HP-UX 11i Version 1.6 Release Notes

HP-UX Servers and Workstations

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Publication History

The manual's publication date and part number indicate its current edition. The publication date changes when a new edition is released. The manual part number changes when extensive changes are made.

To ensure that you receive the new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

- *HP-UX 11i Version 1.5 Release Notes*

  May 2001, Edition 1, **B9106-90003**

  June 2001, Edition 2, **B9106-90003**

  Printed, Instant Information CD, and web at **`http://www.docs.hp.com`**

  September 2001, Edition 3, **B9106-90015**

  Instant Information CD and web at **`http://www.docs.hp.com`**

- *HP-UX 11i Version 1.6 Release Notes*

  June 2002, Edition 1, 5187-0701

  Instant Information CD, and web at **`http://www.docs.hp.com`**

New editions of this manual incorporate all material updated since the previous edition. For the latest version, see the HP-UX 11i Version 1.6 documentation on the web:

`http://docs.hp.com/hpux/os/11iV1.6`

Please direct comments regarding this guide to:

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`http://docs.hp.com/assistance/feedback.html`

Typographic Conventions

We use the following typographical conventions.

audit (5)	An HP-UX manpage. *audit* is the name and *5* is the section in the *HP-UX Reference*. On the web and on the Instant Information CD, it may be a hot link to the manpage itself. From the HP-UX command line, enter "`man audit`" or "`man 5 audit`" to view the manpage. See *man* (1).
Book Title	The title of a book. On the web and on the Instant Information CD, it may be a hot link to the book itself.
Emphasis	Text that is emphasized.
Emphasis	Text that is strongly emphasized.
`ComputerOut`	Text displayed by the computer.
`Command`	A command name or qualified command phrase.
`Computer`	`Computer font` indicates literal items displayed by the computer. For example: `file not found`
`Filename`	Text that shows a filename and/or filepath.
`UserInput`	Commands and other text that you type.
`Variable`	The name of a variable that you may replace in a command or function or information in a display that represents several possible values.
`[ ]`	The contents are optional in formats and command descriptions.
`{ }`	The contents are required in formats and command descriptions. If the contents are a list separated by `|`, you must choose one of the items
. . .	The preceding element may be repeated an arbitrary number of times.
`|`	Separates items in a list of choices.

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1 Overview of the Release Notes

Welcome to HP-UX

HP-UX 11i Version 1.6 is the release for all **Itanium Processor Family** (IPF)-based HP-UX systems. The Release ID for HP-UX 11i Version 1.6 is B.11.22, and the term **HP-UX 11i v1.6** is used throughout the release notes. The HP-UX 11i v1.6 **Operating Environment** (OE) is an integrated and tested software solution containing the operating system and selected applications.

Precision Architecture Reduced Instruction Set Computing (PA-RISC)-based systems should continue to run HP-UX 11i (Release ID B.11.11) or earlier releases. HP-UX 11i v1.6 does not run on PA-RISC based systems.

The HP-UX 11i v1.6 release includes the following major features and enhancements:

- Built from the 11i source stream so it contains:
  - — Same “look & feel” as the 11i version on PA-RISC
  - — 100% leverage of system administrator expertise
  - — Same layered software products
- Built for 64-way scalability.
- Full HP-UX 11i OS functionality with the exception of vPars.
- New OS functionality not yet available on PA-RISC:
  - — MxN threads for improved Java performance
  - — Dynamically tuneable kernel parameters include 14 new parameters
- Full support of the **Logical Volume Manager** (LVM) product. LVM is now the default volume manager.
- Support for running most PA-RISC applications on IPF systems without recompiling.
- New commands and functionality.
- Enhancements to existing commands and functionality.
- Availability of more products in Native mode.

The purpose of this chapter is to help you use these release notes along with related HP-UX documentation effectively. The following topics are covered in this overview:

What is the Purpose of HP-UX Release Notes

The HP-UX 11i v1.6 Release Notes describe what is new, changed, or obsolete in a release as compared to previous releases. These release notes apply only to features that are part of the HP-UX 11i v1.6 operating system.

Additional product specific release notes files are located in the `/opt` directory, in sub-directories named *`[name]`*`/newconfig/RelNotes` (where *`name`* represents the name of the product). For example, **Distributed Computing Environment** (DCE) release notes are loaded in the `/opt/dce/newconfig/RelNotes` directory.

The purpose of the *HP-UX 11i v1.6 Release Notes* is to define the major differences between HP-UX Release 11i Version 1.5 (Release ID B.11.20) and HP-UX 11i v1.6 (Release ID B.11.22). For full information on changes in previous releases, consult the archival release notes located in: `/usr/share/doc/` or at the **`http://docs.hp.com`** web site.

Release notes do not completely document all of the features of a release. Instead, they contain high-level information and provide pointers to more detailed operating system and product-specific documentation. Where appropriate, release notes also tell you about changes in the support of products.

What is in the Remaining Chapters

The remaining chapters of these release notes:

- Chapter 2, “Workstation/Server Specific Information,” on page 17, which presents information regarding the Operating Environments, Operating System features and applications, supported systems, and networking cards and drivers.
- Chapter 3, “HP-UX Features,” on page 39, which presents information on changes to the kernel, system administration, and high availability functionality.
- Chapter 4, “File and Disk Management,” on page 59, which presents information regarding directory, file system and disk management including Logical Volume Manager (LVM).
- Chapter 5, “Networking,” on page 63, which covers changes to networking functionality and internet services.
- Chapter 6, “Commands and System Calls,” on page 79, which includes information of interest to system administrators.
- Chapter 7, “Programming,” on page 91, which covers a wide variety of changes of particular interest to programmers, including changes to compilers, editors, and libraries.
- Chapter 9, “Internationalization,” on page 159, which presents information about text fonts and converters relating to various international languages.
- Chapter 8, “Other Functionality,” on page 129, which includes additional applications or functionality in the Operating Environments.

Where Should I Begin?

This document contains information about HP-UX 11i v1.6. It includes information on changes between HP-UX 11i Version 1.5 and HP-UX 11i v1.6.

Information about the HP-UX 11i V1.5 release is available on the web at:

`http://www.docs.hp.com/hpux/os/11iV1.5/`

Information about the HP-UX 11i V1.6 release is available on the web at:

`http://www.docs.hp.com/hpux/os/11iV1.6/`

Be sure to review the "*HP-UX 11i Version 1.6 Installation and Configuration Guide*", part number **5187-0187**, at the above web site for details on performing an installation.

NOTE The most current version of these documents, as well as all Hewlett-Packard documentation, is always found at:

`http://www.docs.hp.com/`

Locating Release Notes for Previous Versions of HP-UX

Release notes are found in the following locations:

- HP-UX Instant Information CD. See "HP-UX 11i Version 1.6 Instant Information CD" for more information.
- `/usr/share/doc/` on your HP-UX 11i v1.6 system. Also included in the `/usr/share/doc/` directory are files containing information about previous releases of HP-UX.
- **`http://docs.hp.com/`** See "The HP Documentation Web Site" on page 15 for more information.

Other Sources of Information about This Release

In addition to these release notes, you have many other sources of information available to you.

README Documents

README documents are DVD booklets that contain information about the installation process that may not appear in the installation manual. Any product may have a README document, so you may have available several README documents. The README document specific for HP-UX 11i v1.6 is included with your media kit.

HP-UX 11i Version 1.6 Instant Information CD

As of the HP-UX 10.30 Release, Hewlett-Packard introduced a new product, Instant Information, which provides HP-UX documentation on a CD. Instant Information provides improved online presentation, print quality and search capabilities.

HP-UX Welcome Page

The HP-UX Welcome Page on your HP-UX 11i v1.6 system contains pointers to information to help you use your HP-UX system.

Manual Pages

For HP-UX 11i v1.6 systems, the manual (man) pages are available on the HP-UX Welcome Page of your system, from **`http://docs.hp.com`**, in Instant Information under the title *HP-UX Reference*, and through the use of the `man` command.

The HP Documentation Web Site

Hewlett-Packard provides a web site where the latest HP-UX documentation and updates are available. The site can be accessed through **`http://docs.hp.com`**..

White Papers on HP-UX

For HP-UX 11i v1.6, all associated white papers are available at **`http://docs.hp.com`**..

2 Workstation/Server Specific Information

This chapter describes workstation and server specific platforms and configurations, including:

HP-UX 11i Operating Environments (OEs)

Beginning with HP-UX 11i, the operating system is delivered as part of an HP-UX Operating Environment (OE), an integrated and tested software solution containing the operating system and select applications.

In HP-UX 11i v1.6, the operating system and selected applications are provided on a set of DVDs. To install the full OE, all DVDs are necessary. For specific information, refer to *HP-UX 11i Version 1.6 Installation and Configuration Guide*, part number **5187-0187**

The following software bundles are always delivered with each HP-UX Operating Environment. Thus, if you do a minimum install, these bundles, plus the HP-UX applications within each OE, will be loaded:

- `HPUXBase64`, which consists of operating system commands and libraries bundled for 64-bit systems.
- `HPUXBaseAux`, which includes system manageability software such as Event Monitoring Service (EMS), Judy Libraries, Software Distributor (SD), Update-UX, and the new kernel configuration tool, `kcweb`. This additional required core software is also referred to as the Auxiliary OS.
- Always-Installed network and I/O drivers required by the operating system and installed by default are:
  - Fibre Channel Tachlite HBA driver for the PCI adapter
  - intl100 driver for the **A6792A** card
  - 100BASE-T driver for Ethernet adapters
  - 1000Base-T/SX (Gigabit Ethernet) drivers for cards **A4926A**, **A6825A**, **A6794A** and **A6847A**
  - SCSI Ultra4 interface driver for IPF systems with the LSI 53C1030 SCSI Ultra4 controller
- Other Always-Installed products include:
  - `OnlineDiag`, installed by default, which provides the HP-UX 11i Diagnostics that include STM, ODE, and EMS hardware monitors.
  - Base VERITAS Volume Manager version 3.1 for HP-UX (VxVM). This is the same product that was delivered in the HP-UX 11i v1.5 release though it is no longer the default volume manager.

    (See Chapter 4, “File and Disk Management,” on page 59 for specific information.)
  - Java JRE v1.3
  - HP Apache-based Web Server
  - Perl
- The Logical Volume Manager (LVM) is the HP-UX proprietary volume manager and is now the default volume manager for HP-UX.
- `CDE-English`: CDE language (such as for English or alternate languages).

- Selectable software contains the additional products that you can select. These products include:
  - — HP-UX Install Utilities
  - — Intrusion Detection System IDS/9000 (only available on Commercial Server media)

Operating Environment for HP Commercial Servers

The OE for commercial servers contains all the base functionality that is common to other OEs, including the base 64-bit HP-UX Operating System, network drivers, and other always-installed functionality. In addition, this OE includes:

- Common Internet File System (CIFS)/9000 Server version A.01.08 (as is delivered in HP-UX 11i v.1.0)
- CIFS/9000 Client version A.01.08 (as is delivered in HP-UX 11i v.1.0)
- Netscape Communicator
- Pluggable Authentication Modules (PAM) Kerberos

Operating Environments for HP Workstations and Technical Servers

The following HP-UX 11i v1.6 Operating Environments are available for HP9000 workstations and technical servers, though these OEs are not supported on technical workstations:

- **HP-UX 11i v1.6 Minimal Technical OE (MTOE)**

  Contains all the base functionality that is common to other OEs, including the base 64-bit HP-UX Operating System, network drivers, and other always-installed functionality. However, it includes only a sparse set of high-demand applications so as not to increase purchase costs, support costs, or license costs over the base OE. These applications are:

  - — 3D Graphics Developers Kit and Runtime Environment (RTE)
  - — Netscape Communicator
  - — Technical System Configuration (TechSysConf)

    See the “Technical System Configuration” on page 24 for specific information including important potential impact information.

- **HP-UX 11i v1.6 Technical Computing OE (TCOE)**

  Contains the HP-UX 11i v1.6 MTOE, and additional applications to enable a workstation or technical server. These applications are:

  — CIFS/9000 Server version A.01.08 (as is delivered in HP-UX 11i v.1.0)

  — CIFS/9000 Client version A.01.08 (as is delivered in HP-UX 11i v.1.0)

  — Math Libraries (MLIB)

  — Message Passing Interface (MPI)

  — Pluggable Authentication Modules (PAM) Kerberos

Features and Applications Available in HP-UX 11i v1.6

The following optimal features and applications are available in this release:

- Three Operating Environments (Base, MTOE, and TCOE)
- 32 and 64-bit versions of ALL system libraries (shared only), both PA-RISC and IPF
- Dynamic Tunables
- Core security functionality
- JFS Version 3.3 (Veritas File System)
- Veritas Volume Manager version 3.1
- CDFS w/Rock Ridge Extensions
- NIS/NIS+
- Logical Volume Manager (LVM) now the default volume manager
- New kernel configuration tool, `kcweb`
- System Administration Manager (SAM)
- MC/ServiceGuard
- ServiceGuard Extension for RAC (formerly ServiceGuard OPS Edition)
- Enterprise Cluster Master Toolkit
- Network Transport
- Automounter
- Internet Services
- HP-UX Processor Sets
- C, ANSI C++, and Fortran compilers
- Dynamic Loader
- Pthread Library (libthread)
- MxN Thread Model
- Common Desktop Environment (CDE)
- Strong Random Number Generator
- Internationalization fonts, character sets, and converters
- Distributed Computing Environment (DCE)
- HP-UX Software Transition Kit (STK)
- Aries Binary Translator
- Shadow Passwords
- Ignite-UX

The complete list of applications included in the HP-UX 11i v1.6 release can be found in the HP Application Availability Matrix at:

`http://www.software.hp.com/MATRIX/`

Unavailable Features in HP-UX 11i v1.6

In comparison with HP-UX 11i, HP-UX 11i v1.6 does not provide support for the following:

- PA-RISC systems
- Operating system update, HP-UX 11i v1.6 must be cold installed
- HP-UX Workload Manager
- Virtual Partitions (vPars)
- Business Copy/BCV/snapshot features on high-end disk arrays
- Fabric connectivity with Fibre Channel Mass Storage
- OSPF agent for gated
- PA-RISC cross development on IPF
- HP-supplied PA-RISC mode archive system libraries
- HP-supplied IPF archived system libraries
- Mix & match between IPF and PA-RISC binaries and/or 32-bit and 64-bit objects
- Framebuffer graphics support
- Boot from floppy disk
- I/O OLAR/D
- CCNuma
- Veritas Volume Manager version 3.2
- Instant Capacity on Demand (iCOD)

In addition, administrators and developers should make note of the following important changes and limitations:

- No 32-bit version of this OS will be made available.
- There is no supported upgrade path from PA-RISC to IPF.
- The id number returned by `uname` may no longer be unique.

Supported Servers and Workstations

The HP-UX 11i v1.6 release fully supports the following servers and workstations:

- rx5670 (4-way server)
- rx2600 (2-way server)
- zx2000 (2-way workstation)
- zx6000 (2-way workstation)
- rx4610 (4-way server)
- i2000 (2-way workstation)

Additional information, including specifications, warranty and support, can be found at:

`http://www.hp.com/products1/itanium/`

The *HP-UX 11i Version 1.6 Installation and Configuration Guide*, part number **5187-0187**, also contains hardware configuration specifics and can be found at:

`http://docs.hp.com/`

Technical System Configuration

With the HP-UX 11i v1.6 release, the TechSysConf bundle is being introduced as an always-installed part of the MTOE (and, by extension, the TCOE). By delivering part of the functionality that was featured in Easy Setup HP-UX 11.0 (product **B5532A**) for HP Workstations, this bundle addresses the need of HP workstation and technical server customers for improved out-of-the-box performance.

Summary of Change

The TechSysConf bundle is being introduced in HP-UX 11i v1.6 as an always-installed part of the **Minimal Technical Operating Environment** (MTOE). This bundle delivers part of the functionality that was featured in Easy Setup HP-UX 11.00, product number **B5532A**, for HP Workstations. This enhancement is in response to user requirements for improved Out-of-the-Box performance. The MTOE and, by extension, the **Technical Computing Operating Environment** (TCOE) includes this bundle, and the enhancements address the needs of HP Workstation and Technical Server users.

Details of Change

The TechSysConf bundle consists of two component products:

- TC-SysSetup -
  - — Alters kernel configurable parameters, assigning values that are proven to increase performance in technical environments. The actual values and the kernel parameters that are changed by installing the TechSysConf bundle are given in the following table. Some values differ depending on the amount of system memory, as shown in the table. Existing parameter values are tested when possible and no change is made if the new value would be less than the current value.

Table 2-1 New TechSysConf Kernel Parameters

NAME	Parameter Value * <256MB	Parameter Value * <1024MB	Parameter Value * >=1024MB
create_fastlinks	Ignored **	1	1
dbc_min_pct	Ignored **	Ignored **	Formula ***
dbc_max_pct	Ignored **	Ignored **	Formula ***
hfs_max_ra_blocks	Ignored **	20	20
hfs_max_revra_blocks	Ignored **	20	20
hfs_ra_per_disk	Ignored **	256	256
hfs_revra_per_disk	Ignored **	256	256

Table 2-1 New TechSysConf Kernel Parameters (Continued)

NAME	Parameter Value * <256MB	Parameter Value * <1024MB	Parameter Value * >=1024MB
maxdsiz	268435456	3221225472	3221225472
maxdsiz_64bit	1073741824	274877906944	274877906944
maxfiles	Ignored **	2048	2048
maxfiles_lim	Ignored **	2048	2048
maxssiz	8388608	100610048	100610048
maxssiz_64bit	8388608	1073741824	1073741824
max_thread_proc	Ignored **	2048	2048
maxtsiz	67108864	1073741824	1073741824
maxtsiz_64bit	1073741824	4294967296	4294967296
maxuprc	Ignored **	819	3277
maxvgs	Ignored **	80	80
msgmap	Ignored **	5122	5122
msgmax	Ignored **	32768	32768
msgmnb	Ignored **	65536	65536
msgmni	Ignored **	512	512
msgseg	Ignored **	20480	20480
msgssz	Ignored **	128	128
msgtql	Ignored **	5120	5120
nfile	Ignored **	2048	8192
nflocks	Ignored **	2048	2048
ninode	Ignored **	4000	8192
nkthread	Ignored **	2048	6000
nproc	Ignored **	1024	4096
npty	Ignored **	200	200
nstrpty	Ignored **	200	200
nswapdev	Ignored **	25	25
semmni	Ignored **	1024	4096
semmns	Ignored **	2048	8192

Table 2-1 New TechSysConf Kernel Parameters (Continued)

NAME	Parameter Value * <256MB	Parameter Value * <1024MB	Parameter Value * >=1024MB
semmnu	Ignored **	1020	4092
semume	Ignored **	512	512
semvmx	Ignored **	32767	32767
shmmni	Ignored **	512	512
shmseg	Ignored **	512	512
shmmax	Ignored **	2147483648	2147483648
strmsgsz	Ignored **	65535	65535
swapmem_on	Ignored **	1	1
vps_ceiling	Ignored **	64	64
vx_fancyra_enable	Ignored **	1	1
vx_ncsize	Ignored **	8000	8000
vxfs_max_ra_kbytes	Ignored **	1024	1024
vxfs_ra_per_disk	Ignored **	1024	1024

* Parameter Value:

Kernel parameter value is changed only if it increases the current setting, except as noted below.

** Ignored:

Kernel parameter value is unchanged.

*** Formula:

The value is determined using the formula: MIN (15, MAX (3, 40000/Memory)) where Memory is in Megabytes.

This formula sets 20 percent of the memory for the static buffer cache up to a maximum of 400MB (when system has 2667MB memory). However, the minimum allowable parameter value is 3 percent, which takes effect when a system of 13333MB is encountered.

The formula is applied only if the current values of *dbc_min_pct* and *dbc_max_pct* are the defaults (5 and 50 respectively).

— Alters selected system configuration files to ease NFS, AutoFS, and NIS+ configuration.

— Makes other system changes to correct minor nuisances and oversights.

- TC-OpenSource

  Delivers a set of high-demand Open Source software tools:

  — tcsh 6.10, tcsh (a superset of C-shell)

  — XCDROAST 0.98alpha9, X-CD-Roast

  — bash 2.04, The Bourne-Again Shell

  — vim 5.7, Vi Improved

  — emacs 20.7, GNU Emacs

  — gmake 3.79.1, GNU make

  — less 358, GNU less

  — cdrecord 1.10, CDRecord

Impact

The TechSysConf bundle increases the target system disk space occupancy by about 140MB, mostly attributable to the TC-OpenSource product.

Installing the TC-SysSetup product changes kernel parameters, which results in a kernel build and system reboot. Since most of the kernel parameters are selected for the ability to improve performance in typical EDA and MDA application environments, a performance increase should be realized without further kernel tuning.

Specific non-kernel changes include:

- Configure the system as an NFS server in `/etc/rc.config.d/nfsconf`.
- Set NFS daemons to 30 and BIO daemons to 16 in `/etc/rc.config.d/nfsconf`. These values should **only** be changed if it increases the setting.
- Modify the search sequence and fallback activities in `/etc/nsswitch.conf`.
- Enable AutoFS and automount in `/etc/rc.config.d/nfsconf`.
- Set read and write block size to 32Kb in `/etc/auto_master`.
- Configure `/etc/passwd` and `/etc/group` to import NIS-served data.

There are no unique system installation requirements or dependencies. This bundle is intended to be installed on HP workstations and Technical Servers.

IMPORTANT Users who anticipate running a thousand or more of concurrent processes under either the TCOE or MTOE should consider decreasing the kernel parameter *`maxssiz64_bit`* to 256MB, or increasing swap allocation to prevent resource exhaustion issues.

Compatibility

Potential conflicts with other install-time parameter specifications, such as SISP enables, have been identified and addressed in TechSysConf.

Performance

Use of TechSysConf results in an all-around performance improvement on systems with mid-range or large memory capacity.

Obsolescence

Not applicable.

Documentation

For more information regarding kernel parameters effected by TechSysConf can be obtained using the `man` command.

HP SureStore E Disk Array 12H

Support changes for the HP SureStore E Disk Array 12H product.

Summary of Change

The HP SureStore E Disk Array 12H is not supported in the HP-UX 11i v1.5 or HP-UX 11i v1.6 releases, nor will it be supported in any subsequent releases.

Details of Change

No support for this storage device in the HP-UX 11i v1.5 or HP-UX 11i v1.6 releases, nor will it be supported in any subsequent releases.

Impact

If you are currently using these devices you will not able to migrate to future HP-UX releases.

Compatibility

No compatibility impacts.

Performance

No performance impacts.

Obsolescence

Support for the HP SureStore E Disk Array 12H is not provided in the HP-UX 11i v1.5 or HP-UX 11i v1.6 releases, nor will it be provided in any subsequent releases.

Documentation

The following manpages have been modified to reflect this change:

- *ARMServer* (1M)
- *arrayfmt* (1M)
- *arrayrbld* (1M)
- *drivetest* (1M)
- *arraycfg* (1M)
- *arraylog* (1M)
- *arrayrecover* (1M)
- *dteststat* (1M)
- *arraydsp* (1M)
- *arraymgr* (1M)
- *download* (1M)
- *logprint* (1M)

SCSI Ultra4 Interface Driver

The new SCSI Ultra4 interface driver is introduced in the HP-UX 11i v1.6 release.

Summary of Change

The `scsiU320` driver is introduced as part of the always-installed drivers in the HP-UX 11i v1.6 OE.

Details of Change

The `scsiU320` driver details are:

- Supported as core SCSI I/O only.
- Supports the LSI 53C1030 SCSI Ultra4 controller.
- Supports boot and dump.

Impact

No impacts.

Compatibility

The SCSI Ultra4 interface driver is only compatible with IPF systems having the LSI 53C1030 SCSI Ultra4 controller on board as the core I/O.

Performance

No change in performance.

Obsolescence

Not applicable.

Documentation

There is no documentation at this time.

Obsoleted SCSI Drivers

The SCSI Interface drivers for HP-PB, HSC, EISA SCSI cards have been obsoleted.

Summary of Change

SCSI Interface Drivers for HP-PB, HSC, EISA SCSI cards have been obsoleted.

Details of Change

SCSI Interface Drivers for the following cards have been obsoleted:

- HP-PB SCSI Cards [**28655A** , **28696A**]
- HSC SCSI Cards [**A2969A**, **A3644A**, **A4107A**]
- EISA SCSI Cards [**A2679A**]

Impact

No impacts.

Compatibility

No compatibility issues.

Performance

No change in performance.

Obsolescence

The SCSI pass-through driver, `scsi_pt`, has been obsoleted as a part of the obsolescence of the HP-PB SCSI cards.

Documentation

The manpage for *scsi_pt* (7) has been removed.

Fibre Channel Tachlite Driver

The Fibre Channel Tachlite driver in HP-UX 11i v1.6 supports the **A6795A** PCI adapter.

Summary of Change

The changes to the Fibre Channel Tachlite driver in the HP-UX 11i v1.6 release are:

- Supports **A6795A Host Bus Adapter** (HBA).
- Supports Fabric .
- Supports IPF (Itanium Processor Family) servers.
- Supports FC SNIA HBA API.
- Supports Fibre Channel boot and dump only on HP rx5670 and rx2600 servers.

In addition, these modifications to the Fibre Channel Tachlite driver have been effected:

- Tachyon driver is removed.
- The `fcmsutil` command is modified to reflect the removal of Tachyon driver and the addition of **A6795A** support.

Details of Change

The Fibre Channel Tachlite driver allows IPF (Itanium Processor Family) users running HP-UX 11i v1.6 with the **A6795A** FC PCI 2 Gb adapter to connect to fabric using Fibre Channel switches between the host and storage devices. The use of fabric enables better performance, connectivity and fault isolation. Users can take advantage of the higher link speed of the **A6795A** 2 Gb Fibre Channel HBA when used with 2 Gb capable devices. The **A6795A** auto-negotiates 1Gb or 2Gb speed and can be used in the users' existing 1Gb **Storage Area Network** (SAN) infrastructure.

The adapter is supported on the following IPF platform servers:

- rx4610
- rx9610
- rx5670
- rx2600

Fibre Channel boot and dump capabilities are available for the **A6795A** adapter on HP rx5670 and rx2600 servers only. Fibre Channel boot and dump is not supported on rx4610 and rx9610 servers.

NOTE The **A5158A** Tachlite PCI adapter is not supported in HP-UX 11i v1.6. If you are migrating from HP-UX 11i v1.5 to v1.6, HP will replace your **A5158A** adapter with an **A6795A** 2Gb Tachlite PCI adapter. Call your HP representative for the details, and reference Service Note No. A5158A-04

In this version, the Fibre Channel Tachyon driver is not supported and is removed from the software. The driver diagnostic tool, `fcmsutil`, has been modified to remove options specific to Tachyon and to add the new `vpd` option. This option lists Vital Product Data (VPD) on the **A6795A** HBA. It provides such information as the product description, part number, engineering date code, serial number, etc. The `vpd` option applies only to the **A6795A** adapter.

The command for retrieving VPD information is:

`fcmsutil <device filename> vpd`

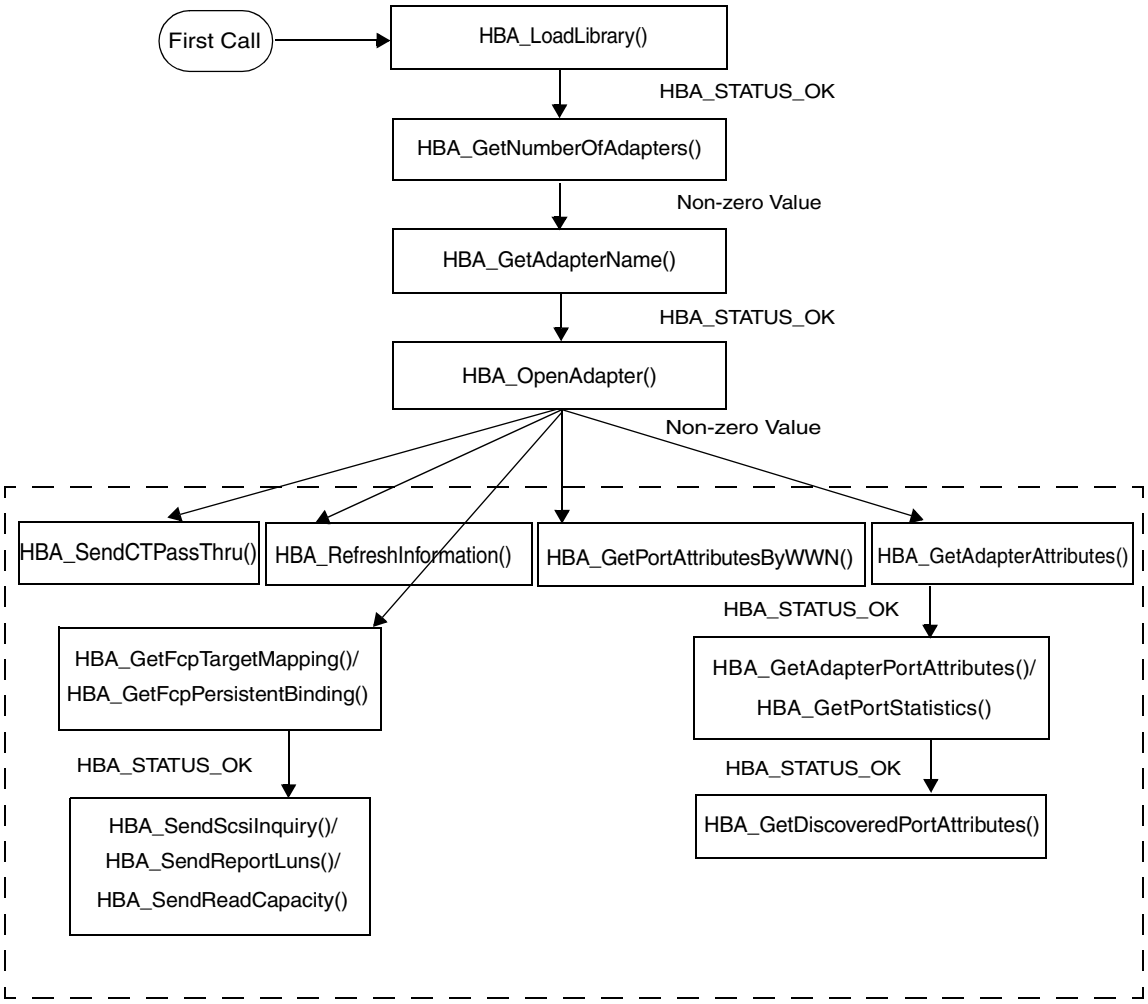
An example of the information that displays is:

```
V I T A L   P R O D U C T   D A T A
               ---------   -------------   -------

Product Discription    :'A6795A 2Gbps/1Gbps Fibre Channel 4X PCI HBA'

Part number            :'A6795-62001'

Engineering Date Code  :'A-4142'

Part Serial number     :'A56466014504'

Misc. Information      :'PW=15W'

Mfd. Date              :'A-4142'

Check Sum              : 0x46

EFI version            : '000000'

Asset Tag              :'NA
```

The Fibre Channel 11i v1.6 driver supports FC SNIA HBA API (Fibre Channel Storage Network Industry Association Host Bus Adapter Application Programming Interface). The SNIA HBA API is a C library interface that provides both a common HBA API library for all HP-UX HBA vendors and a vendor-specific library for HP's **A6795A** Fibre Channel adapter. SNIA user applications are packaged with the HP-UX 11i v1.6 driver depot and installed when you install the driver. Intended users of this API are programmers who create applications for managing SANs networks.

For more information about SNIA HBA API, refer to the *Fibre Channel SNIA HBA API Programmer's Guide, J2635-90015, E1201* at **`http://www.docs.hp.com`** . Following is an updated flowchart of the Call Order Sequence for HP's vendor library that appears in Appendix A of this manual. The flowchart was updated to reflect a change in the call order sequence and is different from the flowchart in the manual.

Figure 2-1 Call Order Sequence for HP's Vendor Library



NOTE The above graphic is only available in the PDF version of this document. The latest version of the HP-UX 11i v1.6 Release Notes is found on the Instant Information CD and on the web at **`http://docs.hp.com/hpux/os/11iV1.6`**.

Impact

The size of the HP-UX 11i v1.6 Tachlite driver depot is approximately 4 Mb.

Compatibility

There are no compatibility issues.

Performance

There are no performance issues

Obsolescence

Not applicable.

Documentation

The manpage, *fcmsutil* (1M), has been updated to reflect the removal of Tachyon specific commands and the addition of the vpd option for **A6795A**.

intl100 Driver

The `intl100` driver supports the **A6792A** cards.

Summary of Change

The `intl100` driver was previously used to claim the add-on cards. In the HP-UX 11i v1.6 release the `intl100` driver is only supported for the Management port and the LAN console port.

Details of Change

The driver now supports only the Management port and the LAN console port; it does not support add-on cards.

Impact

The **A6792A** cards cannot be used as add-on cards since these cards are not supported by the intl100 driver.

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

The `intl100` driver support for add-on cards has been obsoleted.

Documentation

Not applicable.

100BASE-T Card and Driver

The `btlan` driver now claims the **A5230A** and **A5506A/A5506B** cards in HP-UX 11i v1.6. The 100BASE-T Ethernet adapters, like the PCI 100BASE-T single port card **A5230A** and the 4 port PCI 100BASE-T cards **A5506A/A5506B**, are now supported with this driver.

Summary of Change

The `btlan` driver was previously not available in the HP-UX 11i v1.5 release and has been to the kernel as part of HP-UX 11i v1.6 release. This driver now provides you with the ability to use existing 100BT cards on your platforms.

Details of Change

The driver now claims the single port PCI 100BASE-T **A5230A** and the PCI 100BASE-T 4 port **A5506A/A5506B** cards.

The **A5230A** card is now supported on the rx2600, rx5670 servers, and the zx2000 workstation.

The **A5506A/A5506B** cards are supported on the rx2600 server.

The **B5509BA** card is supported on the zx2000 workstation.

The `btlan` driver is included in the `libbtlan.a` library as a part of the kernel.

Impact

The `btlan` driver now claims the **A5230A** cards and the **A5506A/A5506B** cards.

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

Not applicable.

1000Base-SX/T (Gigabit Ethernet) Card and Driver

The Gigabit Ethernet LAN adapters are data link adapters that support the IEEE 802.3z standard for 1000Base-SX operation over fiber and the IEEE 802.3ab standard for 1000Base-T operation over 4-pair CAT-5 copper wiring.

Summary of Change

The HP-UX 11i v1.6 release introduces new adapters with improved performance and a new driver to support the hardware.

Details of Change

The Gigabit Ethernet cards, 1000Base-T (**A6825A**, **A6794A**) and 1000Base-SX (**A6847A**), are supported in the HP-UX 11i v1.6 release. The driver, `igelan`, is available in the GigEther-01 software bundle.

A6825A and **A6847A** cards are supported on Itanium II-based system, though not on Itanium-based system.

A4926A and **A4929A** are supported on Itanium-based system, though not on Itanium II-based system.

A6794A is the core I/O card on rx5630/5670 servers.

Impact

There are no impacts.

Compatibility

There are no compatibility impacts.

Performance

There are no performance impacts.

Obsolescence

Not applicable.

Documentation

For information on installing, configuring, and troubleshooting Gigabit Ethernet, see *PCI 1000Base-T and 1000Base-SX Quick Installation and Configuration Guide* (for **A6825A**, **A6847A**, and **A6794A**) or *PCI 1000Base-T and HSC/PCI 1000Base-SX/9000 Quick Installation* (for **A4926A** and **A4929A**) available in the `/opt/networkdocs` directory on your system and at **`http://docs.hp.com`**.

For advanced features and detailed information on troubleshooting, see *Using PCI 1000Base-T and HSC/PCI 1000Base-SX (Gigabit Ethernet)* available on the Instant Information CD and at **`http://docs.hp.com`**.

3 HP-UX Features

This chapter describes other new and changed operating-system software functionality supported by the HP-UX 11i v1.6 release including:

HP-UX Processor Sets

The HP-UX Processor Sets allow a multi-processor system to be partitioned into two or more groups of processors (CPU's), so that CPU resources for selected applications or users can be isolated from those of other applications or users. Processor Sets (also known as psets) may be created and reconfigured dynamically by users who have the appropriate privileges. Processor Sets was first shipped as part of the optional Software Pack on HP-UX 11i in October 2001, and is available in the Kernel from HP-UX 11i v1.6 by default. Where Processor Sets is available in HP-UX, it is supported on all multi-processor systems. Processor Sets is a full-functioning stand-alone feature, but psets functionality is also fully supported by and integrated with the optionally available **Process Resource Manager** (PRM) product.

Summary of Change

The Processor Sets functionality consists of several system calls, one new library call, the underlying kernel support for those calls, several changed system calls, one changed library call, several changed commands, and one new command.

The new Processor Sets system calls are:

- *pset_create* (2)
- *pset_destroy* (2)
- *pset_assign* (2)
- *pset_bind* (2)
- *pset_getattr* (2)
- *pset_setattr* (2)
- *pset_ctl* (2)

The changed Processor Sets system calls are:

- *mpctl* (2)
- *sysconf* (2)
- *rtsched* (2)
- *pstat* (2)

The new Processor Sets library call is *pthread_pset_bind_np* () which is documented in the existing *pthread_processor_bind_np* (3T) manpage.

To support the Processor Sets functionality, several commands have been enhanced and a new command *psrset* (1M) was introduced.

The following existing commands were enhanced to support Processor Sets functionality:

- *mpsched* (1)
- *ps* (1)
- *sar* (1M)
- *top* (1)
- *uptime* (1)
- *id* (1)
- *rtsched* (1)

Details of Change

The new Processor Sets system calls are:

`pset_create`	Create a pset with no processors. pset_assign() is used to add CPU's to a pset.
`pset_destroy`	Destroy a specific pset.
`pset_assign`	Place a CPU in a processor set. Because every processor is in a pset (initially the "default pset"), pset_assign moves a CPU from one pset to another.
`pset_bind`	Bind selected thread(s) or process(es) to a specific pset.
`pset_getattr`	Get the attributes for a pset. Some example pset attributes are the owner of the pset, or the access permissions for the pset.
`pset_setattr`	Set the attributes for a pset.
`pset_ctl`	Query pset information, such as the pset binding of the calling thread, or the number of CPU's in the pset.

The changed Processor Sets system calls:

`mpctl`	Updated to return pset-specific information by default. For example, applications running within a pset only have access to the CPU's in that pset. Therefore, determining the number of CPU's in the whole system is typically less relevant to the application, than determining the number of CPU's in its pset, so this latter is now the default. The `mpctl` command returns system-wide information through use of a new parameter.

NOTE Note that `mpctl` behavior on HP-UX 11i v1.6 is identical to that of HP-UX 11i with psets installed.

`sysconf`	Updated to include pset information.

`rtsched` Updated to support psets. A real-time thread only runs, or competes for CPU's, within its pset.

`pstat` Updated to include pset information. For example, information regarding the `pstat_getpset()` can now be found in the manpage for `pstat`, as pset information has been added.

The new Processor Sets library call is:

`pthread_pset_bind_np` /added to support psets and pset binding.

The changed Processor Sets commands are:

`mpsched` A new option `-f` has been introduced in `mpsched` to force the operation of binding of a process to a processor if the HP Process Resource Manager is installed and configured.

If `mpsched` is used without `-f` option in the presence of HP PRM to bind a process to a processor, then an error message is displayed. In order for this binding operation to go through, the `-f` option needs to be used along with binding options of mpsched. Moreover, in the presence of Processor Sets functionality if mpsched is used to bind a process to a processor or a ldom, across psets, then it prints the appropriate error message.

`ps` The `ps` command has been enhanced to support the Processor Sets functionality by adding two new options `-z` and `-Z`. These two new options are added to enable the users to know to which pset a pid is bound, and to list all the pids in a given pset.

The description of the new options are:

- The `-z` option adds a column “pset” before column “prmgrp/prmid”. If prmgrp and prmid are not present adds a column “pset” before the “pid” column. The kernel pset, where all the kernel processes run, is displayed as “KERN”. Basically this option maps the pid with a pset to which it is bound. This option doesn’t take any arguments.
- The `-Z` option lists all the process ids bound to a specified pset. This option takes a list of pset ids as arguments. If prmgrp and prmid are not present, this option adds a `pset` column before the `pid` column in the listing.

`sar` The `sar` command has been enhanced to support Processor Sets functionality by adding two new options `-p` and `-P`.

The description of the new options are:

- The `-P` option adds a column “pset” to display the CPU mapping to pset, whenever the `-M` option (per processor information) is specified.
- Also when the option `-p` is specified, it displays only the information of the specified pset. Without `-p` option `sar` displays the information for the whole system.

NOTE These two options should be used along with `-u`, `-q` and `-a` options. If these new options are used with any other options, processor set information is not displayed.

`top` The `top` command has been enhanced to support the Processor Sets functionality by adding two new options `-p` and `-P`.

The description of the new options are:

- The `-p` option takes the pset id as argument and displays load averages and process state break down for system and processor set pset_id. This option shows only the processes running on the processor set pset_id.
- The `-P` option displays a column PSET before column CPU for individual CPU information. Also it displays a column PSET, before the column CPU for each process information.

`uptime` The `uptime` command has been enhanced to support the Processor Sets functionality by adding one new option `-p`.

The `-p` option can be given with or without an argument. If given with an argument, it takes pset id as an argument. The `-p` option prints the current time, the length of time the system has been up, and the number of users logged on to the system in the first line of the output. The load averages over the last 1, 5, and 15 minutes for the psets given in the command line, pset_list, are displayed in the subsequent lines. If no arguments are given, the load averages are displayed for all the psets in the system. If pset id of an empty pset is given in the command line, corresponding message is displayed. The `-p` option cannot be used with other options.

`id` The `-P` option of the `id` command has been enhanced to display correct prmid in the presence of Processor Sets functionality. Also, the `id` command has been modified to return non-zero return values on error conditions and displays an usage message on incorrect usage.

`rtsched` Updated to support psets. A real-time thread only runs, or competes for CPU's, within its pset.

The new Processor Sets command is:

`psrset` The `psrset` command is new and was developed for the Processor Sets functionality. This command creates and manages processor sets on a HP-UX system supporting Processor Sets functionality. The `psrset` command supports different options which a user can use to perform the following tasks:

- Assign a processor to a given pset.
- Bind a pid to a given pset.
- Destroy the specified pset.
- Execute a command on a given pset.

- Bind all the processes belonging to a process group to a given pset.
- Display all the processors and pset attributes for given pset or all psets in the system.
- Enable external I/O interrupts for all processors in a given pset.
- Disable external I/O interrupts for all processors in a given pset.
- Display the pset-processor mapping for a given processor or for all processors in the system.
- Display the pid - pset mapping for a given pid or for all pids in the system.
- Remove the specified processor from the pset and assign it to the default pset.
- Change the attributes of a given pset.
- Unbind a given pid from a pset to which it is currently bound.
- Bind all the processes owned by a user id to the specified pset.

Impact

Not applicable.

Compatibility

The behavior of `mpctl` has evolved as described above, though it is the same as on HP-UX 11i with psets installed.

There are no command compatibility issues because the enhanced functionality in each command is accommodated in new options and the behavior of the existing options is unchanged.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The manpages for all new and updated system and library calls, and commands, are supplied with the system.

A new manpage for command *psrset* (1M) is introduced in HP-UX 11i v1.6, see this manpage for details.

The manpages of the following commands have been updated by adding the description of the new functionality introduced:

getconf (1)	The following line has been added in the supported inquiries section : `PSET_SUPPORT`
mpsched (1)	The SYNOPSIS section of has been changed. The description of the `-c` and -l have been changed. The description for the new `-f` option has been added.
ps (1)	The SYNOPSIS section has been changed. The description for the `-z` and `-Z` options has been added.
sar (1M)	The SYNOPSIS section has been changed. The descriptions of the `-u` and `-q` options have been changed. The description for the new `-p` and `-P` options has been added.
top (1)	The SYNOPSIS section has been changed. In the Display Description, the PSET field has been added. The description for the new `-p` and `-P` options has been added.
uptime (1)	The SYNOPSIS section has been changed. The description for the new `-p` option has been added. In the EXAMPLES section, an example to illustrate the use of the `-p` option has been included.
id (1)	The SYNOPSIS section has been changed. The description of the `-P` option has been changed.
rtsched (1)	The DESCRIPTION section has been updated to include the psets information.

See the manpage of each command for specific information.

The white paper of the Processor Sets functionality is available at:

`http://docs.hp.com/hpux/pdf/5185-4322.pdf`

HP-UX Kernel Configuration

Kernel configuration is a combination of a command set and a Web-based **graphical user interface** (GUI) that allows the user to configure an HP-UX kernel, and to monitor consumption of kernel resources controlled by parameters.

Summary of Change

The `kcweb` application replaces the kernel configuration portion of SAM and adds three commands for kernel configuration and monitoring to the system: *kcweb* (1M), *kcusage* (1M), and *kcalarm* (1M) as well as the daemon *kcmond* (1M), which replaces the obsoleted *krmond* (1M).

Details of Change

New features provided by `kcweb`:

- New Web-based GUI that is faster than the current SAM interface. The new GUI interface is easier to use remotely and is now supported on personal computers (PC).
- View kernel parameter documentation within the GUI.
- Support for dynamic (no reboot) kernel tuning.
- Parameter monitoring - Continual monitoring of the usage of kernel resources (through `kcmond`) can be turned on, allowing the kernel to be tuned proactively rather than waiting for an application to fail. This monitoring can enable:
  - — Tables and graphs of kernel resources controlled by kernel parameters.
  - — User created threshold alarms can trigger notification when consumption of a kernel resource exceeds a specified percentage of the parameter value.
- Improved command line interface (CLI). All functionality available in the GUI is also available through the CLI commands.
- Improved separation between GUI and kernel; the application does not need to be patched as often.

Impact

Less than 12MB of disk is necessary for `kcweb`, and minimal memory is required by CGIs (approximately 20MB memory for HP Apache-based Web Server and Netscape).

The `kcweb` application automatically replaces the kernel configuration section of SAM. In addition, the `kcusage` and `kcalarm` commands are added to provide numerous improvements over previous approaches to kernel configuration. The `kcmond` command replaces `krmond` in this release.

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

The `krmond` command is obsoleted. The kernel configuration portion of SAM is obsoleted.

Documentation

The following new manpages have been added:

- *kcweb* (1M)
- *kcusage* (1M)
- *kcmond* (1M)
- *kcalarm* (1M)

Additionally, the `kcweb` application GUI contains an online help facility to further assist you.

Tunable Kernel Parameters

Tunable Kernel Parameters in HP-UX allows you to customize the behavior of the kernel for specific environments. With dynamic tunables, it is possible to modify parameters and see the effects immediately without the need to reboot the operating system. In contrast, with static tunables a rebuild and reboot of the kernel is necessary.

Summary of Change

Dynamic tunable support on Itanium Processor Family (IPF) platforms has been added. In addition, support for additional dynamic and automatic tunables is added in HP-UX 11i v1.6. Dynamic tunable values may be changed without the need to rebuild or reboot the operating system.

Details of Change

For HP-UX 11i v1.6, Dynamic Tunable support has been added for IPF platforms. Dynamic tunables, previously only supported on PA-RISC platforms (in HP-UX 11i), may now be modified dynamically on IPF platforms. The tunables are:

Table 3-1 Dynamic Tunables

-maxfiles_lim	*-core_addshmem_read*
-maxuprc	*-core_addshmem_write*
-msgmax	*-maxtsiz*
-msgmnb	*-maxtsiz_64bit*
-semmsl	*-shmmax*
-scsi_maxq_depth	*-shmseg*

In addition, support for additional dynamic tunables has been added for HP-UX 11i v1.6. The additionally supported tunables:

Table 3-2 Additionally Supported Tunables

-max_thread_proc	*-shmmni*
-maxdsiz	*-maxssiz*
-maxdsiz_64bit	*-maxssiz_64bit*
-nproc	*-nkthread*
-ksi_alloc_max	

A new tunable, *-max_acct_file_size*, has been added for HP-UX 11i v1.6, and it is dynamic as well.

Also, it is no longer necessary for you to tune the *ncallout* and *maxswapchunks* kernel parameters. In HP-UX 11i v1.6, the HP-UX kernel automatically adjusts the data structures previously controlled by these parameters. The *ncallout* and *maxswapchunks* kernel parameters are no longer “tunable”.

Impact

The changes to the tunable kernel parameters result in increased availability, as it is no longer necessary to reboot the operating system when modifying the aforementioned dynamic tunables.

Compatibility

Scripts/programs accessing *ncallout* and *maxswapchunks* are not effected.

Performance

No measurable impact.

Obsolescence

The following kernel tunable parameters are obsolesced:

Table 3-3 Obsoleted Kernel Tunables

-maxswapchunks	*-ncallout*
-clicreservedmem	*-ndilbuffers*
-spread_UP_drivers	-nni
-bootspinlocks	*-netisr_priority*

Documentation

The manpages for most tunable kernel parameters are available using the man command.

Additionally, the kcweb application GUI contains an online help facility to further assist you.

Kernel Event Notification (KEN)

Kernel Event Notification (KEN) is a kernel service providing the ability for one kernel subsystem to notify other kernel subsystems of important events and is introduced in HP-UX 11i v1.6. The KEN service is intended to provide an event notification mechanism for use within the kernel. With KEN, subsystems have the capability of registering handlers that are invoked upon the occurrence of a KEN event. These handlers are registered with an order number that specifies the sequence in which the handler is called.

Summary of Change

KEN is new in HP-UX 11i v1.6.

Details of Change

KEN is new in HP-UX 11i v1.6.

Impact

KEN is a kernel only service and as such has no user level interfaces.

Compatibility

There are no compatibility issues.

Performance

There are no measurable performance impacts.

Obsolescence

Not applicable.

Documentation

Not applicable.

System Administration Manager (SAM)

The System Administration Manager (SAM) is an HP-UX System Administration tool that provides an easy-to-use **user interface** (UI) for performing various system administration tasks.

Summary of Change

The functional areas Kernel Configuration, Distributed Print Services (DPS), and Dump Devices are obsolete beginning with HP-UX 11i v1.6.

Details of Change

The functional areas Kernel Configuration, Distributed Print Services (DPS), and Dump Devices are obsoleted beginning with HP-UX 11i v1.6. Users can neither make changes to the kernel parameters/drivers/subsystems, configure and manage the HP distributed print service mechanism, nor create/configure/modify dump devices using SAM.

The new Kernel Configuration tool, `kcweb`, can be used to configure the kernel parameters/drivers/subsystems. For more information regarding `kcweb`, refer to HP-UX Kernel Configuration in this chapter.

SAM is available as PA-RISC binaries only for HP-UX 11i v1.6, and requires the ARIES emulator to run on HP-UX 11i v1.6 IPF systems.

Impact

No impact.

Compatibility

No compatibility issues.

Performance

SAM PA-RISC binaries run on the IPF platform using the Aries emulator, as a result there could be performance degradation.

Obsolescence

The functional areas Kernel Configuration, Distributed Print Services (DPS), and Dump Devices are now obsolete.

Documentation

The *sam* (1M) manpage has been updated appropriately.

SAM-Nodal Network Communication (NNC)

SAM - NNC is a GUI tool that handles the configuration of network related resources.

Summary of Change

SAM has been enhanced to support the following two new LAN cards:

100BT

— Driver: `intl100`

— Product No.: **A6792A**

Gigabit Ethernet

— Driver: `igelan`

— Product No.: **1000 Base-SX - A6847A**

1000 Base-T - A6825A, A6794A

Details of Change

SAM has been enhanced to support the 100BT and Gigabit Ethernet drivers.

Existing configuration screens of 100BT (btlan) and Gigabit Ethernet (gelan) cards have been used for configuring the new cards.

Impact

No impact.

Compatibility

No compatibility issues.

Performance

No performance issues.

Obsolescence

Not applicable.

Documentation

The SAM online help has been modified to incorporate the information about the Next Generation GigE features.

MC/ServiceGuard

MC/ServiceGuard (Multi-Computer/ServiceGuard) is a specialized facility for protecting mission critical applications from a wide variety of hardware and software failures.

Summary of Change

MC/ServiceGuard version A.11.14.01 is released in HP-UX 11i v1.6. This version differs from A.11.14 in that some features are not included, and some are included with limitations.

Details of Change

Support for up to four cluster nodes rather than 16 in A.11.14.

This is the first release on IPF.

No changes in system administration tasks from A.11.14 to A.11.14.01.

The following are not supported on SG A.11.14.01:

- ServiceGuard SAM interface is not included.
- Rolling upgrades from any platform
- PA-RISC platform
- Virtual Partitions (vPARs)
- Advanced Tape Services
- Mixed IPF and PA-RISC nodes within a cluster
- Clusters larger than 4 nodes
- VxVM and CVM disk groups
- FC, FDDI, Token Ring, ATM, 100VG, and APA

HP-UX 11i v1.6 does not support FDDI, Token Ring and ATM and hence they cannot be used for SG Heartbeat; SG cannot perform local switching for them, and `cmquerycl` does not detect them. In addition, FC (Fibre Channel) networking and 100VG is not be supported by HP-UX 11i v1.6, so by default, they won't be supported by SG.

In addition, the shared library directory structure is modified. The shared library locations are now in hpux32 or hpux64 depending on whether the libraries are 32 bits or 64 bits.

MC/ServiceGuard is an ISU product. Here are some dependencies on system features that are changing:

- DLPI - ServiceGuard uses DLPI primitives to do network probing and determine link failure.
- Streams/Transport - SG depends on Transport Layer and the sockets API heavily for IP related functions and communications among daemons.
- `libsnet` - Provides calls for managing relocatable IP addresses.

- Use of Kernel threads - SG A.11.14.01 uses kernel threads rather than DCE threads, which are not supported in IPF operating systems.

Impact

As the platform is new there are no impacts.

Compatibility

MC/ServiceGuard A.11.14.01 is a new set of executables on a new platform. Existing ASCII configuration files and control scripts may need to be edited and must be reapplied when porting to this platform. No rolling upgrades are provided.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The existing *Managing MC/ServiceGuard* (**B3936-90065**) reference is shipped with Version A.11.14.01. Differences from the A.11.14 version are detailed in the *MC/ServiceGuard Version A.11.14 Release Notes for IPF on HP-UX 11i Version 1.6 (B.11.22)* (**B3935-90060**).

These documents can be found on the Instant Information CD and at:

`http://docs.hp.com/hpux/ha`

MC/ServiceGuard Quorum Server

The Quorum Server is a software component that provides tie-breaking services for ServiceGuard clusters to avoid split-brain syndrome.

Summary of Change

In HP-UX 111 v1.6, the Quorum Server version A.01.01 (**B8467BA**) contains all the features found in the A.01.00 release in HP-UX 11i v1.0.

Details of Change

This is the first release on IPF.

Impact

As the platform is new there are no impacts.

Compatibility

No compatibility issues.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The content of the release is described in the *MC/ServiceGuard Quorum Server Version A.01.01 Release Notes for IPF on HP-UX 11i Version 1.6 (B.11.22)* (**B8467-90006**) which is found on the Instant Information CD and at:

`http://docs.hp.com/hpux/ha`

ServiceGuard Extension for RAC

ServiceGuard Extension for RAC (formerly known as ServiceGuard OPS Edition) is a special addition to MC/ServiceGuard that supports Oracle RAC (OPS) clusters in addition to providing all the basic ServiceGuard cluster functionality.

Summary of Change

This is the first release in which the RAC components are decoupled from MC/ServiceGuard. Former versions of ServiceGuard OPS Edition included all ServiceGuard filesets; this version contains only the filesets that differentiate the RAC extension from the basic ServiceGuard product.

Details of Change

This is the first release on IPF. Functionality is the same as in ServiceGuard OPS Edition A.11.14 with the same limitations.

Impact

As the platform is new there are no impacts.

Compatibility

No compatibility issues.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The existing *Configuring OPS Clusters with ServiceGuard OPS Edition* (**B5158-90044**) is shipped with ServiceGuard Extension for RAC Version A.11.14.01.

Differences from the A.11.14 version is detailed in the *ServiceGuard Extension for RAC Version A.11.14 Release Notes for IPF on HP-UX 11i Version 1.6 (B.11.22)* (**T1859-90001**). You also receive a copy of *Managing MC/ServiceGuard* (**B3936-90065**).

All of these documents are available on the Instant Information CD and at:

`http://docs.hp.com/hpux/ha`

ServiceGuard Manager

ServiceGuard Manager is a graphical user interface (GUI) for displaying and managing MC/ServiceGuard and ServiceGuard Extension for RAC clusters.

Summary of Change

ServiceGuard Manager version A.02.01 contains all the features found in the A.02.00 release.

Details of Change

This is the first release on IPF.

Impact

As the platform is new there are no impacts.

Compatibility

No compatibility issues.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The *ServiceGuard Manager Version B.02.01 Release Notes* (**B8325-90016**) describe the contents of the release in detail. This document can be found on the Instant Information CD and at:

`http://docs.hp.com/hpux/ha`

Enterprise Cluster Master Toolkit

The Enterprise Cluster Master Toolkit is a set of scripts that enable the use of third party applications to run as packages in a ServiceGuard cluster environment.

Summary of Change

In HP-UX 11i v1.6, the ECM Toolkit version B.01.09 contains tools for supporting the Oracle 9i database in MC/ServiceGuard clusters.

Details of Change

This is the first release on IPF.

Impact

No impact.

Compatibility

No compatibility issues.

Performance

No performance issues.

Obsolescence

Not applicable.

Documentation

The *Enterprise Cluster Master Tookit Version B.01.09 Release Notes for IPF on HP-UX 11i Version 1.6 (B.11.22)* (**B5139-90053**) describe the content of release in detail and is available at:

`http://docs.hp.com/hpux/ha`

4 File and Disk Management

This chapter describes other new and changed operating-system software functionality supported by the HP-UX 11i v1.6 release including:

Logical Volume Manager (LVM)

The Logical Volume Manager is our HP-UX proprietary volume manager, which is tightly integrated into the core HP-UX commands and kernel. LVM has been available on all PA-RISC releases of HP-UX since Release 9.0 and is available for non-boot (data) disks on IPF on HP-UX 11i v1.5. In HP-UX 11i v1.6, LVM on IPF supports all the same features available on PA-RISC.

Summary of Change

The only two Logical Volume Manager (LVM) components that are not already supported on IPF systems are the LVM boot and Shared Logical Volume Manager (SLVM) features. As of HP-UX 11i v1.6, the Logical Volume Manager (LVM) is the designated default volume manager. As such, LVM provides a feature set on IPF platforms in HP-UX 11i v1.6 that is equivalent to the set provided for the Logical Volume Manager (LVM) feature on PA-RISC systems in HP-UX 11i v1.0.

Details of Change

HP-UX 11i v1.6 provides:

- Full LVM (Logical Volume Manager) support on IPF that is equivalent to today's PA-RISC LVM offering on HP-UX 11i v1.0.
- LVM & VxVM support on both IPF & PA-RISC with user selectable volume manager (LVM & VxVM) defaulted to LVM at installation time.
- Full LVM boot-disk support (root/swap/dump).
- Boot loader support for LVM boot disk.
- Ignite/UX install support for LVM.
- Verified Shared LVM (SLVM) capability.

Impact

HP-UX 11i v1.5 supports LVM on IPF only and without LVM boot-disk support.

HP-UX 11i v1.6 provides full LVM boot-disk support on PA-RISC & IPF with user selectable volume manager (VxVM or LVM) defaulted to LVM at installation time.

Compatibility

There is no stated or implied compatibility between PA-RISC LVM boot disks and IPF LVM boot disks. Boot disks are not interchangeable across platforms. Non-boot LVM commands and non-boot (data) disks are expected to be fully compatible between HP-UX 11i v1.5 and HP-UX v1.6 IPF systems.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

Not applicable.

Directory Permissions

Permissions and ownership of a number of directories has changed in HP-UX 11i v1.6.

Summary of Change

The permissions and ownership of the `/tmp` and `/var/tmp` directories has been changed. Also, the`/usr/local` directory permission capabilities has been changed.

Details of Change

The most notable changes are that the permissions on the`/tmp` and `/var/tmp` directories have changed from 0777 to 1777 thus setting the sticky bit. Additionally, `/usr/local` and all of it's sub-directories are no longer world writable. The ownership of `/tmp` and `/var/tmp` has changed from `bin:bin` to `root:root`.

Impact

Refer to the Compatibility sub-section.

Compatibility

The changes in the permissions imply that if an application depends on the ability to remove or rename a file that is owned by another user (under /tmp or /var/tmp), then that application would fail. Similarly, if your user community is using the `/usr/local/` directory to share applications informally, they would notice that this sharing is longer possible beginning in HP-UX 11i v1.6.

If the older (and less restrictive) behavior is desired, change the permissions `/tmp`, `/var/tmp`, `/usr/local`, `/usr/local/[*]` to 777.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.

5 Networking

This chapter describes new and changed networking functionality supported by the HP-UX 11i v1.6 release including:

Network Transport

Network Transport supports and develops core networking in HP-UX.

Summary of Change

The following ndd tunables are now supported:

- *ip_check_subnet_addr* - Controls the subnet portion of a host address.
- *ip_max_bcast_ttl* - Controls the TTL for broadcast packets.

The following new ndd tunables are now available:

- *ip_enable_udp_bcastrecv* - Controls receiving of broadcast packets by UDP sockets.
- *ip_ire_gw_probe* - Enable dead gateway probes.
- *tcp_cwnd_initial* - Initial size of the congestion window as a multiple of the MSS.
- *tcp_deferred_ack_max* - Upper limit on the number of bytes of data that can be received without an ACK.
- *tcp_do_conn_options* - Copy IP options into T_CONN_IND messages.
- *tcp_fin_wait_2_timeout* - Maximum time a TCP connection spends in FIN_WAIT_2.
- *tcp_recv_hiwater_max* - Upper bound on TCP receive buffer size.
- *tcp_sack_enable* - Enable TCP Selective Acknowledgement (RFC 2018).
- *tcp_smoothed_rtt* - Alternate method for computing round trip time.
- *tcp_ts_enable* - Enable TCP timestamp option.
- *tcp_tw_cleanup_interval* - TIME_WAIT time-out expiration checking interval.
- *udp_debug* - Enable UDP debug information logging.
- *udp_def_hop_limit* - Default upper bound for UDP time to live.
- *udp_recv_hiwater_max* - Upper bound on UDP receive buffer size.
- *rawip_recv_hiwater_max* - Maximum size of the RAWIP receive buffer.
- *arp_defend_interval* - Seconds to wait before initially defending a published entry.
- *arp_redefend_interval* - Seconds to wait before defending a published entry.
- *arp_resend_interval* - Number milliseconds between arp request retransmissions.
- *ip_ipsec_integer_pads* - Sets the type of pads used for block ciphers.
- *ip_ipsec_policy_interval* - Sets the interval between attempts to remove unused Security Policy rules.
- *ip_ipsec_pollist* - Display formatted report of IPv4 Security Policies.
- *ip_ipsec_sa_interval* - Sets the interval between attempts to remove unused Security Associations.
- *ip_ipsec_salist* - Display formatted report of all IPv4 Security Associations.

- *ip_ipsec_status* - Display a summary report of the current IPSec Kernel status.
- *socket_buf_max* - Sets maximum socket buffer size for AF_UNIX sockets.
- *socket_caching_tcp* - Controls socket caching for TCP sockets.
- *socket_qlimit_max* - Sets maximum number of connection requests for non-AF_INET sockets.
- *socket_udp_rcvbuf_default* - Sets the default receive buffer size for UDP sockets.
- *socket_udp_sndbuf_default* - Sets the default send buffer size for UDP sockets.

Event port functionality has been implemented.

Details of Change

ndd changes:

It is recommended to use `ndd -h` to list all the supported and unsupported tunable parameters that `ndd` provides.

The IPSEC related `ndd` tunables are usable only if the add-on for IPSEC has been installed on the system.

netconfig changes:

The `/etc/netconfig` file is a network configuration database used to store information about networks connected to this system and provides information about which translation libraries should be used for the name-to-address translation services.

On IPF-based systems, the `/etc/netconfig` file points to libraries with the new extensions .so.1. The symbolic links are created in `/usr/lib`, where PA-RISC-based libraries are located.

On PA-RISC-based systems, the `/etc/netconfig` file is unchanged and points to libraries with PA-RISC extensions `.1`.

Refer to the *netconfig* (4) manpage for more details.

Known Problems

If you try to configure an interface with an invalid netmask using `ifconfig`, the error message `ifconfig: ioctl (SIOCSIFNETMASK): bad value` is displayed and the configuration information of the interface is lost. Thus, when `ifconfig` is executed again to view the current configuration of that same interface, the error message `ifconfig: no such interface` is displayed

Impact

Not applicable.

Compatibility

The symbolic links created in the `/etc/netconfig` file provide for compatibility with all PA-RISC applications, which are run through Aries on IPF machines.

If users modify the `/etc/netconfig` file, appropriate links need to be provided.

If an absolute library pathname is specified for a particular service, the applications using the service work only for that architecture.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The *traceroute* (1) manpage has been added. The *thread_safety* (5) manpage has been added to aid writing thread safe applications using `libc`, `libpthread` and `libgen` interfaces.

Automounter

The automounter mounts directories automatically when users or processes request access to them, and it unmounts them automatically after they have been idle for a period of time (five minutes, by default).

Summary of Change

This is to announce that the HP-UX 11i v1.6 release of automounter is the last release in which automounter is supported.

Details of Change

The AutoFS automounter was released in all versions of HP-UX beginning with HP-UX 10.30. Co-existing with the automounter, AutoFS is the recommended replacement for the automounter. AutoFS performs the same functions as automounter, but has a new, more reliable design. Additionally, AutoFS uses the same maps as automounter and AutoFS supports the NFS PV3 protocol whereas the automounter does not. In summary, both automounter and AutoFS is supported in HP-UX 11i v1.6 , and going forward only AutoFS is supported in future releases.

Impact

No impacts.

Compatibility

No compatibility impacts.

Performance

No performance impacts.

Obsolescence

Automounter in the HP-UX 11i v1.6 release of automounter is the last release in which automounter is supported.

Documentation

Not applicable.

mbuf Functionality Obsolescence

The mbuf.h file and mbuf functionality within the kernel is obsolete.

Summary of Change

The mbuf entities are legacy networking drivers, based on EISA/NIO, buses used within the kernel. These legacy drivers are obsoleted in HP-UX 11i v1.6, and the mbuf.h file was removed.

Details of Change

The purpose of change is the obsolescence of the mbuf functionality, which are memory management entities primarily used by legacy networking drivers

Impact

The driver that is impacted is NETTL. Other subsystems that have included the file mbuf.h with no functionality usage and therefore no impact include PM, GRAPH, STREAMS, btlan driver, Fibre Channel, Transport, intl100 driver, machdep, PPP, and user space programs named, telnet, and gated.

Compatibility

This kernel specific functionality was not documented in previous releases, hence there are no compatibility impacts with the obsolescence of the mbuf functionality.

Performance

No impact to performance.

Obsolescence

These legacy drivers are obsolete in HP-UX 11i v1.6. Removed mbuf.h BE file.

Documentation

No document changes necessary.

Internet Services

The Internet Services product family delivers and supports the networking services considered essential to HP-UX users interoperating on TCP/IP - based networks.

Summary of Change

The Internet Services products discussed in the Internet Services section are:

- Revised version of BIND: 9.2
- Revised version of WU_FTPD: 2.6.1
- Revised version of Sendmail: 8.11.1
- Changes to `rcommand`
- New `telnetd` options
- Support of hostname characters by `rwhod`
- Availability of Secure Internet Services
- Non-availability of OSPF agent for `gated`
- Advance notice of `rbootd` obsolescence
- Use of `use_psd` option for `rexecd`

Details of Change

Each of the Internet Services products identified in the Summary of Change section is described in detail in the following sub-sections:

BIND 9.2

The Domain Name System (DNS) is a mechanism that implements a machine name hierarchy for TCP/IP based internets. The Berkeley Internet Name Domain server (BIND) is a commonly used DNS implementation.

Summary of Change

The HP-UX 11i v1.6 release installs BIND 9.2. The revised BIND 9.2 provides these new features:

- New options in options, zone, and server statements.
- A new utility to generate the `rndc.conf` configuration file.
- New command line options for the various binaries.
- New commands in `rndc`

Details of Change

Certain HP-specific changes that were available in previous BIND releases are now no longer supported:

- `noforward`

  The functionality of the `noforward` option can now be achieved through the forwarders options to an empty list.

- `alias-ip`

  Replaced by the `listen-on` option in the options statement

- `no-round-robin`

  Alternative implementation of this feature via `rrset_order` option is not yet available.

The following features have been removed in BIND 9.2:

- In options statement:
  - named-xfer
  - deallocate-on-exit
  - fake-iquery
  - statistics-interval
  - multiple cnames
  - has-old-clients
  - treat-cr-as-space
  - use-id-pool
  - fetch-glue
  - serial-queries
  - check-names
- In view and zone statement:
  - ixfr-base
  - pubkey
  - max-ixfr-log-size

  The Bind 9.2 port to HP-UX 11i v1.6 currently does not support the topology, `rfc2308-type1` and `min-roots` options.

Documentation

BIND 9.2 Release Notes, as well as, other Internet Services related documentation can be found at:

`http://docs.hp.com/hpux/netcom/`

The manpages associated with this product and released in HP-UX 11i v1.6 are:

- *dig* (1M)
- *dnssec-keygen* (1)
- *dnssec-makekeyset* (1)
- *dnssec-signkey* (1)
- *dnssec-signzone* (1)
- *host* (1)
- *hosts_to_named* (1M)
- *lwresd* (1M)
- *named* (1M)
- *named-checkconf* (1)
- *named-checkzone* (1)
- *named.conf* (4)
- *nslookup* (1)
- *nsupdate* (1)
- *rndc* (1)
- *rndc.conf* (4)
- *rndc-confgen* (1)
- *sig_named* (1M)

WU-FTPD 2.6.1

The `ftp` application is a user interface to the File Transfer Protocol. Running and using `ftp` on a client host, you can copy files over a network connection between the local client host and remote server host. The server, wu-ftpd, is supported in HP-UX 11i v1.6 and above versions.

Summary of Change

The HP-UX 11i v1.6 release installs WU-FTPD 2.6.1.

Details of Change

WU-FTPD 2.6.1 supports the following new features:

- Virtual Hosting
- Admin utility `privatepw` to allow modifications of group access file information
- New clauses for ftpaccess
- RFC 1413 (Identification Protocol) support
- New command line options

The HP-UX port of WU-FTPD 2.6.1 contains the following HP specific features:

- Command line options:

  `-m` number_of_tries: specifies the number of tries for a bind() socket call;

  `-n` nice: sets the nice value for an WU-FTPD process;

  `-B` sets the buffer size of the data socket to blocks of size of 1024 bytes;

  `-p` and `-P`: allows private port access (-p) or third party access as well as private port access (-P) to the client.
- Support for files greater than 2 Gb is now provided.
- Support for large UIDs/GIDs is now provided.
- Trusted systems features.

Changes from previous versions of WU-FTPD:

- The option `sendfiletransfer` in the ftpaccess configuration file has been replaced with new command line option `-U`.
- The two options `suppresshostname` and `suppressversion` have been replaced by the new `greeting` option in the `ftpaccess` configuration file.

Documentation

Internet Services related documentation can be found at:

`http://docs.hp.com/hpux/netcom/`

The manpages associated with this product and released in HP-UX 11i v1.6 are:

- *ftp* (1)
- *ckconfig* (1)
- *ftprestart* (1)
- *ftpwho* (1)
- *ftpcount* (1)
- *ftpshut* (1)
- *ftpd* (1M)
- *privatepw* (1)
- *ftpaccess* (4)
- *ftpgroups* (4)
- *ftpservers* (4)
- *ftpconversions* (4)
- *ftpusers* (4)
- *ftphosts* (4)
- *xferlog* (5)

Sendmail 8.11.1

Sendmail is an electronic mail transport agent, which can be used to send messages to one or more recipients, routing the message over whatever networks are necessary.

Summary of Change

The HP-UX 11i v1.6 release introduces Sendmail 8.11.1. Sendmail 8.11.1 supports the following new features:

- Multiple queue directories
- Enhanced mail status codes for messages
- `DaemonPortOptions` to customize the daemon's SMTP service
- `ClientPortOptions` to customize outgoing connections
- Spam control using Message Submission Agent (MSA - RFC 2476)
- SMTP authentication using the SMTP AUTH command
- Virtual hosting

- Improved LDAP based routing
- Various new option values, configuration options and command options

Details of Change

The following changes have been made in version 8.11.1 of Sendmail:

- The error code returned for unrecognized parameters to the SMTP mail and RCPT commands is changed from 501 to 555 as per RFC 1869.
- The configuration file (`Sendmail.cf`) version number is incremented to 9.
- Aliases with no right-hand side are provided with 'missing value' warnings, when 'newaliases' is run instead of making an attempt to deliver the mail messages to an alias.
- A new mailer flag, 'F=%' is included in this release.
- The [*`hostname`*] is added to class 'w' for the names of all interfaces unless `DontProbeInterfaces` option is set.
- All numbered rulesets have been named in this release.
- A '/Quit' command to address the test mode is added.
- The SMTP commands are not processed when the SMTP connection drops.
- Purgestat and sendmail `-bH` options delete only expired files in the host status database, which have exceeded the values set by *`Timeout.hoststatus`*.
- The process ID file can now be specified with the `PidFile` option.

In this release, the user's address is not available in the Diagnostic-Code field of delivery status notification (DSN) messages.

Documentation

Sendmail 8.11.1 Release Notes, as well as, other Internet Services related documentation can be found at:

`http://docs.hp.com/hpux/netcom/`

The manpages associated with this product and released in HP-UX 11i v1.6 are:

- *killsm* (1M)
- *makemap* (1M)
- *sendmail* (1M)
- *mailq* (1)
- *mailstats* (1)
- *praliases* (1)

rcommand

The rcommands are comprised of:

- `rlogin/rlogind`
- `remsh/rexec`
- `rcp`
- `rdist`
- `ruptime`
- `rwho/rwhod`

Summary of Change

Changes to `remshd/rexecd` are delivered in HP-UX 11i v1.6.

Details of Change

The `remshd` function has been changed to display the error message `Account disabled or expired` when a user attempts `remsh` to a remote system on which his/her account is disabled.

The `remsh/rexec` process may appear hung when a user executes certain remote commands, because `remsh/rexec` waits for the remote command to finish before exiting. This behavior can be changed by starting `remshd/rexecd` with the `-m` option in `/etc/inetd.conf`.

NOTE The `-m` option may prevent standard output or error messages to be displayed on the terminal.

Compatibility

If the service name database (see the *services* (4) manpage) does not contain an entry for *`kshell`*, `remshd` fails to execute and displays this message:

```
remshd: getservbyname
```

For instance, if NIS is used as the service name database, `remshd` will work only if the NIS service map contains *`kshell`* service entry. Note that all releases of the HP-UX operating system have the *`kshell`* entry in the service name database as a default.

Documentation

The *rexecd* (1M) and *remshd* (1M) manpages have been updated to reflect all changes.

telnetd

The `telnetd` daemon executes a server that supports the DARPA standard TELNET virtual terminal protocol.

Summary of Change

New `telnetd` options.

Details of Change

The `telnetd` function contains the following new options:

- `-n` specifies the time in seconds that `telnetd` waits for the client to respond to the initial option negotiation before timing out and closing the connection.
- `-y` causes `telnetd` to close a connection if the baud rate is set to zero. Without this option set, `telnetd` does not close a connection even on zero baud rate.

Documentation

The *telnetd* (1M) manpage has been updated to reflect the new options.

rwhod

The `rwhod` server maintains the database used by `rwho` and `ruptime`. The `rwhod` server sends status information to and receives status information from other nodes on the local network that are running `rwhod`.

Summary of Change

The `rwhod` function now supports valid hostname characters as per RFC 952 only.

Details of Change

The supported characters are all alphanumeric characters, the minus-sign (‘-’) and period (‘.’).

NOTE Hostnames containing invalid characters causes `rwhod` to fail.

Documentation

No documentation changes were necessary.

Secure Internet Services

The Secure Internet Services (SIS) is an optionally enabled mechanism that incorporates Kerberos V5 authentication and authorization for the following internet services: `ftp`, `rcp`, `remsh`, `rlogin`, and `telnet`.

Summary of Change

Secure Internet Services, which was not available on HP-UX 11i v1.5, is now available in HP-UX 11i v1.6.

Details of Change

Prior to this release, SIS depended on the shared library `libsis.sl`, which was not available for IPF platforms. SIS has now been changed to use `libkrb5.sl` library.

Documentation

No documentation changes were necessary.

OSPF agent for gated

The `gated` routing daemon currently handles the RIP, BGP, EGP, HELLO, and OSPF routing protocols.

Summary of Change

OSPF Agent for Gated is not available in HP-UX 11i v1.6.

Details of Change

The ospfagt subagent (SNMP MIB), which retrieves the OSPF routing information from the `gated` product, is not available in this HP-UX 11i v1.6 release.

The OSPF agent depends on the SNMP developer's kit, which is not yet available on IPF platforms.

Documentation

No documentation changes were necessary.

rbootd()

The `rbootd` function services initial boot-up requests from RMP clients over a local area network.

Summary of Change

HP-UX 11i v1.6 is the last HP-UX operating system release that includes `rbootd`.

Details of Change

The `rbootd` function services initial bootup requests from older clients using the proprietary RMP protocol. Clients using the RMP protocol during bootup are no longer supported on releases subsequent to HP-UX 11i v1.6.

Impact

Users may need to move from older RMP clients to clients supporting BOOTP (Internet Boot Protocol) with the next HP-UX release.

Obsolescence

HP-UX 11i v1.6 is the last operating system release that includes `rbootd`.

rexecd()

The `rexecd` utility is used to connect to a specified host and execute a specified command.

Summary of Change

The `rexecd` routine returns stream to a remote command.

Details of Change

The `[use_psd]` option cannot be specified in the `/etc/pam.conf` file for `rexecd`.

Documentation

The *rexecd* (1M) manpage has been updated accordingly.

6 Commands and System Calls

This chapter describes other new and changed operating-system software functionality supported by the HP-UX 11i v1.6 release including:

MLIB 8.2

HP MLIB contains VECLIB, LAPACK and ScaLAPACK subprograms, providing mathematical software and computational kernels for engineering and scientific applications involving linear equations, least squares, eigenvalue problems, the singular value decomposition, vector and matrix computations, convolutions, and Fourier Transforms.

Summary of Change

HP MLIB 8.2 features and optimizations include:

- Sparse BLAS functionality
- ScaLAPACK funtionality
- Archive and shared libraries

Details of Change

- Sparse BLAS Functionality

  In addition to containing a highly effective implementation of the Levels 1, 2, and 3 Basic Linear Algebra Subprograms (BLAS), HP MLIB 8.2 supports Sparse BLAS functionality.

  Sparse BLAS functionality provides computational kernels which support sparse matrix products (matrix-vector and matrix-matrix) and triangular solve operations. Sparse BLAS functionality is based on the NIST Fortran Sparse BLAS (V.0.5) standard. Routines have been extended to four data types:

  — S - Real*4

  — D - Real*8

  — C - Complex*8

  — Z - Complex*16

  This implementation also supports four additional matrix forms (MSC, MSR, BMC, and BMR). The Sparse BLAS library routines are written in Fortran 77 and are callable from Fortran 90 and C routines.

- ScaLAPACK Functionality

  ScaLAPACK is a library of high-performance linear algebra routines capable of solving systems of linear equations, linear least squares problems, eigenvalue problems, and singular value problems. ScaLAPACK can also handle many associated computations such as matrix factorizations or estimating condition numbers.

  ScaLAPACK is a public domain software that was developed by Oak Ridge National Laboratory. It is designed for distributed computing and uses the Message Passing Interface (MPI) for parallelism. This implementation provides a version of ScaLAPACK tuned on HP servers and built with HP's MPI. The ScaLAPACK library routines are callable from Fortran 90 and C routines. Unlike other MLIB libraries, there is not a version of ScaLAPACK that assumes all integers are 8 bytes in length.

- Archive and Shared Libraries

  HP MLIB 8.2 supports archive or shared libraries.

  Application performance is better when archive libraries are used. However, if small executable files are a necessity, shared libraries can be used on any Itanium system running HP-UX 11i v1.5 or higher. This section outlines compiling and linking information for the archive and shared libraries in HP MLIB 8.2.

  — Use the -aarchive_shared flag on your linker command line to ensure that the linker links with archive libraries first. If the archive library is not available, then it links with the shared library.

  — Use the -ashared_archive flag to preferentially link with shared libraries. If you use neither -aarchive_shared nor -ashared_archive, the linker defaults to shared libraries.

Impact

Size Requirements:

Table 6-1 Disk Space Size Requirements

	OLD(8.1)	NEW(8.2)	Delta
hpux32:	66052	86411	20359
hpux64:	134560	178111	43551
pa2.0:	39652	42688	3036
pa20_64:	103904	112160	8256
include:	1468	1463	5

No memory requirements.

Compatibility

No compatibility issues.

Performance

No performance issues.

Obsolescence

Not applicable.

Documentation

The modified manpages associated with MLIB are:

- Sparse BLAS new subroutines (new)
- Sparse BLAS existing subroutines (changed)
- ScaLAPACK (new)
- Sparse Solver (changed)
- VECLIB (changed)
- LAPACK (changed)

Additional documents:

HP MLIB Version 8.2 Release Note (**B6061-96018**) and *HP MLIB User's Guide - Fourth Edition V8.2* (**B6061-96017**) are both found at:

`http://docs.hp.com`

LAPACK User's Guide V3.0 (**B6061-96013**) is found at:

`http://www.netlib.org/lapack/lug`

ScaLAPACK User's Guide V1.0 (**B6061-96014**) is found at:

`http://www.netlib.org/scalapack/slug/index.html`

envd Environment Daemon

The envd daemon is a system physical environment daemon which provides a means for the system to respond to environmental conditions. For example, an over temperature condition and chassis fan failure detected by the hardware.

Summary of Change

The envd daemon is not supported on the IPF platform in HP-UX 11i v1.6.

Details of Change

The envd is not supported on the IPF platform in HP-UX 11i v1.6 due to the non-availability of functionality in the underlying layers.

Impact

Though envd is not supported, you have an alternate mechanism on the IPF platform to detect physical environment events through the Itanium Core Hardware Monitor (ia64_corehw). For more information, refer to the Itanium Core Hardware Monitor (ia64_corehw) documentation at:

`http://docs.hp.com/hpux/onlinedocs/diag/ems/emd_ia64core.htm`

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

The manpage for *envd* (1M) command is changed to indicate that this functionality is available only on the PA-RISC platform and therefore not supported on the IPF platform in HP-UX 11i v1.6.

IO Command

The IO commands that have been changed in the HP-UX 11i v1.6 release are:

`sfd`	This daemon is used to create device special files dynamically.
`iointrc`	This script creates device files.
`ioscan`	This command is used to display the status of IO hardware.

Summary of Change

The changes were effected in HP-UX 11i v1.6 to `sfd`, `iointrc` and `ioscan`.

Details of Change

The changes effected in HP-UX 11i v1.6 to `sfd`, `iointrc` and `ioscan` are:

`sfd`	`sfd` now starts with correct sfd.pid and logs accurate message.
`iointrc`	Device file is now created for Rockwood.
`ioscan`	Performance improvement for `ioscan -k`.

Impact

There are no impacts.

Compatibility

There are no compatibility issues.

Performance

There are no performance issues.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.

lanadmin Command

The `lanadmin` is a local area network (LAN) administration program.

Summary of Change

The `lanadmin` command changes in the HP-UX 11i v1.6 release are:

- A new command option to display the **Management Information Base** (MIB) statistics.
- Improvements to the command.

Details of Change

The following addition is included in this release:

- The `-g` command line option was added to `lanadmin`. This new option displays the MIB statistics for a given **Physical Point of Attachment** (PPA). Earlier the MIB statistics could be seen only in the menu mode operation of lanadmin.

  The exact syntax for using the new `-g` option with `lanadmin` is:

  `lanadmin -g [`*`get_options`*`] [`*`ppa#`*`]`

  For example:

  ```
  lanadmin -g mibstats 0
  ```

  Note that the only supported value for [*`get_options`*] is *`mibstats`*.

The following improvements are delivered in HP-UX 11i v1.6:

- The usage string for `-x` or `-X` option now specifies PPA instead of Net Mgmt ID.
- The `-x lan100'` now prints 'Invalid PPA Number entry' and exit with -1.
- The command now exits with -1 if MAC address given specified for `-A` option is greater than 12 hex digits.

Impact

There are no impacts.

Compatibility

There are no compatibility issues.

Performance

There are no performance issues.

Obsolescence

Not applicable.

Documentation

No manpage changes were effected for `lanadmin` in this release.

NetTL Command

The Network Tracing and Logging (NetTL) facility gathers information about network activity and network products. It is used to log important events and gather trace information for networking products.

Summary of Change

Support for Mobile IPv4, control script changes and `mbuf` obsolescence changes. The `nettladm` functionality is not available on IA in HP-UX 11i v1.6.

Details of Change

New or changed options or features to the `nettl` command include the following:

Support for Mobile IPv4:
The purpose of this change is to enable nettl to format Mobile IPv4 information in IP,UDP and ICMP packets. Without this change, the NetTL formatter is not be able to extract and display Mobile IP information embedded in IP,UDP and ICMP packets. However the Mobile IP information remains part of the data payload.

Control script changes:
The single fileset NETTL-RUN is split into 2 filesets (NETTL-RUN and NETTL2-RUN) to allow for delivery of both IPF and PA-RISC versions of files in the same fileset. Due to this the control scripts are changed as follows:

- NETTL-RUN - preinstall, unconfigure, verify.
- NETTL2-RUN- preinstall, unconfigure.

`mbuf` obsolescence changes:
The purpose of this change is to remove all `mbuf` related references from the `nettl` code as HP-UX no longer support `mbuf`s as of HP-UX 11i v1.6. In view of this, `nettl` is not able to support subsystems which use mbuf's while tracing from HP-UX 11i v1.6 onwards.

Impact

There are no impacts.

Compatibility

There are no compatibility issues.

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

Additionally, the *nettl* (1M) and *netfmt* (1M) manpages have been modified to indicate the changes in the extension of both Log and Trace files.

execve() System Calls

The execve[*]() system calls, in all their forms, load a program from an ordinary, executable file into the current process, replacing the current program. The [*path*] or [*file*] argument refers to either an executable object file or a file of data for an interpreter. In the latter case, the file of data is also called a script file.

Summary of Change

The system call, execve( )is changed in HP-UX 11i v1.6 as described in the following two subsections:

Setuid/Setgid Script Support

A setuid file is one that, if executed, operates with the permissions of the owner of the file, not of the person executing the file. A setgid file operates similarly with the permissions of the group.

Details of Change

Beginning in this release, the kernel ignores *setuid* and *setgid* bits on scripts for security reasons. This affects only the scripts, not the executables.

Impact

The setuid and setgid scripts will no longer function properly.

Compatibility

Due to these changes the setuid and setgid scripts no longer function properly. Attempting to run setuid or setdgid scripts results in this warning message:

```
Warning: Ignoring setuid/setgid on "/tmp/[abc]" as the system tunable
"secure_sid_scripts" is set.
```

Additionally, this warning is sent to the controlling terminal, as well as, syslog.log which is located in the /var/adm/syslog/ directory.

To obtain the HP-UX 11i v1.0 compatible behavior, set the dynamic tunable secure_sid_scripts to 0. Refer to the *kmtune* (1) manpage for syntax and more information.

IMPORTANT The setuid and setgid scripts pose a security threat, hence you should use this tunable with great care.

Performance

Not applicable.

Obsolescence

As of HP-UX 11i v1.6, the kernel ignores *setuid* and *setgid* bits on scripts for security reasons.

Documentation

The *execve* (2) and *secure_sid_scripts* (5) manpages have been updated appropriately, see the manpage of each for more information.

Buffer Overflow Protection

With this release, applications are not allowed to execute code from their stack segment by default. Executing code on stack is one of the most common exploits on UNIX® systems; turning off this feature protects against buffer overflow.

Details of Change

Beginning in HP-UX 11i v1.5, HP-UX supported a kernel tunable parameter *executable_stack* that controlled whether applications were permitted to execute code located on their stack(s). In the initial release, this tunable parameter was disabled by default, for maximum compatibility. In HP-UX 11i v1.6, executable stacks are disabled by default, providing substantial protection from many common security exploits without hurting system performance

Impact

Well over 99% of legitimate applications will not be affected by this change. Some legitimate Java-based applications may not function. Often, this is a sign that the application is missing a critical Java security patch. A few legitimate applications that use self-modifying code, such as some simulators and interpreters, may also be affected.

Compatibility

Any application that attempts to execute code on its stack(s) is terminated with a SIGKILL signal. An error message, similar to the following, is generated to the `syslog.log` file and to the controlling terminal of the offending process:

```
PID 18459 has been terminated.  See the '+es enable' option of chatr(1).
```

If a message similar to this appears, the `/var/adm/syslog/syslog.log` will also contain an error message similar to this:

```
UID 7 PID 18459 may have attempted a buffer overflow attack.

cmd: /abc/estack
```

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

Please refer to the *Restricting Execute Permission on Stacks* section of the *chatr* (1) manpage, as well as, *executable_stack* (5) for additional advice on the use of this feature.

7 Programming

This chapter describes new and changed programming libraries and related tools functionality supported by the HP-UX 11i v1.6 release including:

aC++ and C Compilers

HP aC++ Itanium Processor Family (IPF) compiler, version A.05.36, supports much of the ISO/IEC 14882 Standards for the C++ Programming Language (the international standard for C++). When invoked as a C compiler, it supports the American National Standard for Information Systems - Programming language C, ANS X3.159-1989 (the ANSI C 89 standard).

Summary of Change

C language support is migrated from the existing HP-C product to aC++. As a result, the following two changes are made to HP-UX 11i v1.6 as compared to HP-UX 11i v1.5:

- The bundled C compiler in `/usr/ccs/bin/cc_bundled` is replaced with a driver that invokes the aC++ compiler in ANSI C mode.
- The aC++ headers are added into `/usr/include/aCC` and `/usr/include/aCC_std`. This is to facilitate ISVs and other users who wish to use g++ in favor of aC++.

Details of Change

C language compilation support on IPF platforms is being migrated from the HP-C compiler to a common aC++ compiler which compiles both C and C++ language programs. As a result, the bundled C compiler, `/usr/ccs/bin/cc_bundled`, is now a driver that invokes the aC++ compiler in ANSI C mode. The C Tools previously delivered with the HP-C compiler are no longer accessible in `/opt/ansic/bin`. These tools are: `lint`, `cb`, `cflow`, `cxref`, `endif`, `protogen`. For this release, they are installed with the legacy HP-C compiler in `/opt/ansic/legacy_hpc/bin`.

Users must use absolute paths to reference the old legacy HP-C compiler (`cc`) and C Tools (`lint`, `cb`, `cflow`, `cxref`, `endif`, `protogen`). That is, the path to the old HP-C compiler and C Tools is not included in `/etc/PATH` or `/etc/MANPATH`.

Review the new `+legacy_hpc` option for information on using the `cc` driver to invoke the legacy HP-C compiler.

The aC++ headers are now delivered as part of HP-UX 11i v1.6 operating system. Previously, these were delivered with the aC++ compiler. This is done primarily to facilitate users who wish to use g++ without installing the aC++ compiler. The default include file and library paths in the compiler drivers have been updated to reflect the new location of the aC++ headers.

Our goal is to provide a viable ANSI-C compiler based on a common C/C++ compiler code base with a very high level of compatibility with the previous release of the HP-C in HP-UX 11i v1.5 compiler. There are a small number of known differences, though, between the two compilers that are listed in the “compatibility exception list” (refer to the COMPATIBILITY section that follows), essentially covering deprecated features available in the previous IPF C compiler. We expect that these differences would not impact applications that are migration candidates for the IPF platform, but the new compiler also supports a `+legacy_hpc` option under which it simply serves as a wrapper for the old compiler.

Impact

The bundled C compiler, which is used to regenerate kernel tables, is replaced with a C++ compiler operating in ANSI C mode. This change should be transparent.

The complete contents of the `/opt/aCC` directory occupy approximately 112MB.

The complete contents of the `/opt/ansic` directory occupy approximately 174MB. This is approximately twice the size of the HP-UX 11i v1.5 `/opt/ansic` directory due to retaining the old HP-C compiler in `/opt/ansic/legacy_hpc` (approximately 82MB).

Compatibility

Compatibility exception list for the HP-UX 11i v1.6 ANSI C compiler versus HP-UX 11i v1.5 HP-C:

- no support for implicit “int” variable declarations
- no built-in __int32 a data type (use #define __int32 ... if needed)
- no +M0, +M1, or +M2 migration options. They are all ignored
- no MPE long pointers (`^`)
- no support for the HP_ALIGN pragma (MPE alignments) use “pack” pragma
- no support for `+L` (listing) option and the related listing control #pragmas (LINES, WIDTH, TITLE, SUBTITLE, PAGE, LIST and AUTOPAGE)
- no support for the standalone C tools: `lint`, `cb`, `cflow`, `cxref`, `endif`, `protogen`

Performance

Users may experience some degradation in compile time performance.

Obsolescence

The transition link from `/usr/bin/cc` may be removed in the future. It is recommended that you include contents of the file`/etc/PATH` in the PATH variable of your `.profile`, or manually adjust their paths to access the C compilers (`cc` and `cc_bundled`) in their new locations.

Documentation

The old HP-C manpages (*cc* (1), *c89* (1)) and C Tools manpages (*cxref* (1), *protogen* (1), *cb* (1), *cflow* (1), *lint* (1)) are retained with the legacy HP-C compiler installed under `/opt/ansic/legacy_hpc`. Users must change their *`MANPATH`* or use the `-M` option in order to access these manpages in their new location, `/opt/ansic/legacy_hpc/share/man/man1.Z`.

Fortran Compiler

HP Fortran is a modern, powerful mathematical and scientific language that supports array handling, data abstraction, and data hiding.

HP Fortran v2.6 for HP-UX 11.0, and 11i provides a common source base for all HP-UX operating systems.

Summary of Change

Several optimizations have been added in the HP-UX 11i v1.6 release, including linking optimizations and full OpenMP v2.0.

Details of Change

The following optimizations have been added with the release of HP Fortran v2.6 for HP-UX 11i v1.6:

- Incremental linking optimizations (addition of +ild and +ildrelink flags)
- Full OpenMP v2.0
- +i2 switch added to set default integer size
- +profilebucketsize=n (for n=16 or 32) for compilers; +profilebucketsize n (for n=16 or 32) for linker option
- +tls={static, dynamic}

The following changes have been made to the IPF PBO options with the release of HP Fortran v2.6 for HP-UX 11i v1.6:

- +I, +P, and +df are deprecated.
- +Oprofile=prediction:static is silently ignored.

Impact

No impact identified.

Compatibility

There are no compatibility issues.

Performance

There is no performance impact.

Obsolescence

Not applicable.

Documentation

The *HP-UX 11i v1.6 Fortran Release Note* is also available in `/opt/fortran90/newconfig/RelNotes/Fortran.2.6|pdf|ps|txt`

IPF Assembler

The IPF assembler, also known as the IA-64 assembler, is used to assemble source files written according to the IPF Assembly Language Specification.

Summary of Change

The HP-UX 11i v1.6 release of the IPF assembler contains a number of enhancements. The most significant enhancement is the hazard checking logic and support for the pred.rel assembler directive.

Details of Change

The fixes in HP-UX 11i v1.6 are:

- Explicit bundling not being respected in certain cases:

  In certain cases, especially when using explicit but incomplete bundling the assembler was creating a bundle with a template other than the one explicitly requested by the user by using the template directives. The root cause is related to doing bundle fixes to convert any intra-bundle stops to inter-bundle stops. If applicable and possible, this assures that any instruction that must be the first in an instruction group and that's in a subsequent bundle will, in fact, be the first in the instruction group and not follow nops that are placed after the intra bundle stops in the preceding bundle. The fix selects the best template from a set of possible templates, without taking into account the fact that a explicit template directive is in effect.

- X-format unwind records:

  The emission of the X-format unwind records was found incorrect when the unwind directive contained the register rp or r0. The assembler mistakenly created a record for rp when r0 was specified and failed to create a record for rp when rp was specified. Also, the assembler did not accept the @psp and @priunat pseudo-registers.

- Expression evaluation was unsigned by default:

  The assembler in cases treated a negative number as a large unsigned number, and as such rejected the immediate as too large or the displacement as too distant to be encoded in the instruction.

- Temporary symbols in object file:

  Non-scope restricted temporary symbols were emitted to the object file by mistake.

The enhancements in HP-UX 11i v1.6 are:

- Improved support for opaque and stub symbols:

  Support for opaque symbols and stub symbols is improved by allowing the export class to be set for those symbols.

- Allow predication for alloc instructions:

  To bring the assembler up to date with respect to Intel's SDM version 1.1, the alloc instruction can now be predicated.

- Catalog handling in a XDK environment:

  The XDK logic in the assembler has changed to avoid occasional catalog problems caused by the improper setting of NLSPATH. The assembler now always annotates NLSPATH to include the correct path to the catalog file independently of how it was invoked. This causes the catalog to be found in almost all cases.

- New implementation of dependency checking:

  The dependency or hazard checking logic is vastly improved and now keeps track of dependencies in almost all cases. This includes switching to and from different code sections in between instruction groups. As such, dependency checking is found robust enough to emit errors for the definite violations. Possible dependency violations still remain warnings. As a consequence of the new implementation, support for the .pred.rel directive has been added.

IMPORTANT

The assembler is now more likely to emit the following warning:

```
warning: redundant instruction stop
```

This is the result of acting on the fact that certain instructions do end instruction groups. The explicit use of an instruction stop after these instructions is therefore redundant. The warning is harmless, but it has been observed that the removal of the redundant stop improves bundling and yield more compact code.

Impact

Assembly code that contains definite dependency violations now cause an error, and as such may result in failed builds that used to succeed with a prior version of the assembler.

Compatibility

Compatibility with the *Intel IA-64Architecture Software Developer's Manual Version 1.1* has been maintained or increased slightly. This manual, as well as other related information, can be obtained at:

`http://developer.intel.com/design/itanium/manuals/index.htm`

Performance

There are no negative performance issues.

Obsolescence

Not applicable.

Documentation

The *as* (1) manpage has been updated to reflect these changes, please refer to this manpage for more information.

Link Editor (ld)

The Link Editor, *ld* (1), takes one or more object files or libraries as input and combines them to produce a single (usually executable) file.

Summary of Change

New functionality introduced to HP-UX 11i v1.6 `ld` includes:

- Procedure splitting
- Merging shared library segments
- Filtered Library
- Large section table support
- `+instrumenter` option
- `+O` selective percent option

The `-I` option is also changed to use caliper as default instrumenter.

Details of Change

- Procedure splitting (option: `+[no]procsplitclean`, `+vtype procsplitclean`)

  Procedure splitting enables splitting of the text section into a hot section (.text) and a cold section (.text.cold) depends on profile information. This creates better locality and i-cache performance for the hot section code. Linker dumps verbose trace of procedure splitting using `+vtype procsplitclean` option.

- Merging shared library segments (option: `+mergeseg`)

  Executable build with the `+mergeseg` causes the dynamic loader to merge all the data segments of the shared libraries into one block during startup. The data segments of the dynamically loaded libraries is also merged with the data segments of dependent libraries. This increases run-time performance by allowing the kernel to use larger size page table entries.

- Filtered library (option: `+filter shared_library_path`)

  Filtered library implementation is designed to reduce the amount of data space used by large shared libraries. It enables large shared libraries to be broken down into one “filter” (using `+filter` option) and several “implementation” (regular) libraries. User links with the filter library, which contains references to all of the symbols of the implementation libraries. During runtime, only the implementation libraries that are used are loaded into data space. This functionality decreases the amount of data space needed for a process if the implementation libraries are partition correctly.

- Large section table support (no option, automatic)

Large section table support implements the gABI standard for ELF object files format with more than 64K number of sections. When the number of sections exceeds the 64K limit, the compiler/linker automatically stores this information in a larger field in the ELF file, and a new section is created to store the section header index for symbols in the symbol table. There is no user option for this functionality.

- Instrumenter (option: `+instrumenter`)

  The `+instrumenter` option enables user to invoke the static instrumenter sin instead.

- Selective optimization by percent (option: `+Oselectivepercent n`)

  The `+Oselectivepercent` option instructs the inter procedural optimizer driver to pass the first n percent of the object files to the high level optimizer for inter procedural optimizations such as inlining. This option is designed to work at optimization level 4 (+O4) in the presence of dynamic profiling.

- Instrumenter vs. Caliper (option: `-I `)

  When linking an executable with `-I` option, the default instrumenter is changed to caliper. When the program is executed, the dynamic loader automatically invokes `/opt/langtools/bin/caliper` for instrumentation. If the user wishes to use static instrumenter instead, the `+instrumenter sin` option should be used.

Impact

No impact identified.

Compatibility

ELF object files with more than 64K number of sections need to be recompile.

Performance

There is a minimum of 30% improvement in link time performance.

Obsolescence

Not applicable.

Documentation

The *ld* (1) manpage is also updated to include the new options. Please refer to the revised *ld* (1) manpage for the latest information on linker.

Machines Affected

IPF machines running HP-UX 11i v1.6.

Object File Tools (chatr)

The `chatr()` command is used to change and display program's internal attributes.

Summary of Change

Two new options `+mergeseg` and `+I` are added to modify the shared library segment merging and dynamic instrumentation bit of the executable respectively.

Details of Change

Option `+mergeseg [enable | disable]` is added to enable or disable the shared library segment merging feature. When enabled, all data segments of shared libraries loaded at program startup are merged into a single block. Data segments for each dynamically loaded library is also merged with the data segments of its depend libraries. Merging of these segments increases run-time performance by allowing the kernel to use larger size page table entries

Option `+I [enable | disable]` allows user to enable or disable dynamic instrumentation by caliper. If enabled, the dynamic loader automatically invokes caliper upon program execution to collect profile information. If disabled, no instrumentation occurs.

Impact

No impact.

Compatibility

No compatibility issue.

Performance

No performance change.

Obsolescence

Not applicable.

Documentation

The *chatr* (1) manpage has been updated to reflect the new options.

Machines Affected

Itanium machines running HP-UX 11i v1.6.

Object File Tools (elfdump)

Elfdump is an application that dumps information contained in the ELF object files.

Summary of Change

A new option, `-tx`, is introduced to dump more information in the symbol table.

Details of Change

The `-tx` option is introduced to dump the value stored in the *st_shndx* field of the symbol table, in addition to the section header index of the symbol definition. This option is useful to verify the data stored in the symbol table.

Impact

No impact.

Compatibility

No compatibility issue.

Performance

No performance change.

Obsolescence

Not applicable.

Documentation

The *elfdump* (1) manpage is updated to reflect the new option.

Machines Affected

IPF machines running HP-UX 11i v1.6.

Dynamic Loader

The dynamic loader, *dld.so* (5), is used to dynamically load shared libraries during executable startup.

Summary of Change

The dynamic loader supports static and dynamic Thread Local Storage (TLS) model shared libraries.

Details of Change

The dynamic loader supports static and dynamic Thread Local Storage model shared libraries compiled with the `+tls=static` and `+tls=dynamic` compiler options respectively.

Shared libraries built with +tls=dynamic can be loaded using `dlopen()` and `shl_load()` system call.

Attempting to load a +tls=static shared libraries results in “Can’t `shl_load()` a library containing Thread Local Storage:” error.

Impact

No impact identified.

Compatibility

No compatibility issue

Performance

No performance change

Obsolescence

Not applicable.

Documentation

The *dld.so* (5) manpage is updated, please refer to this manpage for the latest information on dynamic loader.

Machines Affected

IPF machines running HP-UX 11i v1.6.

dlopen() and shl_load() System Calls

The `dlopen()` and `shl_load()` are system calls to load shared libraries.

Summary of Change

The ability to use the `dlopen()` or `shl_load()` system call to load shared libraries with dynamic Thread Local Storage (TLS) model is provided.

Details of Change

The ability to use the `dlopen()` or `shl_load()` system call to load shared libraries with dynamic Thread Local Storage (TLS) model is provided.

IMPORTANT Those libraries containing Thread Local Storage and using static TLS model should not be used as a dependency. If a dependent library contains TLS, was build with static TLS model and if it's not linked against the executable, then either `dlopen()` or `shl_load()` fail to perform the operation.

Impact

No impact identified.

Compatibility

No compatibility issue

Performance

No performance change

Obsolescence

Not applicable.

Documentation

The *dlopen* (3C) and *shl_load* (3X) manpages are updated, please refer to these manpages for the latest information.

Machines Affected

IPF machines running HP-UX 11i v1.6.

Linker and Dynamic Loader TLS Support

Linker (ld) takes one or more object files or libraries as input and combines them to produce a single file.

The dynamic loader (dld) attaches each required library to the process and resolves all the symbolic references between the program and its libraries. Is

Summary of Change

Both linker and dynamic loader now have support to create and dynamically load [using dlopen() and shl_load() APIs] shared libraries containing thread local storage (TLS).

Details of Change

Two thread local storage models are supported: static and dynamic, which is controlled by a compiler option +tls=static/dynamic. The default is +tls=dynamic. Shared libraries built with the dynamic model can be loaded using dlopen() and shl_load() APIs. An attempt to load a shared library built with the static model using dlopen() or shl_load() APIs results in the following error:

```
/usr/lib/hpux[32|64]/dld.so: Can't shl_load() a library containing
Thread Local Storage: /usr/lib/hpux[32|64]/libpthread.so.1
```

The dynamic loader tallies each shared library's thread local storage size, as well as, the program's thread local storage size. When all libraries are loaded, the dynamic loader invokes an initializer in the system library libc, which does the thread initialization, allocation of the initial thread, and sets the thread pointer.

Impact

There are no changes to the linker options/usage patterns with respect to building executables and shared libraries. As long as +tls=dynamic compiler option is used to create object files containing TLS, the linker creates load modules with the dynamic TLS model which in all cases is transparent. There are no changes to the options provided by the APIs dlopen(), shl_load(), to *dld.so* flags , and run time options. The dynamic loader operation, with respect to dynamic TLS support, is transparent.

Compatibility

Applications built on systems prior to HP-UX 11i v1.6 and moved forward to run on HP-UX 11i v1.6 systems are compatible.

Performance

Due to longer access sequences for TLS variables and more complex internal data structures, we expect a slight degradation in performance (within 10%) for applications that heavily use thread local storage.

Obsolescence

Not applicable.

Documentation

These manpages have been updated accordingly:

- *dlopen* (3C)
- *shl_load* (3X)
- *dld.so* (5)

C Library (libc)

The C library, `libc`, provides the interface between the user program and the kernel.

Summary of Change

The `libc` routines which provide the interface between the user program and the kernel, now provide support for the creation and dynamic loading of shared libraries containing thread local storage (TLS).

Details of Change

A routine in `libc` has been added, as well as, other `libc` modules to provide support to the linker, loader and compiler components to provide this functionality in a transparent fashion.

Impact

There are no impacts.

Compatibility

Applications built on systems prior to HP-UX 11i v1.6 and moved forward to run on HP-UX 11i v1.6 systems are compatible.

Performance

There are no performance issues.

Obsolescence

Not applicable.

Documentation

No changes necessary.

C99 Floating Hexadecimal I/O Support in libc

The strtod, printf, and scanf families of functions are enhanced to handle floating hexadecimal input and output. HP-UX 11i v1.6 delivers enhancements for C99 Floating Hexadecimal I/O support in libc.

Summary of Change

The strtod, printf, and scanf families of functions are enhanced to handle floating hexadecimal input and output.

Details of Change

APIs printf and scanf are enhanced to handle the new format specifiers ‘a’ and ‘A’ for floating hexadecimal input and output as specified in C99. The API strtod() is enhanced to accept floating hexadecimal sequences as specified in C99. These changes are extensions to existing functionality.

Impact

No impact.

Compatibility

The new scanf and strtod functions could affect the behavior of an existing program which depends on the rejection of input that the updated functions accept as a floating hexadecimal number. For example, the output of the following program:

```
#include <stdio.h>
int main() {
     const char* input = “0x1p0z”;
     float x;
     char c;
     sscanf(input, “%e%c”, &x, &c);
     printf(“x = %g\n”, x);
     printf(“c = %c\n”, c);
```

changes from:

```
x = 0
c = x
```

to:

```
x = 1
c = z
```

Performance

There is no change in performance.

Obsolescence

Not applicable.

Documentation

The manpages for *printf* (3S), *scanf* (3S) and *strtod* (3C) have been updated to reflect this enhancement.

Math Library (libm)

The HP-UX Math Library, `libm`, supports all mathematical functions specified by the C standard, ANSI/ISO/IEC 9899:1999 (C99) , as well as functions specified by the XPG4.2, SVID, and COSE Common API (Spec 1170) specifications.

Summary of Change

The HP-UX 11i v1.6 introduces new functions in the HP-UX namespace:

- reciprocal square root (`rsqrt[fwlq]`)
- integer-exponent power functions (`pown[fwlq]`, `powlln[fwlq]`)

Details of Change

The reciprocal square root functions provide a combined square root and divide, which is common in some important performance critical applications, with about the execution time of a square root alone.

The integer-exponent power functions provide a direct C translation of the Fortran real integer operations, and achieve better performance in some cases than the standard C pow functions.

Users may call the new functions if they wish, but are not otherwise required to take any action. (See Compatibility below.)

Impact

No impact.

Compatibility

The names of the new functions expand the HP-UX namespace:

Table 7-1 New HP-UX Functions

`rsqrt`	`rsqrtf`	`rsqrtl`
`pown`	`pownf`	`pownl`
`powlln`	`powllnf`	`powllnl`

and further with the `-fpwidetypes` option:

Table 7-2 Further HP-UX Function Expansion

`rsqrtw`	`rsqrtq`	`pownw`
`pownq`	`powllnw`	`powllnq`

If these names have been for other purposes, the pertinent code may need to be altered.

Declarations of the integer-exponent power functions, with names prefixed with an underscore, appeared in the HP-UX 11i v1.5 math.h header, though were not documented in the manpages. The underscore-prefix names are retained in the HP-UX 11i v1.6 math.h header (and the entry points are still in libm.a).

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

The new *rsqrt* (3M) manpage describes the reciprocal square root functions.

The *pow* (3M) manpage is augmented to cover the integer-exponent power functions.

The new functions are mentioned in the math library white paper, which is updated for HP-UX 11i v1.6 and can be found at:

`http://docs.hp.com`

Pthread Library (libpthread)

The pthread library (libpthread) provides interfaces for developing multi-threaded applications.

Summary of Change

The pthread library now provides support for the dynamic loading of shared libraries containing thread local storage (TLS).

Details of Change

The pthread library has implemented interfaces and modules to provide support to the linker, loader and compiler components for this functionality. These interfaces handle allocation and initialization of thread local storage for dynamically loaded shared libraries containing TLS variables.

Impact

No impact.

Compatibility

Not applicable

Performance

No change.

Obsolescence

Not applicable.

Documentation

The *pthread* (3T) manpage has been updated to reflect that the dynamically loaded libraries can declare and statically initialize TLS variables.

Message Passing Interface (MPI 1.8)

HP MPI is a high-performance implementation of the Message Passing Interface standard. HP MPI fully complies with the 1.2 standard and partially with the 2.0 standard. HP MPI provides an application programming interface and software libraries to support parallel, message-passing applications that are efficient, portable, and flexible.

Summary of Change

HP MPI 1.8 features and optimizations include:

- HyperFabric/Hyper Messaging Protocol (HMP) functionality
- Autodouble functionality
- Additional MPI2 functionality o Renamed functions
- New MPI2 functionality
- Dynamic Processes
- Additional One-Sided functionality
- Support for ROMIO
- New option `MPI_ADDRESS_KIND`
- Additional start-up functionality
- New `-show compiler` option
- New `MPI_INSTR` option
- Change of `MPI_FLAGS=y` functionality
- New option `MPI_FLAGS=T`
- Elimination of `mpiview` and XMPI
- Limited PA1.1 support

Details of Change

- HyperFabric/Hyper Messaging Protocol (HMP) functionality
- Hyper Messaging Protocol (HMP) is a messaging-based protocol that significantly enhances performance of parallel and technical applications by optimizing the processing of various communication tasks. It provides low latency, high bandwidth, and low CPU overhead networking. HMP is part of the HyperFabric driver.

NOTE The HMP functionality shipped with HP MPI 1.8 is turned off by default.

- Autodouble functionality

  Autodouble functionality HP MPI 1.8 supports Fortran programs compiled 64-bit with any of the following four data-type-promoting options: `+i8`, `+r8`, `+autodbl4`, or `+autodbl`. The decision of how the Fortran arguments are interpreted by the MPI library is made at link time.

  If the mpif90 compiler wrapper is supplied with one of the above options (`+i8`, `+r8`, `+autodbl4`, or `+autodbl`) at link time, it automatically links in the necessary object files, informing MPI how to interpret the Fortran arguments. The `-show` option to the compiler wrappers can be used to see specifically what they do.

  This autodouble feature is supported in the regular and multi-thread MPI libraries, but not in the diagnostic library.

- Additional MPI2 functionality

  HP MPI is fully compliant with the MPI 1.2 standard, and supports a subset of the MPI 2.0 standard. The HP MPI 1.8 release adds to the MPI2 features supported in HP MPI 1.7 as well as removing some restrictions from the MPI2 features supported in HP MPI 1.7.

NOTE Old functions are still functional.

Renamed Functions:

Table 7-3 Renamed MPI2 Functions

NEW NAME	OLD NAME
`MPI_Comm_create_errhandler()`	`MPI_Errhandler_create ()`
`MPI_Comm_get_errhandler()`	`MPI_Errhandler_get ()`
`MPI_Comm_set_errhandler()`	`MPI_Errhandler_set ()`
`MPI_Comm_create_keyval()`	`MPI_Keyval_create ()`
`MPI_Comm_free_keyval()`	`MPI_Keyval_free()`
`MPI_Comm_delete_attr()`	`MPI_Attr_delete()`
`MPI_Comm_get_attr ()`	`MPI_Attr_get()`

Table 7-3 Renamed MPI2 Functions (Continued)

NEW NAME	OLD NAME
MPI_Comm_set_attr ()	MPI_Attr_put ()
MPI_Get_address ()	MPI_Address()
MPI_Type_create_hindexed()	MPI_Type_hindexed()
MPI_Type_create_hvector()	MPI_Type_hvector()
MPI_Type_create_struct()	MPI_Type_struct()

New MPI2 functionality:

— mpiexec

— MPI_STATUS_IGNORE

— MPI_STATUSES_IGNORE

— MPI_ERRCODES_IGNORE

— MPI_IN_PLACE

- Dynamic Processes

  Spawn:

  — MPI_Comm_get_parent

  — MPI_Comm_spawn

  — MPI_Comm_spawn_multiple

  — MPI_ARG_NULL

  — MPI_ARGS_NULL

  Each collection of spawned ranks talks only to the others through the comm daemons via sockets. Even if two comm_worlds are on the same host, the ranks within one comm_world talk amongst themselves through shared memory, whereas, ranks between two comm_worlds do not talk to each other through shared memory.

  Keys interpreted in the info argument to the spawn calls:

  — host -- we accept standard host.domain strings and start the ranks on the specified host. Without this key, the default is to start on the same host as the root of the spawn call.

  — wdir -- we accept /some/directory strings.

  — path -- we accept /some/directory:/some/other/directory:.... A mechanism for setting arbitrary environment variables for the spawned ranks is not provided.

- Additional One-Sided functionality

  The release of HP MPI 1.8 completes support for the MPI 2.0 standard one-sided communication functionality as well as removing restrictions present in HP MPI 1.7.

  HP MPI 1.8 supports `MPI_Accumulate()` and non-contiguous data types.

- Support for ROMIO

  ROMIO is a high-performance, portable implementation of MPI-IO and is described in the I/O chapter of the MPI 2.0 standard which is found at:

  `http://www.mpi-forum.org/docs`

  HP MPI 1.8 supports version 1.0.3 of ROMIO.

- New option `MPI_ADDRESS_KIND`

  The new option `MPI_ADDRESS_KIND` requires special circumstances for implementation. To avoid breaking older f77 applications, the standard `/opt/mpi/include/mpif.h` header does not include the `MPI_ADDRESS_KIND` variable. Users who compile by hand and do not change anything do not have this new feature. However, this new feature can be obtained by utilizing our mpif77/mpif90 wrappers because it automatically goes to the new `/opt/mpi/include/32/mpif.h` or `/opt/mpi/include/64/mpif.h`. Users who compile by hand can explicitly refer to the desired header in order to get this feature.

- Additional start-up functionality

  In addition to mpirun that starts HP MPI 1.8, 1.7.2, 1.7.1, and 1.7; HP MPI 1.8 also contains mpirun1.6 that starts executables built with archive libraries on HP MPI 1.5 and 1.6. The launch utility is located in the same directory as mpirun.

- `-show` compiler option

  HP MPI 1.8 now offers a `-show` option to compiler wrappers. When compiling by hand, run as `mpicc -show`, and a line prints showing exactly what the job was going to do.

- New *`MPI_INSTR`* option

  The instrumentation mode has a new option MPI_INSTR=filename:l which locks ranks to CPUs and uses the CPUs cycle counter for nice lightweight timing. However, this feature is not supported on PA1.1 machines.

- Change of `MPI_FLAGS=y` functionality

  The functionality of MPI_FLAGS=y# feature has been changed slightly. Now MPI_FLAGS=y no longer means spin forever, but rather “spin for 10 sec. which is effectively forever then sleep”. This option is not used on PA1.1 machines.

- New option `MPI_FLAGS=T`

  New option `MPI_FLAGS=T` prints the user and system times for each MPI rank as shown below:

Table 7-4 MPI Rank Times

MPI Rank	User (seconds)	System (seconds)
0	0.09	0.04
1	0.08	0.04
2	0.07	0.03
3	0.07	0.04
Total:	0.31	0.15

Impact

Minimum of 40MB of disk space in `/opt`.

Compatibility

HP MPI 1.8 is supported on both the Hewlett-Packard servers and workstations running HP-UX 11.00 or later operating systems on PA-RISC platforms as well as the Hewlett-Packard servers and workstations running HP-UX 11i v1.5 or later operating systems on Itanium platforms.

Performance

There are no performance issues.

Obsolescence

Elimination of mpiview and XMPI:

HP MPI 1.8 no longer supports `mpiview` and XMPI. HP MPI 1.7 was the last release to support these functions.

Limited support of PA1.1. :

HP MPI 1.8 provides limited support for PA1.1. Future releases no longer supports PA1.1.

Documentation

The changed manpages are:

- *mpienv* (1), the H and T options

  mpidebug (1) , DDE

- *MPI_Wtick* (3)

  MPI_Accumulate (3)

  MPI_Wtime (3)

The renamed manpages can be found in Table 7-3, “Renamed MPI2 Functions,” on page 113.

The new manpages are:

mpiexec (1)

MPI_ADDRESS_KIND (3)

MPI_STATUS_IGNORE (3)

MPI_Win_call_errhandler (3)

MPI_REPLACE (3)

MPI_Win_create_errhandler (3)

MPI_Win_get_errhandler (3)

MPI_Win_set_errhandler (3)

MPI_Win_create_keyval (3)

MPI_Win_free_keyval (3)

MPI_Win_get_attr (3)

MPI_Win_set_attr (3)

MPI_Win_delete_attr (3)

MPI_Comm_get_parent (3)

MPI_Comm_spawn (3)

MPI_Comm_spawn_multiple (3)

MPI_Errhandler_c2f (3)

MPI_Errhandler_f2c (3)

MPI_Type_create_indexed_block (3)

The new *HP MPI Version 1.8 Release Note* (**B6060-96008**) and the revised *HP MPI User’s Guide - Seventh Edition 1.8* (**B6060-96009**) can be found at:

`http://docs.hp.com/`

MxN Thread Model

Libpthread supporting the MxN thread model.

Summary of Change

At HP-UX 11i v1.6 and forward, HP-UX supports the "MxN" thread model that supports creation of both *PTHREAD_SCOPE_PROCESS* and *PTHREAD_SCOPE_SYSTEM* threads. Prior to HP-UX 11i v1.6, HP_UX only supported PTHREAD_SCOPE_SYSTEM threads (also known as kernel or 1x1 threads). The MxN threads implementation is compliant with the approved POSIX 1003.1-1996 standard.

Details of Change

The Posix threads library, libpthread, provided in HP-UX 11i v1.6 supports the MxN model. The new `libpthread` is provided in the default directory where other libraries are stored. The `libpthread` provided in releases prior to HP-UX 11i v1.6 supports only the 1x1 model.

Threads created with contention scope of *PTHREAD_SCOPE_SYSTEM* contend for resources with all other threads in the system. This attribute is generally used to indicate that the user thread should be bound directly to a kernel-scheduled entity for its entire lifetime. Hence these threads are also known as bound threads.

Threads created with contention scope of *PTHREAD_SCOPE_PROCESS* contend for CPU resources only with other threads within their process that were created with the same scheduling contention scope. This attribute is generally used to indicate that the user thread should be unbound, meaning that the thread is not bound to a specific kernel-scheduled entity. Hence these threads are also known as unbound threads.

In the MxN thread model, unbound threads are multiplexed over one or more kernel-scheduled entities by the user space scheduler in libpthread. An unbound thread may move from one kernel-scheduled entity to another in its lifetime. The kernel-scheduled entities on which unbound thread is scheduled can be considered as virtual processors.

Impact

A multi-threaded application running on a previous release compiles and runs on HP-UX 11i v1.6 without any source changes. A multi-threaded application running on a previous release, brought over to HP-UX 11i v1.6 without recompiling, also runs without any change in functionality. In both cases, all pthread interfaces continue to work the same way as documented in the manpages.

However, users should be aware of the following:

- An application can create both *PTHREAD_SCOPE_SYSTEM* and *PTHREAD_SCOPE_PROCESS* threads explicitly using the `pthread_attr_setscope` API. When no contention scope is specified, a thread created by `pthread_create` has a contention scope of *PTHREAD_SCOPE_PROCESS*. This change in default thread type is due to POSIX standards requirement.

- An application that is not rebuilt on HP-UX 11i v1.6 has all threads created as *PTHREAD_SCOPE_SYSTEM*. If an application is rebuilt on a HP-UX 11i v1.6 system, threads created by default is *PTHREAD_SCOPE_PROCESS* threads. Applications can change the default behavior to create *PTHREAD_SCOPE_SYSTEM* threads by compiling the application with *-DPTHREAD_COMPAT_MODE*.
- Internal helper threads may be created by libpthread and users of `pstat_getlwp` and `pstat_getproc` should be aware of this. In addition, kernel entities used for scheduling unbound threads may be cached by libpthread and may also show up in the output of `pstat_getlwp` and `pstat_getproc`. Hence an application should not make any assumptions about the number of kernel entities used by a multi-threaded process, even if the application is creating only bound threads.
- The behavior of `sigstack`, `sigaltstack` and `sigspace` is undefined when called from unbound threads. These system calls should be called only from bound threads for them to work correctly.
- The `pthread_pset_bind_np` and `pthread_launch_policy_np` are not supported for unbound threads.

Compatibility

The behavior of non-POSIX `sigstack`, `sigaltstack` and `sigspace` is undefined when called from *PTHREAD_SCOPE_PROCESS* threads. These system calls should be called only from *PTHREAD_SCOPE_SYSTEM* threads for them to work correctly.

Performance

The *PTHREAD_SCOPE_PROCESS* feature of the MxN threads implementation can improve performance for a subclass of multi-threaded applications. Applications that use very large number of threads benefit most.

Applications whose threads are computation-bound benefit least. In this case, it is recommended the application continue to use *PTHREAD_SCOPE_SYSTEM* threads.

Obsolescence

Not applicable.

Documentation

These manpages have been changed to reflect the support for MxN thread model:

- *pthread* (3T)
- *sched_setparam* (2)
- *sched_setscheduler* (2)
- *sigaltstack* (2)
- *sigstack* (2)
- *sigspace* (2)
- *pthread_attr_init* (3T)
- *signal* (5)
- *pthread_launch_policy_np* (3T)
- *pthread_pset_bind_np* (3T)

Two new manpages are included to reflect new functionality:

- *pthread_gettimeslice_np* (3T)
- *pthread_settimeslice_np* (3T)

Additional information regarding kernel threads and their use can be found at:

`http://devresource.hp.com/STK/partner/threads.html`

Another resource on the topic of kernel threads is *Thread Time - The Multithreaded Programming Guide*, by HP's Scott Norton and Mark DiPasquale (HP Professional Book, published by Prentice Hall, ISBN 0-13-190067-6).

Header File (ctype.h)

The `ctype.h` header file provides interfaces for developing multi-threaded applications. It contains the prototype declarations of the functions that classify character-coded integer values according to the rules of the coded character set identified by the last successful call to `setlocale()`. These functions are supplied both as library functions and as macros defined in the `ctype.h` header file.

Summary of Change

Some compiler defined symbols are obsoleted and have been removed from the `ctype.h` header file in HP-UX 11i v1.6 to eliminate a potential source of name pollution.

Details of Change

The following obsolete symbols are removed from the `ctype.h` header file:

```
# define _U    01
# define _L    02
# define _N    04
# define _S   010
# define _P   020
# define _C   040
# define _B   0100
# define _X   0200
# define _A   01
# define _G   02
# define _PR   04
```

Impact

No impacts.

Compatibility

Any existing use of the obsoleted symbol definitions must be changed to the fully supported symbols as defined in the following table:

Table 7-5 Obsoleted vs. Supported Symbols

Obsoleted Symbol	Supported Symbol
_U	_ISALPHA
_L	_ISALNUM
_N	_ISBLANK
_S	_ISCNTRL
_P	_ISDIGIT
_C	_ISGRAPH
_B	_ISLOWER
_X	_ISPRINT
_A	_ISALPHA
_G	_ISALNUM
_PR	_ISBLANK

Performance

There are no impacts to performance as a result of the `ctype.h` changes.

Obsolescence

The symbol definitions described herein have been obsoleted from `ctype.h` in HP-UX 11i v1.6.

Documentation

No documentation changes were necessary.

Judy Libraries

The Judy libraries were originally delivered on PA RISC systems only. These libraries have been re-compiled on the IPF platform and are now available in both the compatibility mode version, as well as, the native mode version.

Summary of Change

The Judy libraries have been ported to the IPF platform.

Details of Change

Judy libraries:

- Provide an ideal tool for implementing sparse arrays.
- Provide unbounded array capability.
- Provide scalable arrays that can grow dynamically to very large populations with excellent performance and memory usage characteristics.
- Provide a core technology that replaces many traditional data structures and algorithms, such as arrays, sparse arrays, hash tables, B-trees, binary trees, linear lists, skip lists, sort and search algorithms, and counting functions.

The Judy library files in HP-UX include:

Table 7-6 HP-UX Judy Library Files

`/usr/lib/hpux32/libJudy.a`	32-bit, IPF, archive
`/usr/lib/hpux32/libJudy.so`	32-bit, IPF, shared
`/usr/lib/hpux64/libJudy.a`	64-bit, IPF, archive
`/usr/lib/hpux64/libJudy.so`	64-bit, IPF, shared
`/usr/lib/libJudy.sl/`	32-bit, PA-RISC 1.1, shared
`/usr/lib/pa20_32/libJudy.sl`	32-bit, PA-RISC 2.0, shared
`/usr/lib/pa20_64/libJudy.sl`	64-bit, PA-RISC 2.0, shared

Impact

No impacts.

Compatibility

No compatibility impacts, though applications may need to be re-linked to take advantage of the updated libraries.

Performance

Judy libraries provide significant performance improvement over most similar data structures, especially for very large arrays (e.g. greater than 10,000 elements).

Obsolescence

Not applicable.

Documentation

The documentation changes that follow are installed and can be found on the system at, `/usr/share/doc/Judy`. This documentation can also be found on the web at **`http://www.hp.com/go/Judy`** , then select **`Information Library`**.

The *Judy* (3X), *Judy1* (3X), *JudyL* (3X), *JudySL* (3X) manpages have been updated.

Common Desktop Environment (CDE) Libraries

All cFront CDE components and libraries are delivered in HP-UX 11i v1.6.

Summary of Change

All cfront built CDE libraries (libtt.3, libDtSvc.3) are delivered for backward compatibility along with aC++ built CDE libraries.

Details of Change

All cFront CDE components and libraries have been migrated to aC++, including CDE libraries, *libtt* (3) and *libDtSvc* (3). The cfront applications may not work with aC++ built libraries. In order to provide backward compatibility, both aC++ and cfront built libraries are delivered.

The existing cFront built libraries continue to be available as -

- `/usr/dt/lib/libtt.3` (The tooltalk messaging library)
- `/usr/dt/lib/libDtSvc.3` (The Desktop service library)

The above set of libraries are also delivered as aC++ built libraries -

- `/usr/dt/lib/libtt.4` (The tooltalk messaging library)
- `/usr/dt/lib/libDtSvc.4` (The Desktop service library)

All CDE applications make use of aC++ built CDE libraries.

Impact

No impact.

Compatibility

In order to provide backward compatibility, both aC++ and cfront built libraries are delivered.

Performance

No change.

Obsolescence

Not applicable.

Documentation

No changes necessary.

Strong Random Number Generator

/dev/random, /dev/urandom, rng

Summary of Change

This feature is installable from **http://software.hp.com**, and detailed installation instructions are found at this site as well. This feature is not included with the HP-UX 11i v1.6, and must be installed separately

The strong random number generator for HP-UX 11i v1.6 extracts informational entropy from sub-microsecond timing data associated with external interrupts. This provides a secure, non-reproducible source of binary sequences for applications that generate encryption keys and other cryptographic quantities.

The HP-UX 11i v1.6 strong random number generator design follows the Dynamically Loadable Kernel Module (DLKM) architecture on HP-UX. This permits kernel software to be configured into or removed from the HP-UX kernel domain without rebooting the system. This feature only requires that the /dev/random and /dev/urandom devices are not in use for removal or upgrade. Installation, upgrade, and removal can be completed without system downtime.

Details of Change

This feature produces random data at a high rate in the absence of local input devices such as keyboard and mouse. The National Institute of Standards and Technology (NIST) test suite for randomness was used to confirm cryptographic strength. Even during extended periods of minimal network and disk activity, small sub-microsecond variations in system activity are tapped to produce true random sequences at a sustained rate of 100 bytes/second or more.

A deskewing algorithm by Dr. Yuval Perez, University of California, is used to remove bit skew as the random data is collected.

The /dev/random device interface provides random, unpredictable binary sequences through the standard *read* (2) system call. This *read* () blocks temporarily if the kernel-resident device buffer is too low to guarantee the highest level of entropy.

The /dev/urandom device has the advantage of a non-blocking *read* () call, but the entropy may be much more dilute than that provided by /dev/random. This device interface also provides non-reproducible random data, but relies on cryptographic hashing to guarantee a non-blocking source of random numbers.

The cryptographic hashing employs an encryption algorithm, that meets the Advanced Encryption Standard (AES), which was developed and provided by Dr. Brian Gladman, United Kingdom.

In contrast to pseudo-random number generators such as *random* (3M), this feature does not depend on computationally deriving random sequences from seed values, and is truly unpredictable. The /dev/random and /dev/urandom devices provide a higher degree of security for cryptographic applications.

Impact

The random number generator and device interface space requirements are very small. When loaded, it uses less than 100Kb of memory. For security reasons, this feature does not store state or initialization data on disk or other permanent device. The DLKM and configuration files take less than 100Kb on disk.

Compatibility

It is intended that the `/dev/[u]random` *read* () interfaces provide transparent binary compatibility for applications developed on Linux. This feature depends on HP-UX 11i v1.6 external interrupt handling modifications to extract informational entropy, and is not backward compatible with previously released kernels. It is not dependent on optional hardware or software.

The various *ioctl* () commands available with the Linux `/dev/random` device are not available with this feature. These commands do not appear to be of general use to applications. Their usefulness is mostly for investigating performance and production. The Linux write() capability to `/dev/random` internal buffering within the kernel is also not available since it potentially could constitute a security problem.

For verification of internal entropy, a single *ioctl* (2) command is provided with HP-UX 11i v1.6 to retrieve random data from internal buffering. When data is retrieved using this command, an AES encryption algorithm is bypassed so that generated data can be tested for true randomness.

Performance

The performance impact to external interrupt handling, even when the random number generator is heavily utilized, is very small - much less than 1% of the overhead associated with interrupt handling.

Obsolescence

Not applicable.

Documentation

The operational characteristics are described in the *random* (7) manpage that is installed as part of this feature.

8 Other Functionality

This chapter describes other new and changed operating-system software functionality including:

64-Bit PAM

The **Pluggable Authentication Modules** (PAM) give system administrators the flexibility of choosing any authentication service available on the system to perform authentication. The framework interface is implemented by the library `/usr/lib/libpam.1`. New authentication service modules can be plugged in and made available without modifying the applications. The authentication services are implemented by their own loadable modules whose paths are specified through the `/etc/pam.conf` and `/etc/pam_user.conf` file.

Summary of Change

In HP-UX 11i v1.6, IPF support for the 64-bit PAM libraries has been added.

Details of Change

In order for PAM to support multiple instruction set architectures (i.e. 32/64-bit IPF/PA), we implemented Corrigendum U039 of the PAM Standard in release HP-UX 11i v1.6. Refer to:

`http://www.opengroup.org/pubs/corrigenda/u039f.htm`

In HP-UX 11i v1.6, IPF support for the 64-bit PAM libraries has been added.

NOTE The mixing of 32 and 64-bit is not allowed. For example, a 32-bit application cannot execute 64-bit library code.

Impact

There are no impacts.

Compatibility

There are no compatibility issues.

Performance

There are no performance issues.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.

PAM Kerberos

The Pluggable Authentication Modules (PAM) [OSF RFC 86.0] are an easily configurable framework that provides support for multiple authentication technologies on HP-UX.

PAM Kerberos (Product No. **J5849AA**) is the PAM module that provides support for the Kerberos authentication protocol.

Summary of Change

- PAM-Kerberos in HP-UX 11i v1.6 supports both IPF and PA-RISC applications in 32-bit mode.
- A new tool, `pamkrbval`, used to validate the PAM Kerberos configuration is now available with this product.
- The credentials obtained by a user during login with PAM Kerberos are now cleaned up after the user logs out.
- The PAM kerberos password prompt is now configurable.

Details of Change

Users cannot change another user's password even if the user is aware of the other user's password. This change has been made to conform to the standards. Systems are now more secure.

The new tool, `pamkrbval`, helps administrators validate the PAM Kerberos setup. It validates the following files for PAM Kerberos related entries:

- `/etc/pam.conf`
- `/etc/pam_user.conf`
- `/etc/krb5.conf`
- `/etc/krb5.keytab`

When a user logs onto a system using PAM kerberos they obtain credentials that are stored in a file. This file is deleted when the user logs out of the system if the `/etc/pam.conf` file contains an entry for PAM Kerberos under session management and the application calls `pam_close_session()`.

In the `/etc/pam.conf` file, if the flag *`krb_prompt`* is added to either the login/password entry, the prompt explicitly specifies kerberos as shown below:

```
$ old password           <----- Previous output

$ old kerberos password  <----- Output if krb_prompt is specified
```

Impact

There is no impact.

Compatibility

Not applicable.

Performance

Applications might experience performance degradation if run in PA-RISC mode on an IA-64 system.

Obsolescence

Not applicable.

Documentation

A new manpage for the *pamkrbval* (1m) tool is introduced, see this manpage for details.

The *pam_krb5* (1) manpage has been updated to reflect all changes, see this manpage for more information.

KRB5-Client and GSS-API

The **KRB5-Client** product helps to provide Kerberos authentication and strong cryptography for secure communication over the network.

The **Generic Security Service Application Programming Interface** (GSS-API) provides security services for applications independent of the various underlying security mechanisms. The services include authentication, integrity, and/or confidentiality services.

Summary of Change

Both KRB5-Client and GSS-API are now provided in Native IPF mode. The versions of KRB5-Client and GSS-API that are delivered as part of HP-UX 11i v1.6. are the same as those delivered on HP-UX 11i.

The following products are available in HP-UX 11i v1.6 (IA Release):

- KRB5-Client
- GSS-API

Details of Change

KRB5-Client:

KRB5-Client has two additional filesets for 32 and 64-bit IA64 versions of the Kerberos Client libraries. The 32 and 64-bit IA64 libraries are available in the `/usr/lib/hpux32` and `/usr/lib/hpux64` directories respectively.

GSS-API:

GSS-API has two additional filesets for 32 and 64-bit IA64 versions of `libgss.so`. The 32 and 64-bit libraries are available in the `/usr/lib/hpux32` and `/usr/lib/hpux64` directories respectively.

Impact

Users must recompile their existing Kerberos and GSS-API applications to take advantage of the IPF features.

Compatibility

Kerberos/GSS-API applications built on PA-RISC systems can run on IA64 systems (in the PA-RISC mode).

Users have the choice of using either the PA-RISC or IA64 version of the Kerberos Client and GSS-API libraries.

Performance

Applications might experience performance degradation if run in PA-RISC mode on an IA64 system.

Obsolescence

Not applicable.

Documentation

There are no documentation changes.

Distributed Computing Environment (DCE)

Distributed Computing Environment (DCE) products provide a high-quality, comprehensive, standard framework to develop, administer and use distributed applications.

Integrated Login provides a single-step login and also provides the means for incorporating DCE security technology in the HPUX environment.

Summary of Change

The following products are changed in HP-UX 11i v1.6:

- DCE-Core
- DCE-CoreTools
- Integrated login (PA-RISC version only)

Details of Change

DCE-Core:

Two additional libraries corresponding to the PA-RISC 32 and 64-bit versions respectively has been added:

- `/usr/lib/hpux32/libdcekt.so`
- `/usr/lib/hpux64/libdcekt.so`

DCE-CoreTools:

This product was delivered on the Application CD in the 11i release and beginning in 11i v1.6 it is part of the Core OS.

Integrated Login:

The Integrated Login product is delivered only on the PA-RISC version of HP-UX 11i v1.6. It is not available in the IPF version.

Impact

Users must recompile all RPC applications to take advantage of the IPF features.

As the Integrated Login product is not available in the IPF version of HP-UX 11i v1.6, single-step login incorporating DCE security technology in the HP-UX environment is not possible in an IPF environment.

Compatibility

DCE client applications on IPF system can work with DCE server on a PA-RISC system.

Users have the choice of using either the PA-RISC or IPF version of DCE Runtime library (`libdcekt`).

The header files, `/opt/dce/include/dce/pthread_exc_wrap.h` and `/opt/dce/include/dce/exc_handling_wrap.h`, are not delivered in HP-UX 11i v1.6. Applications using these files should use `/usr/include/pthread_exc.h` and `/usr/include/exc_handling.h` respectively.

Performance

Applications may experience some performance degradation while running in the compatibility mode.

Obsolescence

CMA application development is no longer supported.

KRB-Support product is no longer supported.

The following products are discontinued in HP-UX 11i v1.6:

- DCE-CDS-Server: CDS Services
- DCE-SEC-Server: Security Server
- DCE-C-Tools: Development Tools
- DCE-CoreAdmin: Programming & Administration Tools

Documentation

Not applicable.

Event Monitoring Service (EMS) 3.40

The **Event Monitoring System** (EMS) is a framework for monitoring system resources which includes configuring, checking resource status, and sending notification when configured conditions are met.

Summary of Change

EMS 3.40 framework and GUI are available as 32-bit native applications on IPF platforms. **High Availability** (HA) Monitors are available as PA-RISC binaries on IPF platforms.

Details of Change

The functionality of EMS A.03.20.01 (HP-UX 11i v1.5) is carried over to EMS A.03.40 in HP-UX 11i v1.6. The EMS framework and GUI are 32-bit native binaries on the IPF platform. HA Monitors are available as 32-bit PA-RISC binaries, and require the ARIES emulator to run on HP-UX 11i v1.6 IPF systems.

Impact

No impact.

Compatibility

No compatibility issues.

Performance

HA Monitors PA-RISC binaries run on the IPF platform using the Aries emulator, as a result there could be performance degradation.

Obsolescence

Not applicable.

Documentation

Event Monitoring Service A.03.40 Release Notes for HP-UX 11i v1.6 (B7609-90017) and *High Availability Monitors A.03.40 Release Notes for HP-UX 11i v1.6 (B5736-90040)* are shipped with Event Monitoring Service product in HPUX 11i v1.6.

These documents can be found on the Instant Information CD and at:

`http://docs.hp.com/hpux/ha`

HP-UX Software Transition Kit (STK)

The HP-UX Software Transition Kit (STK) provides documentation and tools to help developers transition their software from HP-UX 10.x to 11.x, as well as, from PA-RISC to IPF platforms.

Summary of Change

Impact and reference information has been added for the transition to HP-UX 11i v1.6 .

Details of Change

The STK filescanners scan C/C++/Fortran and COBOL software, makefiles and scripts looking for problems or issues which effects software moving from one version of HP-UX to the next. This includes such things as obsolescence or deprecated functions, changed parameters, changed semantics, and enhancements. Information has been added to the HP-UX STK to report on issues (termed impacts) that affects software moving to HP-UX 11i v1.6 from a previous version, either PA-RISC or IPF.

No change to usage and task model for the STK.

Impact

- 85MB of space is recommended for English-only STK.
- 189MB of space is recommended for full STK (including Japanese documents).
- This is a user-level tool, there is no effect upon the system.

Compatibility

There are no compatibility issues.

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

New IPF architecture documents are included in the HP-UX STK in the reference section.

Aries Binary Translator

Aries is the HP-UX PA-RISC to HP-UX IPF binary emulator. Aries transparently emulates both 32-bit and 64-bit HP-UX PA-RISC applications on HP-UX IPF.

The Aries distribution on HP-UX IPF system consists of four shared libraries:

```
/usr/lib/hpux32/aries32.so
/usr/lib/hpux32/pa_boot32.so
/usr/lib/hpux64/aries64.so
/usr/lib/hpux64/pa_boot64.so
```

The HP-UX IPF kernel invokes `pa_boot[32/64].so` when a 32/64-bit PA-RISC binary is launched. Similarly, `pa_boot[32/64].so` invokes `aries[32/64].so`.

Summary of Change

Aries is enhanced to allow the user to debug PA-RISC/HP-UX applications running under compatibility mode under Aries on IPF/HP-UX using PA-RISC/HP-UX `gdb`. Support for the generation of PA-RISC Core file on IPF is also provided.

Details of Change

Aries emulates the `ttrace` system call in order to enable `pa-gdb` to run under Aries on IPF. Both 32 and 64-bit Aries incorporate this support. In addition, Aries (both 32 and 64-bit) also generates PA-RISC core dump when an emulated PA-RISC application fails on IPF. Aries follows the exact semantics of PA-RISC HP-UX kernel while creating the core file. Such a core file can be either analyzed on an IPF system using emulated PA-RISC `gdb` or can be transferred to a PA-RISC machine and analyzed using the native PA-RISC `gdb`.

This new Aries feature allows the user to transparently debug PA-RISC/HP-UX applications running in compatibility mode under Aries on IPF/HP-UX, using PA-RISC/HP-UX `gdb`. In this case, the PA-RISC/HP-UX `gdb` also runs on IPF/HP-UX platform in compatibility mode under Aries.

Until now, Aries did not support emulation of debugger programs like `gdb` belonging to the PA-RISC/HP-UX platform on IPF/HP-UX platform. Any ttrace/ptracecall made by a program would fall under Aries Limitation and fail. This feature helps the user to triage failures of a PA-RISC/HP-UX application running under Aries on IPF/HP-UX and find out the possible reasons of failure of the application.

Impact

In HP-UX 11i v1.6 for IPF, the PA-RISC/HP-UX `gdb` is packaged under `/usr/ccs/bin`. Users are advised to add `/usr/ccs/bin` to the *PATH* environment variable. Also, in this release Native `gdb` is enhanced to detect PA-RISC/HP-UX executables and launch them under the packaged PA-RISC/HP-UX `gdb`.

Compatibility

No compatibility issues.

Performance

No performance impact to the system and previous version of Aries.

Obsolescence

Not applicable.

Documentation

The Aries manpage, *aries* (5), is updated with the necessary technical and usage information relating to the new features.

Specific information regarding the new features contained in Aries in the HP-UX 11i v1.6 release can be found at:

`http://devresource.hp.com/STK/Aries.html`

Netscape Communicator

Netscape Communicator 4.7x includes Netscape's popular web browser, Navigator, as well as Messenger and Composer. Communicator includes tools for browsing and composing dynamic web content plus email and News clients. The Navigator web browser allows you to find and view information on the World Wide Web. Messenger is used to send, receive, and work with electronic mail messages. Messenger supports reading and posting email messages to Internet newsgroups. Composer allows the creation, editing, and publishing of web pages.

Summary of Change

Performance enhancements and specific bug fixes have been implemented. Netscape 4.79 is faster, more reliable, and able to access more web pages than any earlier version of Netscape 4.x. The HP-UX 11i v1.5 release used Netscape 4.77. The differences from 4.77 to 4.78 and from 4.78 to 4.79 are described herein.

We are encouraging our users to move to Netscape 6, which is available Natively on IPF and is distributed online at:

`http://www.hp.com/go/netscape`

Details of Change

Changes since Netscape 4.78:

- Improvements accessing sub-folders under the Inbox on certain mail servers.
- Performance improvements when accessing pages with nested tables and style sheets.
- Unix Only: You can now add multiple personal address books.
- Improved support for dual processor machines.
- Fixed incompatibilities which caused Communicator to quit unexpectedly while viewing certain web sites.
- Other minor bug fixes specific to HP-UX

Changes since Netscape 4.77:

- Link failure during long browsing sessions has been fixed.
- Ghost processes present after shutdown problem has been greatly reduced.
- Performance problem with "Mark As Read" option in Newsgroups has been fixed.
- Entered URL in Netsite is no longer wiped out during auto completion.
- Improved support for Sun Java plug-in.
- Other minor bug fixes specific to HP-UX

Impact

Comparable size requirements to the last release.

Netscape 4.79 on HP-UX 11i v1.6 uses its own built-in Java, not the JPI.

The Japanese Language Pack for Netscape 4.79 is only available on HP-UX PA-RISC systems at this time. We have no plans to port this product to IPF, but may do so if there is a user requirement.

Netscape 4.79 has been observed crashing when attempting to access the “combo pulldown” button widget on HP-UX 11.00, 11i, and 11i v1.5. This is used in several locations, including the *Location / Go To:* in the *Location Toolbar*, *Message Search* dialog, and numerous times in the HTML Composer toolbox. We expect this situation to occur on HP-UX 11i v1.6 as well.

Compatibility

There are no known compatibility issues between Netscape 4.79 and earlier versions. The HP-UX 11i v1.5 release used Netscape 4.77. The changes from 4.77 to 4.78 and from 4.78 to 4.79 are described herein. The changes do not cause any compatibility issues that we are aware of.

Performance

The performance of this product on IPF platforms is lower than on PA-RISC architectures.

Obsolescence

This is the last version of Netscape Communicator 4.x to be offered in HP-UX. In the future, Netscape 6/7 will be provided and fully supported in it's place.

Documentation

More information on the changes can be found at:

`http://home.netscape.com/eng/mozilla/4.7/relnotes/unix-4.79.html`

`http://www.hp.com/go/netscape`

HP Apache-based Web Server for HP-UX

The current version of the HP Apache-based Web Server (also referred to herein as HP Apache) for HP-UX is 1.3.26.00 and the Product Number is **B9415AA**.

Designed to run out-of-the-box, the HP Apache-based Web Server for HP-UX ensures strong 128-bit security and high performance for a web site that is reliable and easy to manage. This 64-bit product combines popular Open Source components including software developed by the Apache Software Foundation (**http://www.apache.org/**), the Tomcat Java Servlet Engine, PHP, and Webmin administrative tool. The HP Apache-based Web Server is also enhanced with HP-developed features, such as performance tuning, migration and user guides, Chroot capability and security modules.

Summary of Change

Many changes have occurred since the initial release of HP-UX 11i v1.5, when the HP Apache-based Web Server v.1.3.12 was available as a 32-bit product. Since that time, updates have been posted on the HP Software Depot (**http://www.software.hp.com**) website.

This version of the HP Apache is principally a security-fix, bug-fix, and upgrade release. Apache 1.3.26 addresses and fixes the issue regarding a remotely exploitable vulnerability in handling of large data chunks as noted in the following security bulletins:

HP Security Bulletin: #0197(**http://itrc.hp.com/**)

CAN-2002-0392 (**http://cve.mitre.org/**)

CERT CA-2002-17 (**http://www.cert.org/advisories/CA-2002-17.html**)

IMPORTANT All users are urged to upgrade to this release immediately.

The HP Apache is now a 64-bit binary instead of 32-bit, the versions of some components have been upgraded and new features were introduced. New features include:

- The `mod_jk` connector module for Tomcat
- PHP functionality
- Chroot support
- C++ shared library support
- Webmin administration and configuration GUI
- Automatic restart of Apache/Tomcat/Webmin
- Enhanced product documentation

Details of Change

- HP Apache-based Web Server v.1.3.26.00 for the Itanium Processor Family (IPF) platform.
- RSA BSAFE Crypto C Library v.5.2.1 has U.S. Commerce approval for worldwide export of 128-bit strong encryption.
- OpenSSL v.0.9.6c is a toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols as well as a full-strength general purpose cryptography library.
- The `mod_ssl` v.2.8.9 module is dynamically included and provides strong cryptography using the OpenSSL toolkit and BSAFE Crypto C libraries.
- Tomcat v.3.3.1 is the servlet container used for the reference implementation for Java Servlets 2.2 and JavaServer Pages 1.1 specifications.
- Apache JServ v.1.1.1 servlet engine is compliant with Java Servlets 2.0 and requires the Java Servlet Development Kit (JSDK) 2.0, which you can download from:

  `http://java.sun.com/products/servlet/archive.html`

- The `mod_jserv` module is dynamically included and used by both Tomcat and JServ to communicate with the HP Apache-based Web Server.
- The new `mod_jk` connector module is recommended over `mod_jserv` for Apache to Tomcat communication. The `mod_jk` connector can either use the original ajpv12 protocol or the newer ajpv13 protocol.
- PHP v.4.2.1 is a popular, server-side, cross-platform, HTML-embedded, full-featured language with a Java/C++ syntax. It also supports many databases.
- The `mod_perl` v. 1.25 module is statically included and supports 64-bit version of Perl v.5.6.1.
- Webmin v.0.980 is a web-based administration and configuration tool from Webmin that has been enhanced for the HP Apache-based Web Server.
- Support for loading C++ shared libraries.
- Chroot causes a user-specified directory to become the root directory, the starting point for path searches. A malicious user cannot get to the root file system. Our chroot includes SSL enhancements, such as pass phrase exiting in 60 seconds and retry limits.
- Memory Management (MM) is a 2-layer abstraction library, which simplifies the usage of shared memory between forked (and this way strongly related) processes under Unix platforms.
- Apache/Tomcat/Webmin can now be automatically restarted on reboot. More information on customizing and configuring this feature can be found in the configuration notes.

Impact

- Size Requirements: 65 - 75MB of disk space is recommended for installing HP Apache.
- Bundle Requirements:

  1. The `mod_perl` module is pre-enabled in this release and depends on a 64-bit Perl version 5.6.1 that is included in this Operating Environment and is installed in `/opt/perl_64/bin/perl`.
  2. Webmin depends on Perl 5 or later and is not specific to either 32 or 64-bit versions. Webmin expects Perl to be installed in `/opt/perl/bin/perl`. Refer to the Webmin Notes located in the `/opt/apache/hp_apache_docs` directory for more information.
  3. Tomcat and JServ depend on the IPF version of Java 1.3 that is included in this Operating Environment.
  4. Building DSOs using apxs (Apache Extension Tool) depends on Perl which is included in the HP-UX 11i v1.6 Operating Environment. The expected location for Perl is `/opt/perl/bin/perl`. Either use this Perl, or change the path in the apxs script to the Perl location installed on your machine.
  5. Perl and Java details are contained in release notes and can be found after installing the product in `/opt/apache/hp_apache_docs/` or **`http://yourserver.com/hp_apache_docs/`**.

- Installing over previous versions:

  Before updating, make sure to stop your previous HP Apache binary by executing:

  `/opt/apache/bin/apachectl stop`

  Otherwise, the previous binary will continue running which prevents the new binary from starting.

  By default, `swinstall` does not reinstall filesets if the same revision already exists on your system. If you want to reinstall the same revision (for example, if some files are lost), you can change the installation options by choosing **`Options/Change Option`**.

- Installing a product or a fileset may automatically install dependent filesets necessary to run the selected items.
- If an HP or non-HP version of Apache is already on the system, `swinstall` preserves the existing configuration files under `/opt/apache/conf`, `/opt/apache/conf/jserv`, and `/opt/tomcat/conf` by renaming *`[file]`* to *`[file].save`*.. It also preserves certificates and certificate-related files under `/opt/apache/conf/ssl` directories by renaming *`[file]`* to *`[file].save`*.. In this way, you do not lose previous configuration information. However, the original configuration file (*`[file].save`*) is over-written if you re-install Apache.
- Upon successful installation, `swinstall` runs HP Apache automatically.

Compatibility

Modules that were not distributed with HP Apache and user-developed modules for the previous 32-bit version do not work with this 64-bit release. These modules must be recompiled as a 64-bit binary to work with this release.

Performance

There is no impact to the performance of this product compared to the version that was released in HP-UX 11i v1.5.

Obsolescence

This is the last supported version of HP Apache-based Web Server v1.3.26.x in HP-UX 11i v1.6. No further versions of HP Apache-based Web Server v.1.3.x will be distributed unless a critical fix is required. Users should begin upgrading to HP Apache-based Web Server v.2.0 for HP-UX 11i v1.6, which is available for download from Software Depot at:

`http://www.software.hp.com/`

Compared to previous versions, HP Apache-based Web Server v.2.0 offers better performance, and new IPv6, WebDAV and LDAP support which provides a more robust web server for your HP-UX 11i environment.

For more information on HP Apache-based Web Server v.2.0, please visit our web site at:

`http://www.hp.com/go/webserver`

Documentation

All HP-specific documentation included in the HP Apache software can be found online after installation at:

`http://yourserver.com/hp_apache_docs/`

or in the `/opt/apache/hp_apache_docs/` directory.

The latest information for the HP Apache can be found at:

`http://www.hp.com/go/webserver`

To download the current version go to:

`http://www.software.hp.com/`

then select *HP Apache-based Web Server* from the *Featured Products* menu.

Shadow Passwords

A new Shadow Password feature enhances system security by hiding user encrypted passwords in a shadow password file.

Summary of Change

The HP-UX 11i v1.6 release introduces an optional, configurable Shadow Password feature based on the de-facto standard provided in other UNIX flavors, including Sun Solaris™ and Linux. Encrypted passwords previously stored in the publicly readable `/etc/passwd` file can be moved to `/etc/shadow`, which is accessible only by a privileged user. For HP-UX 11i v1.6, Shadow Passwords are not supported with NIS, NIS+, or LDAP.

Details of Change

Shadow Passwords are optionally configured. The `pwconv` command can be run to move encrypted passwords and password aging information from `/etc/passwd` to `/etc/shadow`. Afterwards, `pwunconv` can be run to convert back to a standard system.

Shadow Passwords are important for system security. Increasing computational power available to password crackers has made the non-hidden passwords in `/etc/passwd` vulnerable to decryption. Also, since Shadow Passwords make HP-UX compliant with the de-facto standard, it simplifies the administration of multi-vendor configurations.

Impact

No impact if `pwconv` is not used on a standard system to convert the system to use Shadow Passwords.

Compatibility

The behavior of this command on a Trusted System is not changed. When run on a standard system, `pwconv` now converts the system to use Shadow Passwords. Previously, when run on a standard system, this command just printed a message saying that it was only for use on Trusted Systems.

In HP-UX 11i v1.6, Shadow Passwords are not supported with NIS, NIS+, or LDAP. Do not run `pwconv` on these configurations.

An application could be impacted if `pwconv` is used to convert the system to use Shadow Passwords, and if the application uses the `getpwent` interfaces or directly accesses the password field of `/etc/passwd` file with the assumption that the password and aging information reside there. That field can now contain a ‘x’, indicating that the information is in `/etc/shadow`, which is accessible only by privileged users.

IPF applications are not affected if they use the preferred `pam` interfaces for authentication. PA-RISC applications (e.g. CDE) require patches to the PA-RISC libraries that support the shadow functionality. These patches, once they are made available, can be identified by their patch numbers:

PHCO_26965
PHCO_26966

These patches should be installed prior to running pwconv, if any of the legacy PA-RISC applications on the system perform authentication.

Performance

There is no performance impact.

Obsolescence

Not applicable.

Documentation

These manpages have been updated appropriately:

- *pwconv* (1M)
- *pwunconv* (1M)
- *pwck* (1M)
- *passwd* (1)
- *getspent* (3C)
- *putspent* (3C)
- *passwd* (4)
- *shadow* (4)
- *security* (4) descriptions of:
  - *PASSWORD_MINDAYS*
  - *PASSWORD_MAXDAYS*
  - *PASSWORD_WARNDAYS*

HP Intrusion Detection System/9000 (IDS/9000)

HP Intrusion Detection System/9000 (IDS/9000), a host-based intrusion detection system for HP-UX.

Version 2.1 is new for IPF systems in HP-UX 11i v1.6. (Versions 1.0, 2.0, and 2.1 have been previously delivered for PA-RISC systems in HP-UX 11.00 and 11i.)

Summary of Change

IDS/9000 enables security administrators to proactively monitor, detect, and respond to attacks targeted at specific hosts. Since there are many types of attacks that can bypass network-based detection systems, IDS/9000 complements existing network-based security mechanisms, bolstering enterprise security.

Details of Change

The IDS/9000 product details are:

- Administrative GUI: task-oriented and easy to use. Controls the interactions for installing, configuring, monitoring and controlling IDS/9000 agents.
- Integrated with OpenView Operations (OVO, formerly known as VPO or ITO) and the associated Smart Plug In (SPI): Enables users to monitor IDS/9000 alerts from the OVO management console. For configuration and control of IDS/9000 agents, the IDS/9000 administrative GUI is launched from within the OVO console.
- Enhances local host-level security within your network by automatically monitoring each configured host system within the network for possible signs of unwanted and potentially damaging intrusions.
- Provides continuous surveillance against inappropriate system usage that is characteristic of hacker break-in attempts, subversive inside activities, and viruses.
- The types of threats that IDS/9000 counters include the following:

  System Critical: Unauthorized access
  Privilege violations
  Trojan horse
  "Root" exploits

  HP-UX OS: Race condition
  Buffer overflow
  Password guessing

  User Security:
  Failed logins
  Failed SU attempts
  User A modifying User B's file

Files:	Modification of critical system files and directories
	Creation of world writable files
	Creating setuid files
	File additions and deletions

- Multiple response script capability: Users can have multiple response scripts invoked when an alert is generated, in addition to simultaneous reports sent to the administrative GUI.

Impact

No impact.

Compatibility

Version 2.1 is **not** compatible with HP-UX systems that are running version 1.0.

Version 2.1 is compatible with PA-RISC systems that are running version 2.0 or 2.1.

Performance

IDS/9000 runs in compatibility mode on IPF systems. Given the associated emulation overhead, we anticipate significant performance degradation. Therefore, we recommend that you do not run IDS/9000 agents on IPF production systems.

Obsolescence

The use of the SIGSEGV signal to terminate agent processes is deprecated, IPF systems should use SIGTERM instead.

Documentation

The following documents are available in the *Internet and Security Solutions* collection on the Instant Information CD and at **`http://docs.hp.com/hpux/internet`**:

HP Intrusion Detection System/9000 Release 2.1 Release Notes, Product Number **J5083-90008**.
HP Intrusion Detection System/9000 Administrator's Guide, Product Number **J5083-90007**.

CDE Environment

The Common Desktop Environment (CDE) is an environment for interacting with your workstation. When CDE is running on your system, it is said to be your system's *desktop*.

Summary of Change

On HP-UX 11.x, CDE uses TPS for printing. CDE now provides an option to print using either `lp` or `TPS`.

Details of Change

CDE now provides an option to print using either `lp` or TPS. Through this option the user can disable TPS and print using `lp` and viceversa. The CDE components that are affected by this change are `dtcm`, `dtmail` and `dtpad`. Printing with `dtcm`, `dtmail` and `dtpad` can occur with either `lp` or TPS.

Impact

There is no impact.

Compatibility

There are no compatibility issues.

Performance

No change in performance.

Obsolescence

Not applicable.

Documentation

The manpages have been updated appropriately for these CDE components:

- *dtmail* (usercmd)
- *dtpad* (usercmd)
- *dtcm* (usercmd)

HP VUE to CDE Migration Tools

VUEtoCDE in CDE is a transition tool that migrates HP VUE customizations to CDE during upgrade from HP-UX 10.x.

Summary of Change

VUEtoCDE transition tool is not available with CDE in HP-UX 11i v1.6.

Details of Change

CDE 2.1 on HP-UX 11.00 and HP-UX 11i v1.0 contains VUEtoCDE transition tool that migrates HP VUE customizations to CDE during upgrade from HP-UX 10.x. This tool is not available on HP-UX 11i v1.5 or v1.6 since there is no upgrade path from HP-UX 10.10/10.20 to these versions.

Impact

There is no impact.

Compatibility

There are no compatibility issues.

Performance

No change in performance.

Obsolescence

VUEtoCDE transition tool is not available on HP-UX 11i v1.5 or v1.6 since there is no upgrade path from HP-UX 10.10/10.20 to these versions.

Documentation

No changes necessary.

Ignite-UX

Ignite -UX is an administrative toolset to help you do the following:

- install HP-UX on multiple systems in your network
- create custom install configurations
- recover HP-UX systems remotely
- monitor system installation status

Summary of Change

The HP-UX 11i v1.6 version of Ignite-UX now supports installation on an Itanium Platform Family (IPF) client and server. Network installation from an IPF system requires unique network installation steps. Detailed instructions for Server Setup and Client Network Boot Options Setup can be found in the *Ignite-UX Administration Guide* at:

`http://software.hp.com/products/IUX /docs/`

Details of Change

Network boot for an IPF system differs from a Precision Architecture (PA) system. IPF systems do not support selecting the server from which to boot the clients. IPF systems use different service ports (67/68) to boot their clients. The first server to respond offers the IP address and boot file. IPF systems use `/etc/bootptab` while PA-RISC systems use `/etc/opt/ignite/instl_booptab` to obtain IP addresses. The Ignite-UX GUI does not configure IP addresses for IPF systems in `/etc/bootptab`, this must be performed manually.

IPF systems support the use of `make_net_recovery`, which can be used instead of make_tape_recovery in most cases.

With the release of VxVM 3.5, changes have been made to Ignite-UX, both HP-UX 11i v1.6 (IPF) and HP-UX 11i v1.0 (PA) systems, to support VxVM rootability. Customers can select at installation time to have their root disk managed by VxVM. HP-UX 11i v1.0 requires these three components to enable VxVM rootability: 1 (VxVM 3.5, 2) IUX Version B.3.7, and 3) Feature Enablement Bundle with VxVM rootability enablement patches. VxVM is supported on root disks with HP-UX 11.i v1.6 for IPF systems only and HP-UX 11i v1.0 PA systems. LVM is supported on both IPF and PA systems.

Impact

No impact.

Compatibility

No compatibility issues.

Performance

No performance issues.

Obsolescence

No obsolescence issues.

Documentation

The *Ignite-UX Administration Guide* has been updated for HP-UX 11i and is available on the Instant Information CD and at **`http://docs.hp.com`** .

Another excellent source of information regarding Ignite-UX which includes documentation, downloads and specifications is found at:

`http://software.hp.com/products/IUX`

Default File System Parameters

Changes to the Ignite-UX default file system parameters are included in HP-UX 11i v1.6.

Summary of Change

A small set of default file system parameters delivered by Ignite-UX in "Instant Ignition" and the HP-UX media kit ("Cold-Install Media") have been tuned for better performance. These changes were made to take better advantage of the larger system memory and disk configurations found in today's HP-UX workstations and servers. These default changes apply equally to all workstation and server systems.

Details of Change

The following specific changes were made to improve overall file system performance:

- File systems in HP-UX 11i v1.6 are created with *largefiles=TRUE* (previous default: *FALSE*)
- Block size increased to:
  - 65536 (64Kb) for HFS (previous default: 8Kb)
  - 8192 (8Kb) for VxFS (previous default: 1Kb)
- Frag size increased to:
  - 8192 (8Kb) for HFS (previous default: 1Kb)
  - Not applicable to VxFS
- Stripe size increased to 64Kb. (previous default: 8Kb)
- Secondary Swap Space Model (for two disk configurations)
  - Previous behavior: Secondary swap space would be spread across both disks in a two disk system configuration.
  - New behavior: Secondary swap space is put only on the second disk. HP-UX then interleaves between the first and second disk swap area for improved performance.

Impact

These changes only affect the values as they apply to the standard file systems (`/`, `/usr`, `/var`, `/opt`, `/tmp`, `/home`, `/stand`) as created by Ignite-UX through an installation from media (known as a Cold Install) or through Instant Ignition. A user adding a new or additional file system either through Ignite-UX, or later with `mkfs`, is free to choose their own values, and finds the default values for new or additional file systems unchanged from previous Ignite-UX releases.

The change to the default *`blocksize`* parameter could have a significant effect on disk utilization for some users, especially for those using large numbers of small files. For example, consider an application, built on VxFS, that currently uses 10,000 semaphore files under `/tmp`. Using 1Kb files, the semaphores would consume 10MB of disk space. However, by using the new default size, the semaphore files now consume 80MB. You should be aware of this possibility and plan accordingly.

NOTE You can change file system parameter values using the Ignite-UX `Advanced Installation` option. Please refer to the *Ignite-UX Administration Guide* for more information on using the Advanced Installation functionality to change file system parameters.

Compatibility

There are no compatibility issues.

Performance

These changes are designed to improve overall file system performance for the majority of users. Depending on your current configurations, you may experience varying amounts of improvement.

Obsolescence

Not applicable.

Documentation

For more information on these changes, including how to use Ignite-UX to maintain earlier file system settings for these parameters, refer to the *Ignite-UX Release Notes* for B.3.7, which can be found in `/opt/ignite/doc/release_note` and at:

`http://software.hp.com/products/IUX`.

Online Diagnostics

Online diagnostics provide the HP-UX 11i v1.6 Diagnostics that include:

Support Tools Manager (STM) is the platform for executing online diagnostics. The commands to start it are `xstm` (GUI interface), `mstm` (menu-driven interface), `cstm` (command line interface), or `stm` (general).

Offline Diagnostic Environment (ODE) is the platform for executing offline diagnostics.

EMS Hardware Monitors allow you to monitor the operation of a wide variety of hardware products and be alerted immediately if any failure or other unusual event occurs. The EMS Hardware Monitors are started automatically with no user intervention.

Summary of Change

The Online Diagnostics are similar to the diagnostics provided for HP-UX 11i v1.5. The major change was to enable support for the IPF platform.

Details of Change

Some commands and displays in the STM User Interface and EMS Hardware Monitors output were modified to add support for new hardware, improve usability and enhancements. These modifications add support for new hardware and improve the usability of the UI. The EMS Hardware Monitors product is improved by clarifying commands, adding detail to the UI output, and standardizing the format for the problems reported during monitoring.

Impact

Any script that depends on the specific output of the EMS Hardware Monitors, or specific commands or displays in the STM UI may have to be modified.

Compatibility

Refer to the Impact sub-section.

Performance

There are no performance issues.

Obsolescence

Not applicable.

Documentation

Specific information regarding STM, ODE or the EMS Hardware Monitors, including release notes, white papers and related reference materials, can be obtained at:

`http://docs.hp.com/hpux/diag/`

9 Internationalization

This chapter describes internationalization functionality including:

TrueType Fonts for Asian Languages

TrueType is a digital font technology consisting of TrueType fonts and the rasterizer. A TrueType font is a data file containing glyphs, the shape/outline of the characters. In addition to the shape/outline of the characters, it contains information such as character to glyph mapping tables, hinting properties, and other information needed to generate the bitmap images for the characters. The rasterizer is a program that reads the font file to generate the bitmap images for display and printer devices.

Summary of Change

The HP-UX 11i v1.6 release provides TrueType fonts for HP-UX supported Asian languages/locales including Japanese, Korean and Chinese (both Simplified and Traditional).

Details of Change

Providing TrueType fonts support on HP-UX enables X Windows System based, Java based, and Internet based applications to render language-based text correctly. The fonts can be used to download the glyphs to the printer for printing language-based text. The TrueType fonts are scalable. This enables the user(s) to scale the font glyphs to the desired size.

The following table shows the list of Asian TrueType fonts:

Table 9-1 Asian TrueType Fonts

Language	Typefaces/Family Names
Japanese	HGMinchoL HGGothicB
Korean	HYBatang HYDotum HYGulim HYGungsuh
Chinese (Simplified)	ZYCJKHei ZYCJKSun
Chinese (Traditional)	ARMingtiL ARMingtiLHK

To make use of the TrueType fonts new mapping tables, tables that map local font indexing to Unicode font indexing have been added.

In addition to these new fonts and mapping tables, CDE has provided enhancements to the config file used by the X Font Server to locate the fonts installed on the system. This enables the applications to get the glyph/character patterns automatically from the X Font Server.

Impact

Size requirements regarding disk space:

Table 9-2 Disk Space Size Requirements for Asian TrueType Fonts

TrueType Fonts	Size
Japanese	32MB
Korean	71MB
Chinese (Simplified)	39MB
Chinese (Traditional)	41MB

The TrueType fonts in the X Window environment is available only through the X Font Server, xfs. To establish a host as a font server, start `xfs` as follows:

```
/usr/bin/X11/xfs -port 7000 -daemon
```

See the *xfs* (1) manpage for more details.

To ensure that the host is always configured to be font server upon reboots, change the line in `/etc/rc.config.d/xfs` to:

```
RUN_X_FONT_SERVER=1
```

To configure a host to use a font server (that is to configure your system as font client), run `xset` command as follows:

```
xset +fp tcp/[hostname]:7000
```

See the *xset* (1) manpage for more details.

Compatibility

No compatibility issues.

Performance

Applications using TrueType fonts should have the same performance as when using bitmap fonts.

Obsolescence

Not applicable.

Documentation

The manpages that have been updated are:

- *xfs* (1)
- *xset* (1)

GB18030 Standard

System level support is provided in HP-UX 11i v1.6 for the GB18030 character set.

GB18030 is officially referred to as “Chinese National Standard GB18030-2000: Information Technology - Chinese Ideograms Coded Character Set for Information Interchange - Extension for the Basic Set”. It is a government mandated conformance requirement for all products sold in China, effective as of September 1, 2001.

GB18030 is a superset Chinese character set standard, including some 30,000 characters that have been defined in either the GB2312-80 standard, the GBK specification or in Unicode’s Unihan Extension A.

Summary of Change

System level support has been provided to allow for the input, storage, retrieval, display and printing of the set of characters defined in the GB18030 character set standard.

GB18030 support has been provided in HP-UX 11i v1.6 via new locales, iconv converters and fonts and modifications to Xlib, CDE, input methods, printer model files, LDTERM, and the `eucset` command.

Two new bitmap fonts have been provided to display all the characters defined in GB18030 in CDE and the X Window System. The Simplified Chinese input method, xsim, has been enhanced to generate all GB18030 characters. The printer model file is also enhanced to print all the GB18030 characters on PCL5-capable LaserJet printers even if the printer does not contain any simplified Chinese fonts.

Details of Change

A new locale, zh_CN.gb18030, has been provided to enable support of GB18030.

New iconv converter tables have been provided to support data conversion between GB18030, Unicode and UTF-8.

List of converter tables:

- gb18030 <-> ucs2
- gb18030 <-> utf8

Commands:

The `eucset` command has been enhanced to set the code widths required for GB18030 that are used by the Streams PTY line discipline module (LDTERM) and dtterm.

PCL5.nloo is a printer model file that works with the lp subsystem to print text files containing Asian multi-byte characters on a LaserJet (PCL5 emulation) which does NOT have any multi-byte font DIMMs installed. PCL5.nloo is enhanced to print text file containing 2-byte and 4-byte characters whose patterns are defined in GB18030, and Mongolian, Tibetan, Yi and Uigur characters when zh_CN.gb18030 is designated to one of print options.

NOTE PCL5.nloo does not use any Asian font DIMMs even if the LaserJet has the font DIMM installed.

Here is a list of primary print options related to GB18030.

Table 9-3 GB18030 Primary Print Options

Option	Behavior
zh_CN.gb18030	designate GB18030 2-byte and 4-byte text input
half or 2	2-in-1 printing
quarter or 4	4-in-1 printing

Since PCL5.nloo extracts the necessary glyph patterns from simplified Chinese TrueType fonts through the X font server, it is required to install those TrueType fonts and invoke xfs in advance to run lp command. Otherwise, no 2-byte and 4-byte characters can be printed.

The following TrueType font is provided to support printing of GB18030 characters:

- ZYCJKHei

Please refer to the section on Asian TrueType fonts for more details.

Input Methods:

Xsim, an input method for simplified Chinese designed to work with CDE and the X Window System, has been enhanced to generate GB18030 2-byte and 4-byte characters in two ways, Internal Code and PinYin input methods.

The Internal Code (hexadecimal code) input method supports generating all the characters in the valid code ranges defined for GB18030, regardless whether a pattern is defined or not, except for those defined in GB2312. In the Internal Code method, if the first two key inputs are from 81 to FE and the following two key inputs are from 40 to 7E or from 80 to FE, then xsim generates one 2-byte character immediately after the fourth key is entered. If the first two key inputs are from 81 to FE and the following two key inputs are from 30 to 39, xsim **waits** for another set of four key inputs, ranging from 81 to FE as the next two key inputs, and 30 to 39 as yet another two key inputs to generate one 4-byte character immediately after the eighth key is entered. Xsim beeps for any non-hexadecimal keys during four or eight key inputs.

The PinYin input method supports generating GB18030 2-byte characters only; it does not support 4-byte characters.

Other input methods like Row-Column and 5-Stroke do not generate GB18030 characters except for those defined in GB2312.

Xlib:

X11R6 has been enhanced to support GB18030.

Fonts:

The following two new bitmap fonts are provided under `/usr/lib/X11/fonts/hp_chinese_s/75dpi` along with `fonts.alias`:

Table 9-4 New GB18030 Bitmap Fonts

Filename	Fontname
song18u.pcf	-hp-song-medium-r-normal--18-180-75-75-c-160-iso10646.2000-cn
song24u.pcf	-hp-song-medium-r-normal--24-240-75-75-c-240-iso10646.2000-cn

The `song18u.pcf` and `song24u.pcf` fonts contain all the 2-byte and 4 byte characters whose patterns are defined in GB18030, including Mongolian, Tibetan, Yi and Uigur characters. Those characters are assigned to the code points defined in ISO10646-1:2000. The fonts are designed to be used for simplified Chinese so the font names include -cn in the CHARSET_ENCODING field to distinguish them from other iso10646.2000 fonts designed for other regions/countries.

CDE:

CDE provides support for the new Chinese locale, zh_CN.gb18030. Users are able to select the new locale at the time of login. CDE provides localization of all CDE components similar to the zh_CN.hp15CN locale and the user are able to input, display and print GB18030 characters.

Streams PTY driver:

The Streams PTY line discipline module (LDTERM) has been modified to support GB18030. It is activated by the eucset command and is used by dtterm to process and display GB18030 characters. There is no direct user interaction with this driver.

Impact

Base GB18030 offering (installed on all systems): Approximately 25MB.

No additional memory requirements are needed for running in the zh_CN.gb18030 locale.

Applications must elect to enable GB18030 support by setting the LANG environment variable to the zh_CN.gb18030 locale.

Systems level software localization support for GB18030 is provided at the same level as for the other supported Simplified Chinese locales: zh_CN.hp15CN and zh_CN.utf8.

Compatibility

There are no compatibility issues involved with the addition of this feature.

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

The *eucset* (1) manpage has been updated with the `GB18030` option.

Hong Kong Supplementary Character Set (HKSCS)

System level support is provided for support of the HKSCS (Hong Kong Supplementary Character Set) extension to the Big5 encoding for Hong Kong.

HKSCS is a collection of 4,702 characters defined by the Hong Kong Special Administration Region (HKSAR) government in September, 1999. These characters are specific to the Hong Kong region and are intended to be a common set of characters in use for computing requirements throughout Hong Kong.

Summary of Change

Systems level support has been provided to allow for the input, storage, retrieval, display and printing of HKSCS characters. This support is based on the repertoire specified in Unicode 2.1 and the ISO 10646-1:1993 standards.

HKSCS support has been provided in HP-UX 11i v1.6 via a new locale, iconv converters, fonts, and updates to Xlib, CDE, input method, and printer model files.

Details of Change

A new locale has been provided, zh_HK.hkbig5, to support the HKSCS specified character repertoire within the Big5 encoding.

This locale is a renaming of the zh_HK.big5 locale, which was first offered in HP-UX 11i v1.0. This rename was required since unexpected results in the display of HKSCS characters could occur due to conflicts in the codeset name with the zh_TW.big5 locale.

New iconv converters have been provided to allow for conversion between HKSCS big5-based encodings, Unicode, and UTF-8.

List of converter tables added:

- hkbig5 <-> ucs2
- hkbig5 <-> utf8

X11R6 Xlib has been enhanced to provide support for the zh_HK.hkbi5 locale.

Five new bitmap fonts are supplied to display all the characters defined in HKSCS in CDE and in the X Window System. Printer model files have also been enhanced to print all the HKSCS characters on HP legacy line printers, Laserjet printers supporting PCL5, and third party printers using ESC/P emulation.

Bitmap Fonts:

The following five new bitmap fonts are provided under `/usr/lib/X11/fonts/hp_chinese_t/75dpi` along with `fonts.alias`:

Table 9-5 New HKSCS Bitmap Fonts

Filename	Fontname
sung18hh.pcf	-hp-sung-medium-r-normal--18-180-75-75-c-160-hphkbig5-
sung24hh.pcf	-hp-sung-medium-r-normal--24-240-75-75-c-240-hphkbig5-
sung34hh.pcf	-hp-sung-medium-r-normal--34-340-75-75-c-340-hphkbig5-
sung42hh.pcf	-hp-sung-medium-r-normal--42-420-75-75-c-420-hphkbig5-
sung50hh.pcf	-hp-sung-medium-r-normal--50-500-75-75-c-500-hphkbig5-

Those fonts contain all the Big5 and HKSCS characters assigned to defined code point in the standard.

Input Method:

The xtim input method allows the use of the big5 internal code input method to generate HKSCS characters. The user must enter the 4-digit hexadecimal code for the character.

Printing:

`PCL5.nloo` is a printer model file that works with the lp subsystem to print text files containing Asian multi-byte characters on a LaserJet (PCL5 emulation) which does NOT have any multi-byte font DIMMs installed. `PCL5.nloo` is enhanced to print text files containing Big5 and/or HKSCS characters when zh_HK.hkbig5 is designated as one of the print options. Note that PCL5.nloo does not use any Asian font DIMM even if the LaserJet has the font DIMM installed.

ESCP is another model file to print Asian multi-byte characters on ESC/P emulation printers. It requires that Asian fonts be previously installed in the printers.

`hpc1200at` is another model file to print on HP legacy HP C1200A/C1205A line printers. It requires printers have the Big5 font installed.

Here is a list of primary printing options related to HKSCS:

Table 9-6 HKSCS Primary Print Options

Option	Behavior
zh_HK.hkbig5	designate Big5 and HKSCS text input
half or 2	2-in-1 printing
quarter or 4	4-in-1 printing
udc or udcf	specify UDC file to print

Common Desktop Environment (CDE):

CDE provides the same level of support for the zh_HK.hkbig5 locale as was provided at HP-UX 11i v1.0 for the zh_TW.big5 locale.

User Defined Character (UDC):

The xudced, an UDC editor to create/modify UDC files, has been enhanced to work with the zh_HK.hkbig5 locale. When the locale is designated, it starts with the first code point defined by HKSCS. Created UDCs can be printed on above printers using the udc or udcf option.

Impact

Base offering (installed on all systems); Approximately 7MB additional disk space is required.

No additional memory requirements are needed for running in the zh_HK.hkbig5 locale.

Compatibility

The zh_HK.big5 locale provided in HP-UX 11i is now renamed to zh_HK.hkbig5 in HP-UX 11i v1.6 and future releases to avoid display conflicts due to the codeset name overlap with the zh_TW.big5 locale.

Any application that expected the zh_HK.big5 locale name in HP-UX 11i v1.0 should now use the zh_HK.hkbig5 locale instead for HP-UX 11i v1.6 and later releases.

The behavior for zh_HK.hkbig5 is designed to be upward compatible with that for zh_HK.big5 with the exception of the UDC code area.

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.

ATOK X Japanese Input Method

HP-UX 11i v1.6 includes ATOK X, one of the dominant input methods in the Japanese market. ATOK X is used in conjunction with CDE and the X Window System.

Summary of Change

ATOK X, the enhanced version of ATOK8, is being introduced in this release. It includes the SuperATOK Kana-to-Kanji conversion engine and provides more comfortable and effective Japanese input. It also provides a migration capability of user-defined dictionary and key-mappings from ATOK8, VJE-gamma and EGBridge input methods.

Since the ATOK X has also been available in several Linux distributions as “ATOK X for Linux”, the HP-UX 11i v1.6 release provides a compatible Japanese input method with a familiar look-and-feel for Linux users.

Details of Change

A change is made on *dtimsstart* menu, which has a new entry of *ATOK X*. User can choose and invoke it among other Japanese input methods on the menu driven by a series of CDE login sessions.

The ATOK X provides the following set of features:

- SuperATOK Kana-to-Kanji conversion engine
- real-time warning for wrong input
- proper word selection by context analysis
- automatic correction for fuzzy input
- various customizable features
- various dictionary operations
- zip code dictionary
- migration for user defined dictionary and key-mapping configuration from existing Japanese input methods
- on-line HTML help

NOTE A limited set of these features was provided in a preview of ATOK X in the HP-UX 11i v1.0 release.

Impact

No impact issues.

Compatibility

Since the ATOK X input method is a new feature at this release, there are no compatibility issues. However, as a benefit for users, ATOK X provides migration capability for the user-defined dictionary and key-mapping configuration, which have been created by ATOK8, VJE-gamma and EGBridge input methods. The user can easily migrate from the previous Japanese input methods to ATOK X.

Performance

There is no impact to performance.

Obsolescence

The VJE-gamma and EGBridge input methods are obsolete and are not supplied in HP-UX 11i v1.6 and future releases. It is recommended that users using these input methods should adopt ATOK X or other Japanese input methods. The transition to ATOK X is simplified by supplied migration features and on-line help.

Documentation

For more information, refer to the ATOK X on-line help available from the help icon on the ATOK X front panel.

Japan Vendor Council (JVC) iconv Converters

New iconv converters are provided to allow for greater inter operability of data sharing within Japanese computing environments.

Summary of Change

New Japanese iconv conversion tables are provided which conform to the Open Group Japanese Vendor Council (TOG/JVC) CDE/Motif Technical working group recommendations in ensuring inter operability of ISO 10646/Unicode/JIS-0221 within Japanese computing environments.

NOTE JIS-0221 is the Japanese national standard equivalent to ISO-10646:1993 and Unicode 2.1.

The TOG/JVC has formalized three possible converter mappings for several characters. These mappings are:

- JIS-0221 based on a strict JIS-0201 standard interpretation
- JIS-0221 Extended which allows for greater co-existence in current ASCII-based (i.e. UNIX) environments
- JIS-0221 based on Microsoft's Japanese mappings

Iconv converter tables are provided. These tables convert between HP's EUC and Shift-JIS (SJIS) characters to those specified by the strict JIS-0201 interpretation as well as the Microsoft™ Unicode and UTF-8 mappings. The JIS-0221 Extended conversion mappings are already supported within HP-UX.

Details of Change

Eight new iconv converter tables are provided to support the alternate mappings in round-trip conversions between EUC and Shift-JIS (SJIS) to/from Unicode and UTF-8.

List of new conversions:

- eucJP0201 <-> ucs2 JIS-0201 interpretation
- eucJPMS <-> ucs2 Microsoft interpretation
- sjis0201 <-> ucs2 JIS-0201 interpretation
- sjisMS <-> ucs2 Microsoft interpretation

The following table illustrates the mapping variances between converter tables when converting between EUC and different interpretations of Unicode character mappings:

NOTE The JIS-0201 Extended (Unix) mappings, already available in HP-UX, are referenced in this table as eucJP.

Table 9-7 EUC Unicode Character Mapping Conversions

EUC :	eucJP0201 UCS2 mapping		eucJP UCS2 mapping		eucJPMS UCS2 mapping
0x5C	0x00A5	-----	0x005C		0x005C
0x7E	0x203E	-----	0x007E		0x007E
0xA1B1	0xFFE3	-----	0x203E	-----	0xFFE3
0xA1C0	0x005C	-----	0xFF3C		0xFF3C
0xA1EF	0xFFE5	-----	0x00A5	-----	0xFFE5
0xA1BD	0x2014		0x2014	-----	0x2015
0xA1C1	0x301C		0x301C	-----	0xFF5E
0xA1C2	0x2016		0x2016	-----	0x2225
0xA1DD	0x2212		0x2212	-----	0xFF0D
0xA1F1	0x00A2		0x00A2	-----	0xFFE0
0xA1F2	0x00A3		0x00A3	-----	0xFFE1
0xA2CC	0x00AC		0x00AC	-----	0xFFE2
0x8FA2B7	0x007E	-----	0xFF5E		0xFF5E
0x8FA2C3	0x00A6		0x00A6	-----	0xFFE4

The following table illustrates the mapping variances between converter tables when converting between SJIS and different interpretations of Unicode character mappings. (Note that the JIS-0201 Extended (Unix) mappings are already available on HP-UX, referenced in this table as SJIS.)

Table 9-8 SJIS Unicode Character Mapping Conversions

SJIS :	sjis0201 UCS2 mapping		SJIS UCS2 mapping		sjisMS UCS2 mapping
0x5C	0x00A5	-----	0x005C		0x005C
0x7E	0x203E	-----	0x007E		0x007E
0x8150	0xFFE3	-----	0x203E	-----	0xFFE3
0x815F	0x005C	-----	0xFF3C		0xFF3C
0x818F	0xFFE5	-----	0x00A5	-----	0xFFE5
0x815C	0x2014		0x2014	-----	0x2015
0x8160	0x301C		0x301C	-----	0xFF5E
0x8161	0x2016		0x2016	-----	0x2225
0x817C	0x2212		0x2212	-----	0xFF0D
0x8191	0x00A2		0x00A2	-----	0xFFE0
0x8192	0x00A3		0x00A3	-----	0xFFE1
0x81CA	0x00AC		0x00AC	-----	0xFFE2

Impact

These converters require 0.6MB of additional disk space.

No additional memory requirements are needed.

Compatibility

There are no compatibility issues involved with the addition of this feature.

Performance

There is no impact to performance.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.

VJE-gamma and EGBridge Japanese Input Method Obsolescence

Two Japanese input methods, VJE-gamma and EGBridge, are obsoleted in HP-UX 11i v1.6 release.

Summary of Change

HP-UX 11i v1.6 and future releases of HP-UX does not provide the two Japanese input methods, VJE-gamma and EGBridge. HP-UX 11i v1.6 provides migration tools to assist users in moving to ATOK X.

Details of Change

HP-UX 11i v1.6 and future releases of HP-UX does not provide the two Japanese input methods, VJE-gamma and EGBridge, which are used in conjunction with CDE and the X Window System. Those two entries are also removed from the *dtimsstart* menu.

Those who have used VJE-gamma and EGBridge can migrate to ATOK X painlessly. ATOK X provides a mode of key mapping emulations of VJE-gamma and EGBridge. ATOK X can import customized user defined dictionaries created by VJE-gamma or EGBridge. ATOK X on-line help, available through from the help icon on the ATOK X front panel, contains sections describing steps required to import user defined dictionaries, a complete list of key mapping emulations, and some restrictions.

Impact

Users of the VJE-gamma and EGBridge input methods are required to migrate to using the ATOK X input method. The impact of this change has been minimized due to the transition tools available in ATOK X.

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

Two Japanese input methods, VJE-gamma and EGBridge, are obsoleted in HP-UX 11i v1.6 release.

Documentation

No documentation changes were necessary.

Japanese Specific Commands and Library Routines

HP-UX 11i v1.6 restores certain Japanese specific commands and library routines which were removed at the HP-UX 11.00 release.

Summary of Change

Certain Japanese code conversion commands and routines, character handling routines, and Kana-to-Kanji conversion routines are restored in this release, in order to maintain binary compatibility with existing HP-UX 10.20/11.00/11i PA-RISC binary applications.

Since there is no intention to support new application development with these functions, header files, manpages and a native IPF library are not provided. These library routines are found in `/usr/lib/libjpn.1`.

Details of Change

For more details, please refer to `/usr/share/doc/JpnCmdLib.txt` which describes the list of commands and routines supplied.

Impact

Not applicable.

Compatibility

Not applicable.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

Not applicable.

Greek Euro Support

System level support is provided for enabling the Euro within supported Greek locales.

In June 2000, Greece joined 11 other countries in adopting the Euro as their currency, with the complete transition effective as of January 1, 2002.

Summary of Change

Systems level support has been provided to allow for the input, storage, retrieval, display and printing of the Euro within the two supported Greek locales: el_GR.utf8 and el_GR.iso88597.

Greek Euro support has been provided in HP-UX 11i v1.6 via updates to locales, iconv converters, fonts, Xlib and CDE.

The level of Euro support provided for Greek is similar to that provided for Western European countries as of HP-UX 11.00 Extension Pack (May 1999) and HP-UX 11i v1.0:

- Dual currency support using @euro modifier
- Euro display and processing capabilities
- Euro input capabilities in Greek locales
- Printer support of Euro with other Greek characters

Details of Change

Euro-enabled Greek Locales:

The el_GR.utf8 and el_GR.iso88597 locales have been enhanced with the addition of 4 new characters, including the Euro:

Table 9-9 New Characters in Greek Locales

Character Name:	ISO-88597	Code Point Unicode	UTF-8
Euro	0xA4	0x20AC	0xE282AC
Drachma Sign	0xA5	0x20AF	0xE282AF
Greek Ypogegrammeni	0xAA	0x037A	0xCDBA
Greek Question Mark	0xAE	0x037E	0xCDBE

Also, the el_GR.utf8 locale binaries are now shipping as part of the release. Previously, only the el_GR.utf8 source file was provided for the user to build separately.

Locale-specific monetary processing and formatting:

When the LANG and/or LC_* environment variables are set to these Euro-enabled locales, the national monetary formatting rules are used to continue support for legacy (Drachma-based) applications. To access the monetary formatting rules for the Euro within the respective locale, the LC_MONETARY environment variable should be set to the desired locale name with the @euro modifier.

For example, to specify the Euro as the currency in the Greek UTF-8 locale, the following environment variables should be set to enable monetary formatting, such as used by *strfmon* (3C):

```
LANG=el_GR.utf8
LC_MONETARY=el_GR.utf8@euro
```

Data conversion (iconv) for Greek Euro:

Greek iconv converters have been updated to support the 4 new characters added to ISO-88597 (see table in Greek locales section) in conversions with UTF-8 and Unicode.

List of converter tables enhanced:

```
iso87 <-> ucs2
iso87 <-> utf8
```

Also, new iconv converters have been added to support data conversion between Greek EBCDIC (code page 875) and UTF-8/Unicode.

List of converter tables added:

```
greee <-> ucs2
greek <-> utf8
```

ISO-88597 and Greek EBCDIC converters have been enhanced to support Euro and have been aligned to match the expected mappings as defined by IBM for code page 875.

List of converter tables modified to align with expected mappings:

```
greee <-> iso87
```

The following table shows the modified code mapping changes made in converting from ISO-88597 to Greek EBCDIC / Code Page 875 (iso87=greee):

Table 9-10 ISO-88597 TO Greek EBCDIC Code Mapping Changes

ISO-88597	Code Page 875 (Incorrect)	Code Page 875 (Corrected)
0X27	0Xd0	0X7d
0X40	0Xff	0X7c
0X5c	0Xff	0Xe0
0X7b	0Xff	0Xc0
0X7c	0Xff	0X6a
0X7d	0Xff	0Xd0
0X7e	0Xff	0Xa1
0Xa0	0Xff	0X74
0Xa1	0X79	0Xce
0Xa2	0Xd0	0Xde
0Xa3	0X7b	0Xb0
0Xa4	0Xff	0Xfc

Table 9-10 ISO-88597 TO Greek EBCDIC Code Mapping Changes (Continued)

ISO-88597	Code Page 875 (Incorrect)	Code Page 875 (Corrected)
0Xa6	0Xff	0Xdf
0Xa7	0x7c	0Xeb
0Xa8	0Xa1	0X70
0Xa9	0X83	0Xfb
0Xab	0X4c	0Xee
0Xac	0Xff	0Xef
0Xad	0X60	0Xca
0Xaf	0Xca	0Xcf
0Xb0	0Xe0	0X90
0Xb2	0Xf2	0Xea
0Xb3	0Xf3	0Xfa
0Xb4	0X7d	0Xa0
0Xb5	0X7d	0X80
0Xb7	0X4b	0Xdd
0Xbb	0X6e	0Xfe
0Xbd	0Xea	0Xdb
0Xc0	0Xb5	0Xcc
0Xda	0X49	0X68
0Xdb	0X63	0X69
0Xe0	0Xb7	0Xcd

The following table shows the modified code mapping changes made in converting from Greek EBCDIC / Code Page 875 to ISO-88597 (greee=iso87):

Table 9-11 Greek EBCDIC/Code Page875 to ISO-88597 Code Mapping Changes

Code Page 875	ISO-88597 (Incorrect)	ISO-88597 (Correct)
0X7	0X7f	0X9f
0X68	0Xff	0Xda
0X69	0Xff	0Xdb
0X6a	0Xff	0X7c

Table 9-11 Greek EBCDIC/Code Page875 to ISO-88597 Code Mapping Changes

Code Page 875	ISO-88597 (Incorrect)	ISO-88597 (Correct)
0X70	0Xff	0Xa8
0X74	0Xff	0Xa0
0X7b	0Xa3	0X23
0X7c	0Xa7	0X40
0X7d	0Xb4	0X27
0X80	0Xff	0Xb5
0X90	0Xff	0Xb0
0Xa0	0Xff	0Xb4
0Xa1	0Xa8	0X7e
0Xb0	0Xff	0Xa3
0Xc0	0Xff	0X7b
0Xca	0Xaf	0Xad
0Xcc	0Xff	0Xc0
0Xcd	0Xff	0Xe0
0Xce	0Xff	0Xa1
0Xcf	0Xff	0Xaf
0Xd0	0X27	0X7d
0Xdb	0Xff	0Xbd
0Xdd	0Xff	0Xb7
0Xde	0Xff	0Xa2
0Xdf	0Xff	0Xa6
0Xe0	0Xb0	0X5c
0Xea	0Xbd	0Xb2
0Xeb	0Xff	0Xa7
0Xee	0Xff	0Xab
0Xef	0Xff	0Xac
0Xfa	0Xff	0Xb3
0Xfb	0Xff	0Xa9
0Xfc	0Xff	0Xa4

Table 9-11 Greek EBCDIC/Code Page875 to ISO-88597 Code Mapping Changes

Code Page 875	ISO-88597 (Incorrect)	ISO-88597 (Correct)
0Xfe	0Xff	0Xbb

NOTE The following 3 characters currently have no Greek EBCDIC Code Page 875 code points defined. Consequently, in converting from either ISO-88597, Unicode or UTF-8, these characters is mapped to the Undefined Character for Greek EBCDIC (0xFF). These 3 characters are subject to data loss in round trip conversions between these codesets:

Table 9-12 Undefined Characters for Greek EBCDIC

ISO-88597	Greek Unicode	EBCDIC (CP 875)	Character
0xa5	0x20af	<undefined>	Drachma Sign
0xaa	0x037a	<undefined>	Greek Ypogrgrammeni
0xae	0x037e	<undefined>	Greek Question Mark

Displaying the Euro for Greek:

X11R6 Xlib has been enhanced to support the Euro when running in el_GR.iso88597 and el_GR.utf8 locales.

New font glyphs have been added to support the 4 new characters in ISO-88597. CDE is providing XlocaleDB for the el_GR.utf8 locale, and with this new XlocaleDB, el_GR.utf8 uses updated ISO-88597 fonts for displaying the euro.

Inputting the Euro for Greek:

Additional keymap support has been added to allow users of Greek-Latin keyboards to input the Euro symbol. The AltGr+5 sequence can be used with this new keymap (PS2_DIN_Greek_Euro) to input the Euro character.

Alternatively, users with US English keyboards can use the PS2_DIN_US_English_Euro keymap where the Euro symbol is mapped to AltGr+4.

CDE provides support to input and display the euro in the iso8859-7 locale.

The additional 3 characters do not have keybindings in any Xserver keymaps. The reason for this is that there is no standard definition among the X Window vendors on which key sequences should activate those other symbols. As a result, they are assigned key bindings whenever the mappings are clarified by the industry.

Printing Euro with Greek characters:

The standard `lp` command is used to print Euro and Greek characters on LaserJet printers. The LaserJet printers should have the resident Greek character/font set with the Euro symbol included. Current LaserJet printer models with this support include the LaserJet 1220 and the LaserJet 2200.

Use the `lp` command with the `-ocs12N` option to select the Greek character/font set. For example:

`lp -d` *`[printer_name]`* `-ocs12N -o` *`[other_options] [print_filename]`*

Impact

Base Greek Euro offering (installed on all systems): Approximately 14.2MB additional disk space is required.

No additional memory requirements are needed for running in either the el_Gr.iso88597 or el_GR.utf8 locales.

Compatibility

Iconv conversion between ISO-88597 and Greek EBCDIC (CP 875) yields different results than in previous releases. In HP-UX 11i v1.6 , these tables have been corrected to provide the correct conversion mappings.

It is recommended that all Greek-encoded legacy persistent data stored on previous versions of HP-UX be converted to ISO-88597 from Greek EBCDIC prior to being moved to an HP-UX 11i v1.6 system.

Performance

Not applicable.

Obsolescence

Not applicable.

Documentation

No documentation changes were necessary.