for NW Spooler

Supported Releases

The naming conventions for the different types of releases have been changed slightly to clarify the type of release being discussed. The terms used to describe or refer to the releases are:

Mainline Release A mainline release involves recompiling and reintegrating all software release components (FOS, SLT, and SUBSYS tapes). The release number is changed (for example, 5.0 or 5.5) and the update *UU* field of the *V.UU.FF* is changed. There are two types of mainline releases: *Platform* and *Non-Platform*.

Platform Release A platform release (previously also known as a “core” release) is a subset of a mainline release. Typically, the release number ends with a “0” such as 6.0. Platform releases are *automatically distributed* to all customers with support contracts.

Non-Platform Release A non-platform release (previously known as a “major” release) is a subset of the mainline release. The release number typically ends with a “5” such as 5.5. Non-platform releases must be *explicitly ordered* by customers.

Both platform and non-platform releases can be referred to as *mainline releases* when not discussing distribution or extended support life.

The following matrix provides information on the supported Commercial Systems MPE/iX mainline releases. It lists the currently supported releases and the SPUs they are supported on. The matrix also provides all known factory support termination dates. When a mainline release becomes unsupported, the factory will not provide any support services for that release. Online calls are not accepted and patches are not created; customers are advised to roll to a supported release.

- In general, HP will support the two most recent mainline releases.
- In order to facilitate customers moving to new releases, we will support the oldest release for at least six months after the new release ships. In other words, Release “N-2” will still be supported for at least six months after Release “N” ships.
- The release of an Express Release or a Powerpatch on any particular release does not extend its support life.

Given the rate with which we ship releases, this new strategy implies that any particular release will be supported for at least three years, and in most cases, most releases will be supported for a significantly longer period of time.

This new strategy is effective now. This implies that Release 5.0, which first shipped February 17, 1995, will become obsolete as early as six months after Release 6.0 ships.

Table 7-2. Supported System Release Matrix

Supported Releases	Supported Systems	Support Termination Date
Release 5.0 (C.50.xx)	920,922,925,930,932,935,948,949,950,955,960,980-100,980-200,980-300,980-400,9x7,9x7LX,9x7RX,9x7SX,9x8LX,9x8RX,939KS,959KS/100,959KS/200,959KS/300,959KS/400,969KS/100,969KS/200,969KS/300,969KS/400,969KS/120,969KS/220,969KS/320,969KS/420,987/150RX,987/150SX,987/200RX,987/200SX,990,990DX,992/100,992/200,992/300,992/400,992/100DX,992/200DX,992/300DX,992/400DX,991DX,995/100DX,995/200DX,995/300DX,995/400DX,995/500DX,995/600DX,995/700DX,995/800DX,991CX,995/100CX,995/200CX,995/300CX,995/400CX,995/500CX,995/600CX,995/700CX,995/800CX	June 1, 1999
Release 5.5 (C.55.xx)	920,922,925,930,932,935,948,949,950,955,960,9x7,9x7LX,9x7RX,9x7SX,9x8LX,9x8RX,939KS,939KS/020,959KS/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/400,980-100,980-200,980-300,980-400,987/150RX,987/150SX,987/200RX,987/200SX,989/150,989/250,989/350,989/450,989/650,989/100,989/200,989/400,989/600,990,990DX,992/100,992/200,992/300,992/400,992/100DX,992/200DX,992/300DX,992/400DX,991DX,995/100DX,995/200DX,995/300DX,995/400DX,995/500DX,995/600DX,995/700DX,995/800DX,991CX,995/100CX,995/200CX,995/300CX,995/400CX,995/500CX,995/600CX,995/700CX,995/800CX,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	6 months following next Mainline release after 6.0 (about end of year 2000)

@ Platform Releases are denoted by an @ sign.

8 Catalog of User Documentation

This chapter provides listings of customer manuals for the HP 3000 computer system. The listings are provided in the following section:

- "MPE/iX New or Updated Manuals," which lists all manuals that have been introduced or changed since the MPE/iX 5.5 Release.

If your contract includes Material-Based Services, you will receive both software and manual revisions. For additional copies of new or revised manuals, you can order Manual Update Services (MUS).

Many of the learning products listed in this chapter can be individually ordered by calling HP Parts Direct Ordering at 800-227-8164. Specify the customer order number of the manual you are interested in when ordering.

MPE/iX New or Updated Manuals

This section lists customer manuals introduced or updated from MPE/iX-Express 2 based on General Release 5.5 through MPE/iX 5.5 Express 7.

Table 8-1. MPE/iX 6.0 New or Updated Manuals

Manual Title	Customer Order No.	Part No.	Latest Edition
ALLBASE/SQL Database Administration Guide	36216-90005	36216-90214	8/97
ALLBASE/SQL Reference Manual	36216-90001	36216-90215	10/98
ALLBASE/SQL Message Manual	36216-90009	36216-90213	8/97
HP 3000 MPE/iX System Software Maintenance Manual	30216-90272	30216-90272	10/98
HP IMAGE/SQL Administration Guide	36385-90001	36385-90012	8/97
HP-PB 100VG-AnyLAN Network Adapter Installation and Service Guide	B5425-90001	B5425-90001	8/97
HP-PB 100Base-T Network Adapter Installation and Service Guide	B5427-90001	B5427-90001	8/97
Installation/Update Procedures for SHAREPLEX	B3933-90005	B3933-90005	6/97
Legato NetWorker ClientPak for MPE/iX Installation Guide	B5475-90001	B5475-90001	12/97
Legato NetWorker ClientPak for MPE/iX User's Guide	B5475-90002	B5475-90002	12/97

Table 8-1. MPE/iX 6.0 New or Updated Manuals

Manual Title	Customer Order No.	Part No.	Latest Edition
Legato NetWorker ClientPak for MPE/iX Release 5.0 Supplement	B5475-90005	B5475-90005	2/98
Legato Networker Storage Node Installation Guide for MPE/iX Release 5.5	B6266-90001	B6266-90001	12/98
Legato Networker Storage Node User's Guide for MPE/iX Release 5.5	B6266-90002	B6266-90002	12/98
Legato Networker Storage Node for MPE/iX Release 5.5 Supplement	B6266-90003	B6266-90003	12/98
NBSpool for MPE Reference Guide	B3933-90002	B3933-90002	6/97
NetBase for MPE Reference Guide	B3933-90001	B3933-90001	6/97
NetBase SQL Shadowing Handbook	B3482-90006	B3482-90006	6/97
ODBCLink/SE Reference Manual	36217-90406	36217-90407	7/98
TurboIMAGE/XL Database Management System Reference Manual	30391-90001	30391-90010	8/97
Vista Plus for MPE User's Guide	B3933-90003	B3933-90003	6/97
Vista Plus for MPE Administrator's Guide	B3933-90004	B3933-90004	6/97

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