Tru64 UNIX

Release Notes for Version 5.0A

Part Number: AA-RH8WB-TE

April 2000

Product Version: Tru64 UNIX Version 5.0A

This manual provides information on new and changed features for Compaq's Tru64™ UNIX® operating system. It also provides information on restrictions to the software and documentation.

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About This Manual

This manual contains release notes for the Tru64™ UNIX® Version 5.0A operating system software.

This manual also describes significant new and changed features in this version of the Tru64 UNIX operating system and lists features and interfaces scheduled for retirement in future releases.

Audience

These release notes are for the person who installs the product and for anyone using the product following installation.

Organization

This manual is organized as follows:

Chapter 1	Contains an overview of new and changed features in this version of the operating system software
Chapter 2	Contains information about features that have been retired in this release of Tru64 UNIX and that are scheduled to be removed in future versions
Chapter 3	Contains installation notes
Chapter 4	Contains processor-specific information
Chapter 5	Contains information about the base operating system software
Chapter 6	Contains information about the development environment
Chapter 7	Contains information about the window system software
Chapter 8	Contains information about the documentation
Appendix A	Contains the disk space requirements for the individual subsets included on the kit
Appendix B	Contains information about time zone enhancments

Related Documents

You will find it helpful to have the following documentation available during the installation of this release:

- The hardware documentation for your system

- The *Installation Guide*
- The *Installation Guide — Advanced Topics*
- The online or hardcopy reference pages
- The HTML files that are provided on the CD–ROM, especially *New and Changed Features from Previous Releases*

You can also view the Tru64 UNIX Version 5.0A *Technical Update* for any additional information not included in these notes. You can access the *Technical Update* from the following URL:

http://www.unix.digital.com/faqs/publications/pub_page/update_list.html

Reader's Comments

Compaq welcomes any comments and suggestions you have on this and other Tru64 UNIX manuals.

You can send your comments in the following ways:

- Fax: 603-884-0120 Attn: UBPG Publications, ZKO3-3/Y32
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- The full title of the book and the order number. (The order number is printed on the title page of this book and on its back cover.)
- The section numbers and page numbers of the information on which you are commenting.
- The version of Tru64 UNIX that you are using.
- If known, the type of processor that is running the Tru64 UNIX software.

The Tru64 UNIX Publications group cannot respond to system problems or technical support inquiries. Please address technical questions to your

local system vendor or to the appropriate Compaq technical support office. Information provided with the software media explains how to send problem reports to Compaq.

Conventions

The following conventions are used in this guide:

`%` `$`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells.
`#`	A number sign represents the superuser prompt.
`% cat`	Boldface type in interactive examples indicates typed user input.
`file`	Italic (slanted) type indicates variable values, placeholders, and function argument names.
`[ | ]` `{ | }`	In syntax definitions, brackets indicate items that are optional and braces indicate items that are required. Vertical bars separating items inside brackets or braces indicate that you choose one item from among those listed.
`...`	In syntax definitions, a horizontal ellipsis indicates that the preceding item can be repeated one or more times.
`cat`(1)	A cross-reference to a reference page includes the appropriate section number in parentheses. For example, `cat`(1) indicates that you can find information on the `cat` command in Section 1 of the reference pages.
Ctrl/*x*	This symbol indicates that you hold down the first named key while pressing the key or mouse button that follows the slash. In examples, this key combination is enclosed in a box (for example, Ctrl/C).

1

New and Changed Features

This chapter provides brief descriptions of features that are new to the Tru64 UNIX operating system in this release or that have changed significantly from previous releases.

Tru64 UNIX Version 5.0A is a functional release that includes the following enhancements:

- Enhanced support for TruCluster Server (Section 1.1)
- Integration of the CAM layered components with the base operating system (Section 1.2)

This release also includes updates to the following functionality:

- Collect (Section 1.3)
- Event Manager (Section 1.4)
- Interoperability between Tru64 UNIX and Windows NT
- Support for the DE602-FA 100 Base FX Ethernet adapter (Section 1.5)
- Additional enhancements to the operating system (Section 1.6)

1.1 Support for TruCluster Server

This version of the operating system supports the first general distribution of the Compaq TruCluster Server product, TruCluster Server Version 5.0A.

TruCluster Server Version 5.0A is a separately licensed product that ships on the Tru64 UNIX Associated Products Volume 2 CD–ROM It is a highly integrated synthesis of Tru64 UNIX software, Compaq AlphaServer™ systems, and storage devices that operate as a single system. A TruCluster Server cluster acts as a single virtual system, even though it is made up of multiple systems. Members of the cluster can share resources, data storage, and clusterwide file systems under a single security and management domain, yet they can boot or shut down independently without disrupting the cluster.

Like the TruCluster Available Server Software and Compaq TruCluster Production Server products available on the Version 4.0x stream of the operating system, TruCluster Server lets you deploy highly available services that can access their disk data from any member in the cluster.

Any application that can run on Tru64 UNIX can run as a highly available single-instance application in a cluster. The application is automatically relocated (failed over) to another cluster member in the event that a required resource, or the current member itself, becomes unavailable.

Like the Compaq TruCluster Production Server Software product, TruCluster Server lets you run components of distributed applications in parallel, providing high availability while taking advantage of cluster-specific synchronization mechanisms and performance optimizations.

TruCluster Server Version 5.0A provides the following features:

- A Cluster File System (CFS) that supports a single clusterwide namespace and uniform coherent access to all file systems in a cluster.
- A device request dispatcher (DRD) facility that provides highly available clusterwide access to both character and block disk devices, as well as tape devices. The semantics of Logical Storage Manager (LSM) as shipped in the base operating system have also been extended to a cluster environment.
- A connection manager that ensures that all cluster members communicate with each other in order to control the formation of a cluster.
- A cluster application availability (CAA) facility that provides resource monitoring and application restart capabilities similar to those provided by user-defined services in the TruCluster Available Server Software and TruCluster Production Server Software products.
- A cluster alias subsystem that lets TCP and UDP applications address the cluster as though it were a single system.
- Out-of-the-box highly available NFS server capabilities.
- The Memory Channel interconnect as a high-speed interconnect designed specifically for the needs of clusters. The Memory Channel interconnect provides both broadcast and point-to-point connections between cluster members.
- A distributed lock manager (DLM) that provides specialized synchronization capabilities for cluster-aware applications.
- Single system management capabilities. The SysMan suite of graphical management utilities provides an integrated view of the cluster environment, letting you manage a single member or the entire cluster. Because a cluster uses CFS, there is a single copy of security administration files such as `/etc/passwd` and `/etc/group`. A user authenticated on one member has access to all members.
- Software infrastructure required to support rolling upgrades and patches. Customers who install TruCluster Server Version 5.0A will

be able to perform a rolling upgrade to subsequent TruCluster Server releases, and roll patches onto a Version 5.0A cluster.

See the TruCluster Server *Technical Overview* for more information on these features.

1.2 CAM Layered Components Integrated into the Base Operating System

The CAM Layered Components (CLC) kit has been integrated into the base operating system. The components formerly included in the CLC kit were the optical driver, the changer driver, and the `mcutil` program to access the changer functionality. The changer driver and the `mcutil` program, along with any associated files, have been integrated into the base operating system. This version of the operating system does not provide support for the optical driver.

1.3 Collect Data Collection Tool

Collect Version 2.0 is a Y2K-compliant tool that collects operating system and process data under all supported versions of Tru64 UNIX. Collect is designed for high reliability and low system resource overhead. Collect can run continuously in historical mode, managing its own log files. See the `collect`(8) reference page for information about turning on continuous monitoring.

The Collect tool gathers and displays information for subsystems. You can set Collect to gather data for a single subsystem or any combination of the following:

- `process`
- `lsm`
- `tty`
- `memory`
- `network`
- `filesystems`
- `disk`
- `cpu`
- `message`
- `queue`
- `tape`

Collect has two modes: collection and playback. In collection mode, it gathers operating system and process data and writes it to standard output, to a binary file with a compressed format, or to both.

In playback mode, Collect reads from a previously written binary file and writes to standard output. The format of the data when written to standard output is identical, whether during real-time collection or playback mode.

Collect installs with the `setld` utility, and kits are also available from the following FTP sites:

- `ftp://ftp.digital.com/pub/DEC/collect` (US)
- `ftp://ftp.digital.de/pub/DEC/collect/` (Germany)

1.4 Event Manager

Event Manager (EVM) obtains the translation of a binary error log (`binlog`) event by passing the event to either DECevent or Compaq Analyze, depending on the type of system. If neither of these services is available, or if the translation of attempt fails for any reason, the Translation section of EVM output shows a message indicating the failure.

For configuration options and details of EVM's use of DECevent and Compaq Analyze, refer to the Event Management information in the *System Administration* guide.

1.5 Support for DE602-FA

Support for the DE602-FA 100 Base FX Ethernet adapter has been added to the Intel Ethernet adapter driver. This adapter runs only in 100 Base FX mode (i.e, no 10 Base FL). The DE602-FA is a daughter card that attaches to the DE60 2-AA dual 10/10 0 Ethernet adapter.

1.6 Additional Changes

The following sections provide brief descriptions of additional changes included in Tru64 UNIX.

1.6.1 AlphaServer DS20E

In addition to the systems listed in the Version 5.0A *Software Product Description* (SPD), this release provides support for the AlphaServer DS20E.

1.6.2 Mail Servers Enhancements

The `sendmail`, IMAP, and POP servers have been updated in this release. The `sendmail` Version 8 Server has been updated from Version 8.8.8 to

Version 8.9.3. The Cyrus IMAP server has been updated from Version 1.5.2 to Version 1.5.19 and Qualcomm POP server from Version 2.2 to Version 2.5.

The `sendmail` Version 8.9.3 Server provides advanced features such as the following:

- Masquerading
- Virtual Domain Hosting
- Restricted Relaying

These features can be configured using the web-based Mail Configuration Utility provided by Compaq's *Open Source Software Collection*, included with your kit.

For more information on `sendmail` Version 8, see the reference pages and documentation provided with the operating system, as well as *Sendmail* by Bryan Costales and Eric Allman, published by O'Reilly & Associates, Inc.

1.6.3 Turning Off Security Checks for Sendmail Support Files

The `sendmail` utility checks the modes of its support files (for example, the `aliases` file, `.forward` file, and help file) and the paths of the directories in which they reside. It does not read most files that are group-writable or those that reside in directories that are group-writable.

If you are willing to compromise on this security feature or if you have `sendmail` support files in group-writable directories, you can turn this checking off by adding the `DontBlameSendmail` option in the `sendmail` configuration file (`/var/adm/sendmail/sendmail.cf`).

See the *sendmail Installation and Operation Guide* (Section 4.7.2, Turning Off Security Checks) for information on how to set this option.

If you update your `/var/adm/sendmail/sendmail.cf` file and then use the mail configuration utilities (`/usr/sbin/mailconfig` or `/usr/sbin/mailsetup`), the utilities return a warning about being unable to recognize changes made to the `sendmail.cf` file. In such cases, do the following:

1. Ignore the warning and continue to reconfigure mail using the configuration utility.
2. Edit the `/var/adm/sendmail/sendmail.cf` file and add the `DontBlameSendmail` option.
3. Restart the `sendmail` daemon (`/sbin/init.d/sendmail restart`).

1.6.4 Direct I/O Performance Improvements

Several changes have been made to improve the usability and performance of the direct I/O capability of AdvFS in this release.

Optimal direct I/O throughput is now obtained when the requested transfer is aligned on a disk sector boundary and the transfer size is an even multiple of the underlying sector size (currently 512 bytes). Previously, the best performance was achieved by direct I/O when the requested transfer was aligned on a file page boundary and the transfer size was evenly divisible into 8 KB pages. This restriction has been relaxed.

Another performance improvement has been to change the way that the `file_lock` is seized. This reduces contention among threads that are doing direct I/O to the same file as long as the sectors that they are referencing do not overlap.

1.6.5 UFS Delayed Metadata Mount Option

To maintain the file system's consistency, UFS metadata (such as inode, directory, and indirect blocks) is updated synchronously by default. The new `delayed` mount option allows you to disable synchronous metadata writes on a specified file system. When enabled, all metadata writes are delayed (flushed later by the `sync` daemon).

Metadata updates are typically performed synchronously to prevent file system corruption after a crash. The trade-off for this file system integrity, however, is performance. In some cases, such as a file system serving as a cache, performance (faster metadata update) is more important than preserving data consistency across a system crash, for example, files that are under `/tmp` or web proxy servers.

Delayed metadata update means two things:

- Multiple updates to one block become only one block write as opposed to multiple writes of the same block with traditional synchronous metadata update.
- Metadata-intensive applications run much more responsively and faster because metadata writes do not go out to the disk immediately and users get their prompt back as soon as the metadata updates are queued.

Do not use the `delayed` option on the root, `/usr`, or other file systems that need to survive across a system crash. Only use it on file systems that do not need to survive across a system crash.

See the `mount`(8) reference page for details on using the `delayed` and other mount options.

1.6.6 New Mount Options

This release provides the following new options for the `mount` command:

- `smsync2` — This option enables the alternate smooth sync policy, in which a modified page is not flushed to disk until it has been idle for a set period of time for UFS and AdvFS file systems.
- `throttle` — This option prevents excessive asynchronous I/O from overloading the device queue for UFS file systems.

For more information, see the `mount`(8) reference page.

1.6.7 New vfs Subsystem Attributes

The vfs subsystem includes the following new attributes you can use to throttle UFS file systems:

- `io_throttle_maxmzthruput`
- `io_throttle_shift`
- `io_throttle_static`

For more information, see the `sys_attrs_vfs`(5) reference page.

1.6.8 New Options in SysMan Menu for NTP

When you use the SysMan Menu to configure your system as an NTP client, you will see two new options in the Add/Modify NTP Servers & Peers window. These options, Fudge factor and Stratum, allow you to configure reference clocks in special ways.

Selecting the Fudge factor check box adds a fudge line to the `ntp.conf` file, and selecting an integer in the Stratum field allows you to override the default stratum assigned by the `xntpd` daemon.

You can add a fudge line only for a corresponding server (not a peer) when that server has an address of the form `127.127.t.u`. You can enter a stratum value only if the Fudge factor check box is selected.

See the `ntp.conf`(4) reference page for more information about fudge lines and stratum values.

1.6.9 ToolTalk Security Enhancement

To prevent unauthorized access to your machine, a new security mechanism has been added to ToolTalk. This security mechanism, which was jointly developed by all companies shipping CDE, requires that a ToolTalk message contain a valid cookie in order for the `ttsession` message server to deliver the message to its recipients. A different cookie is generated by `ttsession` every time a user logs in using `dtlogin`.

The cookie resides in a new file called `.TTauthority` under your home directory. This permits you to send ToolTalk messages to the local `ttsession` message server. Any other user who wants to send a ToolTalk message to `ttsession` must place a copy of the cookie in his or her `.TTauthority` file. See the `ttauth`(1) reference page for instructions on how to share a cookie with other users.

For the special case of a root user sending messages to the local `ttsession`, ToolTalk looks for the cookie in the `.TTauthority` file of the user who owns the `ttsession` process. For messages being sent to a `ttsession` on a remote machine, ToolTalk looks for the cookie in root user's `.TTauthority` file.

You can use the `TTAUTHORITY` environment variable to specify an alternate authority file.

Requiring all ToolTalk messages to contain a valid cookie might cause problems with some ToolTalk clients. Therefore, you now have the ability to start `ttsession` with either relaxed security, full security, or no security.

Relaxed security is the default and requires a valid cookie only for the ToolTalk messages used to start an application on a remote machine. These messages contain a handler `ptype`, or have an operation name that maps to a `ptype` in the `ptype` database. Other message types are always delivered. Relaxed security is ideal for situations in which notification messages are constantly being sent between ToolTalk clients.

To request full security, which requires that all messages contain a valid cookie, start the `ttsession` with the `-F` flag. You must use the `-F` flag in conjunction with the `-a cookie` flag (set by default).

To request no security, start the `ttsession` with the `-a none` flag. With no security, all messages are delivered without verification. This is not recommended, because it leaves your machine vulnerable to attack.

1.6.10 XEmacs

The `XEmacs` editor has been upgraded from Version 20.4 to Version 21.1.7 in this release. This new version of `XEmacs` is contained in the OSFEMACS505 runtime subset and the FSFEMACS505 source subset.

This new version of the `XEmacs` editor has also replaced the `Emacs` editor. The `XEmacs` editor has an extensive graphical user interface when run in a window system, such as X. A symbolic link has been created from the `/usr/bin/emacs` to `XEmacs`.

Although `Emacs` is no longer shipped on the *Operating System Volume 1* CD–ROM, it is available on the *Open Source Software Collection* CD–ROM included with your kit.

1.6.11 Netscape Communicator Version 4.7

This release of Tru64 UNIX contains Netscape Communicator Version 4.7. For information on using Netscape Communicator to display the online documentation, see the *Installation Guide*. To obtain the latest fixes to the Netscape Communicator problems described in Chapter 5 of these release notes, it is recommended that you download and install the latest version available of Netscape Communicator for Tru64 UNIX from the Netscape Netcenter's Download World Wide Web site at the following URL:

http://home.netscape.com/download/index.html#clients

1.6.12 Ladebug

The Ladebug debugger has a new graphical user interface (GUI) that replaces the old interface. You invoked the old interface using the `dxladebug` command.

The new version of the GUI is not included with the kit. Instead, you download it from the Ladebug public web page at the following URL:

http://www.unix.digital.com/ladebug/

1.6.13 TruType Rasterizer Support

The X server can display TrueType fonts. The operating system currently supplies only Chinese TrueType fonts, but you can add other TrueType fonts to your system. Then, you can use the new TrueType font rasterizer (or font renderer) to display those fonts. This rasterizer is available starting with this version of the operating system. For more information, see the `TruType`(5X) reference page.

1.6.14 Intelligent ABC Input Method for Simplified Chinese

Starting with this release, the Intelligent ABC input method is supported by the Simplified Chinese input method server (`dxhanziim`). The Intelligent ABC input method allows you to quickly and efficiently combine words, phrases, and short sentences in Simplified Chinese.

See the `dxhanziim` application's online help for information about using the Intelligent ABC input method. For general information about Chinese input methods and the input method server, see the `Chinese`(5) and `dxhanziim`(1X) reference pages, respectively.

1.6.15 AlphaServer 8400/GS140 Power Supply Monitoring

This release adds support for reporting power supply and fan status, the current system temperature, and the maximum allowed system temperature for AlphaServer 8400/GS140 systems. This functionality is performed through the environmental monitoring subsystem, which you must enable prior to booting the system.

You can use the `/sbin/sysconfig` command to view the system environment at any time. When enabled, this feature prints warning messages in the case of power supply failure or abnormality or extreme temperatures. Error logs are logged in the `/var/adm/binary.errlog` log file.

For more information, see the *System Administration* guide and the `envconfig`(8) reference page.

1.6.16 MAXCLIENTS Attribute

The maximum value of the MAXCLIENTS system attribute has been increased from 128 to 256.

1.6.17 New Base Operating System CD–ROM Format

The Tru64 UNIX *Operating System Volume 1* CD-ROM is mastered in ISO 9660 format with Rock Ridge Interchange Protocol (RRIP) extensions to provide support for long and mixed-case file names on UNIX systems and Microsoft's Joliet extensions to provide the same support for 32-bit Windows systems.

Some documentation files on the CD–ROM are fully ISO 9660 Level-1 compliant and can be viewed on any system that supports the standard.

If you are using Tru64 UNIX Version 5.0 or higher, you can mount the *Operating System Volume 1* CD–ROM using the following command:

```
# mount /dev/disk/cdromnc /mnt
```

For versions of Tru64 UNIX earlier than Version 5.0, you can mount the CD–ROM by specifying the `-t cdfs` and `-o rrip` options to the `mount` command, as follows:

```
# mount -r -t cdfs -o rrip /dev/rznc /mnt
```

1.6.18 Enhancements to the Documentation CD–ROM

The Documentation CD–ROM has been enhanced with the following new features:

- The CD–ROM now includes a keyword search feature for the reference pages. This feature provides direct access to the HTML reference pages by searching a local copy of the database that is used by the `apropos` command. The search displays its results in a hot-linked table like the one produced by the `webman` CGI script.
- The HTML library pages have been redesigned for improved usability.
- There is a send us mail button on each of the library pages. Compaq encourages users to return comments and suggestions to help us to improve our documentation.

See Section 8.1 for more information.

2

Features and Interfaces Scheduled for Retirement

This chapter provides information on Tru64 UNIX features that have been retired from the operating system or that are scheduled to be removed from, or changed in, future major functional releases. This information is provided so that users and developers can migrate away from these features in the near future.

2.1 Retired in This Release

The following sections provide information on features that have been retired in this release. These changes were announced in previous releases. For information on features retired in previous releases, see the *New and Changed Features from Previous Releases* on the *Tru64 UNIX Version 5.0A Documentation* CD–ROM.

2.1.1 DECwindows Applications

The following DECwindows utilities and tools have been retired from Tru64 UNIX. These dx* tools and utilities, commonly known as DECwindows, have been replaced by the dt* tools in Common Desktop Environment (CDE) that were introduced in Version 4.0. The replacement applications are listed in Table 2–1. Not all of the dx* applications that have been retired have a replacement due to the limited use or capability of that specific tool or utility.

Table 2–1: Retired DECwindows Applications

Retired Tools/Utilities	Replacement Option(s)
dxmail	dtmail
dxprint	None
dxcalendar	dtcm
dxcalc	dtcalc, xcalc
dxclock	Front Panel, xclock
dxpaint	dticon/dtstyle, bitmap
dxnotepad	dtpad

Table 2–1: Retired DECwindows Applications (cont.)

Retired Tools/Utilities	Replacement Option(s)
dxbook	dthelpview, Netscape
dxcardfiler	None
dxsession	xdm, dtsession
dxvdoc	ghostview
libids	None

It is recommended that you migrate to the dt* tools and utilities or other options as soon as possible.

The CDA applications in Table 2–2 have also been retired.

Table 2–2: Retired CDA Applications

caspar	cdoc	ctod
ddifanls	ddifps	ddiftext
dtifanls	dtifddif	dtoc
textddif	vdoc	libcapsar
libcda	libcda_be	libcda_fe
libddif	libddif_be	libddif_fe
libimg	libdvs	libids_nox

2.1.2 DEC C Compiler Default Changed from -std0 to -std

The default language mode for the Tru64 UNIX C compiler has changed from `-std0` to `-std`.

You can revert back to the previous default language mode by adding the `-std0` flag to the `cc` command line, the `/usr/ccs/lib/cmplrs/cc/comp.config` file or the `$DECC_CC` or `$COMP_HOST_ROOT` environment variable definitions.

2.1.3 Sendmail Version 5.65

The `sendmail` Version 5.65 utility has been retired in this release and is no longer available from the system.

This version of the operating system includes `sendmail` Version 8.9.3. For more information, see Section 1.6.2.

2.1.4 MH/POP

The Post Office Protocol (POP) service provided as part of the Rand Mail Handler (MH) subset (OSFMH) has been retired from the operating system. The following components were associated with this service:

- `/usr/lib/mh/spop`
- `/usr/lib/mh/popauth`
- `/usr/lib/mh/popd`
- `/usr/lib/mh/popaka`
- `/usr/lib/mh/popwrd`

The replacement for this functionality was provided in Version 5.0. This new service is an implementation based on Qualcomm's public domain POP3 service, known as `popper`. Its components are as follows:

- `/usr/sbin/pop3d`
- `/usr/bin/mailauth`
- `/usr/bin/popcv`

It is important that you migrate all your existing MH/POP users to this new service. If you do not, run-time errors will occur because the old service no longer exists. You can use the existing `mailcv`(1) and `popcv`(8) utilities to migrate existing MH/POP information into the new service.

The new service is the default.

2.1.5 The cc.alt Compiler

Previous releases provided an Alternative C Compiler and associated development tools (known as the `cc.alt` compiler), which shipped in the CMPDEVALT subset on the *Associated Products Volume 1* CD–ROM. The `cc.alt` compiler was intended to deliver run-time performance improvements, using more recent compiler components than the corresponding Tru64 UNIX base operating system tools.

The `cc.alt` compiler is no longer provided with your kit. However, if you want a more recent compiler, you can download the Developers' Toolkit Supplement C compiler from the following URL:

http://www.unix.digital.com/dtk

Unlike the `cc.alt` compiler, after you install the DTK Supplement compiler, you invoke it using the `cc` command and it is documented in the `cc`(1) reference page.

After you install the DTK Supplement compiler, you invoke the regular base operating system C compiler using the `cc -nodtk` command and it is documented in the `cc-notdk`(1) reference page.

The DTK Supplement compiler is a fully supported, free upgrade for all users with an active Developers' Toolkit license. From time to time, the DTK web site may also include Advanced Development Kits, which will provide even more recent compiler components.

2.1.6 System V Environment

Tru64 UNIX provides 80 percent of the System V Interface Definition (SVID) standard, as verified by the SVVS 3 and SVVS 4 test suites. As a result, Tru64 UNIX contains a substantial number of System V Release 4 (SVR4) features and delivers the highest composite SVR4 conformance of any implementation. SVR4 functionality will be further expanded in the base operating system when the System V Environment re-engineering is complete, eliminating the need for the layered product. A migration plan for upgrading to the appropriate version of the Tru64 UNIX base operating system has been developed to assist customers who currently use the System V Environment layered product. The System V Environment (SVE) product is not available as a separately licensed layered product with the Tru64 UNIX family. Instead, many of its features are being re-engineered and will be merged into the operating system in future releases.

2.2 Features and Interfaces Scheduled for Retirement in Future Releases

This section provides information on features and interfaces that will be retired in future releases. This information is provided so you can begin planning for the time when these features are retired.

2.2.1 POSIX 1003.4a (Draft 4) pthread Routines in the POSIX Threads Library

The POSIX 1003.4a, Draft 4 interface of POSIX Threads (formerly DECthreads) will be retired in a future release of Tru64 UNIX. Applications that were written using the POSIX 1003.4a, Draft 4 API should be migrated to the IEEE Std. 1003.1-1996, POSIX System Application Program Interface provided by POSIX Threads. The POSIX 1003.1c standard interface is the most portable, efficient, and powerful programming interface offered by POSIX Threads. A compatibility mode for the Draft 4 POSIX 1003.4a API has been provided to ease migration. This compatibility mode will be removed in a future release.

2.2.2 POSIX Threads CMA Interface

The CMA interface of POSIX Threads (formerly DECthreads) is obsolete beginning with this release. Obsolescence means that while the CMA API continues to exist and is supported in Tru64 UNIX, CMA routines are no longer documented or enhanced. It is recommended that you port your CMA-based application to the IEEE Std 1003.1-1996, POSIX System Application Program Interface provided by POSIX Threads Library.

2.2.3 Asynchronous I/O Binary Compatibility

Data structures for asynchronous I/O, like `aio_read()` and `aio_write()`, changed between Version 3.2 and Version 4.0 of the operating system. The kernel currently handles these differences so that applications built under Version 3.2 continue to run when executed on Version 4.0x.

In the next major release of the operating system, support for applications built under Version 3.2x using asynchronous I/O will be discontinued. You will need to recompile and relink these applications to run under Tru64 UNIX Version 4.0D or higher.

2.2.4 SCSI Device Names

Support for rz and tz SCSI device names will be retired in a future release of Tru64 UNIX. Any code that derives knowledge about a device from the ASCII name or minor number may be impacted.

All code that uses the current namespace will be compatible when the change occurs because a mechanism that ensures binary compatibility will be provided. Existing interfaces, such as names and minor numbers, will be fully supported.

2.2.5 The -x and -p Options to addvol and mkfdmn

The `-x` and `-p` options to the `addvol` and `mkfdmn` commands allow you to set the per-volume bitfile metadata table (BMT) when you create a new volume or file domain. Users typically set the BMT to prevent an extent exhaustion problem.

In Version 4.0D and later, the limitations in the operating system that caused the extent exhaustion problem were removed, hence the `-x` and `-p` options are no longer needed and will be retired in a future release.

2.2.6 OSF/Motif Version 1.1.3

The Motif Version 1.1.3 libraries have been provided as run-time services for compatibility with applications that have not yet converted to Motif 1.2. Development support was retired in DEC OSF/1 Version 2.0.

In Version 4.0 of the operating system, the Motif 1.1.3 libraries were moved to an optional subset. Applications requiring the libraries will see an error from the loader, requiring you to install the optional subset. This optional subset will be removed from the product in a future release.

2.2.7 XIE Version 3.0 X Client Extension

Tru64 UNIX Version 5.0A supports XIE Version 5.0. Support for XIE Version 3.0 server extensions was removed in Version 4.0. Client support will be removed in a future release.

2.2.8 The atmsetup Script

The `atmsetup` script introduced in Version 4.0D of the operating system has been superseded by a new application. The new application is part of the SysMan suite, and provides a full graphical user interface. The `atmsetup` command now invokes the new SysMan application.

You can access the `atmsetup` script by including the `-old` flag with the `atmsetup` command.

The `atmsetup` script will be retired in a future release of Tru64 UNIX.

For more information on how to use the new `atmsetup` application, see the `atmsetup`(8) reference page and the *Asynchronous Transfer Mode* guide.

2.2.9 The installupdate -i Option

The `-i` option to the `/sbin/installupdate` command will be retired in a future release of the operating system.

The `-i` option currently allows you to interactively select kernel components after the new software subsets have been installed. Starting with the next major release, this flag will be unnecessary because you will be able to interactively select optional kernel components at the beginning of the update installation process, prior to software installation. These kernel components will be built into the kernel automatically during the kernel build phase at the end of the update installation; therefore, you need not be present at that time.

2.2.10 The pixstats Program-Analysis Command

The `pixstats` program-analysis command will be retired in a future release of the operating system. The `pixstats` command will be replaced by the `prof -pixstats` command, which became available in Version 4.0D and which provides a more complete and correct implementation of the same capabilities and flags.

2.2.11 ATM IP Switching Will Be Retired

Tru64 UNIX provides limited support for IP Switching over ATM, based on the Ipsilon Networks Inc. reference model (RFC 1953 and 1954). This support will be retired (removed from the Tru64 UNIX distribution) in a future release.

IP Switching support is provided in this release for backward compatibility only. Do not use it to develop new applications. Other methods of carrying IP over ATM, including Classical IP and LAN Emulation, will continue to be supported.

2.2.12 The ogated Routing Daemon

The `ogated` daemon (the old version of the `gated` routing daemon) will be retired in a future release of Tru64 UNIX. If you use the `ogated` routing daemon, you should migrate to the `gated` routing daemon, which supports a superset of functionality in the `ogated` daemon.

2.2.13 NL*/NC* libc Interfaces

A Worldwide Portability Interface (WPI) for internationalization based on the XPG4 standard was introduced in Version 2.0 of the operating system. Because the WPI interfaces supersede the `libc` OSF/1 proprietary interfaces, all `libc` interfaces that begin with the letters `NL` or `NC` will be removed in a future release of the operating system.

2.2.14 DEC Ada RTL

DEC Ada (UPI - 0HM) and DEC Ada PDO (UPI - 0VS) will be retired in a future release of Tru64 UNIX.

2.2.15 The /usr/include/userpw.h Header File

The `/usr/include/userpw.h` header file will be retired in a future release. This file was inadvertently shipped with earlier versions of the operating system. It contains prototypes for non-existent functions and unused structures. It does, however, contain two definitions that you might have

mistakenly used; password length, PW_PASSLEN, and user name length, PW_NAMELEN. These values are not appropriate for Tru64 UNIX.

The correct definition for password length is SIAMXPASSWORD in the sia.h file, or PASS_MAX in the limits.h file. The correct definition for user name length is LOGIN_NAME_MAX in the limits.h file, or L_cuserid in the stdio.h file.

It is recommended that you not use this file because it contains incorrect values.

2.2.16 Internationalized Print Filters dl1152wrof and dl5100wrof

The DEC Laser 1152 and 5100 printers are no longer being produced. Therefore, the corresponding internationalized print filters, dl1152wrof, and dl5100wrof, will be retired in a future release. The filters' functionality can be replaced by the new wwpsof print filter.

In this release, the dl1152wrof and dl5100wrof print filters have been moved to the IOSWWOBSOLETE subset within the Worldwide Language Support (WLS) software. The printcap entries for these two print filters will be removed from the /etc/lprsetup.dat print filter in the next release.

In a future release, these two print filters will be taken out of the kit and the installation procedure will convert the old /etc/printcap entries, which use the old print filters, to use the new wwpsof print filter.

2.2.17 Replacement of hiprof, pixie, and third Interfaces

The atom-tool interfaces documented in the hiprof(5), pixie(5), and third(5) reference pages will be retired in a future release. When these interfaces are retired, they will be undocumented and unsupported.

The interfaces have been superseded by the new hiprof, pixie, and third commands. The new commands are documented in the hiprof(1), pixie(1), and third(1) reference pages.

2.2.18 Event Report Formatter (uerf)

The Event Report Formatter (uerf) will be retired in a future release. The uerf command is not certified to be Y2K compliant. Depending on your system, use either Compaq Analyze or DECevent.

2.2.19 Ladebug to Replace dbx As the Default Debugger

In a future release, Ladebug will replace dbx as the default debugger.

When this change is implemented, the Ladebug debugger will be invoked by the `dbx` command and the `dbx` debugger will be invoked with the `dbx -old` command.

Note that despite efforts to make the two debuggers compatible, differences exist in the syntax accepted and the output produced by the debuggers. You might have to edit scripts that use `dbx` when this change occurs.

2.3 Hardware Support Retirement Notices

To allow for future growth and enhancements to the operating system, it is necessary to retire support for some of the existing hardware. This section provides information on hardware support that has been retired in this release and hardware support that will be retired in future releases.

2.3.1 Hardware Support Retired in This Release

The following sections provide information on hardware support that has been retired in this release of the operating system.

2.3.1.1 KZESC and KZPSC Array Controllers

The KZESC and KZPSC storage array controllers have been retired in this release of the operating system.

2.3.2 Hardware Support Scheduled to Be Retired in Future Releases

The following sections provide information on hardware support that will be retired in future releases.

2.3.2.1 Systems

In a future release of the operating system, support for all models of the following systems will be retired:

- DEC 2000
- DEC 3000
- DEC 4000
- DEC 7000

2.3.2.2 Disk Devices

In a future release of the operating system, support for the following disk devices will be retired:

- RZ55
- RZ56

- RZ57
- RZ58
- RZ73
- RZ74

2.3.2.3 Array Controllers

In a future release of the operating system, support for the HSZ10, HSZ20, HSZ40, HSZ50 and HSZ80 storage array controllers will be retired.

2.3.2.4 Interconnect Controllers

In a future release of the operating system, support for the following interconnect controllers will be retired:

- HSC40, HSC50, HSC60, HSC65, HSC70, HSC90, and HSC95 — storage controllers for CI
- RA60, RA70, RA71, RA72, RA73, RA80, RA81, RA82, RA90, and RA92 — MSCP disks
- TA78, TA79, TA81, TA90, TA90E, and TA91 — TMSCP tapes
- CIXCD — CI adapter for XMI
- KDM70 — MSCP/TMSCP adapter for XMI

2.3.2.5 Network Adapters

Support for the following network adapters will be retired in a future version of the operating system:

- DE500-FA — Single-port Ethernet and multi-mode FibreChannel adapter
- DE500-BA — Single-port Ethernet, copper
- DE450–CA — Single-port Ethernet, twisted pair
- DE435 — PCI Ethernet
- DE425 — EISA Ethernet
- DE422 — EISA Ethernet
- DEFEA — EISA FDDI
- DEFMA— XMI FDDI
- DEFTA/DEFZA — TURBOchannel FDDI

2.3.2.6 TURBOchannel Adapters

In a future release of the operating system, support for the following TURBOchannel adapters for the DEC 3000 will be retired:

- KZTSA, PMZAB, and PMAZC — SCSI adapters
- PMAG (all models) and PMAD — Graphics adapters
- DETRA — Token Ring adapter
- DGLTA — ATM adapter
- DEFTA and DEFZA — FDDI adapters

2.3.2.7 XMI Adapters

In a future release of the operating system, support for the following adapters for XMI will be retired:

- KZMSA — SCSI adapter
- DEMNA — Network adapter
- DEMFA — FDDI adapter

2.3.2.8 TGEC Network Adapter for the DEC 4000

In a future release of the operating system, support for the TGEC network adapter for the DEC 4000 will be retired.

2.3.2.9 FDDI Adapter for Futurebus

In a future release of the operating system, support for the DEFAA FDDI adapter will be retired.

3

Installation Notes

The notes in this chapter discuss the following topics:

- General information about installation (Section 3.1)
- Layered product considerations (Section 3.2)
- Full installation (Section 3.3)
- Update installation (Section 3.4)
- RIS installation (Section 3.5)
- Dataless Server installation (Section 3.6)

Do not attempt to install Tru64 UNIX Version 5.0A without first reading the notes in this chapter and in Chapter 4 that are appropriate to your processor. Failure to read these notes can result in installation problems. Also, before you start your installation, be sure to review the hardware documentation that came with your system.

3.1 General Information About Installation

The following notes apply to the installation process in general.

3.1.1 Disk Space Requirements

The minimum disk size requirement for single-disk installations is now 1 GB. It is possible to perform single-disk installations on disks with less than 1 GB of disk space, however, performance may be degraded and it is not recommended. If you attempt a single-disk installation on a disk smaller than 1 GB, you will receive a warning message.

For more information about disk space requirements, see Appendix A, which lists the size requirements for each subset.

3.1.2 Firmware Revision

The proper firmware for your system is included on the *Alpha Systems Firmware Update* CD–ROM that came with your kit. The *Release Notes Overview* included with the firmware CD–ROM provides all the information you need to install the proper firmware.

Alternatively, you can obtain this information from the Internet by using the following URL with a web browser:

http://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html

You can also obtain this information from the Internet by using the following address to access the firmware using FTP:

```
ftp.digital.com/pub/Digital/Alpha/firmware
```

You can determine the current level of the firmware on your system by entering the following command on most systems:

```
# consvar -v -l | grep "Firmware Rev"
```

If this command is not supported on your system, you can use the following command:

```
# uerf | grep "Firmware revision:" | tail -1
```

3.1.3 HSZ Firmware Requirements

The following list provides the firmware requirements for HSZ controllers:

- HSZ20 - Version 3.4 or higher firmware
- HSZ22 - No minimum requirements.
- HSZ40A - This controller cannot be placed on a multi-initiator bus in a cluster or multi-initiator from the same host.
- HSZ40B - Version 3.4 or higher
- HSZ40C - Version 3.4 or higher
- HSZ50 - Version 5.4 or higher
- HSZ70 - Version 7.7 or higher
- HSZ80 - Version 8.3 or higher
- HSG80 - No minimum requirements

3.1.4 IMAP and POP

In order to use the Internet Message Access Protocol (IMAP) and Post Office Protocol (POP) servers after performing an update installation or installing the `OSFINET (Additional Networking Services)` subset, you need to do the following:

1. Make sure that the `/etc/passwd` file (local, yp, or NIS) contains entries for the IMAP and POP users. If it does not, create them. For example:

   ```
   pop:*:13:6:POP Mail Service Account:/:
   imap:*:14:6:IMAP Mail Service Account:/:
   ```

   Substitute the values 13 and 14 with a user ID that is appropriate for

your system. For more information, see the passwd(4) reference page. Also, substitute the value 6 with the group ID of the mail group on your system; see the group(4) reference page.

2. Enter the following command as root so that the IMAP and POP files and directories have the correct permission, owner, and group:

```
# setld -c OSFINET500 MAILSERVERSETUP
```

3.1.5 Initial sendmail Warning Message

The first time you boot the system after a full installation, the following warning message is displayed as a result of starting sendmail:

```
warning: local host name (hostname) is not qualified;
fix $j in config file.
```

This indicates that the system does not have a qualified name because neither DNS (BIND) nor mail has been configured. However, sendmail will continue to operate.

3.1.6 The autopush Message Displayed During Boot

The following message is displayed on the console while booting:

```
/usr/sbin/autopush: Can't push requested modules on STREAM for entry 39
/usr/sbin/autopush: Device (6,-1) already configured
```

You can ignore this message.

3.1.7 Join Database Migration

If your system provides Dynamic Host Configuration Protocol (DHCP) Services, Remote Installation Services (RIS), or Dataless Management Services (DMS) to other systems, you must update the database files for the join daemon after you complete the installation. See Section 5.4.1 for additional information.

3.1.8 I/O Error Message

After the installation process has completed installing all of the requested subsets, you may encounter the following benign error message:

```
I/O error (errno 5) for block ( xxx , xxx ) on device xxx , x
```

You can ignore this message. The installation will complete successfully.

3.1.9 Worldwide Language Support Error

During the installation of the Worldwide Language Support subsets, the following error may appear in the installation log:

```
Loading subset 1 of 36 ...
find: ./usr/dt/config/psfonts : No such file or directory

Worldwide Base System
Copying from kit (disk)
Working....Tue Mar 28 16:56:16 EST 2000
Verifying
```

You can ignore this error; it has no adverse affect on the installation.

3.2 Layered Product Considerations

The following notes apply to layered products for Tru64 UNIX Version 5.0A.

3.2.1 Mounting the Associated Products CD–ROM

You can mount the Associated Products CD–ROMs (APCDs) with the `mount` command on Tru64 UNIX systems running Version 4.0E or later, as follows:

```
# mount -r /dev/rz4c /mnt
```

To mount the APCDs on releases prior to Version 4.0E, you must mount the CD–ROMs with the following options:

```
# mount -r -t cdfs -o rrip /dev/rz4c /mnt
```

On versions prior to Version 4.0D you might receive the following error message, indicating that compact disc file system (CDFS) support is not built in to the kernel that is currently running:

```
# mount -r -t cdfs -o rrip /dev/rz4c /mnt
/dev/rz4c on /mnt: No valid filesystem exists on this partition
```

If you receive this error, you need to build your kernel with the following option:

```
ISO 9660 Compact Disc File System (CDFS)
```

3.2.2 Internet AlphaServer System Software

The notes in this section apply to Internet AlphaServer System Software (IASS). It is expected that these problems will be corrected in the next release of IASS.

3.2.2.1 Disable ASE Failover for IASS Services Before Upgrade

IASS Version 4.2 and earlier versions are not supported on this version of the operating system. It is recommended that you upgrade to Open Source Internet Solutions Version 5.0 or later.

If you intend to continue running an older version of IASS and are upgrading to this version of the operating system, you must disable all ASE failover

support of IASS services before the upgrade. Use the IASS Administration utility to disable ASE failover support.

ASE functionality is replaced by TruCluster Server Version 5.0A.

3.2.3 AlphaServer Console Revision 5.7 Firmware Required for TruCluster Server

Systems that will run TruCluster Server Version 5.0A or higher require AlphaServer Console Revision 5.7 or higher. If you use Revision 5.6 console firmware, the cluster member might fail to boot with Reservation Conflict errors.

Only clustered systems require Revision 5.7 or higher. All other systems are supported with the AlphaServer Console Revision 5.6 included with your kit.

The AlphaServer Console Revision 5.7 firmware is not included with your kit. However, you can obtain the firmware from the following URL:

http://ftp.digital.com/pub/DEC/Alpha/firmware

3.3 Full Installation

To perform a full installation on your system, refer to the instructions in the *Installation Guide*.

This section provides additional information on performing a full installation.

3.3.1 Systems with Large Numbers of Disks

Because of the new device naming technology in this release, a condition may arise where a machine with a large number of disks might not be able to be initially installed. (Note that a RAID disk is configured as a JBOD, it is seen as single disk.) This is because the number of inodes in the memory file systems used for devices might be exhausted. As a guide, you can refer to following table to determine if you will encounter this problem:

Memory Size	Max Number of Disks
64 MB to 256 MB	63
256 MB to 512 MB	127
512 MB to 1 GB	190

Noted that a RAID device, namely a SWXVR device, is counted as a single disk device.

To avoid the problem, power down a number of the disks on the system prior to attempting the full installation. This reduces the number of inodes used and hence allows you to install the software on the system. Once the installation is complete, you can repower the disks and reboot the system, at which time the disks are reconfigured into the system.

3.3.2 Errors Displayed After a Full Installation

The first time you boot a system after a full installation, the device-naming verification fails. The error is reported as `wrong major number` and you are stopped in single-user mode. You can clear the error by executing the following command:

```
# dsfmgr -vF
```

This command performs a verification with the `fix` option. After issuing this command, you can continue to boot the system.

The problem is caused by the installation process on systems where the minimal installation kernel's device switch table differs from the one that is saved. When the previous configuration data is restored to the new disk, there is a mismatch of major numbers. This causes some devices to be incorrectly created as cluster devices or causes cluster devices not to be created as cluster devices.

3.4 Update Installation

Version 5.0A supports update installations from Versions 4.0F and 5.0.

To update your Tru64 UNIX operating system software to Version 5.0A, you must use the `installupdate` utility or full installation procedures as described in the *Installation Guide*.

Note that the `-i` flag for the `installupdate` command will be retired in a future version of Tru64 UNIX. See Section 2.2.9 for more information.

The `installupdate` procedure checks to see if there is enough space on the disk you have selected to do the installation. If there are any conflicts, the `installupdate` procedure enables you to remove unecessary files to create space. For more information, see the *Installation Guide*.

The following sections apply to the update installation procedure.

3.4.1 Adaptec AIC-789x Ultra SCSI Driver Support

If you update a Version 4.0F system that supports the Adaptec AIC-789x Ultra SCSI Driver to Version 5.0A, the Adaptec Driver will no longer be supported.

This support was provided in Version 4.0F by the New Hardware Delivery-3 kit. Support for this device on Version 5.0A systems, will be provided through a later version of the New Hardware Delivery kit.

3.4.2 Hardware Product Kit

If the Update Installation process detects an installed hardware product kit, you are prompted to insert the appropriate version of the hardware product kit CD–ROM.

You can bypass the update of the hardware product kit by pressing the Return key at the Enter kit location prompt and continue the update installation.

You can decide to bypass the update of the kit, although this is not recommended, if you do not have the current hardware product kit CD–ROM in your possession or if you do not want to update the hardware product kit at all.

3.4.3 Update Installation Might Exit While Removing SVE

If the update installation detects that the System V Environment (SVE) product is installed on the system, it asks for that product to be removed. If the `SVEADM` subset is installed, the update installation is terminated by the removal of the `SVEADM` subset. The cause of this is an `init` command present in the `SVEADM` subset control program (`.scp` file).

To avoid this problem, remove the `SVEADM` subset prior to running the update installation by performing the following steps:

1. Determine the exact subset name by issuing the following command:

   ```
   # setld -i | grep SVEADM | grep installed
   ```

2. Remove the subset by using the `setld -d` command and the name of the subset.

3.4.4 Reconfigure Mail After an Update Installation

After performing an update installation on any system running an earlier version of the operating system, you must reconfigure mail by using either `/usr/sbin/mailconfig` or `/usr/sbin/mailsetup`. The new `sendmail` configuration will ensure that all mail leaving your system has a fully qualified return address and your mail configuration is cluster-ready.

You must use the application that was used to create the current `sendmail.cf` file; otherwise, you will lose your previously saved configuration.

If you use the /usr/sbin/mailsetup program, the following message might be displayed:

```
An m4 configuration file has been found and it is different
from the default produced by mailsetup.  Mailsetup does not
support a /var/adm/sendmail/sendmail.m4 file which has been
modified.  Use this file at your own risk.  Do you wish to
use this file (y/[n]) ?
```

If you want sendmail to fully qualify the return address when leaving the system and to be cluster-ready, answer no. If you do not want these features, answer yes.

3.4.5 Failure to Merge /var/adm/sendmail/sendmail.cf

If you have a client mail configuration created by mailsetup and perform an update installation from Version 4.0F, the /usr/adm/sendmail/sendmail.cf merge process fails to update IMAP rules. You can ignore this error.

If you want to use IMAP in a client configuration, rerun the configuration using either mailsetup or mailconfig.

3.4.6 Additional Disk Space Needed

If your system does not have enough free disk space to complete the update installation, you are presented with a list of three options to recover additional disk space.

If you remove software subsets belonging to the Operating System (OSF) or Worldwide Language Support (IOS) products to recover disk space, the update installation process must recalculate the disk space amount listed in the Total Needed category. Allow the update to continue so it can recalculate the disk space based upon the currently installed software subsets.

3.4.7 Core Files Present After Update Install

Due to a change in the stat system call, it was necessary to modify the update installation process so that the new executables could be run on a previous release of the operating system during the update process. However, after the update completes, the modifications are no longer accessible and therefore some commands fail.

The umount command is one of the commands that fail. The core files for this command are placed in the root directory.

The failure of these commands does not impact the successful completion of the update installation process.

3.4.8 PanoramiX ADK

If you previously installed the Advance Developers kit (ADK) for the PanoramiX extension to the X server, you must remove it before doing an update installation of Tru64 UNIX Version 5.0A. If you do not, the X server will not start. If this happens, do the following:

1. Log in as root.
2. Remove the ADK.
3. Replace the X server configuration file with the original version of the Tru64 UNIX Version 5.0A file, `/var/X11/Xserver.conf`.
4. Run the `xlogin start` command.

3.4.9 Ignore clu_get_info Warnings

When the update installation process determines that there is not enough disk space to complete the process, you can use the Remove Software Subsets option from the Recover of Disk Space dialog box. While subsets are being deleted, the following message might be displayed:

```
Deleting subset_description_and_name/updmnt/isl/setld:
clu_get_info: not found
```

You can ignore these warnings; they do not affect the operation of the update installation process or the removal of the subsets.

3.5 RIS Installation

This section provides notes pertaining to Remote Installation Services (RIS).

3.5.1 Time Zone Restriction

New time zones have been added to this version of the operating system. Therefore, servers that might have indicated the US-Eastern time zone while running an earlier version of the operating system now indicate a time zone such as America-New York.

When you install an earlier version of the operating system on a client from a RIS server running Tru64 UNIX Version 5.0A, the earlier version of the operating system does not recognize the time zone and does not automatically set the time zone during the installation procedure. This occurs because the new time zones do not match those in the earlier versions. Therefore, you must set the time zone manually after the installation.

3.6 Dataless Server Installation

This section provides notes pertaining to Dataless Server installations.

3.6.1 Restriction Using TruCluster Server

TruCluster Server Version 5.0A does not support the Dataless Management Services (DMS).

4

Processor-Specific Notes

This chapter contains general notes that apply to all processors and specific notes that apply to the following systems:

- Personal Workstation 433au, 500au, and 600au systems (Section 4.2)
- AlphaServer 1000 and 1000A Systems (Section 4.3)
- Alpha VME and PCI/ISA (DMCC) Modular Single-Board Computers (Section 4.4)

Do not attempt to install Tru64 UNIX Version 5.0A without first reading the notes appropriate to your processor. Failure to read these notes can result in installation problems. Also, before you start your installation, be sure to review the hardware documentation that came with your system.

4.1 General Notes on Processors

The following sections apply to more than one processor type.

4.1.1 Upgrading Your Hardware

You can follow the instructions in the *Installation Guide* and those provided by your hardware and firmware documentation when you add new options or change your system hardware. However, if the new option is supported only in the newest version of Tru64 UNIX, you must perform the upgrade in the following sequence:

1. Update your operating system software to Tru64 UNIX Version 5.0A.
2. Upgrade your firmware.
3. Upgrade your hardware or install the new option.
4. Follow the instructions in Chapter 2 of the Tru64 UNIX *Installation Guide* to rebuild your system kernel.

4.1.2 KZPSA Behind the PCI-to-PCI Bridge

On AlphaServer 1000A and 2100A class systems, updating the firmware on a KZPSA SCSI adapter is not supported when the adapter is behind the PCI-to-PCI bridge. See your hardware installation guide for further information. A later version of the console firmware will support this feature.

4.1.3 Qlogic ISP1040B CAM Errors

On systems with a Qlogic ISP1040B option, CAM errors like the following might occur when you boot the system:

```
pci2000 at pci0 slot 8
isp0 at pci2000 slot 0
isp0: QLOGIC ISP1020A
cam_logger: CAM_ERROR packet
cam_logger: bus 0
isp_probe
NVRAM parameters invalid, using driver Fast10 defaults
```

To alleviate the error, you must use the `eeromcfg` utility to program the NVRAM with the proper set of parameters. The `eeromcfg` utility is provided in the */mnt-pnt*`/utility` directory of the *Alpha Systems Firmware Update* CD–ROM. Consult the `readme.txt` file in that same directory for information about how to use the utility.

4.1.4 DJ-ML200-xx PCI NVRAM Hardware Revision

The revision of the ML200-xx 2/4/8MB PCI NVRAM adapter must be revision E01.

4.1.5 Limited Monitoring of the HSZ and HSG Hardware

When using SWCC with HSZ or HSG controllers, you must use Version 2.3, or higher. Versions prior to Version 2.3 are not supported for use on Version 5.0, or later, of the operating system.

4.1.6 No Console-Level Multipath Support for Some Older Systems

The console firmware on the DEC 3000, DEC 4000, DEC 7000, AlphaServer 1000, AlphaServer 1000A, and AlphaServer 2x00 systems does not support selecting multiple boot or dump devices for storage units located behind HSZ70, HSZ80, or HSG80 Raid Array controllers enabled for multiple-bus failover mode.

The console must have a visible path to the storage unit that it is booting from or to which it is dumping. If a controller, in multiple-bus failover mode, fails over to the other controller, all devices served by the failed controller are now visible on alternate paths. Therefore, before booting the system, reset the `bootdef_dev` console environment variable to a path that is visible to the boot device.

After the operating system has been booted, multipath support is fully functional.

4.2 Personal Workstation 433au, 500au, and 600au Systems

The following notes are specific to Personal Workstation class systems.

4.2.1 64-Bit PCI Option Cards

The 64-bit PCI slots, slots 4 and 5, are intended only for those cards listed in the *Systems and Options Catalog* as supported for slots 4 and 5. The console prevents system operation and displays the following error if an unsupported card is present in these slots (*n*):

```
Illegal device detected on primary bus in physical slot n
Power down the system and remove the unsupported
device from slot n
```

4.2.2 Incorrect Default Keyboard Mappings

If you use a PCXLA-NA keyboard on a Compaq Personal Workstation 433au, 500au, or 600au class system, the keys will not map properly unless you reconfigure the keyboard driver to use the correct keymaps.

You can do this by executing the following command:

```
# sysconfig -r gpc_input kbd_scancode=2
```

If you prefer, you can use the `sysconfigdb` command to add the following entry to the `/etc/sysconfigtab` file:

```
gpc_input:
kbd_scancode = 2
```

Note that if you execute the `sysconfig` command to reconfigure the driver, you must do this every time you reboot the system. Using the `sysconfigdb` utility to make the change preserves the information across reboots, and no other user intervention is required.

4.3 AlphaServer 1000 and 1000A Systems

The following notes are specific to AlphaServer 1000 and 1000A systems.

4.3.1 EISA Configuration Utility Diskette Version 1.10

This note applies to users who utilize the onboard Cirrus VGA graphics controller.

The default setting for the VGA graphic controller when running the EISA Configuration Utility (ECU) Version 1.10 diskette is `Disabled`. For previous versions the default is `Enabled`.

When you run the ECU Version 1.10 for the first time on a system that was previously configured with an earlier version of the ECU diskette,

the setting for the onboard VGA graphic controller is automatically set to `Disabled`. While running the ECU, select Step 3: View and edit details and set the VGA graphic controller to `Enabled` before exiting. If you do not set the VGA graphic controller to `Enabled` prior to booting Tru64 UNIX, your X server will not start and you will use generic console support when you boot Tru64 UNIX.

4.3.2 Graphics Resolution

The default graphics resolution for Compaq AlphaServer 1000A systems containing built-in Cirrus video with 1 MB of video RAM is 1024x768. If the optional 512 KB of video RAM is not present, Tru64 UNIX supports resolutions of 640x480 (by default) or 800x600 only.

The default resolution for Compaq AlphaServer 1000 systems that contain built-in Cirrus video with 512 KB of video RAM is 640x480. This configuration also supports 800x600 resolution.

To use 800x600 resolution, edit the following line in the `/usr/lib/X11/xdm/Xservers` file:

```
:0 local /usr/bin/X11/X
```

Change the line to:

```
:0 local /usr/bin/X11/X -screen0 800
```

To use 800x600 resolution for the CDE Session Manager, edit the following line in the `/usr/dt/config/Xservers` and `Xservers.conf` files:

```
:0 Local local@console /usr/bin/X11/X :0
```

Change the line to:

```
:0 Local local@console /usr/bin/X11/X :0 -screen0 800
```

Before editing these files for XDM or CDE, be sure that your system's monitor supports 800x600 resolution.

4.4 Alpha VME and PCI/ISA (DMCC) Modular Single-Board Computers

For information about configuring the operating system on Alpha VME single-board computers (SBCs) and PCI/ISA EBMnn modular SBCs, see the *System Configuration Supplement: OEM Platforms*. (The PCI/ISA modular systems and components product family was formerly known as DIGITAL Modular Computing Components, or DMCC.)

5

Base System Software Notes

This chapter contains notes about issues and known problems with the base operating system and, whenever possible, provides solutions or workarounds to those problems.

The following topics are discussed:

- Commands and utilities (Section 5.1)
- SysMan system management applications (Section 5.2)
- System administration (Section 5.3)
- Network and communications (Section 5.4)
- Local Area Transport (LAT) (Section 5.5)
- File systems (Section 5.6)
- Logical Storage Manager (LSM) (Section 5.7)

5.1 Commands and Utilities

The following notes apply to commands and utilities.

5.1.1 Escaped Comment Symbols in a Makefile

The `make` command will not recognize escaped comment symbols as literal characters in a Makefile. Comment lines that begin with a number sign (#) and all text following this symbol up to the end of the line are considered part of a comment. This is true even if the symbol is preceded with a backslash (\).

5.1.2 Editing an HTML File with XEmacs

If you use XEmacs to edit an HTML file, it looks for an entry corresponding to the email ID in an `.emacs` file. If this file does not exist or if the entry is not found, XEmacs prompts the user for the mail ID and this information is updated in the `.emacs` file.

5.1.3 Problem with the at Command During Daylight Saving Time

The `at` command can have a problem scheduling jobs during daylight saving time (DST) in time zones and countries where daylight saving time applies.

The problem occurs for jobs set to execute during the transition hour on the day the clocks are set ahead.

Currently, if you schedule a command to run during the hour in which the clocks are set ahead, the command will run an hour earlier. For example, if you schedule a job to run at 2:30 AM on the day the clocks are set ahead, the job will be executed at 1:30 AM, which is one half hour before 3:00 AM.

Alternatively, you can schedule the job to run an hour later. Then it will run between 3:00 and 4:00 AM.

5.1.4 Change in the Behavior of the cron Daemon

In previous releases, the `cron` daemon would periodically clean files such as `/var/adm/cron/log` and `/var/adm/messages` by default.

These tasks have been removed from the root `crontab` file, `/var/spool/cron/crontabs/root`. Therefore the `cron` daemon does not clean up these files by default.

If you want the `cron` daemon to clean up these files, add the entries into your root `crontab` file.

5.1.5 Regular Expression Subexpression with Alternatives

The regular expression functionality does not function properly for expressions that include subexpressions with alternatives that use global match keys. For example, the following command does not function properly:

```
# grep -E '(ab.*|in)=' file
```

This problem is known to cause problems with the `calendar` command and may effect other utilities that rely on complex regular expression syntax.

5.1.6 Netscape Communicator

The following notes apply to the Netscape Communicator.

5.1.6.1 Netscape Communicator Dumps Core Running in CDE

Netscape Communicator dumps core when the application posts a file selection dialog (`XmFileSelectionBox`). Typically, this occurs when you are running the application in the Common Desktop Environment (CDE) and select the Save As option in the File pulldown menu of the Navigator browser. It can also occur when you select a link to download a file or save an attachment to a mail message in the Messenger Mailbox component.

To avoid this problem, invoke Netscape using the following script:`/usr/bin/X11/netscape`.

As long as this script is used to start Netscape Communicator, the application will display the file selection dialog within CDE without core dumping. Use the `-xrm '*nsMotifFSBCdeMode: True'` command-line option if you are starting Netscape Communicator using some other means.

For more information, see the Communicator on UNIX release notes at the Netscape Web site:

http://home.netscape.com/eng/mozilla/4.0/relnotes/unix-4.0.html

5.1.6.2 Deleting Multiple Mail Messages Causes Netscape Communicator to Dump Core

Deleting multiple mail messages in Netscape Communicator's Messenger Mailbox component sometimes causes Communicator to dump core. Usually, it requires several multiple deletions of mail to make Communicator dump core. If Communicator does not dump core immediately, deleted messages might reappear in the mail folder from which they were deleted.

5.1.6.3 Netscape Communicator Dumps Core Intermittently

Netscape Communicator intermittently dumps core and returns the following error in the terminal window from which it is started:

```
Memory Fault - (core dumped)
```

This core dump occurs with different hardware and software configurations and under different circumstances. Sometimes it hangs for a time, taking most of the CPU time, then it crashes. At other times, its process has to be killed and the application restarted. Numerous problems of this nature have been reported. None are resolved at this time and no workaround is available. In all cases, the behavior cannot be reproduced consistently.

5.1.6.4 Cannot Delete Mail Messages from Inbox to Trash When Using IMAP Server

After upgrading from a previous version of Communicator, an IMAP mail user cannot move messages to the Trash folder in the Messenger component. All Delete options in the user interface are insensitive (greyed-out). Setting the Move it to trash folder option in the IMAP mail server preferences window does not work. This behavior is the result of a new feature in Netscape Communicator that might require user customization after upgrading to the latest version.

Starting with Netscape Communicator, the Namespace extension to the standard IMAP protocol is used to locate the users' folders on the IMAP mail server. This feature does not work if you are using an older IMAP server that does not support the Namespace extension to the protocol. Use

the following procedure to customize Netscape Communicator to be able to locate a user's Trash folder on an old IMAP server:

1. Select the Preferences option in the Edit pulldown menu and choose the Mail and News Servers option in the Preferences window.
2. Select the Mail Servers option from the list of Mail and News Servers options.
3. Select the IMAP server from the list of servers and choose the Edit button to edit the server configuration.
4. Choose the Advanced tab in the pop-up dialog box.
5. Ensure that the Namespace field in the tab reads as follows (quotes and period included):

   ```
   Namespace: "INBOX."
   ```

6. Click on the OK button in the pop-up window and again in the Preferences window to save the settings.
7. Exit and restart Communicator.

You can now move messages to the Trash folder and all the Delete options will now be sensitive (dark letters). Because IMAP mail server configurations differ (including the location of the user's folders on the server), check with your IMAP mail server administrator if the preceding procedure fails to resolve the problem.

5.1.6.5 Communicator Returns sh: /usr/bin/X11/showps: not found

When you select a link to a PostScript file in the Navigator component of Communicator, it might return the following error message:

```
sh: /usr/bin/X11/showps: not found
```

The `showps` helper application has been retired from Tru64 UNIX as a result of licensing changes to Adobe Display PostScript. The user might have customized the PostScript Document MIME type to use the `showps` helper application in `$HOME/.mailcap` and `$HOME/.mime.types` files.

To resolve this problem, you must obtain a new PostScript viewer and reconfigure the helper application for the PostScript Document MIME type in Communicator. Use the Edit option in the Edit->Preferences->Navigator->Applications pulldown menu of Communicator to edit your PostScript Document helper application and replace `/usr/bin/X11/showps` with the path to your new PostScript viewer.

5.2 SysMan System Management Applications

The following sections apply to restrictions on using the SysMan system management applications.

5.2.1 SysMan Account Manager

You cannot delete a user using the SysMan Account Manager application while the `dxaccounts` application is running. If `dxaccounts` is running and you try to delete a user using the SysMan Account Manager application, the Account Manager application displays the following warning message:

```
/etc/.AM_is_running existing
```

If you continue the deletion operation, the Account Manager displays the following error message and the application hangs:

```
Error: key userName UID not found in /account_management/local
_passwd_table
```

If this occurs, kill the hung process. Look for the following entry in the process table:

```
sysmansh /usr/share/sysman/menu/tasks/account_management
```

5.2.2 Tcl Error Can Occur During DNS (BIND) Configuration

During the DNS client configuration, the following steps might result in an Out Of Order Hide Tcl error:

1. Enter a domain name in Local Domain.
2. Add DNS servers.
3. Choose OK in the main window.
4. Choose Yes to update the system host name to reflect the host name with new domain name.
5. Choose Yes to add "localhost" to access control list? option.

At this point a Tcl Stack Error can occur. However, the data is not lost.

Because all the data entered by the user is committed by the DNS client application, kill the DNS client application and restart the DNS configuration using the SysMan DNS to avoid this problem.

5.2.3 Large Integer Values in Configuration Applications

Entering a very large integer value (on the order of 10^{19}) in numeric fields in some system configuration applications can cause a stack trace. Such large integers are not appropriate values for these applications. Therefore, this problem is not expected to impede you from configuring your system.

5.2.4 Error Message When Using sysman -cli -set values Command

If you use the `sysman -cli -set values` command to change specific values for an existing row in the table defined by the group `staticRoutes`, you might receive an error message. For example:

```
# sysman -cli -set values -comp routing -group staticRoutes\"

 -attr gateway=1.2.3.4 -key1 "dummy system 1.1.1.1"
Error: "SYSMAN_NO_DATA"
No row exists with the specified key: 'dummy system 1.1.1.1'
```

If a row with the defined key is present in the `staticRoutes` group, you can ignore this message. In any case, you can verify that the row was modified properly by issuing the following command:

```
# sysman -cli -list values -comp routing -group staticRoutes
```

5.2.5 Problem with sysman -cli When Setting Values Interactively Using the -attr Option

The following command nullifies the value of the selected attribute (`attr`) when using the interactive mode:

```
# sysman -cli -set value -comp comp -group group -attr attr
```

To avoid this problem, use the following syntax:

```
# sysman -cli -set value -comp comp -group group
-attr attr = newvalue
```

5.2.6 The -noverbose Argument on sysman -cli When Setting Values Causes Errors

The `-nonverbose` option does not function properly when setting values. Therefore, do not use `-nonverbose` when setting values using the `sysman -cli` command.

5.2.7 Problem When Reconfiguring Network Interface Cards

If you use a SysMan application to reconfigure a network interface card (NIC) and you change the host name, the `HOSTNAME` variable in the `/etc/rc.config` file is not updated.

If the system has a single network interface card, you can correct this problem by performing the steps in the following procedure. If the system has more than one network interface card and you changed the host name of

the primary card (that is, the card with the same host name as the system's host name), do the following to correct the problem:

1. Use the `rcmgr set HOSTNAME` command to set the `HOSTNAME` to the correct name. For example:

   ```
   # rcmgr set HOSTNAME abcxyz.com
   ```

2. Use the `hostname` command to change the host name to the correct value in the kernel. For example:

   ```
   # hostname abcxyz.com
   ```

3. Use the `xhost` command to add `localhost` to the access control list of the local Xserver, as follows:

   ```
   # xhost + localhost
   ```

5.2.8 SysMan Applications

The `sysman` configuration and administration utility does not work on hardware configurations within the following locales:

- `tr_TR.ISO8859-9`
- `tr_TR.ISO8859-9@ucs4`

To avoid this problem, set the `LC_ALL` and `LANG` environment variables to C when you run the `sysman` utility.

5.2.9 NTP Configuration Restriction

If you edit the `/etc/ntp.conf` file manually and subsequently run the SysMan NTP client configuration utility, your changes might be lost.

The SysMan NTP client configuration utility understands only a small subset of the commands that can be used in the `ntp.conf` file. When the NTP client configuration utility reads the `/etc/ntp.conf` file, it ignores commands it does not understand and it does not output those commands when rewriting the file. It also does not allow you to enter commands it does not understand. For example, it does not allow you to enter commands using the `sysman -cli` command.

If you want to configure your system as an NTP sever or your configuration requires a more complex `ntp.conf` file than SysMan can produce, edit the `ntp.conf` file manually and do not use the SysMan utility to modify it. For more information, see the *Network Administration* guide and the `ntp.conf`(4) and `xntp.conf`(8) reference pages.

5.2.10 NTPconfig Error When Fudge Is Checked for Peer

On the Add (or Modify) NTP Servers/Peers window, the fudge factor toggle is disabled when you select peer mode. If fudge factor was already checked, it remains checked after peer mode is selected. Subsequently clicking OK or Apply causes a validation error to be reported.

To avoid this problem, change back to server mode, uncheck fudge factor, and return to peer mode.

5.2.11 NIS Configuration and Enhanced Security

The `sysman nis` configuration for an NIS master server does not build the `prpasswd` maps required for enhanced security. To build the maps, execute the following commands, after running the NIS configuration:

```
# cd /var/yp
# make prpasswd
```

5.2.12 Checkmarks Do Not Appear in Checklist

Checkmarks are supposed to appear next to a task's icon after the task is run from the System or Custom Setup graphical application (`/usr/sbin/checklist`).

The checkmarks do not appear. Therefore, there is no indication as to whether the task has already been run.

5.2.13 Starting the automount Daemon with an Empty Argument List

To start the `automount` daemon with an empty argument list, use the Configure system as an NFS client item of the Network File System (NFS) option. The option is provided by either the `nfsconfig` utility or the SysMan Menu.

Do not use the {Re}start NFS daemons item. It will restart the `automount` daemon with default arguments instead of the empty argument list and reset the `AUTOMOUNT_ARGS` parameter in the `rc.config.common` file to the default arguments. If this happens, restart the `automount` daemon using the Configure system as an NFS client item. This will reset the `AUTOMOUNT_ARGS` parameter to the empty argument list.

5.2.14 SysMan Menu

The notes in this section apply to the SysMan Menu application. Also see Section 8.11.1 for information related to online help.

5.2.14.1 Installation Branch Hangs When Run in Background

The Install software, List installed software, and Remove installed software tasks in the Installation branch of the SysMan Menu hang if you run the SysMan Menu in the background. Do not run the SysMan Menu in the background if you plan to use these tasks in Installation branch.

5.2.14.2 Installation Branch Is Not Supported for Clusters

Do not run the SysMan Menu Installation Branch in a cluster environment. The Install software, List installed software, and Remove installed software tasks in the Installation Branch of the SysMan Menu do not work on a cluster system.

5.2.14.3 Some Tasks Can Only Be Run by the root User

Each of the tasks in the SysMan Menu is associated with an action name. The task's action name is the same as its accelerator as displayed by the `sysman -list` command. These action names are associated with privileges by the Configure Division of Privilege (DOP) application in the SysMan Menu. Non-root users can be granted the privilege to run specific actions. There is a problem where several SysMan Menu tasks do not have a required privilege associated with their actions. You can perform these tasks only when you are logged in as root. These tasks are:

- View hardware hierarchy
- View cluster
- View device information
- Manage Cluster File System
- Manage DRD Storage
- Cluster Alias Manager

Note that in order to perform cluster tasks, the system must be a member of a cluster.

5.2.14.4 Running the SysMan Menu Standalone on a PC Fails to Launch Tasks

When you run the SysMan Menu from a PC, you might encounter the following problems:

- Sometimes multiple logins are required. You are asked for your username and password each time you launch a task.
- Sometimes tasks fail to run. No error is displayed. The task window is just not displayed.

To avoid these problems, run the SysMan Menu from within the SysMan Station by doing the following:

1. Start the SysMan Station either from the Start menu or from a web browser.
2. Choose the Hardware view.
3. Right click on a host icon and choose the SysMan Station.

5.2.14.5 Manage Local and NIS Users

The Manage local users and Manage NIS users tasks in the SysMan Menu are front ends for the `useradd`, `usermod`, and `userdel` commands. If a warning message is displayed when a user account is added or modified, the change to `/etc/passwd` file has completed successfully. However, the Manage local users and Manage NIS users tasks do not correctly display the changes in their dialog boxes. This happens in the following cases:

- When you are adding or modifying a user and specifying a primary or secondary group that does not exist.
- When you are adding a user with Create Home Directory enabled but the user's home directory already exists.

To correct this problem, exit the task and restart it. The correct attributes for the user will now be displayed.

5.2.15 SysMan Station (SMS)

The notes in this section apply to the SysMan Station (SMS). Also see Section 8.11.2 for information related to online help.

5.2.15.1 Incorrect Launch Status

SMS checks the status returned by all the applications that it launches. A few applications incorrectly exit with non-zero (failure) status returns even though the tool has launched successfully.

5.2.15.2 Objects Might Not Display Properly from Internet Explorer

Objects might not display properly in SMS View windows when running SMS from a PC using the Internet Explorer web browser. Sometimes objects are overlayed on top of each other in the upper left-hand corner of the display window.

To correct this problem, select the Show All option from the Action menu to redraw the display properly.

5.2.15.3 Cannot Restart the Client in a Web Browser

When you are running the SMS client from a web browser, if you exit the Sysman Station and attempt to restart it by returning to the URL (`http://`*`your_machine`*`:2301`), the client will not restart.

You can correct the problem by restarting the browser. The client will load properly from the URL.

5.2.15.4 Client 5–Minute Timeout

If the SMS server (`smsd`) is restarted while there are active SM Station clients, the clients will keep an active network connection that times out after 5 minutes have elapsed. Attempts to use the `/sbin/init.d/smsd start` during this 5–minute interval will fail to restart the server because it cannot access the required network port. You must wait for the 5–minute timeout to elapse before you can restart the SMS server.

You can also check to see if any clients are using the network port with the following command:

```
/usr/sbin/netstat -a | grep 596
```

If no matches are found, you can restart the SMS daemon (`smsd`).

5.2.15.5 Physical_Filesystems View Displays Two Disk Objects for LSM File Systems

Two disk objects are displayed in the Physical_Filesystems view for each file system that uses LSM. One disk object represents the LSM private region, the other represents the LSM public region.

5.2.15.6 Icons Indicating Warning or Failed States

Objects in a failed or warning state are depicted in the SysMan Station's Hardware view using a red or yellow highlight for the object's icon. A very small number of objects do not have warning or failed icons. In this case, the object's label does correctly indicate that it is in a warning or failed state.

5.2.15.7 Group Icons Are Not Available for Some Objects

When objects are grouped together, a special group icon is used to represent the grouping. A small number of objects do not display a group icon when an object group is formed. In these instances, the group's label will correctly indicate that the icon represents a group.

5.2.15.8 Some Tools Might Not Execute with Proper Priviledges

Some tools may not execute with the proper privileges when launched from within the SysMan Station (SMS). This occurs only for users whose group is privileged in the Division of Privileges (DOP) database but the users themselves are not. Also, this is only a problem when launching X11 applications; suitlets will work properly.

If this problem occurs, error messages are displayed that indicate you do not have the appropriate permissions to make modifications or that you must be root to run the application.

To avoid this problem, launch the applications directly from the command line. For example, to launch the X11 Account Manager application, enter the following on the command line:

```
# dop X11:accounts
```

5.2.15.9 Multiple AdvFS Volumes Might Not Appear Properly

When multiple volumes are added to AdvFS file domains, the new AdvFS volume objects might not appear in the SMS AdvFS Filesystem and Physical Filesystem view windows.

You can correct this problem by restarting the SMS daemon (`smsd`). To restart the `smsd` daemon, exit all connected SMS client sessions and issue the following command:

```
# /sbin/init.d/smsd restart
```

5.2.16 Configuring Tru64 UNIX from Other Systems

You can now configure Tru64 UNIX from Linux systems. The following section provides information on how to install the SysMan client on these systems.

5.2.16.1 Installing the SysMan Client on a Linux System

You can configure a system running Tru64 UNIX from a system that is running Linux using Java by performing the following steps:

1. Download the `/usr/share/sysman/web/classLib/suit.jar` file from the Tru64 UNIX system to your Linux system and add the full path of that file to your `CLASSPATH` environment variable.

   If you use `csh` and you downloaded the `suit.jar` file to `/usr/local/lib`, use the following syntax:

   ```
   setenv CLASSPATH $CLASSPATH:/usr/local/lib/suit.jar
   ```

If you use ksh and you downloaded the suit.jar file to /usr/local/lib, use the following syntax:

```
CLASSPATH=$CLASSPATH:/usr/local/lib/suit.jar
export CLASSPATH
```

2. Run SysMan Menu with the following command, substituting the name or IP address of your Tru64 UNIX computer for *HOST*:

   ```
   java suit HOST sysman
   ```

   Alternatively, you can run a SysMan task directly by substituting the accelerator for sysman. For example:

   ```
   java suit HOST ntp_config
   ```

You can redirect the standard output to /dev/null if you do not want to see the diagnostic messages that SysMan prints when run in this fashion.

SysMan has been tested on RedHat Linux Version 6.0 and SuSE Linux Version 6.0 on Intel using Version 1.1.7 of the Java Run-time Engine (JRE). Other versions of Linux and Java might also work.

5.3 System Administration

The following notes apply to system administration.

5.3.1 Boot Sequence Stops in Single-User Mode After Core Dump

A problem exists that causes the boot sequence to stop in single-user mode and display the following message:

```
/sbin/dn_setup: 1048647 Memory fault - core dumped
bcheckrc: Device Naming failed boot configure or verify.
Please correct the problem and continue or reboot

INIT: SINGLE-USER MODE
#
```

This problem is most likely to occur every time you boot systems with Fibre Channel devices or once if you have changed the hardware configuration between boots.

The problem occurs after the dsfmgr command has successfully completed during the exit cleanup routines.

Data integrity is not compromised and there is no corrective action required, except to remove the core file left in the root directory (/core or /core.dsgmgr*).

You can continue the boot process by pressing Ctrl/d to exit single-user mode or by initiating multi-user mode with the init 3 command. Alternatively, you can reboot the system, provided there are no Fibre Channel devices connected to the system.

5.3.2 Restriction on the hwmgr Command

Do not use the `hwmgr -refresh component` command.

In certain cases, using the `hwmgr -refresh component` command prevents the `dsfmgr` command from creating new device special files and the problem cannot be corrected using the `dsfmg r -vF` command. This problem may prevent you from being able to reboot the system without manual intervention to correct the problem.

To avoid this problem, Use the `hwmgr -delete comp -id`*number* to remove extraneous entries from the hardware component, SCSI, and hardware topology databases.

5.3.3 Account Manager

The following notes apply to the Account Manager, `dxaccounts`.

5.3.3.1 General Restrictions

The Account Manager has the following restrictions on both base security and enhanced security (C2) systems:

- When copying user accounts via cut and paste or drag-and-drop, the Allow Duplicate UIDs option in the General Preferences dialog box is honored. For example, when making a copy of a user account that has a UID of 200, if the Allow Duplicate UIDs check box is off (the default), a unique UID is automatically generated for the resulting copy. If the Allow Duplicate UIDs check box is on, then the copy will have an identical UID. The same rules apply to copying groups.
- Leading and trailing white space is not stripped from text entry areas. This can lead to confusion. For example, if a field in the Find dialog box contains a space character before the desired search string, the search string will not match because of the spurious space character.
- Using mouse button 1 (MB1) to drag-and-drop user accounts, groups, or templates does a copy operation, not a move operation. This is different from the CDE/Motif default where MB1 performs a drag-and-drop move operation and Shift/MB1 performs a copy operation. For example, if you use MB1 to drag a user account from the Local Users view and drop it in the NIS Users view, you create a copy of that user account in NIS. To avoid this problem, delete the original icon after the copy has been completed.
- If you change a user's UID with the Account Manager, the ownership of the user's files and subdirectories does not change and, under certain circumstances, the home directory ownership may not change, either. For example, if you change the UID of user `johndoe` from 200 to 201, the

files and subdirectories under his home directory still belong to UID 200. Furthermore, if `johndoe` does not own his home directory, the ownership of that directory does not change. To avoid this problem, use the `chown` command to change the directory and files, if applicable.

- You cannot drag-and-drop items across different instances of the Account Manager. For example, if the Account Manager A on system 1 and the Account Manager B on system 2 are displayed on the same workstation, then you cannot drag-and-drop between Account Manager A and B. To avoid this problem, use the copy/paste feature to copy users, groups, or templates from Account Manager A to B. After paste operations, the Paste Errors dialog box might be displayed. You can ignore the error message and click OK to dismiss the dialog box.
- Although the Account Manager correctly allows two or more system administrators to work on the same password files simultaneously, only one system administrator can use the Account Manager at a time. If multiple instances of the Account Manger are run concurrently, the proper file locking occurs and new accounts can be added or modified. However, the local groups file, `/etc/group`, and the NIS groups file, `/var/yp/src/group`, are written out after modification of each group. Therefore, if more than one system administrator is working on the same file, the last one to change a group's view window overwrites any prior changes from a different system administrator. For this reason, running multiple, concurrent Account Manager instances is not recommended.

5.3.3.2 Account Manager and Enhanced Security

The following problems apply to the Account Manager application when running on systems with enhanced security:

- The Lock/Unlock Toolbar and Menu Options are inactive for the Template views. To avoid this problem, change the template lock setting on the Add/Modify Template dialog screen after selecting the template by double clicking on the template icon in the Template view icon box.
- The C1Crypt Encryption Type restricts the password length to between 6 and 8 characters, even though the Minimum Length and Maximum Length fields of the Password Controls imply otherwise. To avoid this problem, set the passwords by using the `/usr/tcb/bin/dxchpwd` or the `/usr/bin/passwd` command when using the C1Crypt Encryption Type.
- The Account Manager does not enforce the minimum and maximum password length limitations when setting passwords. To avoid this problem, set passwords by using the `/usr/tcb/bin/dxchpwd` or the `/usr/bin/passwd` command if the minimum and maximum password length limitation is necessary.

- On an enhanced security system, you typically retire user accounts instead of deleting them. However, there are times when you might want to delete a user account. Account Manager supports retiring user accounts but not deleting them. To delete a user account, do the following:

  1. Manually edit the `/etc/passwd` and `/etc/group` files to remove references to the user account.
  2. Use the following command to remove the user account from the protected password database:

     # **/usr/tcb/bin/edauth -r *user name***

- When you rename a user account by changing the Username field of the Add/Modify User dialog box in Modify mode, the protected password database entry for the old name does not change. To avoid this problem, use the following command to remove the dangling protected password database entry:

  # **/usr/tcb/bin/edauth -r** *user name*

- Do not rename a template by changing the Template name field of the Add/Modify Template dialog box in Modify mode. The Account Manager creates a new template without removing the old template, but renames, the old template's icon from the Icon Box. To avoid this problem, restart the Account Manager to restore the former template icon. Use the Delete Toolbar icon or the Edit->Delete... option from the Template view to delete the undesired template.
- Accounts and templates inherit their settings either from locally defined values in their protected password database entry or from the templates that they reference. All accounts and templates implicitly reference a default template that is not served by the Network Information Service (NIS). This creates an inconsistency for the Account Manager when displaying NIS user accounts and templates on a NIS master. The user and template values displayed might be the default template values of the NIS master. When a NIS user logs in to an NIS client, the NIS client's default template might be different from the NIS master's default template. The client's default template is used to establish the user's account settings.
- When you use drag-and-drop to copy a user account on a different view, the user's template references are copied by value. This means that the template itself is no longer referenced by the new account. Instead, the template's values are contained directly in the new user's protected password database entry. For example, assume the local user Joe has an account based on the developers template. If you drag-and-drop Joe's account from the Developers view into the NIS Users view, the attributes from the developers template are placed into the protected

password database entry for Joe's account. This preserves Joe's developer attributes and overrides any corresponding attributes from the default template for NIS users. To avoid this problem, modify the copied user's account and change the template from the default to the desired template. Note that the template reference is maintained if the user account is dropped within the same view.

- After deleting a template, the NIS maps are not remade. Therefore, you will have to manually remake the NIS maps or perform an Account Manager function (for example, Account Modification) that will remake the maps. To manually remake the maps, do the following:

```
# cd /var/yp
# make all
```

5.3.3.3 NIS Plus and Minus Accounts

The plus (+) and minus (–) signs are special characters used by NIS in the local `/etc/passwd` file that specify whether a user is or is not allowed to log into the system. Users with accounts that are preceded by a plus sign are allowed to log in, while users with accounts that are preceded with a minus sign are not. In the following example, the user `joe` would be allowed to log in to the local system and the user `harry` would not:

```
+joe::::::
-harry::::::
```

All the account management commands insist that the NIS user account exist before creating the corresponding plus or minus account. However, even when the NIS account does exist, the account management tools refuse to create the local plus or minus account. This problem affects the following applications and commands:

- Account Manager (`dxaccounts`)
- SysMan Menu's Manage local users and Manage NIS users
- The `useradd -t` and `usermod -t` commands

To avoid this problem, use the Account Manager (`dxaccounts`), add a plus (+) or a minus (–) sign to the username but do not use the NIS Overrides field in the Options subdialog box. This allows the account to be added correctly. Note that the `/etc/passwd` record will contain a UID and GID but these will be ignored and the user's NIS UID/GID will be honored.

5.3.4 EISA Configuration Utility Revision Requirements

For Tru64 UNIX Version 5.0A and its software supplements, the supported version of the EISA Configuration Utility (ECU) is Version 1.10 or higher. If your system is configured with an EISA bus, update the ECU to this supported version.

5.3.5 Alternate Root Installation May Change Host File Dates

During an alternate root installation of base operating system subsets, such as is done using the `dmu` utility to set up a Dataless Management Services environment, the file access dates on some of the files in the host server's file system might be changed to correspond to those from the subset's file inventory. When the release installed into the alternate root is different from that installed on the host system, these changed dates appear invalid because they may be newer (or older) than the actual file dates from the host system's installation kit.

This occurs when the `pax` utility is invoked by the `setld` utility to copy symbolic links from the kit subsets, and the symbolic links target absolute paths that correspond to actual files in the host system's file system. The `pax` utility attempts to adjust the dates for the symbolic link, but the file system actually adjusts the dates for the target of the symbolic link.

The changed dates have no operational impact on the host system. The content of the affected files is not changed. However, because the dates have changed, the behavior of utilities that examine file dates (such as the `find` command or archivers) might be affected.

5.3.6 Use db_checkpoint for Log Trimming

A customized version of the Berkeley Database (Berkeley DB) is embedded in this version of the operating system to provide high-performance database support for critical security files. The database includes full transactional support and database recovery, using write-ahead logging and checkpointing to record changes.

The `secconfig` utility enables you to create a `cron` job to perform log file trimming; that is, to delete log files no longer involved in active transactions.

The `db_archive` utility requires a log file checkpoint to determine when a log file is no longer in use. Under some circumstances, security activity may not generate checkpoints for long intervals. Therefore, add the following line to the `/var/spool/cron/crontabs/root` before the `db_archive` entry:

```
/usr/tcb/bin/db_checkpoint -1 -h /var/tcb/files
```

5.3.7 Swap Device List and /sbin/swapdefault Moved to /etc/sysconfigtab

The list of swap devices has moved from the `/etc/fstab` file to the `/etc/sysconfigtab` file. The use of `/sbin/swapdefault` to indicate the swap allocation modes has been moved to the `/etc/sysconfigtab` file.

The swap devices and swap allocation mode are automatically placed in the `/etc/sysconfigtab` file during installation.

Swap devices listed in `/etc/fstab` are ignored.

For more information, see the *System Administration* guide.

5.3.8 Compressed Crash Dump Might Display Incorrect Byte Count

If you have full crash dumps enabled on a machine with more than 2 GB of memory, the compressed crash dump message that displays the number of bytes will be less than zero. If a machine has over 4 GB of physical memory, the displayed value will overflow. For example:

```
DUMP: Will attempt to compress -688128 bytes of dump
    : into 3927949296 bytes of memory.
```

This problem is an artifact of the 32-bit integer math used in the `printf()` code that generates the message. It does not affect the results of the crash dump.

5.3.9 Security

The notes in this section have to do with system management and security.

5.3.9.1 Authentication Problem With Multi-Threaded Applications

Third-party applications that perform user authentication or impersonation from multiple threads, such as PMDF, will only correctly verify a user's group membership from the first thread. All other threads that call the `sia_get_groups` routine receive a failure status. This can lead to seemingly random behavior, in which a user's membership in a group of which the user is a legitimate member is sporadically denied.

5.3.9.2 Shadow Password Mode Requires 8–Character Passwords

When you configure enhanced security in Shadow Password mode, the default settings restrict users changing their passwords to a password of exactly 8 characters. Attempts to enter passwords of different sizes produce the following error message:

```
Password must be from 8 to 8 characters long
```

You can change this by setting the system default settings in the `/etc/auth/system/default` file, using the `edauth` utility. The `u_newcrypt` field defines the cryptographic algorithm used on password changes. The default setting of 2 causes the maximum password length to be restricted to 8 characters, which is the maximum that the BSD cryptographic algorithm can accept. Changing the `u_newcrypt` field to 0 invokes the

bigcrypt algorithm, which allows the value of the u_maxchosen field to determine the maximum password length.

The 8–character minimum occurs because the u_minchosen field defaults to zero. Zero specifies to compute a minimum according to Green Book rules. The computed minimum is 9. The minimum is therefore set to 8 because it would exceed the maximum of 8 characters for the algorithm. You can easily change this behavior by setting the u_minchosen field to a value other than zero.

Note that these defaults will change in a future release of Tru64 UNIX.

5.3.9.3 Security and Insight Manager

The Insight Manager agent (or daemon) is configured by default when you install the operating system. Anonymous login to WebAgent applications, enabled by default, allows nonprivileged users to invoke the Insight Manager and view details of any connected devices in the local area network, although users cannot perform any operations unless authorized. If this is not appropriate given your site security policy, see the *System Administration* guide for information on reconfiguring the Insight Manager agent.

5.3.9.4 Behavior of useradd, usermod, and userdel Commands

The useradd command correctly honors the default administrative lock value found in the /.sysman/Account_defaults file. If the Account_defaults file does not exist, the internal default for the useradd command is to create locked accounts. Use the administrative_lock_applied extended command-line option to override the default. In the following example, the useradd command creates a locked account for foo regardless of the default value for administrative lock:

```
useradd -x administrative_lock_applied=1 foo
```

For base security, a locked account has the text Nologin in the password field in the /etc/passwd file. If an account is unlocked and has no password, that account has no value in the password field. The account is open and accessible to anyone. A warning is displayed if an unlocked account with no password is created.

For enhanced security, all accounts have an asterisk (*) in the password field in the /etc/passwd file, but the lock flag in the protected password database is correctly set to reflect the lock status. As with base security, an unlocked account with no password is accessible to anyone.

The usermod command correctly sets the lock flags for enhanced security when the administrative_lock_applied option is given on the command

line. If you use the usermod command to unlock a locked account with no password, a warning is displayed.

The userdel command will retire, instead of remove, accounts on a system running enhanced security.

5.3.9.5 Prevent IP Spoofing Attacks

To detect and prevent an IP spoofing attack that can potentially result in a denial of service, configure the ifaccess.conf file to disable localhost as a source address.

For all adapters except the local loopback adapter (lo0), disable incoming packets with a source address of localhost (127.0.0.1). For example, add the following entry to the /etc/ifaccess.conf for tu0:

```
tu0     127.0.0.1   255.255.255.255  denylog
```

Then enable access filtering on tu0:

```
# ifconfig tu0 filter
```

5.3.10 Change in struct utmp, struct utmpx, and struct lastlog

To bring them into compliance with several UNIX and Internet standards, the struct utmp, struct utmpx, and struct lastlog structures have been changed. These changes affect the /usr/include/utmp.h, /usr/include/utmpx.h, and /usr/include/lastlog.h files :

- The time field in the struct utmp structure has changed from a time_t structure to a struct __ut_timeval structure (to be consistent with the /usr/include/utmpx.h file).
- The ut_host field size (in the struct utmp and struct utmpx structures) has been increased to comply with relevant Internet RFCs.
- The ll_line and ll_host manifest constants in the/usr/include/lastlog.h file have changed to allow their sizes to correspond to the ut_line and ut_host fields in struct utmp and struct utmpx structures.

These changes also affect the format of the /var/adm/utmp, /var/adm/wtmp, and /var/adm/lastlog files. The following conversion programs are supplied:

- /usr/lbin/wtmpconvert
- /usr/lbin/llconvert

The programs enable you to convert your existing /var/adm/wtmp and /var/adm/lastlog files to the new format or convert new format files to the old format for use by existing programs. See the corresponding reference pages for more information.

5.3.11 Argument Size Limit for the exec System Call

The amount of memory used by the arguments to the `exec` system call is limited by `sysconf(_SC_ARG_MAX)`, which is about 38 KB. You can exceed this limit systemwide by setting the `exec_disable_arg_limit` argument in the `sysconfigtab` file to 1 as follows:

```
# sysconfig -r proc exec_disable_arg_limit=1
```

When you set this argument to 1, the limit becomes an amount that is slightly less than the maximum stack size for the process, which is typically 8 MB or more. When you set the `exec_disable_arg_limit` argument to 1, `sysconf(_SC_ARG_MAX)` incorrectly reports that the limit is 38 KB. However, programs that rely on this value will not be limited to 38 KB and will function normally.

It is unlikely that programs will require more than 38 KB of memory; however, test suites that test this limit and expect an error return when `sysconf(_SC_ARG_MAX)` is exceeded will not obtain their expected result. If you are running test suites that expect an error return when this limit is exceeded, leave the `exec_disable_arg_limit` argument set to 0. Otherwise, it is recommended that you set this argument to 1.

5.3.12 Startup Messages Lost in Large Configurations

On systems that display a large number of console messages at system initialization (typically, systems configured with a large number of devices), some messages may be missing from the `/var/adm/messages` file. You can correct this problem by increasing the size of the kernel's message buffer.

Use either of the following procedures to change the buffer size. You must be root to make the change.

To change the buffer size using graphical administration tools, use the following steps:

1. Start the `dxkerneltuner` application.
2. Select the `generic` subsystem.
3. Set the Boot Time Value entry for the `msgbuf_size` attribute to the new value.
4. Apply the change before exiting.

To change the buffer size from the command line, use the following steps:

1. Create a temporary file, `/tmp/msgbufsize`, containing the following lines, but replacing the 32768 with the size appropriate for your system:

```
generic:
msgbuf_size = 32768
```

2. Enter the following command:

   ```
   % sysconfigdb -f /tmp/msgbufsize -m
   ```

   If a different entry is present in the database, `sysconfigdb` displays a warning message to advise you of the change in size.

The increase takes effect at the next system reboot. After rebooting, you can verify the change by entering the following command:

```
% sysconfig -q generic | grep msgbuf_size
```

Note

The default size of the message buffer is 4 KB, and the example above sets it to 32 KB. Because the space used by the buffer is not returned for general use after initialization, set the size only high enough to correct the problem.

See the *System Administration* guide for information on changing the buffer size.

5.3.13 Insight Manager

This section provides information on the Insight Manager.

5.3.13.1 Insight Manager Known Problems

The following problems exist in the current version of the Insight Manager:

- The Compaq SNMP subagent might dump core while processing verbose messages in the `/var/adm/messages` file. This is most likely to occur while you are debugging a kernel. If a core dump occurs, delete or rename the `/var/adm/messages` file and restart the SNMP subagent.
- The Insight Manager Device Discovery web page (`http://machine:2301/cpqdev.htm`) may show inconsistent or incorrect data on some platforms, as active discovery is not fully functional.
- On some browsers, the login dialog box, which consists of text fields for Name and Password, opens with the initial focus on the Password text field.
- The Insight Manager AutoRefresh option, when set for less than 60 seconds, might stop refreshing web pages when run from a Netscape browser running on Tru64 UNIX.

5.3.13.2 Compaq SNMP Subagent and Insight Manager Restrictions

The online help for Insight Manager in `/usr/share/sysman/bin/insightd` describes four login accounts: anonymous, administrator, operator, and user. For this release, only the anonymous and administrator accounts are accessible. Before you log in as the Insight Manager administrator, use the Set Up Insight Manager application from the SysMan Menu to configure the administrator password.

This version of Insight Manager does not generate SNMP traps. Thus, alerts are not generated.

The Compaq SNMP subagent in `/usr/sbin/cpq_mibs` incorrectly reports the CPU logical slot instead of the physical slot on some Alpha platforms. Therefore, Insight Manager displays large values for this attribute.

The Compaq SNMP subagent returns incorrect values for SCSI disk read and write statistics. Therefore, the values displayed by the Insight Manager web pages are also incorrect. The values returned are in units of bytes rather than sectors. Additionally, the statistics displayed are only calculated once, when the subagent is started.

5.3.14 Event Manager (EVM)

The notes in this section apply to the Event Manager (EVM).

5.3.14.1 Sorting Events by Summary Gives Incorrect Ordering

If you choose to sort events by Summary in the Event Viewer, events might appear to be sorted incorrectly. The viewer uses the `evmsort` command to provide sorted output. In this release, the `evmsort` command does not provide an option to expand an event's format data item before sorting. Therefore, the results are based on the summary, before variable data has been included.

5.3.14.2 Event Viewer and evmget Display a Message When the binlog File Is Invalid

If the binary error log file, `/var/adm/binary.errlog`, contains invalid log entries, an error message similar to the following is displayed when you run `evmget`:

```
binlog2evm: Invalid event data encountered at offset 80216
binlog2evm: Error occurred while reading from
"/.local../usr/var/adm/binary.errlog"
binlog2evm: Skipped invalid data - restarted at offset 85248
```

If you see this message, follow your normal investigation and reporting procedures to determine the source of the corruption.

A short-term solution to prevent the message from being displayed is to redirect `stderr` to `/dev/null`.

If you are certain that the error log is properly backed up and does not contain required event information, you can permanently remove the invalid data by initiating a cleanup of the log file by using the directions in the `binlogd`(8) reference page. Note that this operation removes the log file and starts a new one. Because two generations of the error log are held, the message continues to be displayed until you run the cleanup procedure twice.

5.3.14.3 Double Clicking in the Event Viewer Launched from SMS Core Dumps

If you launch the Event Viewer from the SysMan Station (SMS) and double click in the More options window, the viewer fails, resulting in a stack trace.

To avoid this problem, single click in the More Options windows and then click OK to finish your choice.

This problem exists only when you launch the Event Viewer from SMS. If you launch the viewer from the command line or from the Sysman Menu, you can double click an option to select it.

5.3.14.4 EVM Reports Kernel Messages with Critical Priority

EVM reports all messages that are posted from the kernel through the `syslog` event facility as having critical priority. This incorrectly includes many informational messages that are posted when you start the system.

5.3.14.5 EVM Logger Might Miss Events

The EVM logger might not receive all events in situations where many events are posted in a short period of time. This is due to buffer overflow. If this happens, the logger inserts an event into the log reporting the number of events that were missed.

5.3.14.6 Problem with Low-Resolution Displays

Some graphical applications may be longer than the display for low-resolution displays using large fonts. Windows that are larger than the display are truncated at the bottom, often resulting in the buttons being cut off. Some windows in Quick Setup have exhibited this behavior on some displays.

To avoid this problem, you can try reducing the size of the font. See the documentation for the window manager you are using. Also, applications that have a curses (character) mode fit better than graphical applications using large fonts.

For more information, see X(1X), dtstyle(1), curses(3), and sysman_intro(8X).

5.4 Network and Communications

The following notes apply to network and communications software.

5.4.1 DHCP Database Migration (joind and bootpd)

Starting with Tru64 UNIX Version 4.0F, DHCP database files are stored in an entirely new format that is incompatible with older formats. The operating system ships with an online document, provided by JOIN Systems, that explains the reasons behind this change, lists the files that are affected, and provides instructions for converting the files to the new format. The document and conversion utility, README-DB237 and conv185-237, respectively, are located in the /etc/join directory.

5.4.2 Mail

This section provides information on problems that can occur when configuring and running mail on your systems.

5.4.2.1 The mailcv -I -t and -M -t Commands Do Not Work As Expected

If you are converting a dtmail folder hierarchy to IMAP, or you are converting a single folder that does not already exist in the IMAP hierarchy, you receive the following error message and the conversion of the hierarchy stops:

```
Mailcv: Can?t create output file {foldername}, ignoring conversion.

foldername is the new name of the folder.
```

Use Netscape to migrate your folders to IMAP as follows:

1. Set the Local Mail folder to point to the directory that contains the dtmail folder hierarchy.
2. From the Preferences menu, select the Mail & Newsgroup subtree, then select Mail Servers.
3. Select the Local Mail Directory and change the directory to the UNIX folder directory you want to convert.
4. Select OK and restart Netscape.
5. Select the Netscape Messenger window to display your mail folders. Drag and drop the mail folders from the local folders to the IMAP folders or select all the messages in a folder and use the move command to move all the messages to the IMAP folder.

If you are converting dxmail or MH mail to IMAP folders, you receive the following error message:

```
Mailcv: Can?t create output file {foldername}, ignoring conversion.

foldername is the new name of the folder.
```

To migrate folders from dxmail or MH mail folders to IMAP, do the following:

1. Migrate the folders to UNIX style by using the mailcv command with the -A option.
2. Use Netscape, as described in the previous procedure, to migrate the UNIX mail folders to your IMAP folders.

5.4.2.2 IMAP Server: Preserving Uppercase User Names

If your system is configured as an IMAP server and you want to preserve uppercase for user names, do the following:

1. Add the F=u flag for IMAP mailer in your sendmail configuration file.
2. Edit the /var/adm/sendmail/sendmail.cf.pd file and /var/adm/sendmail/sendmail.m4 file (if it exists) before you run either the mailsetup script or mailconfig application.

   Search for the line with Mimap and add the u flag to its F= option. The original line appears as follows:

   ```
   Mimap,   P=/usr/bin/deliver, F=nsmFDM, S=10, R=20/50, A=deliver $u
   ```

   After you update the line, it should appear as follows:

   ```
   Mimap,   P=/usr/bin/deliver, F=nsmFDMu, S=10, R=20/50, A=deliver $u
   ```

If you have already configured sendmail using either the mailsetup script or the mailconfig application, apply these changes to the /var/adm/sendmail/sendmail.cf file in addition to the /var/adm/sendmail/sendmail.cf.pd and /var/adm/sendmail/sendmail.m4 files.

5.4.2.3 sendmail Warning Message

The permissions on the /var directory do not satisfy the checks by the sendmail binary. The sendmail utility expects the permission of the /var directory to be 755. However, the permissions are 775. Due to this, sendmail logs the following warning message in the syslog file every time it checks the mode of the /var directory:

```
WARNING: writable directory /var/adm/sendmail
```

This does not impact the functionality of sendmail, so you can ignore this warning. If you want, you can change the permissions on the directory to 755 by logging in as root and entering the following command:

```
# chmod go-w /var
```

5.4.2.4 Problem Starting the Sendmail Daemon

If you manually edit the `/var/adm/sendmail/sendmail.cf` file and there are errors in the file, the Sendmail startup script might display that the daemon started when it has not.

To verify whether the `sendmail` daemon has actually started, issue the following command:

```
# ps -aef | grep sendmail
```

If the `sendmail` process is not present, check the `mail.log` file for any errors associated with the start of the daemon. The full path name for this file is `/var/adm/syslog.dated/current/mail.log`. Correct any errors recorded in this file before starting the `sendmail` daemon again with the following command:

```
# /sbin/init.d/sendmail start
```

5.5 Local Area Transport

The following notes apply to Local Area Transport (LAT).

5.5.1 Duplicate Minor Numbers and latsetup

The `latsetup` utility sometimes creates devices with duplicate minor numbers. If you manually create LAT BSD devices that do not match the valid BSD `tty` name space convention, `latsetup` can create devices with duplicate minor numbers. For example, creating device `tty0` with a minor number 2 instead of 1 can cause this problem.

5.5.2 Simultaneous llogin Connections

When doing a number of simultaneous `llogin` connections, use `llogin` with the `-p` option. To speed up an `llogin` connection, add the target host name as a reserved service.

5.6 File Systems

The notes in this section apply to file systems.

5.6.1 UNIX File System Warning Message

When a valid UFS file system has been detected and the `fstype` in the disk label is marked as unused, the following messages are displayed:

```
# ./mount /dev/disk/dsk5c /mnt
Warning: partition /dev/disk/dsk5c was detected as marked unused.
Warning: partition /dev/disk/dsk5c temporarily set to 'FS_BSDFFS'
4.2BSD fast file system.
Warning: Please use disklabel to correct this condition.
```

Currently the `fstype` in the disk label is temporarily set and will revert when you unmount the file system with no warning message. The label could be changed without the knowledge of the user if the `newfs` command is issued on another partition on the same disk.

If you receive this message, use the `disklabel` command to correct the label.

5.6.2 Advanced File System (AdvFS)

The following notes discuss features, problems, and restrictions of the Advanced File System (AdvFS).

5.6.2.1 AdvFS and fsync()

You can use the `fsync()` system call to synchronously write dirty file data to disk. There are two ways a file can have dirty data in memory. One way is via the `write()` system call. The other is from a memory write reference after an `mmap()` system call. For AdvFS files, the `fsync()` system call writes out dirty data only from the `write()` system call. If dirty data from an `mmap()` system call also needs to be written, then you must also use the `msync()` system call.

5.6.2.2 New AdvFS On-Disk File Formats

This version of the operating system provides a new on-disk format (Version 4) for AdvFS that was introduced in Version 5.0. Kernels built with this version of the operating system will work with the old on-disk format (Version 3) as well as with the new format. However, you cannot use a kernel built with a version of the operating system prior to Version 5.0 with the new AdvFS on-disk format.

You can bring an AdvFS domain forward from an earlier version and mount it on a system running Version 5.0 or higher. If you do this, your domain will not change; it will continue to use the Version 3 on-disk format, which is still supported.

If you perform an update installation, you do not get the new on-disk format. You only get the new on-disk format if you do a full installation or if you create a new domain using Version 5.0 or higher.

No conversion utility is available to move Version 3 domains to Version 4 domains. The only way to move your data to a new domain using the new

on-disk format is to back up your data from a Version 3 domain and restore it into a new Version 4 domain.

Due to the new on-disk file formats, certain AdvFS utilities from earlier releases of the operating system have the potential to corrupt domains created using the new on-disk formats. Therefore, all statically linked AdvFS utilities from versions prior to Version 4.0 will not run on Version 5.0 or higher. Additionally, the following dynamically linked utilities from earlier releases do not run on Version 5.0 or higher:

- /sbin/advfs/verify
- /sbin/chvol
- /usr/sbin/advfsstat
- /sbin/showfdmn
- /usr/sbin/balance
- /usr/sbin/defragment
- /usr/sbin/presto
- /usr/sbin/rmvol

5.6.2.3 Running verify on the root Domain

The verify command has been modified so that you can no longer run it on a mounted root domain with either the -f or -d flags. If you need to run the verify command on the root domain with either of these flags, you must boot off another disk or CD–ROM as follows:

1. From the CD–ROM, exit the installation procedure.
2. Change directory to the /etc/fdmns directory:

   # **cd /etc/fdmns**
3. Create a temporary domain directory:

   # **mkdir verify_root**
4. Change directory to the newly created directory:

   # **cd verify_root**
5. Create a symbolic link in this directory to the disk partition that contains the domain you want to run verify on:

   # **ln -s /dev/disk/dsk3a dsk3a**
6. Change directory back to the root directory (/):

   # **cd /**
7. Run verify on the temporary domain:

```
# /sbin/advfs/verify -f verify_root
```

8. Delete the temporary domain:

```
# rm -rf /etc/fdmns/verify_root
```

5.7 Logical Storage Manager

The following notes describe problems and restrictions of the Logical Storage Manager (LSM).

5.7.1 Using LSM rootvol Requires sysconfigtab Parameters

If you use the LSM `rootvol` volume for the root file system and the `swapvol` volume is in use as a primary swap volume, LSM adds the following entries to the `/etc/sysconfigtab` file to enable it to become root:

```
lsm:
lsm_rootdev_is_volume=1
```

If these entries are deleted or if the `/etc/sysconfigtab` file is deleted, the system will not boot. If this happens, you can boot the system interactively as follows:

```
>>> boot -fl i
.........
.........
Enter kernel_name option_1 ... option_n: vmunix
lsm_rootdev_is_volume=1
```

Use the `sysconfigdb` utility to add the LSM entries as shown previously to the `/etc/sysconfigtab` file after the system boots. Then, reboot the system for the changes to take effect.

5.7.2 Cannot Enable Logging on RAID 5 Volumes Using LSM's Bottom-Up Commands

You can create RAID 5 volumes using either LSM's top-down or bottom-up commands. However, you cannot enable logging using the bottom-up commands, such as `volsd aslog`, to associate a log subdisk to a plex or `volplex att` to attach a logging plex to a RAID 5 volume.

The `volassist` top-down command does work. Therefore, use the `volassist addlog` command to add logging to RAID 5 volumes. Note that if you create a RAID 5 volume using the `volassist make` command, logging is configured and enabled automatically.

5.7.3 LSM Dirty Region Logging (DRL) Cannot Be Used with rootvol

LSM Dirty Region Logging (DRL) cannot be used with a mirrored `rootvol`. If a system with a mirrored `rootvol` is not brought down cleanly, the system automatically recovers the `rootvol` by doing a complete resynchronization. Attaching a logging subdisk might degrade the `rootvol` write performance with no benefit in recovery time.

5.7.4 The LSMSA Server (lsmsad) Is Not Started at System Startup

The LSMSA server (`lsmsad` daemon) does not start on system boot. If the server is not running, it starts automatically when you start a GUI session and it stops when all GUI sessions are ended. The `/lsbin/rc3.d/S79lsmsa` and `/lsbin/rc0.d/K41lsmsa` scripts no longer exist.

Previous documentation detailing how to start and stop the server is no longer applicable. The system starts the `lsmsad` server as follows:

1. When the GUI is started, the system attempts to connect it with the server process on the indicated host.
2. If the GUI cannot connect, the system then attempts to connect it to the indicated host at the port, `initlsmsad`, defined in the `/etc/services` file, and `vrts.remote.server.initLsmsadPort`, defined in the `/usr/lib/java/applications/lsmsa/properties` file. The port numbers defined in these two files must match.

   When the GUI connects to the `initlsmsad` port, the `inetd` server executes the `/usr/lib/java/applications/initlsmsad` program, which creates a subprocess where the `/usr/sbin/lsmsad` script will run. The `lsmsad` script starts the LSMSA server processes VMServerImpl, VRTSRegistry, and `cmdserver`. After the LSMSA server processes have been started, the GUI then connects and operates normally.
3. If the GUI cannot connect to a port, the error message "Cannot connect to the server" is displayed. When LSMSA exits and disconnects from the server, the server continues to exist in an idle state until another GUI connects or an LSM configuration event occurs (such as creation, deletion, or modification of an LSM object). When the server receives notification of an LSM configuration event, if no GUIs are connected, the server exits. When the server exits, all of the LSMSA server processes exit, as well.

If the GUI cannot connect to the server, try the following:

1. Check the `/var/lsmsa/logs/server.log` file for startup and error messages.

2. Run the `/usr/lib/java/applications/initlsmsad` program to view error messages. You must be root user.
3. On a very slow network, you may need to adjust the value assigned to the CONNECTION_TIMEOUT variable in the `/usr/sbin/lsmsadscript`. This is the amount of time after startup that the LSMSA server will wait for a connection from the client. The default value is 30 seconds. When the server process receives an LSM configuration event, if no GUIs have been or are currently connected and the CONNECTION_TIMEOUT seconds have elapsed, the server exits.

6

Development Environment Notes

This chapter contains notes about issues and known problems with the development environment software and, whenever possible, provides solutions or ways to avoid the problems. The following topics are discussed:

- General programming (Section 6.1)
- POSIX Threads Library (Section 6.2)
- Kernel programming (Section 6.3)

6.1 General Programming

The following notes apply to general programming.

6.1.1 Change to bcopy, bcmp, and bzero

The argument types for the `bcopy`, `bcmp`, and `bzero` system functions have been changed to conform to the ANSI specification. The new interface prototypes are as follows:

```
int bcmp __((const void *, const void *, size_t);
int bcopy __((const void *, void *, size_t);
int bzero __((void *, size_t);
```

You can access the old prototype definitions by compiling applications using the `-D__V40_OBJ_COMPAT` compile flag. For example:

```
> cc -D__V40_OBJ_COMPAT test.c
```

6.1.2 Change in struct utmp, struct utmpx, and struct lastlog

To bring them into compliance with several UNIX and Internet standards, the `struct utmp`, `struct utmpx`, and `struct lastlog` structures have been changed. These changes affect the `/usr/include/utmp.h`, `/usr/include/utmpx.h`, and `/usr/include/lastlog.h` files :

- The time field in the `struct utmp` structure has changed from a `time_t` structure to a `struct __ut_timeval` structure (to be consistent with the `/usr/include/utmpx.h` file).
- The `ut_host` field size (in the `struct utmp` and `struct utmpx` structures) has been increased to comply with relevant Internet RFCs.

- The ll_line and ll_host manifest constants in the/usr/include/lastlog.h file have changed to allow their sizes to correspond to the ut_line and ut_host fields in struct utmp and struct utmpx structures.

These changes also affect the format of the /var/adm/utmp, /var/adm/wtmp, and /var/adm/lastlog files. The following conversion programs are supplied:

- /usr/lbin/wtmpconvert
- /usr/lbin/llconvert

The programs enable you to convert your existing /var/adm/wtmp and /var/adm/lastlog files to the new format or convert new format files to the old format for use by existing programs. See the corresponding reference pages for more information.

6.1.3 Segmentation Fault in gprof

When you run the gprof call-graph profiler with the -F or -f filtering options on an executable that contains a procedure with no name in the symbol table (for example, a static function compiled with the default -g0 debug information), it core dumps with a segmentation fault.

To avoid this problem, do not use the -F and -f options. Instead use -E or -e filtering options.

6.2 POSIX Threads Library (pthreads)

DECthreads has been renamed the POSIX Threads Library. Compaq has made enhancements to the library to improve the performance of some classes of threaded applications.

The following notes apply to POSIX Threads Library.

6.2.1 Problems with Use of the stackaddr Thread Creation Attribute

Using the stackaddr thread creation attribute, which allows you to allocate your own stack for a thread, is not recommend. The semantics of this attribute are poorly defined by POSIX and the Single UNIX Specification, Version 2. As a result, code using the attribute is unlikely to be portable between implementations. The attribute is difficult to use reliably, because you must, by intimate knowledge of the machine architecture and implementation, know the correct address to specify relative to the allocated stack. The implementation cannot diagnose an incorrect value because the interface does not provide sufficient information. Using an incorrect value might result in program failure, possibly in obscure ways.

Alternatively, if you want to supply your own thread stacks, consider using the `pthread_attr_setstackaddr_np()` routine. Callers specify the thread stack using a base address and size, which avoids the worst problems with the standard interface.

6.2.2 Memory Alignment Issue

Although older Alpha processors (prior to the 21264 chip) can only access memory in units of at least a quadword (8 bytes), multiple variables, each of which is less than 8 bytes, can occupy the same quadword in memory. In such cases, multithreaded programs might experience a problem if two or more threads read the same quadword, update different parts of it, then independently write their respective copies back to memory. The last thread to write the quadword overwrites any data previously written to other parts of the quadword. This can happen even though each thread protects its part of the quadword with its own mutex.

The Tru64 UNIX C compiler protects scalar variables against this problem by aligning them in memory on quadword (8-byte) boundaries. However, in composite data objects such as structures or arrays, the compiler aligns members on their natural boundaries. For example, a 2-byte member is aligned on a 2-byte boundary. Because of this, any adjacent members of the composite object that total 8 bytes or less could occupy the same quadword in memory.

Inspect your multithreaded application code to determine if you have a composite data object in which adjacent members could share the same quadword in memory. If you do and if your project allows, it is recommended that you force alignment of each such member variable to a quadword boundary by redefining the variable to be at least 8 bytes, or by defining sufficient padding storage after the variable to total 8 bytes.

Alternatively, you can create one mutex for each composite data object in which adjacent members can share the same quadword in memory. Then use this single mutex to protect all write accesses by all threads to the composite data object. This technique might be less desirable because of performance considerations.

For more information, see the Granularity Considerations section in the *Guide to the POSIX Threads Library*.

6.2.3 POSIX Threads Library pthread_debug() and pthread_debug_cmd() Routines

In order to allow for the possibility of a more comprehensive and robust threads debugging environment, it has become necessary to remove the `pthread_debug()` and `pthread_debug_cmd()` routines. To prevent

existing binaries from failing, the routines will continue to be recognized. However, a call to either routine now results in an immediate return to the calling program. The `pthread_debug_cmd()` routine returns a zero (0) indicating success. Debuggers such as Ladebug and TotalView provide functionality formerly provided by these routines.

6.2.4 POSIX Threads Library SIGEV_THREAD Notification Mechanism

Using the `SIGEV_THREAD` notification mechanism, a user-defined function is called to perform notification of an asynchronous event. The function runs as though it were the start routine of a thread and can make full use of the POSIX Threads Library synchronization objects.

The `SIGEV_THREAD` notification mechanism and the function to be called are specified in the `sigevent` structure. This mechanism is useful for programming with the POSIX 1.b realtime signal interfaces, such as timers and asynchronous I/O. For information and cautions concerning the use of signals in a multithreaded environment, see the *Guide to the POSIX Threads Library*. For more information about using `SIGEV_THREAD`, see the *IEEE POSIX 1003.1-1996* standard and *The Open Group Single UNIX Specification, Version 2*.

6.2.5 POSIX Threads Library Change in the Default Stack Size

POSIX Threads Library now supports using uncommitted memory for thread stacks. As part of this new support, the default thread stack size has been raised to 5 MB. This means that it should rarely, if ever, be necessary to override the default. However, you should change any existing code that determines the default dynamically by fetching from an initialized attributes object and multiplying it to avoid allocating more address space than the application needs. If you do not, the application could also encounter `ulimit` problems.

Also, code that specifies literal sizes usually allocates stacks sizes that are smaller than the default. Therefore, it is recommended that these applications use the default stack size.

6.2.6 Process-Shared Synchonization Objects and Debugging

The POSIX Threads Library (pthread) interface now supports the sharing of certain synchronization objects (mutexes, condition variables, and read-write locks) among threads running in multiple cooperating processes. Such objects are termed process-shared objects.

For this release, process-shared objects are not visible to the Ladebug debugger. For example, the `show mutex` Ladebug command lists process-private mutexes but not process-shared mutexes.

6.3 Changes to the ATM Kernel Programming Interface

To support features needed for point-to-multipoint virtual circuits (VCs) and to provide for future enhancements, the parameters to the `atm_cmm_register_cvg()` and `atm_cmm_register_sig()` routines have been changed.

Binary compatibility with previously compiled modules has been maintained. Convergence and signaling modules require minor source code changes when recompiled under Tru64 UNIX 5.0A.

See the *Asynchronous Transfer Mode* manual for more information.

7

Window System Software Notes

This chapter contains notes about issues and known problems with the windowing software and, whenever possible, provides solutions or workarounds to those problems. The following topics are discussed in this chapter:

- Hardware notes and restrictions (Section 7.1)
- X servers (Section 7.2)
- CDE clients (Section 7.3)
- Internationalization (Section 7.4)

7.1 Hardware Notes and Restrictions

The following notes apply to graphics hardware restrictions.

7.1.1 PowerStorm Graphics Support

Support for the following graphics adapters is not available on this version of Tru64 UNIX. Therefore, these devices are supported in VGA mode only:

- PowerStorm 4D40T
- PowerStorm 4D51T
- PowerStorm 4D60T
- PowerStorm 300

Please refer to the following URL for the necessary drivers and more information:

http://www.service.digital.com/open3d

7.1.2 Qvision Graphics Display Error

Different versions of Qvision graphics boards demonstrate `fillsolid` drawing problems, leaving a line at the bottom of the screen, which is evident when running the CDE blank lock screen. The line varies in color and intensity depending on the version of the Qvision board.

7.2 X Servers

The following notes apply to X servers.

7.2.1 Limited Multiscreen Display Support with CDE

CDE provides limited support for X servers with more than one screen. While a multiscreen environment is possible, a number of inconsistencies are noticeable. For example, colors in secondary screens may not be correct, icons may not display properly, and applications may not appear on the screen where they are invoked. Using the PanoramiX extension mitigates some of these inconsistencies.

7.2.2 Pixmap Color Errors with PanoramiX

Some pixmap color corruption has been seen when using the PanoramiX extension. Background pixmaps can be corrupted when a client is displayed on any screen other than the physical screen 0. The corruption is most frequently seen when using Netscape and loading pages with background pixmaps.

To avoid this problem, check the "Always use my colors, overriding document." box under the color section of Netscape preferences.

7.2.3 Using LBX Clients

This note provides information for using LBX clients:

- On systems without DECnet, you must start the `lbxproxy` with the `-pn` option.
- You do not use the X server's node-based access control (`xhost` *`host_name`*) for LBX clients.
- XDM-AUTHORIZATION-1 authorization only works for LBX clients if the client is running on the same system as the `lbxproxy` that it is using and if the client specifies a network connection to `lbxproxy` (`lbxproxy -display` *`host_name`*`:1`) instead of a local connection (`lbxproxy -display :1`).

  Note that the restrictions on authorization for LBX clients are part of the standard implementation of LBX from The Open Group.

You can use the following methods to authorize an LBX client to display on an X server:

- Use MIT-MAGIC-COOKIE-1 authorization. You can do this by including the MIT-MAGIC-COOKIE-1 entries in the LBX client's XAUTHORITY file.

- Use XDM-AUTHORIZATION-1 authorization and run a separate `lbxproxy` on each client system that is used by the clients on that system. Also, set the clients' display specifications to use a network connection to `lbxproxy` (`lbxproxy` *`host_name`*`:1`).
- Disable access control in the X server. You can do this by starting the X server with the `-ac` options or by using the `xhost +` command. These methods are insecure and are not recommended.

If you use the MIT-MAGIC-COOKIE-1 or XDM-AUTHORIZATION-1 authorization methods with an LBX client, the client's XAUTHORITY file entries must specify the display name for the `lbxproxy` utility and the authorization key for the target X server.

The following are some examples of using LBX. In these examples, server is the system running the X server, client1 is one system running LBX clients, and client2 is a second system running LBX clients.

- If the following command is executed on client1, the `lbxproxy` listens for connections on client1:1 and displays information on server:0.

  ```
  # lbxproxy -pn -display server:0 :1
  ```

  LBX clients running on client1 that are not using XDM-AUTHORIZATION-1 authorization should set their display to :1. For example:

  ```
  # xterm -display :1
  ```

  LBX clients running on client1 that are using XDM-AUTHORIZATION-1 authorization should set their display to client1:1. For example:

  ```
  # xterm -display client1:1
  ```

  All LBX clients on client2, regardless of whether they are using XDM-AUTHORIZATION-1 authorization, should set their display to client1:1.

- To use the MIT-MAGIC-COOKIE-1 or XDM-AUTHORIZATION-1 authorization mechanisms, set up your XAUTHORITY files as follows:
  - The X server's XAUTHORITY file:

    ```
    server:0  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcdef
    server/unix:0  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcdef
    ```

  - The XAUTHORITY file for `lbxproxy`:

    ```
    server:0  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcdef
    server/unix:0  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcde
    ```

  - The LBX clients' XAUTHORITY files (on both client1 and client2):

    ```
    client1:1  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcdef
    client1/unix:1  MIT-MAGIC-COOKIE-1  0123456789abcdef0123456789abcdef
    ```

7.2.4 Colons Missing from Display

In a few instances, colons are seen as spaces in a display after you create a cluster. This problem is rare and does not affect the files. To correct the problem, log out and log back in to the session.

7.3 CDE Clients

The following notes apply to CDE clients.

7.3.1 Inaccessible Dialog Buttons

When running CDE with 640 x 480 graphics resolution, the OK, Apply, Cancel, and Help buttons of some application dialogs may be inaccessible. To correct this problem, set the `DXmfitToScreenPolicy` resource to `as_needed` in the application's defaults file or, for systemwide problems, in the `/usr/dt/config/$LANG/sys.resources` file.

7.3.2 Screen Savers Prevent Efficient Power Management

When the screen on a DPMS-capable monitor is switched to standby, suspend, or off mode, the X server continues to run the screen saver. In CDE, which has a number of active screen savers, this may defeat the CPU slowdown features for power management on certain Energy Star-compliant platforms. To minimize power consumption, you should stop using active screen savers by doing any of the following:

- In the Screen Saver panel of the Screen dialog box, under the Style Manager, select Blank Screen and deselect any active screen savers that might be running.
- Click on the Off button in the same dialog box.
- Execute `xset s off` from a terminal client window.

7.3.3 Remote Invocation of CDE File Manager dtfile

File Manager, Application Manager, and Trash Manager are different views supported by the `dtfile` application. Avoid invoking `dtfile` from a remote system with the `DISPLAY` environment variable set appropriately. This restriction is necessary because of the client-server model used by the `dtfile` application and its close interaction with the ToolTalk messaging system.

In the event of unexpected behavior from any of these utilities, close all windows associated with the File Manager, Application Manager, and Trash Manager. Then kill all processes associated with `dtfile`. You can get the `pid` for each process by using the following command:

```
# ps -aef | grep dtfile
```

7.3.4 Possible Failure in the XOpenDisplay Call

When logging in to the CDE desktop, some applications may not restart. The X server process may not be able to handle all of the requests for new open connections, causing some to fail in the `XOpenDisplay` call. Some applications, like `xterm`, log startup errors in the `dxconsole` window, such as the following error:

```
xterm error: can't open display :0
```

To avoid this problem, add the following resource to your `$HOME/.Xdefaults` file:

```
Dtsession*contManagement:   2
```

This resource enables a handshake protocol between the CDE Session Manager and Window Manager during the login phase to control the appearance of new windows. While it may marginally increase the time before the login completes, it better assures that all applications will be restarted.

You can add this to the `/usr/dt/app-defaults/C/Dtsession` file to make the change for all users automatically.

7.3.5 Login to CDE_SESSION Restriction

Login to `CDE_SESSION` is restricted to machines with host names that are not greater than 31 characters. This is because CDE and the X libraries use the `uname` command to get the system name to process the user credentials.

7.4 Internationalization

The following notes apply to restrictions on use of internationalization features in the windowing environments.

7.4.1 Japanese Keyboard Support in Console Mode

When running in single-user or console mode, Tru64 UNIX now supports two new Japanese keyboard types (JIS and ANSI) on AlphaStation and AlphaServer systems. (Japanese keyboard support is not available on TURBOchannel-based machines.)

To use JIS-type Japanese keyboards, like the PCXAJ-AA and LK411-JJ, set the `language` console environment variable to 50, as in the following example:

```
>>> set language 50
```

To use ANSI-type Japanese keyboards, like the LK411-AJ, set the `language` console environment variable to 52, as in the following example:

```
>>> set language 52
```

7.4.2 System-Default Keyboard Setting Might Prevent User Login

When a user logs on to a system, the default keyboard setting must be appropriate for the keys that the user presses when entering characters in the user name and password fields. Otherwise, characters that are correct from the user perspective, given the keyboard being used, might be treated as invalid. In this case, the user cannot log on to the system. This situation most often arises when a keyboard is being used in one language and the default keyboard setting is another language. You can change the default keyboard setting at the console prompt or, if the required language is not available at the console level, by editing the `Xserver.conf` file to change the keymap used by the X server. See `keyboard`(5) for more detailed information about changing keyboard settings.

8

Documentation Notes

This chapter contains release notes that apply to Tru64 UNIX Version 5.0A documentation. It provides information on the following:

- Netscape problem with the Search by Keyword feature (Section 8.1)
- System limits documentation (Section 8.2)
- AltaVista search (Section 8.3)
- *Command and Shell User's Guide* (Section 8.4)
- *AdvFS Administration* (Section 8.4)
- *System Configuration and Tuning* (Section 8.7)
- The `mount`(8) reference page (Section 8.9)
- Online help (Section 8.11)

8.1 Netscape Problem with the Search by Keyword Feature

Netscape on Tru64 UNIX does not handle JavaScript forms correctly. When you use the Reference Pages Search by Keyword feature on the Documentation CD–ROM, the search can fail.

To work around the problem, click in any other window and return to the search window.

This problem does not occur with Netscape or Microsoft Internet Explorer on a Windows PC or Macintosh.

8.2 System Limits Documentation

The system limits information has been moved from the *Release Notes* to the Tru64 UNIX Version 5.0A *Software Product Description* (SPD). Any references to this information being in the *Release Notes* is in error. PDF and PostScript copies of the SPD are located in the `/DOCUMENTATION` directory on the Tru64 UNIX Version 5.0A Operating System Volume 1 CD–ROM.

8.3 AltaVista CD–ROM Search Might Not Work Correctly with Netscape Communicator

When the Tru64 UNIX *Software Documentation* CD–ROM is used on a PC for which Internet Explorer is the default browser, the CD–ROM search capability works as documented in the instructions window. This window automatically pops up when you click on the Search button that is available from the main page of the documentation library. The instructions tell you to open Windows Explorer, double click on the icon for the CD–ROM drive, and then double click on `search.exe`, which automatically loads the search query entry form into the Internet Explorer window.

When the documentation CD–ROM is used on a PC for which Netscape Communicator is the default browser, these instructions might work, but sometimes do not. Problems observed when trying to use AltaVista CD–ROM Search with Netscape Communicator (Version 4.5 or higher) include the following:

- An attempt to load the search query entry form (`InitPage.html`) results in a "browser not found" error.
- The search query entry form comes up in a window different from the Netscape browser window.
- If the search query entry form does come up in the Netscape browser window, the first search query consistently hangs.

If you encounter one or more of these problems, use the following procedure to work around them:

1. After launching the AltaVista Search Dispatcher (`search.exe`), invoke Netscape manually if it is not already running.
2. Use the `File Open` option in the Netscape window to find and open the `InitPage.html` file on the CD–ROM drive. Alternatively, you can type the URL to this file in the Netscape browser's Location: field.
3. If your first search query takes more than 30 seconds to execute, click on the Stop icon and re-enter the query.

8.4 Command and Shell User's Guide

Table 3-1 of the *Command and Shell User's Guide* contains an error for the `ls` command option. The following description for the `-R` option is incorrect:

> `-R` Lists all entries including hidden files. Without this flag, the `ls` command does not list the names of entries that begin with a dot (.), such as `.profile`, `.login`, and relative pathnames.

This is the description of the `-a` option. Therefore, it should read as follows:

> `-a` Lists all entries including hidden files. Without this flag, the `ls` command does not list the names of entries that begin with a dot (.), such as `.profile`, `.login`, and relative pathnames.

8.5 Security

The information in Section 19.10.2 of the *Security* guide describing the binary audit log record format is incomplete and potentially misleading. Do not use this information as a basis for any code.

8.6 DECthreads Is Now the POSIX Threads Library

With this release, DECthreads has been renamed the POSIX Threads Library. The *Guide to DECthreads* is now the *Guide to the POSIX Threads Library*.

8.7 System Configuration and Tuning

The following notes pertain to the *System Configuration and Tuning* manual.

8.7.1 AdvFS Buffer Cache

AdvFS stores recent read and write requests for both file data and metadata in memory buffers. When an application requests a page, AdvFS checks the AdvFS buffer cache for the page, and then checks the UBC. If the page is found in memory, AdvFS reuses the buffer and avoids a disk I/O operation. Buffers that are not reused are eventually recycled for newly referenced pages.

You may be able to improve performance by modifying the size of the AdvFS buffer cache. If your applications reuse data, you can maximize the number of AdvFS buffer cache hits by making the AdvFS buffer cache large enough to hold pages until they are reused. However, increasing the size of the AdvFS buffer cache consumes memory and may cause paging.

If your applications do not reuse I/O, you do not need a large cache size. Also, on very large-memory systems, the AdvFS buffer cache may be too large and may waste memory. You may want to free memory by decreasing the size of the cache in these cases.

The `advfs` subsystem attribute `AdvfsCacheMaxPercent` specifies the size of the AdvFS buffer cache. The default value of the `AdvfsCacheMaxPercent` attribute is 7 percent of physical memory. The minimum value is 1 percent; the maximum value is 30 percent.

To determine if you need to modify the size of the AdvFS buffer cache, you must understand how your applications perform file system I/O. Then, use the `advfsstat -b` command to check the AdvFS buffer cache hit rate for the specified domain.

After you gather information about how your applications perform file system I/O and run the `advfsstat -b` command, use the following table to determine if you should modify the size of the AdvFS buffer cache. These recommendations apply only if AdvFS is configured on your system.

Requirement	Tuning Recommendation
AdvFS is configured on your system, but you are not using AdvFS.	Set the value of the `AdvfsCacheMaxPercent` attribute to 1 to minimize the memory allocation to the AdvFS buffer cache.
You are running applications that perform their own buffer caching.	Decrease the value of the `AdvfsCacheMaxPercent` attribute by 1 or 2. Then, use the `advfsstat -b` command to check the hit rate. Continue to decrease only if the hit rate is above 80 percent.
You have a very-large memory system, with a moderate AdvFS load and an AdvFS buffer cache hit rate of more than 80 percent.	In this case, an overly large buffer cache may be wasting memory. You may want to decrease the size of the AdvFS buffer cache. Reduce the value of `AdvfsCacheMaxPercent` by 1 or 2. Then, use the `advfsstat -b` command to check the hit rate. Continue to decrease only if the hit rate is above 80 percent.

Requirement	Tuning Recommendation
You have an AdvFS buffer cache hit rate of more than 80 percent.	You may be able to improve file system performance by increasing the memory available to cache AdvFS pages. To do this, increase the value of the `AdvfsCacheMaxPercent` attribute by 1 or 2. Then, use the `advfsstat -b` command to check the hit rate, and use the `vmstat` command to check for increased paging. Continue to increase the value of `AdvfsCacheMaxPercent` only if you continue to improve the hit rate, without causing the system to page. Use the `vmstat` command to check for paging activity.
You have a low cache hit rate of less than 80 percent.	This may indicate one of the following: • The size of the AdvFS cache is insufficient for the load and pages are being recycled (used for a different AdvFS page) from the cache too quickly. In this case, you may want to increase the value of the `AdvfsCacheMaxPercent` attribute by 1 or 2. • Applications are mainly writing to new files and are not reusing the cached AdvFS pages. In some cases, increasing the value of the `AdvfsCacheMaxPercent` attribute by 1 or 2 may reduce cache recycling and provide better AdvFS I/O consolidation. (Applies only to Tru64 UNIX Version 4.0F and higher versions.) Use the `advfsstat -b` command to check the hit rate, and use the `vmstat` command to check paging activity. Continue to increase `AdvfsCacheMaxPercent` only if you continue to increase the hit rate, without causing the system to page.

You must reboot the system to use the new value of the `AdvfsCacheMaxPercent` attribute.

After you size the AdvFS buffer cache, you may want to consider tuning the AdvFS buffer cache hash chains.

8.7.2 AdvFS Buffer Hash Chains

The following information on `AdvfsCacheHashSize` in the *System Configuration and Tuning* guide is incorrect:

- The last sentence in the When to Tune section states that you should increase the hash chain table if the average number of buffers for each chain is greater than 100. This is incorrect. You should increase the hash chain table if the average number of buffers for each chain is greater than 10.
- The first two sentences in the Recommended Values section state that the default value of the `AdvfsCacheHashSize` attribute is either 8192 KB or 10 percent of the size of the AdvFS buffer cache (rounded up to the next power of 2), whichever is the smallest value and that the minimum value is 1024 KB. This is incorrect. This should read as follows:

  > The default value of the `AdvfsCacheHashSize` attribute is either 8192 or 10 percent of the size of the AdvFS buffer cache (rounded up to the next power of 2), whichever is the smaller value. The minimum value is 1024.

The cache hash chain table is used to locate pages of AdvFS file and metadata that are stored in the AdvFS buffer cache. The table has a number of hash chains, which contain buffers (entries) that point to pages of file system data that have already been read into memory. When a page is requested, AdvFS uses a hashing algorithm to identify the hash chain that contains the buffer, and then searches that hash chain for the buffer.

The number of buffers on each hash chain can affect AdvFS performance. Short hash chains contain less buffers to search, which improves lookup speeds and decreases CPU usage.

When the system allocates AdvFS buffers, it spreads them evenly across the available hash chains. AdvFS attempts to use a hash chain size of ten (buffers). However, if the system allocates a large number of AdvFS buffers, each hash chain will contain more than ten buffers. In this case, you may be able to improve performance by increasing the number of hash chains. This will spread the AdvFS buffers across more hash chains and decrease the number of buffers on each hash chain.

Increase the number of hash chains only if there are more than ten buffers on each hash chain. In addition, if the size of your AdvFS buffer cache is less than 640 MB, you do not have to increase the number of hash chains.

To determine the number of buffers on each hash chain, follow these steps:

1. Determine the total number of AdvFS buffers. Use one of the following methods:
   - Examine the AdvFS startup message that displays the number of buffers. At boot time, the system allocates a number of AdvFS buffers and displays a message similar to the following:

     ```
     ADVFS: using 1611 buffers containing 12.58 megabytes of memory
     ```

- Determine the number of 8 KB pages that can be obtained from the memory allocated to the AdvFS buffer cache. To do this, divide the value of the `AdvfsCacheMaxPercent` attribute (as a percentage of total physical memory) by 8192.

2. Divide the number of buffers by the number of hash chains, which is specified by the `AdvfsCacheHashSize` attribute.

If there are more than 10 buffers on each hash chain, you may want to increase the value of the `AdvfsCacheHashSize` attribute. Set the attribute to 10 percent of the total number of AdvFS buffers allocated at boot time, up to a maximum of 65,536.

If you later increase the amount of memory available to the AdvFS buffer cache, recalculate the number of buffers on each hash chain. Increase the number of hash chains if there are more than ten buffers on each hash chain.

8.7.3 AdvFS File Domain and Fileset Configuration Guidelines

The guidelines for configuring AdvFS filesets are not accurate in the Version 5.0 *System Configuration and Tuning* manual.

In Table 9-2, the following AdvFS fileset configuration guidelines are not accurate:

- Configure one fileset for each domain
- Keep filesets less than 50 GB in size

Additionally, the information in Section 9.3.4.2 is not accurate.

To configure AdvFS file domains and filesets for high availability, high performance, scalability, and ease of management, use the following information and guidelines.

The filesets in a file domain share the disk space in the domain and use the same domain transaction log. Each fileset has its own directory structure, root tag directory, quota files, and frag file.

The optimal AdvFS configuration depends on the requirements of the applications that use the file domains and filesets. Consequently, your AdvFS configuration may consist of different combinations of volumes, file domains, and filesets.

The following file domain guidelines are applicable to most configurations and workloads:

- Configure multiple small file domains, instead of a single large file domain

  This provides better control over physical resources, improves a fileset's total throughput, and decreases administration time. Multiple domains

can also improve availability, because a domain volume failure makes the entire domain unavailable.

For most configurations, the optimal size of a file domain is 20 to 50 GB. This size enables AdvFS administrative commands to run quickly. However, a domain that is larger than 50 GB may provide adequate performance, depending on the application that uses it and the degree of access.

- Configure multiple-volume file domains, instead of single-volume file domains

  This provides better control over physical resources and improves a fileset's total throughput. Because a volume failure will make the entire domain unavailable, the more volumes in a file domain, the greater the risk that the domain will fail. Therefore, you may want to limit the number of volumes in a file domain to eight, or eliminate this point of failure by mirroring the volumes or by using RAID 5.

  See the *System Configuration and Tuning* manual for more information about configuring file domains.

The optimal number of AdvFS filesets in a file domain depends on the requirements of the applications that use the fileset. In some cases, you may want to configure a single fileset in a file domain. In other cases, you may want multiple filesets in a file domain.

The amount of I/O contention on the volumes in a file domain is the most critical factor for fileset performance. This can occur on large, very busy file domains.

To help you determine how to set up filesets, first identify:

- Frequently accessed data
- Infrequently accessed data
- Specific types of data (for example, temporary data or database data)
- Data with specific access patterns (for example, create, remove, read, or write)

Then, use the previous information and the following guidelines to set up filesets:

- Configure filesets that contain similar types of files in the same file domain to reduce disk fragmentation and improve performance. For example, do not place small temporary files, such as the output from `cron` and from news, mail, and Web cache servers, in the same file domain as a large database file.
- For applications that perform many file create or remove operations, configure multiple filesets and distribute data across the filesets. This

reduces contention on individual directories, the root tag directory, quota files, and the frag file.

- Configure filesets used by applications with different I/O access patterns (for example, create, remove, read, or write patterns) in the same file domain. This might help to balance the I/O load.

Additionally, Compaq recommends that you consider future file system needs when setting up file domains and filesets. For example, you may want to set up filesets so that they can accommodate an increase in data without causing the file domain to grow to an unmanageable size.

As part of preventative maintenance and to avoid problems, periodically check for the following:

- I/O contention on file domain volumes — To reduce I/O contention in a multi-volume file domain with more than one fileset, divide it into multiple domains and distribute the filesets across the domains. This enables each volume and domain transaction log to be used by fewer filesets.
- File domain that is greater than 50 GB — Divide a large file domain into multiple domains. Note that a file domain that is larger than 50 GB may provide adequate performance, depending on the application that uses it and the degree of access.
- Fileset with a very large number of small files — This configuration may affect `vdump` and `vrestore` commands at times. Dividing the fileset into multiple filesets enables the `vdump` command to be run simultaneously on each fileset, and decreases the amount of time needed to recover filesets with the `vrestore` command.
- Fileset with many frequently accessed files — Divide a busy fileset into multiple filesets and distribute the files across the filesets. Use filesets on different domains to reduce log contention caused by many writes or metadata changes.
- Large number of files in each fileset directory — If the fileset is in a file domain that uses the on-disk formats employed by AdvFS prior to Version 5.0 (that is, domain version 3), divide the fileset into multiple filesets and distribute the files across the filesets. Note that the version 4 on-disk format supported by Version 5.0 and later releases greatly improves directory access performance and scalability.

Use the `showfdmn` command to display information about the file domain size and volumes. See the `showfdmn`(8) for more information.

Use the `showfsets` command to display the number of filesets in a domain and the size of a fileset. See `showfsets`(8) for more information.

8.8 AdvFS Administration Guide

The example in the *AdvFS Administration* guide that shows how to remove a file from a trashcan is in error. The example should read as follows:

```
# cd keeper
```

8.9 Error in the mount(8) Reference Page

The `rdonly` option listed in the AdvFS and UFS Arguments section of the `mount`(8) reference page is incorrect. This option does not exist.

To allow read-only access, use the `ro` option.

8.10 Additional Information for the ifconfig(8) and ifaccess.conf(4) Reference Pages

The following information was omitted from the `ifconfig`(8) and `ifaccess.conf`(4) reference pages:

> The `netstat -I` command displays an interface's filter information as set up with the `/etc/ifaccess.conf` file.

8.11 Online Help

The notes in this section apply to the online help.

8.11.1 SysMan Menu

The notes in this section apply to the online help for the SysMam Menu application.

8.11.1.1 Title Bar Is Incorrect

When you are using the SysMan Menu's online help in the Common Desktop Environment (CDE), the title bar displayed for the help window always displays the name of the first application for which you requested help.

Ignore the title bar. The correct help volume is displayed in the help window and the Volume label at the top of the window correctly identifies the help volume.

8.11.1.2 Help on Item Sometimes Fails

The SysMan Menu's Help On Item buttons provide online help for the selected menu item. When running the SysMan Menu from a PC, from a web browser, or from the SysMan Station, Help On Item for certain tasks fails with an error when trying to access a URL such as the following:

http://*your_machine*:2301/SYSMAN/suitlet_help/html/en_US.ISO-8859-1/help_*application*/*help_task*.html

To avoid this problem, launch the specific task and select the online help within the task itself. You can also run the SysMan Menu on a terminal or on an X11 display (for example, `sysman -display host:0.0`) and the help is displayed properly.

8.11.2 System Management Station

The notes in this section apply to the online help for the System Management Station (SMS).

8.11.2.1 Some Online Help Does Not Work Until Connected to the Server

The SysMan Station (SMS) client obtains its online help information from the SMS server. A few of the dialog boxes displayed during the initial connection sequence have Help or More Information buttons that do not function properly because a server connection has not yet been established. Specifically, this is a problem with the Welcome, Connecting to, and Failed to connect dialog boxes.

8.11.2.2 Some Links Do Not Work Properly

The following links under Section 2.2, View Window, of the Reference section of the SysMan Station Online Help do not work properly:

- ADVFS_Filesystems View
- CAA_Applications_(all) View
- CAA_Applications_(active) View
- Hardware View
- Mounted_Filesystems View
- Physical_Filesystems View

You can obtain information on these topics by selecting Section 2.2, View Window.

8.11.2.3 Online Help Window Does Not Maximize Automatically

If you open an SMS online help window and minimize it, it does not automatically maximize when you reselect Help from the SMS session. You must manually maximize the Help window to view the new help information.

A

Software Subset Information

This appendix provides information on the disk space required to install Tru64 UNIX, including information on software subsets for full and RIS installations.

A.1 Disk Space Required for Software Subsets

Table A–1, Table A–2, and Table A–3 show disk space as the number of 512-byte blocks required in the `root`, `/usr`, and `/var` file systems to install each Tru64 UNIX software subset. The figures for each group of files within a subset have been rounded up to the next-highest 512-byte increment; this means that the total space requirements listed are slightly greater than the space actually required.

To determine the subset size in megabytes (MB), divide the size in blocks by 2048.

For information on the contents of each subset, refer to the *Installation Guide*. If you want to add optional subsets after you install Tru64 UNIX Version 5.0A, use the `df` command to determine free disk space in blocks.

Table A–1: Disk Space Requirements for the Base Operating System

Tru64 UNIX Version 5.0A Operating System

Subset	root	/usr	/var	Total
OSFACCT505	9.28	1076.92	99.53	1185.72
OSFADVFS505	6731.68	1847.51	—	8579.19
OSFADVFSBIN505	2337.02	3.06	—	2340.08
OSFADVFSBINOB-JECT505	—	3954.96	—	3954.96
OSFADVFSDAEMON505	10.88	1677.74	139.18	1827.80
OSFAFM505	—	2160.73	—	2160.73
OSFATMBASE505	245.11	1322.00	—	1567.11
OSFATMBIN505	4951.93	21.40	—	4973.33
OSFATMBINCOM505	—	284.83	—	284.83
OSFATMBINOBJECT505	—	17505.10	—	17505.10

Table A–1: Disk Space Requirements for the Base Operating System (cont.)

Tru64 UNIX Version 5.0A Operating System

Subset	root	/usr	/var	Total
OSFBASE505	37893.90	95327.26	1554.04	134775.21
OSFBIN505	17152.82	1508.41	—	18661.23
OSFBINCOM505	42.44	29387.21	71.88	29501.53
OSFBINOBJECT505	—	27514.73	—	27514.73
OSFC2SEC505	414.65	1155.16	160.22	1730.04
OSFCDEAPPS505	—	12486.60	—	12486.60
OSFCDEDEV505	—	27196.67	—	27196.67
OSFCDEDT505	—	55410.44	—	55410.44
OSFCDEMAIL505	—	4198.03	—	4198.03
OSFCDEMANOP505	—	2039.40	—	2039.40
OSFCDEMANOS505	—	1432.32	—	1432.32
OSFCDEMIN505	—	16438.70	22.05	16460.74
OSFCLINET505	972.91	17474.21	47.12	18494.24
OSFCMPLRS505	—	27542.62	—	27542.62
OSFDCMT505	—	1094.47	—	1094.47
OSFDCMTEXT505	—	4367.30	—	4367.30
OSFDECW505	—	2877.28	60.99	2938.27
OSFDMS505	—	94.93	73.06	167.99
OSFDOSTOOLS505	—	3228.54	—	3228.54
OSFEMACS505	—	169008.38	—	169008.38
OSFENVMON505	21.48	142.10	—	163.58
OSFEURLOC505	—	1509.82	—	1509.82
OSFEXAMPLES505	—	2325.43	—	2325.43
OSFEXER505	—	6853.63	—	6853.63
OSFFONT15505	—	3160.99	—	3160.99
OSFFONT505	—	2432.85	—	2432.85
OSFHWBASE505	26651.39	2768.43	34.40	29454.22
OSFHWBIN505	28548.13	2089.03	6.10	30643.26
OSFHWBINCOM505	—	3649.94	—	3649.94

Table A–1: Disk Space Requirements for the Base Operating System (cont.)

Tru64 UNIX Version 5.0A Operating System

Subset	root	/usr	/var	Total
OSFHWBINOBJECT505	—	28930.77	—	28930.77
OSFIMXE505	13.85	7221.47	299.40	7534.72
OSFINCLUDE505	—	5662.00	—	5662.00
OSFINET505	1079.64	19597.24	732.75	21409.63
OSFJAVA505	—	21715.71	—	21715.71
OSFJAVADEV505	—	17727.53	—	17727.53
OSFJAVADOC505	—	34278.77	—	34278.77
OSFKBDLK201505	—	361.70	—	361.70
OSFKBDLK401505	—	248.44	—	248.44
OSFKBDLK411505	—	134.33	—	134.33
OSFKBDLK421505	—	16.42	—	16.42
OSFKBDLK444505	—	126.52	—	126.52
OSFKBDPCXAL505	—	273.11	—	273.11
OSFKTOOLS505	—	1564.69	7992.54	9557.23
OSFLAT505	648.92	941.01	7.83	1597.76
OSFLDBBASE505	—	13460.43	—	13460.43
OSFLDBDOC505	—	408.38	—	408.38
OSFLEARN505	—	3099.59	—	3099.59
OSFLIBA505	—	8674.83	—	8674.83
OSFLSMBASE505	7125.54	5072.89	—	12198.44
OSFLSMBIN505	1652.29	9.16	—	1661.45
OSFLSMX11505	—	10051.91	61.54	10113.45
OSFMANOP505	—	18434.20	—	18434.20
OSFMANOS505	—	15465.05	—	15465.05
OSFMANWOP505	—	8788.48	—	8788.48
OSFMANWOS505	—	1252.13	—	1252.13
OSFMH505	—	4144.21	—	4144.21
OSFMITFONT505	—	18754.98	104.01	18858.99
OSFMOTIF11505	—	10808.58	—	10808.58

Table A–1: Disk Space Requirements for the Base Operating System (cont.)

Tru64 UNIX Version 5.0A Operating System

Subset	root	/usr	/var	Total
OSFNETCONF505	—	1381.19	—	1381.19
OSFNETSCAPE505	—	53942.84	—	53942.84
OSFNFS505	52.49	1269.93	—	1322.42
OSFNFSCONF505	—	44.08	—	44.08
OSFOBSOLETE505	—	1494.67	—	1494.67
OSFOLDDECW505	—	328.46	—	328.46
OSFPERL505	—	20912.89	—	20912.89
OSFPGMR505	—	9870.42	—	9870.42
OSFPRINT505	114.24	8271.79	44.13	8430.16
OSFRCS505	—	1889.18	—	1889.18
OSFRIS505	—	199.94	143.19	343.12
OSFSCCS505	—	12107.63	—	12107.63
OSFSDE505	—	19317.06	—	19317.06
OSFSDECDE505	—	314.93	—	314.93
OSFSER505	—	14042.48	50.63	14093.11
OSFSERPC505	—	4099.94	—	4099.94
OSFSERTC505	—	683.81	—	683.81
OSFSERVICETOOLS505	15.54	2201.46	3.08	2220.08
OSFSVID2505	30.00	616.61	—	646.60
OSFSYSMAN505	122.50	51784.35	8.24	51915.09
OSFTCLBASE505	—	12887.37	—	12887.37
OSFTERM505	—	3702.49	—	3702.49
OSFTKBASE505	—	10192.20	—	10192.20
OSFTRUETYPE505	—	399.35	—	399.35
OSFUUCP505	97.75	14808.68	272.15	15178.58
OSFX11505	22.30	38989.39	717.84	39729.52
OSFXADMIN505	—	6687.73	68.38	6756.11
OSFXADVFS505	—	21218.63	654.15	21872.79
OSFXC2SEC505	—	582.56	—	582.56

Table A–1: Disk Space Requirements for the Base Operating System (cont.)

Tru64 UNIX Version 5.0A Operating System

Subset	root	/usr	/var	Total
OSFXDEMOS505	—	1855.40	—	1855.40
OSFXDEV505	—	2735.67	—	2735.67
OSFXEXAMPLES505	—	9172.60	—	9172.60
OSFXIEDOC505	—	1478.88	—	1478.88
OSFXINCLUDE505	—	8068.52	—	8068.52
OSFXLIBA505	—	15189.75	—	15189.75
OSFXMIT505	—	6060.57	47.91	6108.48
OSFXNEST505	—	376.50	9.81	386.31
OSFXOEM505	—	—	965.52	965.52
OSFXPRINT505	—	717.14	—	717.14
OSFXPRT505	—	1207.62	318.93	1526.56
OSFXSYSMAN505	66.64	17518.45	238.05	17823.14
OSFXVFB505	—	219.16	9.81	228.97
Totals	**137025.30**	**1190635.99**	**15018.48**	**1342679.77**
Grand Totals	**root**	**/usr**	**/var**	**Total**
	137025.30	**1190635.99**	**15018.48**	**1342679.77**

Table A–2: Disk Space Requirements for APCD Volume 1

Advanced Printing Software

Subset	root	/usr	/var	Total
APXADMIN101	—	4343.51	—	4343.51
APXBASE101	—	7294.00	76.00	7370.00
APXGUI101	—	14387.37	—	14387.37
APXGW101	—	1078.09	—	1078.09

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Advanced Printing Software				
Subset	**root**	**/usr**	**/var**	**Total**
APXSVR101	—	2435.88	—	2435.88
Totals	**—**	**29538.84**	**76.00**	**29614.84**
COM for Tru64 UNIX V1.1				
Subset	**root**	**/usr**	**/var**	**Total**
CUEDEV110	—	9835.49	75.71	9911.20
CUEDOC110	—	5622.46	—	5622.46
CUEMAN110	—	81.15	—	81.15
CUERTS110	—	17200.25	3665.21	20865.47
Totals	**—**	**32739.35**	**3740.93**	**36480.28**
DEC C++ Class Libraries Version 4.0 for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
CXLLIBA505	—	224.93	—	224.93
CXLSHRDA505	—	280.46	—	280.46
Totals	**—**	**505.39**	**—**	**505.39**
Compaq COBOL RTL V2.6-467 for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
DCARTL260	—	2581.81	—	2581.81

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Compaq COBOL RTL V2.6-467 for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
O2ABASE260	—	1734.24	—	1734.24
Totals	**—**	**4316.05**	**—**	**4316.05**
Compaq Fortran RTL #388 for Compaq Tru64 UNIX Alpha Systems (f90 and f77)				
Subset	**root**	**/usr**	**/var**	**Total**
DFARTL388	—	4543.53	—	4543.53
Totals	**—**	**4543.53**	**—**	**4543.53**
DEC Pascal RTL V5.6-21 for Digital UNIX Systems				
Subset	**root**	**/usr**	**/var**	**Total**
DPORTL563	—	1742.89	—	1742.89
Totals	**—**	**1742.89**	**—**	**1742.89**
Sort Library				
Subset	**root**	**/usr**	**/var**	**Total**
SORLIB400	—	2521.32	—	2521.32
Totals	**—**	**2521.32**	**—**	**2521.32**
MERANT DataDirect				
Subset	**root**	**/usr**	**/var**	**Total**
DAUDOC200	—	—	7207.04	7207.04
DAUJDBCODBC200	—	—	720.95	720.95
DAUODBCCON200	—	—	15484.19	15484.19
DAUSQLNKJAVA200	—	—	4738.95	4738.95
DAUSQLNKODBC200	33.32	—	5512.07	5545.39

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

MERANT DataDirect				
Subset	**root**	**/usr**	**/var**	**Total**
DAUSQLNKSVR200	—	—	41443.76	41443.76
Totals	**33.32**	**—**	**75106.97**	**75140.29**
Development Enhancment Tools for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
CMPDEVENH505	—	249.42	—	249.42
Totals	**—**	**249.42**	**—**	**249.42**
Free Software Foundation GNU Source for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
FSFEMACS505	—	68185.15	—	68185.15
FSFGZIPSRC505	—	1894.79	—	1894.79
FSFINDENTSRC505	—	1238.49	—	1238.49
FSFPERL505	—	20029.00	—	20029.00
FSFRCSSRC505	—	1907.55	—	1907.55
Totals	**—**	**93254.98**	**—**	**93254.98**
Multimedia Services V3.0 for Compaq Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
MMEDEV300	—	3211.56	—	3211.56
MMEDOC300	—	256.68	—	256.68
MMEDOCDEV300	—	4.00	—	4.00
MMEDOCHW300	—	—	—	—
MMEDRVEN-SONIQ300	—	919.92	—	919.92
MMEDRVMMSESS300	—	874.51	—	874.51
MMEDRVMSB300	—	1174.82	—	1174.82
MMEMANDEV300	—	1589.61	—	1589.61
MMEMANRT300	—	290.04	—	290.04
MMERELNOTES300	—	36.34	—	36.34
MMERT300	23.93	24198.46	11.23	24233.62

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Multimedia Services V3.0 for Compaq Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
MMERTCDE300	—	445.26	—	445.26
MMERTSMPLDAT300	—	12389.70	—	12389.70
Totals	**23.93**	**45390.91**	**11.23**	**45426.06**
Netscape FastTrack V3.01 for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
WEBNETSCAPEFAST-TRACK301	—	172955.13	—	172955.13
Totals	**—**	**172955.13**	**—**	**172955.13**
Performance Manager for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
PMGRAPP505	—	411.37	—	411.37
PMGRBASE505	—	4268.04	—	4268.04
PMGRGUI505	—	26177.69	5.65	26183.34
PMGRMAN505	—	63.43	—	63.43
PMGRUTIL505	—	41.14	2293.77	2334.91
Totals	**—**	**30961.67**	**2299.42**	**33261.09**
Digital Porting Assistant V3.0-0 for Digital UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
PRTBASE300	—	50631.13	—	50631.13
PRTMAN300	—	18.45	—	18.45
Totals	**—**	**50649.58**	**—**	**50649.58**
Graphical Program Analysis Tools V3.0 for Compaq Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
GPABASE300	—	45377.38	—	45377.38

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Graphical Program Analysis Tools V3.0 for Compaq Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
GPALCLCLIENTS300	—	18165.79	—	18165.79
Totals	**—**	**63543.16**	**—**	**63543.16**
Tru64 UNIX Retired Components				
Subset	**root**	**/usr**	**/var**	**Total**
OSRETIRED-CLINET500	—	209.30	—	209.30
OSRETIRED-CLINET505	—	208.51	—	208.51
OSRETIREDNFS500	—	44.65	—	44.65
OSRETIREDNFS505	—	44.25	—	44.25
Totals	**—**	**506.71**	**—**	**506.71**
Visual Threads V2.0-015 for Tru64 UNIX				
Subset	**root**	**/usr**	**/var**	**Total**
DVTBASE200	—	32188.17	—	32188.17
Totals	**—**	**32188.17**	**—**	**32188.17**
Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSAACMENU505	—	—	—	—
IOSCACDEAPPS505	—	2162.38	—	2162.38
IOSCACDEDEV505	—	190.33	—	190.33
IOSCACDEDT505	—	1497.68	—	1497.68
IOSCACDEMAIL505	—	90.00	—	90.00
IOSCACDEMIN505	—	587.98	—	587.98
IOSCADECW505	—	32.61	—	32.61
IOSCAX11505	—	734.12	3.30	737.42
IOSCAXDEV505	—	93.73	—	93.73
IOSCAXSYSMAN505	—	116.46	—	116.46
IOSCSBASE505	—	166.79	—	166.79

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A

Subset	root	/usr	/var	Total
IOSCSCDEAPPS505	—	2042.07	—	2042.07
IOSCSCDEDEV505	—	154.96	—	154.96
IOSCSCDEDT505	—	1224.80	—	1224.80
IOSCSCDEMAIL505	—	83.71	—	83.71
IOSCSCDEMIN505	—	4012.74	—	4012.74
IOSCSDECW505	—	45.39	—	45.39
IOSCSX11505	—	1488.46	3.30	1491.76
IOSCSXDEV505	—	93.63	—	93.63
IOSCSXSYSMAN505	—	115.07	—	115.07
IOSDECDEAPPS505	—	291.42	—	291.42
IOSDECDEDEV505	—	191.50	—	191.50
IOSDECDEDT505	—	1407.69	—	1407.69
IOSDECDEHLP505	—	20427.28	—	20427.28
IOSDECDEMAIL505	—	92.01	—	92.01
IOSDECDEMIN505	—	584.03	—	584.03
IOSDECHX11505	—	354.06	—	354.06
IOSDEDECW505	—	32.48	—	32.48
IOSDEX11505	—	1692.61	3.30	1695.91
IOSDEXDEV505	—	93.75	—	93.75
IOSDEXSYSMAN505	—	117.10	—	117.10
IOSELBASE505	—	85.32	—	85.32
IOSELCDEDT505	—	29.45	—	29.45
IOSELCDEMIN505	—	79.76	—	79.76
IOSELFONT100M505	—	1092.72	—	1092.72
IOSELFONT100P505	—	1080.35	—	1080.35
IOSELFONT75M505	—	933.73	—	933.73
IOSELFONT75P505	—	926.07	—	926.07
IOSELOLFONT505	—	2011.26	37.23	2048.49

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSELX11505	—	195.94	3.30	199.24
IOSESCDEAPPS505	—	279.40	—	279.40
IOSESCDEDEV505	—	189.70	—	189.70
IOSESCDEDT505	—	1416.86	—	1416.86
IOSESCDEHLP505	—	24298.32	—	24298.32
IOSESCDEMAIL505	—	91.19	—	91.19
IOSESCDEMIN505	—	563.77	—	563.77
IOSESDECW505	—	32.59	—	32.59
IOSESX11505	—	1693.78	3.30	1697.08
IOSESXDEV505	—	93.79	—	93.79
IOSESXSYSMAN505	—	117.11	—	117.11
IOSFRBEX11505	—	354.06	—	354.06
IOSFRCAX11505	—	354.06	—	354.06
IOSFRCDEAPPS505	—	282.65	—	282.65
IOSFRCDEDEV505	—	182.86	—	182.86
IOSFRCDEDT505	—	1420.64	—	1420.64
IOSFRCDEHLP505	—	20764.14	—	20764.14
IOSFRCDEMAIL505	—	94.31	—	94.31
IOSFRCDEMIN505	—	564.39	—	564.39
IOSFRCHX11505	—	354.06	—	354.06
IOSFRDECW505	—	32.60	—	32.60
IOSFRX11505	—	1710.28	3.30	1713.58
IOSFRXDEV505	—	93.84	—	93.84
IOSFRXSYSMAN505	—	117.29	—	117.29
IOSHUBASE505	—	169.83	—	169.83
IOSHUCDEAPPS505	—	2054.00	—	2054.00
IOSHUCDEDEV505	—	171.68	—	171.68
IOSHUCDEDT505	—	1203.20	—	1203.20

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSHUCDEMAIL505	—	86.40	—	86.40
IOSHUCDEMIN505	—	4060.22	—	4060.22
IOSHUDECW505	—	45.32	—	45.32
IOSHUX11505	—	1494.58	3.30	1497.88
IOSHUXDEV505	—	93.74	—	93.74
IOSHUXSYSMAN505	—	115.46	—	115.46
IOSITCDEAPPS505	—	2165.61	—	2165.61
IOSITCDEDEV505	—	189.30	—	189.30
IOSITCDEDT505	—	1500.34	—	1500.34
IOSITCDEHLP505	—	14673.58	—	14673.58
IOSITCDEMAIL505	—	94.21	—	94.21
IOSITCDEMIN505	—	570.67	—	570.67
IOSITDECW505	—	32.53	—	32.53
IOSITX11505	—	1713.00	3.30	1716.30
IOSITXDEV505	—	93.79	—	93.79
IOSITXSYSMAN505	—	119.48	—	119.48
IOSIWBASE505	—	460.97	3.30	464.27
IOSIWCDEDT505	—	130.56	—	130.56
IOSIWCDEMIN505	—	139.46	—	139.46
IOSIWFONT100M505	—	664.17	—	664.17
IOSIWFONT100P505	—	2157.05	—	2157.05
IOSIWFONT75M505	—	439.21	—	439.21
IOSIWFONT75P505	—	1901.38	—	1901.38
IOSIWOLFONT505	—	3038.24	62.44	3100.68
IOSIWX11505	—	1707.30	—	1707.30
IOSIWXDEV505	—	932.66	—	932.66
IOSJPABASE505	—	3332.37	—	3332.37
IOSJPAMANOS505	—	35.49	—	35.49

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A

Subset	root	/usr	/var	Total
IOSJPBASE505	—	40410.55	13.16	40423.71
IOSJPBIN505	628.05	95.82	6.10	729.96
IOSJPCDEAPPS505	—	661.54	—	661.54
IOSJPCDEDEV505	—	1166.38	—	1166.38
IOSJPCDEDT505	—	3473.40	—	3473.40
IOSJPCDEHLP505	—	32613.78	—	32613.78
IOSJPCDEHLP-SJIS505	—	32965.09	—	32965.09
IOSJPCDEMAIL505	—	329.54	—	329.54
IOSJPCDEMIN505	—	2219.84	—	2219.84
IOSJPDECW505	—	97.34	—	97.34
IOSJPDOSTOOLS505	—	680.97	—	680.97
IOSJPFONT100M505	—	12497.12	—	12497.12
IOSJPFONT100P505	—	12184.75	—	12184.75
IOSJPFONT75M505	—	8875.36	—	8875.36
IOSJPFONT75P505	—	8523.70	—	8523.70
IOSJPFONTM505	—	13715.83	—	13715.83
IOSJPLDBBASE505	—	968.29	—	968.29
IOSJPLSMX11505	—	2156.41	—	2156.41
IOSJPMANOS505	—	7026.44	—	7026.44
IOSJPMANWOS505	—	109.16	—	109.16
IOSJPNETSCAPE505	—	6133.10	—	6133.10
IOSJPPGMR505	—	2039.39	—	2039.39
IOSJPSDECDE505	—	41.81	—	41.81
IOSJPSYSMAN505	—	1366.95	—	1366.95
IOSJPWNN505	9.57	20165.96	95.00	20270.54
IOSJPWNNPGMR505	—	1211.33	—	1211.33
IOSJPWNNSRC505	—	10790.03	—	10790.03

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A

Subset	root	/usr	/var	Total
IOSJPX11505	—	2654.70	—	2654.70
IOSJPXADMIN505	—	3699.02	—	3699.02
IOSJPXADVFS505	—	1749.29	—	1749.29
IOSJPXDEV505	—	123.89	—	123.89
IOSJPXSYSMAN505	—	13821.64	—	13821.64
IOSKOBASE505	—	10970.84	6.59	10977.43
IOSKOCDEAPPS505	—	195.79	—	195.79
IOSKOCDEDEV505	—	175.02	—	175.02
IOSKOCDEDT505	—	4792.56	—	4792.56
IOSKOCDEHLP505	—	11097.10	—	11097.10
IOSKOCDEMAIL505	—	137.24	—	137.24
IOSKOCDEMIN505	—	843.84	—	843.84
IOSKODECW505	—	53.89	—	53.89
IOSKOFONTM505	—	3896.31	—	3896.31
IOSKOFONTP505	—	9568.90	—	9568.90
IOSKOOLFONT505	—	6157.34	3.07	6160.42
IOSKOPGMR505	—	171.59	—	171.59
IOSKOX11505	—	2109.04	—	2109.04
IOSKOXDEV505	—	96.60	—	96.60
IOSLTX11505	—	195.78	3.30	199.08
IOSPLBASE505	—	169.83	—	169.83
IOSPLCDEAPPS505	—	2117.87	—	2117.87
IOSPLCDEDEV505	—	184.03	—	184.03
IOSPLCDEDT505	—	1130.71	—	1130.71
IOSPLCDEMAIL505	—	89.16	—	89.16
IOSPLCDEMIN505	—	4084.27	—	4084.27
IOSPLDECW505	—	45.38	—	45.38
IOSPLX11505	—	1508.80	3.30	1512.10

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSPLXDEV505	—	93.73	—	93.73
IOSPLXSYSMAN505	—	116.54	—	116.54
IOSRUBASE505	—	82.33	—	82.33
IOSRUCDEAPPS505	—	1954.45	—	1954.45
IOSRUCDEDT505	—	135.54	—	135.54
IOSRUDECW505	—	39.86	—	39.86
IOSRUX11505	—	1482.67	3.30	1485.97
IOSRUXDEV505	—	93.90	—	93.90
IOSSKBASE505	—	169.83	—	169.83
IOSSKCDEAPPS505	—	2102.04	—	2102.04
IOSSKCDEDEV505	—	272.73	—	272.73
IOSSKCDEDT505	—	1132.52	—	1132.52
IOSSKCDEMAIL505	—	86.22	—	86.22
IOSSKCDEMIN505	—	4050.63	—	4050.63
IOSSKDECW505	—	45.39	—	45.39
IOSSKX11505	—	1476.49	3.30	1479.79
IOSSKXDEV505	—	93.61	—	93.61
IOSSKXSYSMAN505	—	115.26	—	115.26
IOSSLCDEDT505	—	32.41	—	32.41
IOSSLX11505	—	206.89	3.30	210.19
IOSSVCDEAPPS505	—	281.65	—	281.65
IOSSVCDEDEV505	—	183.93	—	183.93
IOSSVCDEDT505	—	1361.14	—	1361.14
IOSSVCDEHLP505	—	14824.52	—	14824.52
IOSSVCDEMAIL505	—	86.24	—	86.24
IOSSVCDEMIN505	—	536.77	—	536.77
IOSSVDECW505	—	32.51	—	32.51
IOSSVX11505	—	1692.08	3.30	1695.38

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSSVXDEV505	—	93.59	—	93.59
IOSSVXSYSMAN505	—	113.42	—	113.42
IOSTHBASE505	—	851.81	3.29	855.10
IOSTHBIN505	503.68	12.20	6.10	521.98
IOSTHCDEAPPS505	—	150.02	—	150.02
IOSTHCDEDEV505	—	266.79	—	266.79
IOSTHCDEDT505	—	1134.03	—	1134.03
IOSTHCDEMAIL505	—	82.59	—	82.59
IOSTHCDEMIN505	—	478.31	—	478.31
IOSTHDECW505	—	45.36	—	45.36
IOSTHFONTM505	—	196.30	—	196.30
IOSTHOLFONT505	—	7382.06	123.70	7505.76
IOSTHPGMR505	—	126.13	—	126.13
IOSTHPRINT505	—	173.17	—	173.17
IOSTHX11505	—	1410.67	—	1410.67
IOSTHXDEV505	—	106.24	—	106.24
IOSTRBASE505	—	85.32	—	85.32
IOSTRCDEDT505	—	29.40	—	29.40
IOSTRCDEMIN505	—	79.76	—	79.76
IOSTRFONT100M505	—	1097.05	—	1097.05
IOSTRFONT100P505	—	4112.34	—	4112.34
IOSTRFONT75M505	—	944.16	—	944.16
IOSTRFONT75P505	—	3467.88	—	3467.88
IOSTROLFONT505	—	5455.58	102.34	5557.92
IOSTRX11505	—	281.66	3.30	284.96
IOSWWBASE505	23.70	56959.48	177.67	57160.85
IOSWWBIN505	992.83	130.00	12.20	1135.03
IOSWWBINCOM505	17.52	69.56	3.08	90.15

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A

Subset	root	/usr	/var	Total
IOSWWEURLOC505	—	1482.94	—	1482.94
IOSWWFGC505	—	1479.80	—	1479.80
IOSWWFONTM505	—	702.40	—	702.40
IOSWWFONTP505	—	396.18	—	396.18
IOSWWLAT2FONT100M505	—	1178.66	—	1178.66
IOSWWLAT2FONT100P505	—	4363.28	—	4363.28
IOSWWLAT2FONT75M505	—	871.17	—	871.17
IOSWWLAT2FONT75P505	—	3805.77	—	3805.77
IOSWWLAT2OL-FONT505	—	5573.37	102.34	5675.71
IOSWWLAT4FONT100M505	—	1183.15	—	1183.15
IOSWWLAT4FONT100P505	—	4386.89	—	4386.89
IOSWWLAT4FONT75M505	—	885.65	—	885.65
IOSWWLAT4FONT75P505	—	3828.26	—	3828.26
IOSWWLAT9FONT100M505	—	2257.23	—	2257.23
IOSWWLAT9FONT100P505	—	3034.22	—	3034.22
IOSWWLAT9FONT75M505	—	1905.38	—	1905.38
IOSWWLAT9FONT75P505	—	2565.30	—	2565.30
IOSWWLAT9LOC505	—	1300.75	—	1300.75
IOSWWLATC-FONT100M505	—	1159.46	—	1159.46
IOSWWLATC-FONT100P505	—	2420.13	—	2420.13
IOSWWLATC-FONT75M505	—	985.95	—	985.95
IOSWWLATC-FONT75P505	—	2029.76	—	2029.76
IOSWWLATCOL-FONT505	—	3660.26	62.14	3722.40
IOSWWMOTIF11505	—	12749.71	—	12749.71

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A

Subset	root	/usr	/var	Total
IOSWWMULE505	—	78237.71	—	78237.71
IOSWWMULESRC505	—	26959.23	—	26959.23
IOSWWOBSOLETE505	24.59	680.51	—	705.10
IOSWWPGMR505	—	298.94	—	298.94
IOSWWPHRASE505	455.36	537.91	6.10	999.37
IOSWWPRINT505	12.79	1782.96	44.15	1839.90
IOSWWSVEDEV505	—	428.06	—	428.06
IOSWWSYSMAN505	—	731.15	4.78	735.93
IOSWWUDCOS505	470.41	1961.41	6.10	2437.92
IOSWWUDCWOS505	—	106.88	—	106.88
IOSWWX11505	—	3331.17	—	3331.17
IOSWWXDEV505	—	2362.82	—	2362.82
IOSWWXFR505	14.60	1156.40	3.49	1174.49
IOSZHBASE505	—	65301.24	—	65301.24
IOSZHBIG5505	168.58	250.41	3.05	422.04
IOSZHCNBASE505	—	2666.75	6.57	2673.33
IOSZHC-NCDEAPPS505	—	154.96	—	154.96
IOSZHCNCDEDEV505	—	184.26	—	184.26
IOSZHCNCDEDT505	—	11155.92	—	11155.92
IOSZHCNCDEHLP505	—	18520.48	—	18520.48
IOSZHCNCDE-MAIL505	—	95.91	—	95.91
IOSZHCNCDEMIN505	—	551.41	—	551.41
IOSZHCNLOC505	—	795.83	—	795.83
IOSZHCONV505	82.20	75.51	3.05	160.75
IOSZHHKBASE505	—	3585.73	13.16	3598.89
IOSZHPGMR505	—	2474.40	—	2474.40

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
IOSZHSDECW505	—	45.93	—	45.93
IOSZHSFONTM505	—	3449.72	—	3449.72
IOSZHSFONTP505	—	27595.29	—	27595.29
IOSZHSOLFONT505	—	15013.72	6.19	15019.91
IOSZHSSYSMAN505	—	456.50	—	456.50
IOSZHSTTFONT505	—	85204.57	—	85204.57
IOSZHSX11505	—	2658.57	—	2658.57
IOSZHSXADMIN505	—	38.46	—	38.46
IOSZHSXDEV505	—	195.93	—	195.93
IOSZHSXSYSMAN505	—	75.93	—	75.93
IOSZHTDECW505	—	122.50	—	122.50
IOSZHTELEX505	134.42	6.10	3.05	143.57
IOSZHTFONTM505	—	9272.73	—	9272.73
IOSZHTFONTP505	—	25532.25	—	25532.25
IOSZHTOLFONT505	—	28158.10	6.20	28164.30
IOSZHTWBASE505	—	6557.88	9.86	6567.75
IOSZHTWCDEAPPS505	—	379.01	—	379.01
IOSZHTWCDEDEV505	—	473.34	—	473.34
IOSZHTWCDEDT505	—	10471.69	—	10471.69
IOSZHTWCDEHLP505	—	11918.55	—	11918.55
IOSZHTWCDE-MAIL505	—	221.14	—	221.14
IOSZHTWCDEMIN505	—	1342.58	—	1342.58
IOSZHTWLOC505	—	5579.38	—	5579.38
IOSZHTX11505	—	4921.12	—	4921.12
IOSZHTXDEV505	—	933.87	—	933.87
IOSZHX11505	—	4751.51	—	4751.51
Totals	**3538.29**	**1103786.04**	**985.01**	**1108309.35**

Table A–2: Disk Space Requirements for APCD Volume 1 (cont.)

Tru64 UNIX Worldwide Language Support Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
Grand Totals	**root**	**/usr**	**/var**	**Total**
	3595.54	**1669393.14**	**82219.56**	**1755208.24**

Table A–3: Disk Space Requirements for APCD Volume 2

Advanced Server for UNIX Version 5.0				
Subset	**root**	**/usr**	**/var**	**Total**
ASUADM500	—	27720.55	—	27720.55
ASUADMJP500	—	26249.39	—	26249.39
ASUBASE500	13.01	38800.73	—	38813.74
ASUMANJP500	—	535.83	—	535.83
ASUMANPAGE500	—	513.21	—	513.21
ASUSIA500	3.96	83.00	—	86.96
ASUTRAN500	111.89	4063.77	3173.80	7349.46
Totals	**128.86**	**97966.48**	**3173.80**	**101269.14**
DECevent				
Subset	**root**	**/usr**	**/var**	**Total**
DIABASE310	21.55	71240.29	606.00	71867.85
Totals	**21.55**	**71240.29**	**606.00**	**71867.85**
Legato NetWorker				
Subset	**root**	**/usr**	**/var**	**Total**
LGTOCLNT552	—	74800.23	—	74800.23
LGTOMAN552	—	2205.09	—	2205.09
LGTONODE552	—	35684.00	—	35684.00

Table A–3: Disk Space Requirements for APCD Volume 2 (cont.)

Legato NetWorker				
Subset	**root**	**/usr**	**/var**	**Total**
LGTOSERV552	—	46457.34	—	46457.34
Totals	**—**	**159146.66**	**—**	**159146.66**
PowerStorm 3x0 Support				
Subset	**root**	**/usr**	**/var**	**Total**
3X0CONFIG514	—	—	—	—
3X0DEVICE514	—	43608.08	—	43608.08
3X0GLBASE514	—	7536.69	—	7536.69
Totals	**—**	**51144.76**	**—**	**51144.76**
PowerStorm 4D51T Version 5.0				
Subset	**root**	**/usr**	**/var**	**Total**
4DTBASE500	—	12454.41	—	12454.41
4DTCONFIG500	—	—	—	—
4DTGLBASE500	—	8106.62	—	8106.62
4DTGLEXAM500	—	12586.55	—	12586.55
4DTGLMAN500	—	2050.56	—	2050.56
4DTZE3500	—	25975.81	—	25975.81
Totals	**—**	**61173.95**	**—**	**61173.95**
Tru64 UNIX TruCluster(TM) Server Software Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
TCRBASE505	2331.37	87450.10	13820.06	103601.53
TCRMAN505	—	1720.92	—	1720.92

Table A–3: Disk Space Requirements for APCD Volume 2 (cont.)

Tru64 UNIX TruCluster(TM) Server Software Version 5.0A				
Subset	**root**	**/usr**	**/var**	**Total**
TCRMIGRATE505	—	2165.74	—	2165.74
Totals	**2331.37**	**91336.76**	**13820.06**	**107488.20**
UniCensus				
Subset	**root**	**/usr**	**/var**	**Total**
UNICEN434	—	—	2224.47	2224.47
Totals	**—**	**—**	**2224.47**	**2224.47**
Web-based Enterprise Service				
Subset	**root**	**/usr**	**/var**	**Total**
WEBESBASE210	—	55985.90	—	55985.90
Totals	**—**	**55985.90**	**—**	**55985.90**
Windows 2000 Single Sign On				
Subset	**root**	**/usr**	**/var**	**Total**
W2KSSO100	73.96	5278.96	—	5352.91
Totals	**73.96**	**5278.96**	**—**	**5352.91**
Grand Totals	**root**	**/usr**	**/var**	**Total**
	2555.74	**593273.76**	**19824.33**	**615653.84**

A.2 Disk Space Required for RIS Areas

The Remote Installation Services (RIS) area for Tru64 UNIXVersion 5.0A requires approximately 3 MB of disk space. The space requirements are identified by product area in the following table Table A–4.

Table A–4: Disk Space Required for RIS Areas

Product Area	**512-Byte Blocks**
Tru64_UNIX_Operating_System	1307486
Advanced_Printing	28238
COM	38172
Data_Direct	73670
DEC_C++_RTL	350
DEC_Cobol_RTL	2134

Table A–4: Disk Space Required for RIS Areas (cont.)

Product Area	512-Byte Blocks
DEC_Fortran_RTL	2556
DEC_Pascal_RTL	802
DEC_Sort_RTL	1238
Development_Enhancements	254
GNUSRC	34808
Multimedia_Service	33356
Netscape_FastTrack_Server	79188
Performance_Manager	30944
Porting_Assistant	22496
Program_Analyzers	22098
Tru64_Retired	226
Visual_Threads	21194
Worldwide_Language_Support	626210
Advanced_Server	88316
DEC_EVENT	19856
NetWorker	175726
PowerStorm_300_and_350	28094
PowerStorm_4D51T	29262
TruCluster	82192
UniCensus	1584
WEBES	56410
Windows2000_SSO	17634
Total	2824494

A.3 Disk Space Required for Documentation

The Tru64 UNIX documentation set is provided in HTML and PDF format on the Tru64 UNIX *Software Documentation* CD–ROM. It requires approximately 197 MB of disk space, as follows:

- 88 MB for the HTML files
- 38 MB for the PDF files

B

Time Zone Enhancements

The naming convention for /etc/zoneinfo/ time zone directories and files has changed from the former COUNTRY/ZONE style (for example, US/Eastern) to the more stable AREA/LOCATION format (for example, America/New_York), where AREA is the name of a continent or ocean, and LOCATION is the name of a specific location (major city, locale, and so on within that region). All previous /etc/zoneinfo/ directories and time zone files are available, for compatibility; however, many of the files are now hard links to their renamed counterparts. Obsolete time zone mappings are provided for reference in Table B–2.

The time zone data file format has been expanded to handle more complex transition rules. (See the tzfile(4) reference page for details.) The zic compiler zdump command and several time-related functions in the standard C library have been updated to support the expanded time zone data file format.

While the time zone data file format has been expanded to support additional transition rules, time zone data files created on prior versions of the operating system will work without recompilation. This provides support for user-generated time zone data files, which may or may not have original source code.

Conversely, static applications created on prior versions of the operating system and that reference time zone data will be able to process most of the new time zone data files in the /etc/zoneinfo/ directory. They will not take advantage of the new time zone data file extensions, but will still read and process the portions of these files they did previously. However, due to the expanded number of time transition types available in the new time zone data files, certain older static applications will not be able to read the new time zones listed in Table B–1.

Table B–1: Incompatible New Time Zones

Asia/Aqtobe	Atlantic/Azores	Europe/Monaco
Asia/Aqtau	Atlantic/Madeira	Europe/Moscow
Asia/Baku	Europe/Amsterdam	Europe/Paris
Asia/Riyadh87	Europe/Kaliningrad	Europe/Riga
Asia/Riyadh88	Europe/Kiev	Europe/Samara

Table B–1: Incompatible New Time Zones (cont.)

Asia/Riyadh89	Europe/Lisbon	Europe/Simferopol
Asia/Tbilisi	Europe/Ljubljana	Europe/Tallinn
Asia/Yekaterinburg	Europe/Luxembourg	Europe/Vilnius
Asia/Yerevan	Europe/Minsk	

Enablers were added to Version 4.0D of the operating system to allow the new time zones to be read; therefore, static applications built on Version 4.0D or later releases will not have problems with these files. It is important to note that none of the time zones listed in Table B–1 existed on versions of the operating system prior to Version 5.0. It is, therefore, unlikely that any existing applications reference any of the time zones listed.

Shared applications are not affected by the issue above, because they automatically pick up the new time zone data file support in Version 4.0D and later versions of the operating system.

Table B–2 provides a mapping of the old time zones to the new time zones.

Table B–2: Mapping of the Old Time Zones to New Time Zones

Obsolete Time Zone	New Time Zone
Australia/ACT	Australia/Sydney
Australia/LHI	Australia/Lord_Howe
Australia/NSW	Australia/Sydney
Australia/North	Australia/Darwin
Australia/Queensland	Australia/Brisbane
Australia/South	Australia/Adelaide
Australia/Tasmania	Australia/Hobart
Australia/Victoria	Australia/Melbourne
Australia/West	Australia/Perth
Australia/Yancowinna	Australia/Broken_Hill
Belfast	Europe/Belfast
Brazil/Acre	America/Porto_Acre
Brazil/DeNoronha	America/Noronha
Brazil/East	America/Sao_Paulo
Brazil/West	America/Manaus
Canada/Atlantic	America/Halifax

Table B–2: Mapping of the Old Time Zones to New Time Zones (cont.)

Obsolete Time Zone	New Time Zone
Canada/Central	America/Winnipeg
Canada/East-Saskatchewan	America/Regina
Canada/Eastern	America/Montreal
Canada/Mountain	America/Edmonton
Canada/Newfoundland	America/St_Johns
Canada/Pacific	America/Vancouver
Canada/Saskatchewan	America/Regina
Canada/Yukon	America/Whitehorse
Chile/Continental	America/Santiago
Chile/EasterIsland	Pacific/Easter
Cuba	America/Havana
Dublin	Europe/Dublin
Egypt	Africa/Cairo
GB-Eire	Europe/London
GMT	Etc/GMT
GMT+0	Etc/GMT+0
GMT+1	Etc/GMT+1
GMT+10	Etc/GMT+10
GMT+11	Etc/GMT+11
GMT+12	Etc/GMT+12
GMT+13	Etc/GMT+13
GMT+2	Etc/GMT+2
GMT+3	Etc/GMT+3
GMT+4	Etc/GMT+4
GMT+5	Etc/GMT+5
GMT+6	Etc/GMT+6
GMT+7	Etc/GMT+7
GMT+8	Etc/GMT+8
GMT+9	Etc/GMT+9
GMT-0	Etc/GMT-0

Table B–2: Mapping of the Old Time Zones to New Time Zones (cont.)

Obsolete Time Zone	New Time Zone
GMT-1	Etc/GMT-1
GMT-10	Etc/GMT-10
GMT-11	Etc/GMT-11
GMT-12	Etc/GMT-12
GMT-2	Etc/GMT-2
GMT-3	Etc/GMT-3
GMT-4	Etc/GMT-4
GMT-5	Etc/GMT-5
GMT-6	Etc/GMT-6
GMT-7	Etc/GMT-7
GMT-8	Etc/GMT-8
GMT-9	Etc/GMT-9
GMT0	Etc/GMT0
GMT1	Etc/GMT+1
GMT10	Etc/GMT+10
GMT11	Etc/GMT+11
GMT12	Etc/GMT+12
GMT13	Etc/GMT+13
GMT2	Etc/GMT+2
GMT3	Etc/GMT+3
GMT4	Etc/GMT+4
GMT5	Etc/GMT+5
GMT6	Etc/GMT+6
GMT7	Etc/GMT+7
GMT8	Etc/GMT+8
GMT9	Etc/GMT+9
Greenwich	Etc/Greenwich
Hongkong	Asia/Hong_Kong
Iceland	Atlantic/Reykjavik
Iran	Asia/Tehran

Table B–2: Mapping of the Old Time Zones to New Time Zones (cont.)

Obsolete Time Zone	New Time Zone
Israel	Asia/Jerusalem
Jamaica	America/Jamaica
Japan	Asia/Tokyo
Libya	Africa/Tripoli
London	Europe/London
Mexico/BajaNorte	America/Tijuana
Mexico/BajaSur	America/Mazatlan
Mexico/General	America/Mexico_City
NZ	Pacific/Auckland
NZ-CHAT	Pacific/Chatham
Navajo	America/Denver
PRC	Asia/Shanghai
Poland	Europe/Warsaw
ROC	Asia/Taipei
ROK	Asia/Seoul
Singapore	Asia/Singapore
Turkey	Europe/Istanbul
UCT	Etc/UCT
US/Alaska	America/Anchorage
US/Aleutian	America/Adak
US/Arizona	America/Phoenix
US/Central	America/Chicago
US/East-Indiana	America/Indianapolis
US/Eastern	America/New_York
US/Hawaii	Pacific/Honolulu
US/Indiana-Starke	America/Indiana/Knox
US/Michigan	America/Detroit
US/Mountain	America/Denver
US/Pacific	America/Los_Angeles
US/Samoa	Pacific/Pago_Pago

Table B–2: Mapping of the Old Time Zones to New Time Zones (cont.)

Obsolete Time Zone	New Time Zone
UTC	Etc/UTC
Universal	Etc/Universal
W-SU	Europe/Moscow
Zulu	Etc/Zulu

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You can order documentation for the Tru64 UNIX operating system and related products at the following Web site:

http://www.businesslink.digital.com/

If you need help deciding which documentation best meets your needs, see the Tru64 UNIX *Documentation Overview* or call **800-344-4825** in the United States and Canada. In Puerto Rico, call **787-781-0505**. In other countries, contact your local Compaq subsidiary.

If you have access to Compaq's intranet, you can place an order at the following Web site:

http://asmorder.nqo.dec.com/

The following table provides the order numbers for the Tru64 UNIX operating system documentation kits. For additional information about ordering this and related documentation, see the *Documentation Overview* or contact Compaq.

Name	Order Number
Tru64 UNIX Documentation CD-ROM	QA-6ADAA-G8
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