Digital UNIX

Release Notes and Installation Instructions for Version 3.2G

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This manual contains the release notes and installation instructions for Digital UNIX Version 3.2G.

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Contents

About This Manual

Audience ix
Organization ix
Related Documentation x
Reader's Comments xi
Conventions xi

1 Introduction

What does this software kit offer? 1–1
Are there any releases between 3.2D and Version 3.2G? 1–2
When would you see Version 3.2G? 1–3
If you already have a previous version of Digital UNIX, do you need Version 3.2G? 1–4
Which parts of this document do you need to read? 1–4
Are there any other documents that pertain to this release? 1–4

2 Release Notes

2.1 General Release Notes 2–1
2.1.1 EISA Configuration Utility Revision Requirements 2–1
2.1.2 PCI RAID Controller Firmware Requirements 2–1
2.1.3 PCI Shared Interrupt Support 2–2

2.1.4 PCI/ISA Token Ring 2–2
2.1.5 PC-style Keyboard Support 2–2
2.1.6 RZxx-VA and RZxx-VW drives 2–3
2.1.7 Patch for Large Shared Memory Hang 2–3
2.1.8 Changes in the mount Command for AdvFS 2–3
2.1.9 AdvFS ‘‘Operation not supported’’ Message 2–4
2.1.10 Utilities Unable to Distinguish proc in AdvFS 2–5
2.1.11 PBXGB-xx Video Card Support 2–5
2.1.12 Battery Backed-Up Clock Incompatibility 2–5

2.2 Enhancements Provided in Version 3.2G 2–5

2.2.1 Maintenance 2–6
2.2.2 New Features 2–8

2.2.2.1 Network-Related Features 2–9
2.2.2.2 Calcomp DrawingBoard III Tablet 2–9
2.2.2.3 DEC C Compiler (cc -migrate command) and Driver . 2–9
2.2.2.4 Enhancements to the date Command for Year 2000 Support 2–10

2.2.2.4.1 Syntax 2–10
2.2.2.4.2 Handling of Two-Digit Year Input 2–11
2.2.2.4.3 Optional Century [cc] Input 2–11
2.2.2.4.4 Handling of Ambiguous Input 2–11
2.2.2.4.5 Examples 2–11
2.2.2.4.6 Previous Version of the Date Command 2–12

2.2.2.5 Madvise Extensions 2–12

2.2.2.5.1 Madvise Function 2–13
2.2.2.5.2 Malloc Function 2–13

3 New System Support Notes

3.1 Digital AlphaServer 1000A Class Systems 3–1

3.1.1 System Identification 3–1
3.1.2 Firmware Requirements 3–2
3.1.3 Version 3.2D-2 to Version 3.2G Upgrade Recommended 3–2
3.1.4 Hardware Upgrade 3–2
3.1.5 Restrictions and Known Problems 3–3

3.1.5.1 Resolution 3–3

3.1.5.2 PB2GA-JA Video Card Support 3–3
3.1.5.3 KZPSA Behind the PCI-to-PCI Bridge 3–3
3.1.5.4 PCI NVRAM 3–3

3.2 Digital AlphaServer 2100A Class Systems 3–3

3.2.1 System Identification 3–4
3.2.2 Firmware Requirements 3–4
3.2.3 Hardware Upgrade 3–4
3.2.4 PBXGB-xx Video Card Support 3–4
3.2.5 Restrictions and Known Problems 3–4

3.2.5.1 KZPSA Behind the PCI-to-PCI Bridge 3–4
3.2.5.2 EISA NVRAM 3–5
3.2.5.3 PCI NVRAM 3–5

3.3 Digital AlphaServer 4000 Class Systems 3–5

3.3.1 System Identification 3–5
3.3.2 Firmware Requirements 3–5
3.3.3 Restrictions and Known Problems 3–5

3.3.3.1 EISA NVRAM 3–6
3.3.3.2 PCI NVRAM 3–6
3.3.3.3 PBXGB-xx Video Card Support 3–6

3.4 Digital AlphaServer 8200/8400 Class Systems 3–6

3.4.1 System Identification 3–6
3.4.2 Firmware Requirements 3–6

3.5 Digital AlphaStation 500/400 Systems 3–7

3.5.1 System Identification 3–7
3.5.2 Firmware Requirements 3–7
3.5.3 Special Installation Requirement 3–7
3.5.4 Setting the os_type Console Variable 3–8
3.5.5 Hardware Upgrade 3–8
3.5.6 PBXGB-xx Video Card Support 3–8

3.6 DMCC EBM4x Class Single Board Computers 3–8

3.6.1 System Identification 3–8
3.6.2 Firmware Requirements 3–8

3.6.3 Restrictions and Known Problems 3–9
3.6.3.1 Option Cards Restrictions 3–9
3.6.3.2 General Restrictions 3–10
3.7 Alpha VME 4/224 and 4/288 Single Board Computers 3–10
3.7.1 System Identification 3–10
3.7.2 Firmware Requirements 3–10
3.7.3 Restrictions and Known Problems 3–11
3.7.4 New Configuration Parameter 3–11
3.7.4.1 Specifying the DMA Interleave GAP 3–12
3.8 AlphaPC64, EB64+, EB66+, and EB164 Single Board Computers .. 3–13
3.8.1 System Identification 3–13
3.8.2 Firmware Requirements 3–13
3.9 Hardware Upgrades 3–14

4 Installation Notes

4.1 Update Installation Restrictions 4–1
4.1.1 Version 3.2C to Version 3.2G 4–1
4.1.2 Version 3.2G to Version 4.0 4–2
4.2 Removing the Version 3.2G Software Subsets 4–2
4.3 Version 3.2G Installation 4–3
4.3.1 Warning Messages During Installation 4–3
4.3.2 Installation Procedures 4–4
4.3.2.1 Verifying Firmware, ECU, and RCU Versions 4–4
4.3.2.2 Setting Console Firmware Environment Variables 4–4
4.3.2.3 Using CD–ROM Media to Install 4–5
4.3.2.3.1 CD–ROM Drive May Be Offered as Installation Target Disk 4–6
4.3.2.4 Installing from the Network 4–6
4.3.2.4.1 Booting from a Digital UNIX Server 4–6
4.3.2.4.2 Booting from an ULTRIX Server 4–7

4.3.3 Upgrading to Version 3.2G 4–7
4.3.3.1 Preparing your System for the Software Upgrade 4–8
4.3.3.2 Upgrading the Software 4–8
4.3.3.3 Rebuilding the System’s Target Kernel 4–10
4.3.4 Verifying the Installation 4–12

A Installing Using the Remote Installation Services (RIS)

A.1 Requirements A–1
A.2 Installation CD–ROM Contains a "Dirty" File System A–2
A.3 Setting Up a Version 3.2G RIS Area on a Digital UNIX Server A–2
A.4 Setting Up a Version 3.2G RIS Area on an ULTRIX Server A–2
A.4.1 Updating the boot File for New Clients A–4
A.4.2 hUPDATE Error Message A–4

B Dataless Management Services

C Software Subset Information

D Patch for Large Shared Memory Hang

D.1 Granularity Hints for Shared Memory Segments D–1
D.2 Shared PTEs for Shared Memory Segments D–2
D.3 Rework of Shared Memory Locking for Better Parallelism D–4
D.4 Improvements in Kernel malloc Garbage Collection D–4

E Calcomp DrawingBoard III Tablet

E.1 Configuring the CalComp DrawingBoard III Tablet E–1
E.2 Notes and Restrictions E–3

Index

Figures

1-1: Releases in the Digital UNIX Version 3.2C Stream 1–3

Tables

3-1: Supported Options Behind Bridge 3–9
3-2: Nonsupported Options Behind Bridge 3–9
3-3: VIC DMA Interleave Gap 3–12
4-1: Installation Paths to Version 3.2G 4–2
C-1: Subset Names and Sizes for Version 3.2G C–1
E-1: CalComp DrawingBoard III Tablet Configuration Options and Values . E–1

About This Manual

This manual contains information specific to the Digital UNIX Version 3.2G software supplement to the Version 3.2C kit. The information herein supplements that provided in both the Digital UNIX Version 3.2C *Release Notes* and the *Installation Guide*. It is important to read all of these manuals when you are installing the Digital UNIX operating system.

Audience

This manual should be read by anyone using the Digital UNIX Version 3.2G software kit.

Organization

This manual has four chapters and several appendixes:

Chapter 1	Summarizes the Version 3.2G software supplement to the Digital UNIX Version 3.2C software product and explains how to use this document.
Chapter 2	Contains general release notes for Version 3.2G as well as descriptions of some of the enhancements provided by Version 3.2G.
Chapter 3	Contains release notes that are specific to the new system support for the Digital AlphaServer 1000A class systems, Digital AlphaServer 2100A class systems, Digital AlphaServer 4000 class systems, Digital AlphaServer 8200/8400 class systems, Digital AlphaStation 500/400 systems, Digital DMCC EBM4x class SBCs, AlphaPC64, EB64+, EB66+, and EB164 SBCs, and Alpha VME 4/224 and 4/288 SBCs.
Chapter 4	Contains installation release notes and procedures that apply to Version 3.2G.
Appendix A	Contains information about setting up Remote Installation Services (RIS) for Version 3.2G.
Appendix B	Contains information about configuring Version 3.2G into a Version 3.2C DMS environment.
Appendix C	Contains information on the software subsets for the Digital UNIX software kit.
Appendix D	Contains information about enabling the granularity hints patch for Digital UNIX Version 3.2G.

Appendix E Contains information about configuring the Calcomp DrawingBoard III Tablet on Digital UNIX Version 3.2G systems.

Related Documentation

In addition to this manual, you need to review the following documents:

- *Read This First* letter

  This letter provides general information pertaining to the Digital UNIX Version 3.2G software.

- Digital UNIX Version 3.2C *Release Notes*

  This document includes release notes and installation notes for Digital UNIX Version 3.2C, on which Digital UNIX Version 3.2G is based.

- *Console Firmware Release Notes* for Version 3.2C

  This document includes the console firmware revision numbers and release notes.

- Digital UNIX Version 3.2C *Installation Guide*

  This document describes in detail how to install Digital UNIX Version 3.2C. Although there are a few differences between the installation procedures for Digital UNIX Version 3.2C and the supplement in this kit (see Chapter 4 of this manual), the majority of the information in the Digital UNIX Version 3.2C *Installation Guide* also applies to Version 3.2G.

- *Sharing Software on a Local Area Network*

  This document describes in detail how to set up and manage a Remote Installation Services (RIS) area for Digital UNIX systems. It also contains information on setting up Dataless Management Services (DMS). (For supplementary information on setting up a RIS or DMS server for Version 3.2G, see Appendix A, Appendix B, and the *Sharing Software on a Local Area Network* manual, respectively.)

- *System Administration*

  This document contains information on administering and maintaining your system.

- Hardware setup guides and firmware release notes.

Note that all the remaining documentation that ships with the Digital UNIX Version 3.2C kit also applies to Version 3.2G.

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`/usr/doc/readers_comment.txt`

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If you have suggestions for improving particular sections or find any errors, please indicate the manual title, order number, and section numbers. Digital also welcomes general comments.

Conventions

The following conventions are used in this manual:

`%` `$`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne and Korn shells.
`#`	A number sign represents the superuser prompt.

`>>>`
`CPU`*`nn`*`>>`
`R>`
	The console subsystem prompt is a combination of letters, numbers, and right angle brackets. Not all systems include all of these elements in their prompts.

`% cat`	Boldface type in interactive examples indicates typed user input.
`file`	Italic (slanted) type indicates variable values, placeholders, and function argument names.
`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.

Introduction 1

This introduction to the Digital UNIX Version 3.2G software kit attempts to help you understand and accomplish the following:

- Ascertain the contents of this software kit
- Determine the major differences between this and previously distributed software kits
- Locate the chapters and sections of this document and other documents that you should read

This information is provided in the form of brief questions and answers. This format quickly and effectively provides you with the information you need so that you can get the most out of this Digital UNIX software kit.

What does this software kit offer?

The Digital UNIX Version 3.2G software supplements the Version 3.2C operating system software by providing support for the following:

- Maintenance for Digital UNIX Version 3.2C and later
- Limited new features:
  - Network-Related
    - Extensible Simple Network Management Protocol support
    - Fast Ethernet support
    - Point-to-Point Protocol support
    - TCP/IP performance improvements
    - TCP tunability
  - Miscellaneous
    - Calcomp DrawingBoard III Tablet
    - DEC C Compiler (`cc -migrate` command) and driver
    - Enhancements to the date command for Year 2000 support
    - Madvise extensions

In addition, because Version 3.2G subsumes and replaces earlier hardware supplements for Digital UNIX (namely Version 3.2D-2 and 3.2F), it provides continuing support for the following:

- New Hardware Platforms:
  - Digital AlphaServer 1000A class systems
  - Digital AlphaServer 2100A class systems
  - Digital AlphaServer 4000 class systems
  - Digital AlphaServer 8200/8400 class systems
  - Digital AlphaStation 500/400 systems
  - Digital DMCC EBM4x class SBCs
  - AlphaPC64, EB64+, EB66+, and EB164 SBCs
  - Alpha VME 4/224 and 4/288 SBCs
- Optional devices:
  - PCI/ISA Token Ring
  - Calcomp Drawing Board III Tablet

For more information on how this software supplement differs from the Version 3.2C operating system software, see Chapter 2 and Chapter 3.

Are there any releases between 3.2D and Version 3.2G?

Yes, there are Version 3.2E and 3.2F supplements.

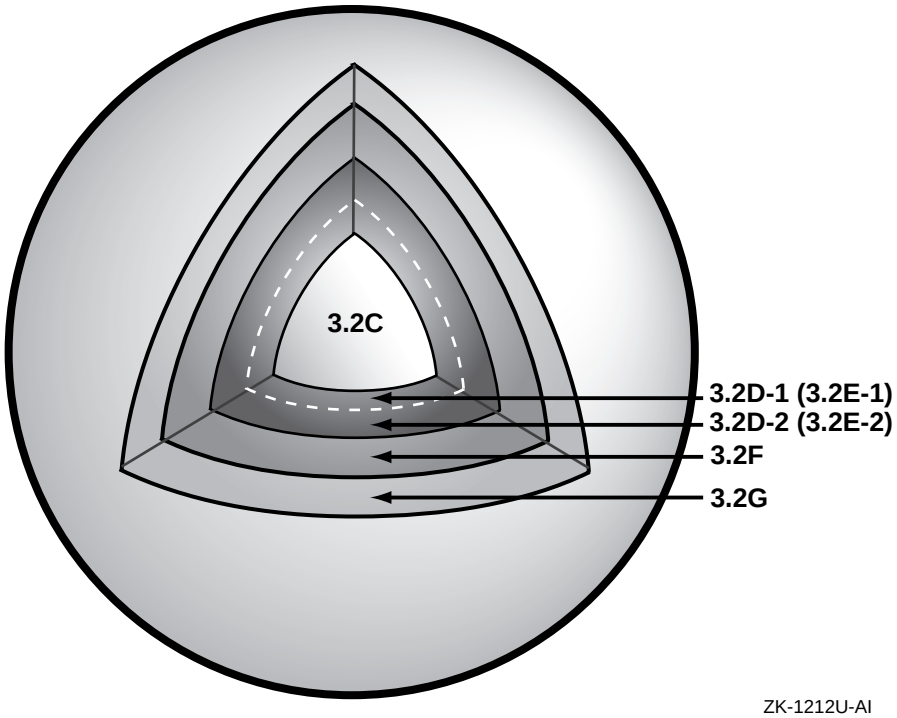
Version 3.2E contains minor but essential maintenance specifically required by TruClusters Version 1.0. The only customers who have seen this release of Digital UNIX are users of TruClusters Version 1.0 software.

Version 3.2F contains support for the previously mentioned new hardware systems. Version 3.2F was simply the vehicle to deliver this support to customers until Version 3.2G was available.

Note that the installation and run-time changes from Versions 3.2E and 3.2F have been incorporated into Version 3.2G; therefore, you need not install Versions 3.2E or 3.2F before installing Version 3.2G.

Figure 1-1 clarifies the relationships between these versions of the Digital UNIX operating system.

Figure 1-1: Releases in the Digital UNIX Version 3.2C Stream



In Figure 1-1, the Digital UNIX operating system is represented as a sphere, the core of which is Version 3.2C. The core is surrounded by layers that represent the software supplements that came after Version 3.2C. Hence, the figure illustrates that each software supplement builds on the kit that was released before it, and that each version after Version 3.2C incorporates the maintenance, features, and system support from previous releases.

When would you see Version 3.2G?

You would see the Version 3.2G identifier under the following conditions:

- If you have purchased a new system and it comes pre-installed with Version 3.2G via the factory installed software (FIS) option.
- If you upgrade your operating system software from Version 3.2C to Version 3.2G following the procedure outlined in Chapter 4

If you already have a previous version of Digital UNIX, do you need Version 3.2G?

If you are running Digital UNIX Version 3.2D-2 on a Digital AlphaServer 1000A class system or Version 3.2F on a Digital AlphaStation 500/400 system, you may want to upgrade your operating system software to Version 3.2G because of code changes it contains that you might find useful. Such an upgrade is recommended, but not required. For more information, see Section 3.1.3 and Section 3.5.4, respectively.

For any other system, if your system is functioning properly with the version of Digital UNIX that you are currently using, then you do not necessarily need to upgrade. However, Version 3.2G provides some enhancements, including maintenance and new features, that have not previously been introduced into Digital UNIX. If you are interested in any of these enhancements, then you should upgrade.

For more information about the changes that went into Version 3.2G, see Chapter 2.

Which parts of this document do you need to read?

If your system already has Digital UNIX Version 3.2G software installed, read the following chapters and sections of this manual:

- If your machine is not one of the newly supported hardware systems, read the remainder of this chapter and Chapter 2.
- If your machine is one of the newly supported hardware systems, read the remainder of this chapter, Chapter 2, and Chapter 3.

If you are using the CD–ROMs in this kit to reinstall or upgrade install any of the operating system software, you must read this entire manual. However, if your machine is not one of the newly supported hardware systems, you can skip Chapter 3.

Are there any other documents that pertain to this release?

In addition to the documentation listed in the About This Manual section, consider reviewing the following documents:

- Hardware documentation

  Provides instructions about how to set up and use your new hardware system.
- Digital UNIX Version 3.2G Customer Log Desk (CLD) Fixes and Digital UNIX Version 3.2D-1 Customer Log Desk (CLD) Fixes

Provide descriptions of the fixes that went into Version 3.2G. These documents are available on line on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM in the following directory:

/mnt-point/DOCUMENTATION/TEXT

Replace *mnt-point* with the name of the directory where your CD–ROM is mounted.

- Digital UNIX *Network Supplement*

  Provides information about the new network-related features in Version 3.2G. This document is available on line on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM in the following directories:

  /mnt-point/DOCUMENTATION/POSTSCRIPT
  /mnt-point/DOCUMENTATION/BOOKREADER

  Replace *mnt-point* with the name of the directory where your CD–ROM is mounted.

- DECsafe Available Server and TruCluster Software installation information

  If you plan to install the DECsafe Available Server product or the TruCluster Software product on a system running Digital UNIX Version 3.2G, you must read the following documents in addition to the existing documentation:

  On the *Complementary Products for Digital UNIX V3.2G* CD–ROM:

  /mnt-point/ASE130/documentation/ps/ASE130_USING_ON_3.2G.PS
  /mnt-point/ASE130/documentation/txt/ASE130_USING_ON_3.2G.TXT
  /mnt-point/TCR100/documentation/ps/TCR100_USING_ON_3.2G.PS
  /mnt-point/TCR100/documentation/txt/TCR100_USING_ON_3.2G.TXT

  Or, on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM:

  /mnt-point/DOCUMENTATION/POSTSCRIPT/ASE130_USING_ON_3.2G.PS
  /mnt-point/DOCUMENTATION/POSTSCRIPT/TCR100_USING_ON_3.2G.PS
  /mnt-point/DOCUMENTATION/TEXT/ASE130_USING_ON_3.2G.TXT
  /mnt-point/DOCUMENTATION/TEXT/TCR100_USING_ON_3.2G.TXT

  Replace *mnt-point* with the name of the directory where your CD–ROM is mounted.

You may also want to refer to the *Digital UNIX V3.2C Online Documentation* CD–ROM, which provides Bookreader files for the full Digital UNIX documentation set from Version 3.2C.

Release Notes 2

This chapter provides general operating system release notes and notes describing the enhancements, including maintenance and new features, in Version 3.2G.

2.1 General Release Notes

The following sections provide release notes for:

- EISA Configuration Utility revision requirements
- PCI RAID controller firmware requirements
- PCI shared interrupt support
- PCI/ISA Token Ring
- PC-style keyboard support
- RZxx-VA and RZxx-VW drives
- Patch for large shared memory hang
- Changes in the `mount` command for AdvFS
- AdvFS ‘‘operation not supported’’ message
- Utilities unable to distinguish `proc` in AdvFS
- PBXGB-xx video card support
- Battery backed-up clock incompatibility

2.1.1 EISA Configuration Utility Revision Requirements

For Digital UNIX Version 3.2G, the supported version of ECU is V1.9 or higher.

2.1.2 PCI RAID Controller Firmware Requirements

For the Digital UNIX Version 3.2G software, the supported firmware and ARC for the PCI RAID controller is as follows:

- RAID Configuration Utility (RCU) requires revision 3.11 or higher.

- ARC revision must be at revision 3.5 or higher.

2.1.3 PCI Shared Interrupt Support

In Digital UNIX Version 3.2D and subsequent releases, PCI-based system and I/O support code is shared interrupt capable. The only exception is the 53C810 (onboard or option) SCSI controller.

You can use the following console firmware command to determine if your system has a 53C810 SCSI controller:

```
>>> show config
```

In order to set up your PCI-based system to share interrupts, you must ensure the following:

- The firmware revision for your system supports shared interrupts
- You have placed the option cards in PCI slots that allow sharing

Refer to your Digital UNIX layered product documentation (for example, for MME or Open3D) for information about the shared interrupt capabilities of the software.

2.1.4 PCI/ISA Token Ring

The following notes and restrictions apply to the PCI Token Ring support:

- The PCI adapter will automatically determine what type of media is being used (whether it is UTP or STP). Do not plug in both types of cables at once because this could confuse the filter logic.
- The adapter starts up at 16M bps by default. If you need to change the speed to 4M bps, use the `ifconfig` command to change it. For example:

  ```
  # ifconfig tra0 speed 4
  ```

2.1.5 PC-style Keyboard Support

The Traditional Chinese input server (`dxhanyuim`) does not recognize the backspace key of a PC-style keyboard (for example, keyboard model PCXAL). However, the Traditional Chinese input server recognizes the delete key and deletes the left character when the delete key is pressed. If you want to use the backspace key to delete the left character, which is similar to the <X] key of a workstation keyboard, you can map the backspace

key as delete by using the following command:

```
xmodmap -e "keysym BackSpace = Delete"
```

This causes the backspace key to behave like the delete key.

Note that in the PC-style keyboard, the backspace key is located in the upper-right corner of the main keyboard, while the delete key is located in the mini keypad.

2.1.6 RZxx-VA and RZxx-VW drives

Mixing RZxx-VA and RZxx-VW drives in a wide storage enclosure may cause a problem. If you do have problems with this configuration, contact Digital technical support (800-DIGITAL).

2.1.7 Patch for Large Shared Memory Hang

The granularity hints patch, OSF350-055, for Digital UNIX Versions 3.2D, 3.2E, 3.2F, and Version 3.2G fixes the problem where a system with large shared memory segments and numerous processes attached to the shared memory segments could hang or panic when these processes exit. If the following conditions exist on your large database server, you should enable this patch:

- The system appears hung when the database (or all processes) shuts down
- The system is an SMP system
- The system uses more than 500MB of shared memory
- The server is running a few hundred processes that map the same shared memory segment

The patch is actually implemented in four separate parts, as described in Appendix D. Each of these parts contributes to reducing greatly the shared memory detach time.

2.1.8 Changes in the mount Command for AdvFS

The `mount` command was changed in Digital UNIX Version 3.2D-1 and all versions thereafter. It now checks all of the sizes of the volumes in the file domain of the fileset it is mounting. It verifies that the volumes are at least the size stated in the file domain internal structures.

If all of the volumes pass the size check, a mount update is issued on the fileset. In this case, the fileset is left in a read-only state only if the user originally issued the `mount` command with the read-only option.

If one or more volumes fail the size check, each volume is flagged and the fileset is left as read-only. To correct this, make a complete backup copy of

all volumes in the file domain. This will assure that you can recover your data in the event of a catastrophic failure during the volume label correction process.

Make sure there is adequate free space in the fileset. There must be enough free space to hold all the data with any one of the incorrectly labeled volumes removed. If there is not enough free space, you must add additional volumes to the fileset. Once this is done, perform the following steps on each of the failed volumes:

1. Remove the volume from the file domain (`rmvol`)
2. Correct the disk label of the volume
3. Add the corrected volume back to the file domain (`addvol`)
4. Balance the file domain (`balance`)

Note that the last step is very important. If the domain is not balanced after adding the corrected volume, other incorrectly labeled volumes may fill and cause an I/O error.

After completing the corrective procedures, recheck the volumes by issuing a `mount -u` command on the fileset. This will cause the `mount` command to recheck all of the volumes.

The following is an example of the error message that the `mount` command will issue if a volume in a file domain is incorrectly labeled.

```
# mount dmn#fs1 /fs1
Domain dmn, Volume /dev/rz9c has an incorrect size!
Domain dmn, Volume /dev/rz10c has an incorrect size!
Domain dmn, Volume /dev/rz11c has an incorrect size!
Domain dmn, Volume /dev/rz12c has an incorrect size!
Domain dmn, Volume /dev/rz13c has an incorrect size!
Domain dmn, Volume /dev/rz14c has an incorrect size!
The file system dmn#fs1 has been mounted READ ONLY!
Please check the disklabel of all volume(s) listed above!!
```

2.1.9 AdvFS ‘‘Operation not supported’’ Message

After installing Version 3.2G and configuring AdvFS on the root file system, you may receive the following message when mounting the `root_domain` at system boot time:

```
root_domain#root on /: Operation not supported
```

You can ignore this message; the system comes up with the `root_domain` mounted and writeable.

2.1.10 Utilities Unable to Distinguish proc in AdvFS

Certain utilities such as `vdump`, `DECnsr`, and `find` may be unable to distinguish `/proc` as a separate mount point from the AdvFS root file system. This may result in the utilities including `/proc` files in their operations.

2.1.11 PBXGB-xx Video Card Support

PBXGB-xx video card support has been integrated into the Version 3.2G kit. You are no longer required to use the Open3D software kit for PBXGB-xx base graphics support. You should see Chapter 3 for information about those systems that support PBXGB-xx video cards.

2.1.12 Battery Backed-Up Clock Incompatibility

A short amount of time, possibly up to three minutes, will be lost on the system clock under the following circumstances:

- During an upgrade installation of Version 3.2G

  After the installation, while the system is booting, the following message will be printed to the console:

  ```
  WARNING: lost battery backup clock -- CHECK AND RESET THE DATE!
  ```

  The time will be set to the previous shutdown timestamp.

- When a system that has access to Version 3.2G and to an earlier version moves between the two versions

  For example, on a system that has a disk with Version 3.2 installed and another disk with Version 3.2G installed, shutting the system down and booting the other version could result in the loss of time. Time would not be maintained by the battery backed-up time-of-year (TOY) clock and would be set to the previous shutdown time-stamp between bootups of the different versions. There may be system-specific exceptions to this behavior.

Note that systems running the Network Time Protocol (`ntp`) should not be affected by the time loss, with the exception that a warning message might be printed to the console while the system is booting up.

2.2 Enhancements Provided in Version 3.2G

Version 3.2G provides maintenance, limited new functionality, and new hardware options support for the Digital UNIX Version 3.2C product.

2.2.1 Maintenance

The Version 3.2G supplement provides maintenance for the following system functional components:

- `acctcms` command
- ADA
- ASE
- AdvFS
- `aio_suspend` function (located in `libaio.so`)
- ATM IP
- `automount` daemon
- `awk` command
- BIND
- `bootp` server daemon
- `cat` command
- `chmod` command
- DECthreads
- FDDI
- `find` command
- `ftp` command
- `get*_r` functions (located in `libc_r`)
- `ld` command
- LSM
- `mmap` function
- `mount` command
- `mountd` daemon
- `msync` function
- NFS
- `nm` command
- `odump` command
- `pax`, `cpio`, and `tar` commands
- `proc` PIOCPSINFO ioctl system call
- `ps` command

- `quota` command
- RAID
- `scu` command
- SMP
- SMP systems running applications that use POSIX real-time timers
- `snmp_pe` command
- `sprintf` function
- `strace` command
- `strncat` function (located in `libc.a` and `libc.so`)
- `telnet` command
- `tftpd` daemon
- UFS
- `utmp` command
- `vdump` command
- `vold` utility
- `xdm` daemon
- Xserver
- X Window System
- `yacc` compiler
- `ypserv`/ `ypbind` commands

The Version 3.2G supplement provides maintenance for the following system hardware support components:

- AlphaStation 600 Series systems
- DECchip 21040-AA and 21041-AA

  The DECchip 21040-AA is embedded on various AlphaStations, AlphaServers, and Alpha Single Board Computers (SBCs). This device is also used on various PCI and EISA network options such as the DE434, DE435, DE436, and DE425. The DECchip 21041-AA is only used on the DE450 PCI Ethernet options.
- DW300 token ring option
- EV4.5 or EV5 processors with embedded VIP/VIC64 VME bus adapter
- HSZ40 adapter
- KFTIA Integrated I/O Port Module (ITIOP)

- KZMSA adapter
- KZPSA SCSI adapter
- LAT subsystems
- Loadable PCI device driver support
- Qlogic SCSI adapters (ITIOP and P2SE)
- PB2GA-JB graphics cards
- TKZ15 tape drives

For specific descriptions of the maintenance included in Version 3.2G, see the *Digital UNIX Version 3.2G CLD Fixes* and *Digital UNIX Version 3.2D-1 CLD Fixes* ASCII files included in this kit. They are located on line on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM in the following directory:

/mnt-point/DOCUMENTATION/TEXT

Replace *mnt-point* with the name of the directory where your CD–ROM is mounted.

2.2.2 New Features

The Version 3.2G supplement also provides a limited number of new features:

- Network-Related
  - Extensible Simple Network Management Protocol support
  - Fast Ethernet support
  - Point-to-Point Protocol support
  - TCP/IP performance improvements
  - TCP tunability
- Miscellaneous
  - Calcomp DrawingBoard III Tablet
  - DEC C Compiler (`cc -migrate` command) and driver
  - Enhancements to the date command for Year 2000 support
  - Madvise extensions

The following sections contain notes pertaining to the new features in Version 3.2G.

2.2.2.1 Network-Related Features

Documentation for the new network-related features provided in Version 3.2G can be found in the Digital UNIX *Network Supplement*. PostScript and Bookreader versions of this supplement are available on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM in the following directories:

/mnt-point/DOCUMENTATION/POSTSCRIPT
/mnt-point/DOCUMENTATION/BOOKREADER

Replace *mnt-point* with the name of the directory where your CD–ROM is mounted.

Note that if you use the Fast Ethernet support in Digital UNIX Version 3.2G, you cannot upgrade to Version 4.0 because Fast Ethernet is not supported in that release. It will be supported in a later release.

2.2.2.2 Calcomp DrawingBoard III Tablet

The CalComp DrawingBoard III tablet is a third-party input device that can be configured to emulate a system mouse on Digital UNIX systems. See Appendix E for instructions on how to add support for this device to your system.

2.2.2.3 DEC C Compiler (cc -migrate command) and Driver

The following two switches have been added to the existing `cc -migrate` command. These switches are in addition to what is already documented for the `cc -migrate` command in the `cc`(1) reference page.

- `-assume [no]trusted_short_alignment`

  Allows the compiler to make additional assumptions about the alignment of `short` objects that, although naturally aligned, may cross a quadword boundary.

  Specifying `-assume trusted_short_alignment` tells the compiler to assume that any `short` object that is accessed through a pointer is naturally aligned. This generates the fastest code, but can silently generate the wrong results when an unaligned `short` object crosses a quadword boundary. This is the behavior when `-migrate` is not specified.

  Specifying `-assume notrusted_short_alignment` tells the compiler that `short` objects may not be naturally aligned. The compiler generates slightly larger (and slower) code that will give the correct result, regardless of the actual alignment of the data. This is the default when `-migrate` is specified.

  Note that `-assume notrusted_short_alignment` does not override the `__unaligned` type qualifier, the `-misalign` flag, or the `-assume noaligned_objects` flag.

- `-Wf,-[no_]ansi_args`

  Tells the compiler whether the source code follows all ANSI rules about arguments; that is, whether the type of an argument matches the type of the parameter in the called function, or whether a function prototype is present so the compiler can automatically perform the expected type conversion.

  Specifying `-Wf,-no_ansi_args` means that the argument type may not match the expected parameter type. For example, this flag is important when the caller passes a parameter of type `long` and the called routine expects an `int`. The `-Wf,-no_ansi_args` flag forces the compiler to generate argument-cleaning code to convert the argument to the appropriate type. Except when the `-std1` flag is specified, `-Wf,-no_ansi_args` is the default. Note that it is safe to specify `-Wf,-ansi_args` if you use ANSI-style function prototypes at all call sites.

  Specifying `-Wf,-ansi_args` means that your code meets the ANSI C requirements, so no special argument-cleaning code is generated. This is a performance gain. When `-std1` is specified, `-Wf,-ansi_args` is the default.

2.2.2.4 Enhancements to the date Command for Year 2000 Support

The `date` command has been enhanced to support setting the system date past the year 1999, providing customers with the ability to begin testing their software for potential century rollover problems. The changes are outlined in the following sections.

2.2.2.4.1 Syntax – The following formats are valid for setting the system date using the date command.

Using the XPG4-UNIX format:

date *mmddHHMM*[*yy*]

Using one of three Digital formats:

date *mmddHHMM*[*yy*][*.ss*]

date [*yy*]*mmddHHMM*[*.ss*]

date *mmddHHMM*[*.ss*[[*cc*]*yy*]]

The following definitions apply:

mm is the month number

dd is the number of the day in the month

HH is the hour in the day

MM is the number of minutes

ss is the number of seconds

yy is the last two digits of the year

cc is the first two digits of the year

Note that the *LC_TIME* variable, if it is defined, controls the ordering of the day (*dd*) and month (*mm*) numbers in these formats. The default order is the month (*mm*) followed by the day (*dd*).

2.2.2.4.2 Handling of Two-Digit Year Input – When the year is specified using two digits (as in the first three formats, or when the [*cc*] field is omitted from the fourth), the century is determined in the following manner: if the specified two digit year is between 69 and 99 inclusive, the 20th century is assumed (that is, 19*yy*), otherwise the 21st century is assumed (that is, 20*yy*).

2.2.2.4.3 Optional Century [cc] Input – The *mmddHHMM*[*.ss*[[*cc*]*yy*]] format allows the optional input of the century (first two digits of the year). This century field is optional to ensure that input formats previously accepted by the `date` command are still supported.

Currently, the XPG4-UNIX format does not have a century field, which is consistent with X/Open specifications regarding the `date` command. The century field will be added to the XPG4-UNIX and other formats in a future release of Digital UNIX after X/Open updates its specifications.

2.2.2.4.4 Handling of Ambiguous Input – If the input string is ambiguous, that is, if the format cannot be conclusively determined from the data, the date command will issue a warning to STDERR and assume the *mmddHHMM*[*yy*][*.ss*] format. To avoid ambiguous input, use the *mmddHHMM*[*.ss*[[*cc*]*yy*]] format and specify the [*cc*] field.

2.2.2.4.5 Examples – To set the date to 09:34:00 AM Jan 7, 2000:

Using the *mmddHHMM*[*yy*] XPG4-UNIX format:

```
# date 0107093400
```

Using the *mmddHHMM*[*yy*][*.ss*] Digital format:

```
# date 0107093400.00
```

Using the [*yy*][*mmddHHMM*[*.ss*] Digital format:

```
# date 0001070934
# date 0001070934.00
```

Using the *mmddHHMM*[*.ss*[[*cc*]*yy*]] Digital format:

```
# date 01070934.0000
# date 01070934.002000
```

An example of ambiguous input:

```
# date 0101010000
```

This input could be recognized as one of the following formats:

mmddHHMM[*yy*][*.ss*]	meaning 01:00:00 AM Jan 1, 2000
[*yy*]*mmddHHMM*[*.ss*]	meaning 12:00:00 AM Jan 1, 2001

In this case, the date command will display a warning and assume the *mmddHHMM*[*yy*][*.ss*] format, setting the date to 01:00:00 AM Jan 1, 2000.

2.2.2.4.6 Previous Version of the Date Command – Should you desire to restore the previous version of the `date` command, it is available in the `OSFOBSOLETE375` subset. Refer to the *Installation Guide* and the `setld` reference page for instructions on installing this subset. Once the subset is installed, the previous version of the date command can be referenced from the following locations:

```
/usr/opt/sterling/sbin/date
/usr/opt/sterling/usr/bin/date
```

Note that this previous version of the `date` command will not be available in future releases.

2.2.2.5 Madvise Extensions

The `MADV_DONTNEED` option has been enabled in Version 3.2G. The following sections describe changes to the `madvise` and `malloc` functions as a result of this new support.

2.2.2.5.1 Madvise Function – When the `MADV_DONTNEED` option is used, the system will free any resident pages that are allocated to the region. All modifications will be lost and any swapped out pages will be discarded. Subsequent access to the region will result in a `zero-fill-on-demand` fault as though it is being accessed for the first time. Reserved swap space is not affected by this call.

By default, this option will be effective only if the applications are re-compiled after Version 3.2G is installed. You can allow existing binaries to make use of the call by doing one or both of the following:

- As superuser, execute the `sysconfig` command on a running system:

```
# sysconfig -r vm enable-madvise-dontneed=1
enable-madvise-dontneed: reconfigured
```

- In order to make this the default system behavior on every reboot, add the following lines to your `/etc/sysconfigtab` file:

```
vm:
enable-madvise-dontneed=1
```

2.2.2.5.2 Malloc Function – The default value of `__madvisor` has been changed to 0.

New System Support Notes 3

This chapter contains notes that only apply to the following newly supported hardware systems:

- Digital AlphaServer 1000A class systems
- Digital AlphaServer 2100A class systems
- Digital AlphaServer 4000 class systems
- Digital AlphaServer 8200/8400 class systems
- Digital AlphaStation 500/400 systems
- Digital DMCC EBM4x class SBCs
- Alpha VME 4/224 and 4/288 SBCs
- AlphaPC64, EB64+, EB66+, and EB164 SBCs

In addition, this chapter provides a general discussion of upgrading your hardware system and operating system software to Version 3.2G, where applicable.

3.1 Digital AlphaServer 1000A Class Systems

The AlphaServer 1000A class, which includes the new AlphaServer 1000A 5/300, is Digital's latest low-end server offering.

The AlphaServer 1000A 5/300 is an enhanced version of the Digital AlphaServer 1000A 4/233 and Digital AlphaServer 1000A 4/266 systems. It replaces the Alpha 21064A-based CPU card with an Alpha 21164-based CPU card.

The following notes are specific to Digital AlphaServer 1000A class systems.

3.1.1 System Identification

Use the `sizer` utility to identify the CPU in your Digital AlphaServer 1000A class system. The `sizer -c` command displays the following output on these machines.

For the Digital AlphaServer 1000A 5/300:

```
sysname> sizer -c
cpu             "DEC1000A_5"
```

For all other Digital AlphaServer 1000A class systems:

```
sysname> sizer -c
cpu             "DEC1000A"
```

3.1.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital AlphaServer 1000A 5/300 is X4.5 or higher. The minimum firmware version required for all other Digital AlphaServer 1000A class systems is V3.1 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.1.3 Version 3.2D-2 to Version 3.2G Upgrade Recommended

If you are currently running Digital UNIX Version 3.2D-2 on your AlphaServer 1000A class system and you are updating your console firmware to the latest version of firmware that is shipping on the Version 3.6 Console Firmware CD–ROM, Digital recommends that you also upgrade your operating system software to Digital UNIX Version 3.2G. The Version 3.2G software kit contains a code fix that is required for the firmware PAL revision 1.45 (or higher), which is included in the latest console firmware for Digital AlphaServer 1000A class systems.

For further information about upgrading your operating system software, see Section 4.3.3.

3.1.4 Hardware Upgrade

For further information about how to upgrade your operating system software as part of a hardware upgrade, see Section 3.9.

3.1.5 Restrictions and Known Problems

The following restrictions and known problems apply to Digital AlphaServer 1000A class systems.

3.1.5.1 Resolution

The default resolution for the Digital AlphaServer 1000A class systems containing built-in Cirrus video with 1MB of video ram is 1024x768. If the optional 512KB of video ram is not present, Digital UNIX will only support resolutions of 640x480 (by default) or 800x600. To use 800x600 resolution, edit the `/usr/lib/X11/xdm/Xservers` file and change the following line:

```
:0 local /usr/bin/X11/X -nice2
```

to:

```
:0 local /usr/bin/X11/X -nice2 -screen0 800
```

Before editing the `/usr/lib/X11/xdm/Xservers` file, be sure your system's monitor supports 800x600 resolution.

3.1.5.2 PB2GA-JA Video Card Support

The PB2GA-JA video cards are not supported on Digital AlphaServer 1000A class systems when placed behind the bridge in the lower four slots.

3.1.5.3 KZPSA Behind the PCI-to-PCI Bridge

Updating the firmware on the 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.

3.1.5.4 PCI NVRAM

The minimum hardware version supported on the Digital AlphaServer 1000A class systems is E01.

3.2 Digital AlphaServer 2100A Class Systems

The AlphaServer 2100A class is Digital's replacement offering for its midrange AlphaServer 2000/2100 class offerings.

The following notes are specific to Digital AlphaServer 2100A class systems.

3.2.1 System Identification

The `sizer` utility identifies Digital AlphaServer 2100A class systems as Digital AlphaServer 2100A family members. The `sizer -c` command displays the following output:

```
sysname> sizer -c
cpu             "DEC2100_A500"
```

3.2.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital AlphaServer 2100A class systems is V4.3 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.2.3 Hardware Upgrade

For further information about how to upgrade your operating system software as part of a hardware upgrade, see Section 3.9.

3.2.4 PBXGB-xx Video Card Support

The PBXGB-xx video cards are supported on Digital AlphaServer 2100A class systems.

3.2.5 Restrictions and Known Problems

The following restrictions and known problems apply to Digital AlphaServer 2100A class systems.

3.2.5.1 KZPSA Behind the PCI-to-PCI Bridge

Updating the firmware on the 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.

3.2.5.2 EISA NVRAM

The EISA NVRAM adapter is not supported on the Digital AlphaServer 2100A class systems.

3.2.5.3 PCI NVRAM

The minimum hardware version supported on the Digital AlphaServer 2100A class systems is E01.

3.3 Digital AlphaServer 4000 Class Systems

The AlphaServer 4000 class, which currently includes only the AlphaServer 4100, is Digital's newest mid-range server offering. The following notes are specific to Digital AlphaServer 4000 class systems.

3.3.1 System Identification

The `sizer` utility identifies Digital AlphaServer 4000 class systems as Digital AlphaServer 4000 family members. The `sizer –c` command displays the following output:

```
sysname> sizer -c
cpu             "DEC4100"
```

3.3.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital AlphaServer 4000 class systems is V1.2 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.3.3 Restrictions and Known Problems

The following restrictions and known problems apply to Digital AlphaServer 4000 class systems.

3.3.3.1 EISA NVRAM

The EISA NVRAM adapter is not supported on the Digital AlphaServer 4000 class systems.

3.3.3.2 PCI NVRAM

The minimum hardware version supported on the Digital AlphaServer 4000 class systems is E01.

3.3.3.3 PBXGB-xx Video Card Support

PBXGB-xx ZLXp-Ex 8 plane and 24 plane video cards are not supported on AlphaServer 4100 systems.

3.4 Digital AlphaServer 8200/8400 Class Systems

The AlphaServer 8200/8400 class is Digital's current high-end, enterprise server offering. The Digital UNIX Version 3.2G release provides operating system support enhancements for the AlphaServer 8200/8400 class systems.

The following notes are specific to Digital AlphaServer 8200/8400 class systems.

3.4.1 System Identification

The `sizer` utility identifies Digital AlphaServer 8200/8400 class systems as Digital AlphaServer 8200/8400 family members. The `sizer -c` command displays the following output:

```
sysname> sizer -c
cpu             "DEC21000"
```

3.4.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital AlphaServer 8200/8400 class systems is V2.3 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following

console firmware command at the prompt:

```
>>> show version
```

3.5 Digital AlphaStation 500/400 Systems

The AlphaStation 500/400 system is Digital's latest mid-range workstation offering.

The following notes are specific to Digital AlphaStation 500/400 systems.

3.5.1 System Identification

Use the `sizer` utility to identify the CPU in your Digital AlphaServer 500 class system. The `sizer -c` command displays the following output:

```
sysname> sizer -c
cpu             "DEC_KN20AA"
```

3.5.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital AlphaStation 500/400 systems is V6.0 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.5.3 Special Installation Requirement

When upgrading your operating system software to Version 3.2G on a Digital AlphaStation 500/400 system following the instructions in Section 4.3.3, you must take note of the following installation requirement.

When you reach Step 5 in Section 4.3.3.3, follow the instructions under ''A. Upgrading Software and Hardware,'' not the instructions under ''B. Upgrading Software Only.''

While you will only be upgrading the operating system software, this change is necessary because the system configuration file found in the `/sys/conf` directory in the Version 3.2F release is not correct for use with Version 3.2G. Using the procedure in ''A. Upgrading Software and Hardware'' generates the correct configuration file.

3.5.4 Setting the os_type Console Variable

The Version 3.2G software has fixed the problem reported in the *Release Notes and Installation Instructions for Version 3.2F* that required the `os_type` variable be set to *`OpenVMS`*. If you upgrade your operating system software to Version 3.2G, you can then set the `os_type` console variable back to `UNIX`.

3.5.5 Hardware Upgrade

For further information about how to upgrade your operating system software as part of a hardware upgrade, see Section 3.9.

3.5.6 PBXGB-xx Video Card Support

The PBXGB-xx video cards are supported on Digital AlphaStation 500/400 systems.

3.6 DMCC EBM4x Class Single Board Computers

The Digital Modular Computing Components (DMCC) EBM4x-xx is Digital's latest PCI/ISA-based single board computer (SBC). The following notes are specific to Digital DMCC EBM4x class SBCs.

3.6.1 System Identification

The `sizer` utility identifies Digital DMCC EBM4x class SBCs as DMCC EBM4x family members. The `sizer -c` command displays the following output:

```
sysname> sizer -c
cpu             "DECEV45_PBP"
```

3.6.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Digital DMCC EBM4x class SBCs is V4.5 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following

console firmware command at the prompt:

```
>>> show version
```

3.6.3 Restrictions and Known Problems

The following restrictions and known problems apply to Digital DMCC EBM4x class SBCs.

3.6.3.1 Option Cards Restrictions

The ETMXB-AB (7 PCI) slot backplane uses PCI-to-PCI bridge [PPB] technology to provide three primary and four secondary (behind the PPB) slots. It does not contain an on-board SCSI controller. An option card such as KZPAA-AA is required for SCSI.

The option cards shown in Table 3-1 have been found to work behind the bridge. These cards can be plugged into any available slot.

Table 3-1: Supported Options Behind Bridge

Option Type	Part Number	Description
Graphics	PBXGA-AA	ZLXp-E1 8 PLANE ADAPTER
Disk	KZPAA-AA	PCI-SCSI HOST BUS ADAPTER, FNS
Network	DE435-AA	PCI Bus, 32 Bit,PC NIC
Network	DE450-CA	PCI NIC (TP, TW, AUI)

The option cards shown in Table 3-2 do not function behind the bridge. These must be plugged into the primary slots only.

Table 3-2: Nonsupported Options Behind Bridge

Option Type	Part Number	Description
Graphics	PB2GA-FA	ATI Mach64 2D GFX
Graphics	PB2GA-JA	S3 TRIO64 2MB DRAM PCI card

3.6.3.2 General Restrictions

The following server management features are not yet supported:

- Operator control panel
- Watchdog timer

3.7 Alpha VME 4/224 and 4/288 Single Board Computers

The Alpha VME 4/224 and 4/288 are Digital's latest VME-based single board computers (SBCs).

Support for the VME VIP/VIC64 VME adapter on the Digital Alpha VME 4/224 and 4/288 platforms is the same as the support for this adapter on the AXPvme Single Board Computers and Digital Alpha VME 2100 systems. VME performance improvements and bug fixes have been incorporated into this release of Digital UNIX Version 3.2G for VME support on Digital Alpha VME 4/224 and 4/288 systems.

The following notes are specific to Alpha VME 4/224 and 4/288 SBCs.

3.7.1 System Identification

The `sizer` utility identifies Alpha VME 4/224 and 4/288 SBCs as Alpha VME 4/2xx family members. The `sizer -c` command displays the following output:

```
sysname> sizer -c
cpu             "DECALPHAVME_224"
```

3.7.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the Alpha VME 4/224 and 4/288 SBCs is V1.0 or higher. If you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the firmware documentation that came with your system.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.7.3 Restrictions and Known Problems

The Alpha VME 4/224 and 4/288 SBCs do not support VME autovectors.

3.7.4 New Configuration Parameter

In addition to the configuration parameters documented in Appendix D of Digital UNIX's *Writing VMEbus Device Drivers* guide, a new parameter has been added to `/sys/data/ebv10_vme_data.c`. This parameter allows the DMA interleave gap, the time period between Master Block Transfer DMA bursts, to be specified. In previous releases of Digital UNIX, the DMA interleave gap was always configured for the maximum interleave gap (3.75us).

During the DMA interleave gap, stalled or new programmed I/O (PIO), VME IACK cycles, or slave DMAs may obtain the bus to perform the required I/O operation. The VIC64 is enabled for `dual path` to allow these I/O operations to occur during the DMA interleave gap. Changing this parameter arbitrarily may cause undesirable side affects.

Decreasing the value from the default value will increase DMA throughput. However, as the number approaches zero, outstanding PIO operations, VME IACKs, and slave DMAs may be held off from obtaining the bus until the DMA in progress has been completed. These operations might have occurred during the DMA interleave gaps if the default value had been used.

Specifying a small DMA interleave gap may result in PCI retry timeouts, poor PIO performance, increased interrupt response time, other PCI transactions to be held off, and possible system time loss. Beware of these side effects when specifying a new parameter value for the DMA interleave gap.

The DMA interleave gap configuration parameter is identified by `VME_DMA_INTRLV` in the `/sys/data/ebv10_vme_data.c` structure, as follows:

```
struct  ebv10_vme_data ebv10_vme_data = {
    VME_BR3,             /* Bus Request Level for master cycles     */
    VME_ARB_RR,          /* Arbitration Method                      */
    VME_FRTO_DSABL,      /* VMEbus fair requester disabled          */
    VME_BUSTO_256US,     /* Local bus timeout period                */
    VME_BUSTO_512US,     /* VMEbus timeout period                   */
    VME_ROR,             /* Release Type                            */
    VME_SYS_CONTROLLER,  /* System Controller                       */
    VME_A24_A32_OVRLAP,  /* Inbound A24/A32, if same space, overlap */
    VME_WRT_POST_DSABL,  /* Disable VIC Master Write Posting        */
    VME_DMA_INTRLV_15,   /* MBLT DMA Interleave Gap (value * 250ns) */
    0x08000000,          /* A32 Inbound DMA window base address     */
    VME_SZ_128_MB,       /* A32 window sz in kb (131072kb = 128mb)  */
    0x00C00000,          /* A24 Inbound DMA window base address     */
    VME_SZ_4_MB,         /* A24 window size in kb (4096kb = 4mb)    */
    0x00000100,          /* A16 Interprocessor Communication base   */
    0x00000000,          /* A16 Interprocessor Communication mask   */
```

```
                        /* Following entries are for adapters that */
                        /* are not part of base platform support.  */
    SPLDEVLOW,          /* VME IRQ level to system SPL map         */
    SPLDEVLOW,          /* VME IRQ 1 to SPL spldevlow              */
    SPLDEVLOW,          /* VME IRQ 2 to SPL spldevlow              */
    SPLDEVLOW,          /* VME IRQ 3 to SPL spldevlow              */
    SPLDEVLOW,          /* VME IRQ 4 to SPL spldevhigh             */
    SPLDEVLOW,          /* VME IRQ 5 to SPL spldevhigh             */
    SPLDEVLOW,          /* VME IRQ 6 to SPL spldevhigh             */
    SPLDEVLOW,          /* VME IRQ 7 to SPL splrt                  */
    SPLDEVLOW,          /* Adapter resource blocking SPL level     */
    0                   /* Adapter MBLT I/O access (sparse/dense)  */
};
```

3.7.4.1 Specifying the DMA Interleave GAP

You can specify one of the values shown in Table 3-3 for the Master Block Transfer DMA interleave gap. The DMA interleave gap value (`dma_intrlv`) is stored in the VIC64 Block Transfer Control Register (`BTCR`) during the start of a Master Block Transfer DMA. This parameter is only applicable when the VME adapter's hardware DMA engine is used to perform the DMA.

Table 3-3: VIC DMA Interleave Gap

Value	Definition
VME_DMA_INTRLV_15	3.75us DMA interleave gap
VME_DMA_INTRLV_14	3.50us DMA interleave gap
VME_DMA_INTRLV_13	3.25us DMA interleave gap
VME_DMA_INTRLV_12	3.00us DMA interleave gap
VME_DMA_INTRLV_11	2.75us DMA interleave gap
VME_DMA_INTRLV_10	2.50us DMA interleave gap
VME_DMA_INTRLV_9	2.25us DMA interleave gap
VME_DMA_INTRLV_8	2.00us DMA interleave gap
VME_DMA_INTRLV_7	1.75us DMA interleave gap
VME_DMA_INTRLV_6	1.50us DMA interleave gap
VME_DMA_INTRLV_5	1.25us DMA interleave gap
VME_DMA_INTRLV_4	1.00us DMA interleave gap
VME_DMA_INTRLV_3	0.75us DMA interleave gap

Table 3-3: (continued)

Value	Definition
VME_DMA_INTRLV_2	0.50us DMA interleave gap
VME_DMA_INTRLV_1	0.25us DMA interleave gap
VME_DMA_INTRLV_0	0.00us DMA interleave gap[a]

Table note:

a. The value `VME_DMA_INTRLV_0` must not be specified if D64 Master Block Transfers are to be performed. Unpredictable errors and possible data corruption may result in the use of this value with D64 transfers.

3.8 AlphaPC64, EB64+, EB66+, and EB164 Single Board Computers

The AlphaPC64, EB64+, EB66+, and EB164 are Digital Semiconductor's current Single Board Computers (SBCs). The following notes are specific to the Digital Semiconductor SBCs.

3.8.1 System Identification

The `sizer` utility identifies AlphaPC64, EB64+, EB66+, and EB164 SBCs as Digital AlphaPC or EB family members. The `sizer -c` command displays the following output on these machines.

For the AlphaPC64 and EB64+:

```
sysname> sizer -c
cpu             "ALPHAPC64"
```

For the EB66+:

```
sysname> sizer -c
cpu             "EB66PLUS"
```

For the EB164:

```
sysname> sizer -c
cpu             "EB164"
```

3.8.2 Firmware Requirements

Before installing the Digital UNIX software kit, make sure that your system has the correct firmware version. The minimum firmware version required for the AlphaPC64, EB64+, EB66+, and EB164 SBCs is V4.4 or higher. If

you have an earlier firmware version, update your firmware before installing the Version 3.2G software. For information on how to update your firmware, refer to the *Alpha SRM Console for Alpha Microprocessor Evaluation Boards User's Guide*.

To determine the version of firmware on your system, enter the following console firmware command at the prompt:

```
>>> show version
```

3.9 Hardware Upgrades

You can upgrade your existing Digital UNIX operating system software to Version 3.2G as a part of your hardware upgrade with the following restrictions:

- You must already be running Digital UNIX Version 3.2C or higher.
- You must upgrade the operating system before upgrading your hardware or firmware. Note that this is the opposite of what was stated earlier in this chapter where the software installation was not part of a hardware upgrade.

These restrictions would apply to, but are not limited to, the following:

- AlphaServer 2100 upgrade to an AlphaServer 2100A
- AlphaServer 1000A 4/233 or 4/266 upgrade to an AlphaServer 1000A 5/300
- AlphaStation 500/266 or 500/233 upgrade to an AlphaStation 500/400

For further information on upgrading your operating system software to Version 3.2G, see Section 4.3.3.

Installation Notes 4

This chapter provides installation release notes and procedures for Digital UNIX Version 3.2G. If your system has been shipped with Digital UNIX Version 3.2G factory installed software (FIS), you do not need to read the rest of this chapter.

Some of the instructions in the following sections refer to procedures that are described in the Digital UNIX Version 3.2C *Installation Guide* and your hardware documentation. Have these documents available when you review these instructions.

Also, before you start your installation, be sure to do the following:

- Review Section 2.1 in the Digital UNIX Version 3.2C *Release Notes*
- Refer to Chapter 3 of this manual for processor-specific release note information on the new hardware systems, if applicable.

4.1 Update Installation Restrictions

The Digital UNIX operating system provides an update installation procedure, `installupdate`, that you can use to update your operating system software between major and minor operating system versions (for example, updating from Version 3.0 to Version 3.2 or Version 3.2C, or updating from Version 3.2C or Version 3.2D to Version 4.0). This section discusses the known restrictions when using the update installation procedure with these Digital UNIX supplementary software products.

4.1.1 Version 3.2C to Version 3.2G

You cannot use the Digital UNIX update installation procedure to install Version 3.2G from Version 3.2C. An update installation using the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM will only install Version 3.2C on your system. Table 4-1 provides an overview of the proper installation process for each supplement with respect to the version of Digital UNIX currently running on your system.

Table 4-1: Installation Paths to Version 3.2G

Current Version	Desired Version	Action
3.2, 3.2A, 3.2B	3.2G	Update install to 3.2C, then upgrade install to 3.2G
3.2C, 3.2D-1, 3.2D-2, 3.2E-1, 3.2E-2, 3.2F	3.2G	Upgrade install to 3.2G
3.2G	3.2G (reinstalled)	Full install to 3.2G

For more information about upgrading your operating system software to Version 3.2G, see Section 4.3. For information about updating your operating system from 3.2, 3.2A or 3.2B to 3.2C with the `installupdate` command, refer to Chapter 2 of the *Installation Guide*.

4.1.2 Version 3.2G to Version 4.0

You cannot use the Digital UNIX update installation procedure to update a Version 3.2G system to Version 4.0. Note that the Version 4.0 `installupdate` software specifically prohibits this update progression because Version 3.2G supports new hardware systems that are not supported in Version 4.0. For this reason, installing Version 4.0 on one of these new hardware systems could leave your system in an unusable state.

Refer to Chapter 1 for a list of the newly-supported hardware systems in Version 3.2G.

4.2 Removing the Version 3.2G Software Subsets

If your system has Version 3.2G Factory Installed Software (FIS) loaded or if you have already installed Version 3.2G as described in this chapter, you can use the `setld` command to remove or deinstall software from your system. However, Digital recommends that you do not remove or deinstall any Version 3.2G software subsets (identified by the *375 product subset code) because:

- Removing any of the Version 3.2G kernel software subsets may cause subsequent kernel builds (including a generic kernel build) to fail. You can determine what software subsets are categorized as kernel required

subsets by entering the following command:

```
# setld -i | grep Kernel
```

The output from this command sequence will be a list of the Version 3.2G kernel subsets with information as to whether they have been installed on your system. If they already have been installed, you should not remove them.

- Removing any other Version 3.2G supplementary software (identified by the *375 product subset code) will remove the supplied maintenance, functionality, or hardware support from your system or DMS environment. This can leave your system in an unusable state.

For further information see the Digital UNIX *System Administration* guide.

4.3 Version 3.2G Installation

The following sections provide installation notes for Version 3.2G by covering the following topics:

- Warning messages during installation
- Installation procedures

For processor-specific information about the newly supported systems, refer to Chapter 3.

4.3.1 Warning Messages During Installation

During installation of the Digital UNIX Version 3.2G software, the following error and warning messages may be displayed; you can safely ignore them.

- When initializing the system disk, the installation software displays the following message:

```
Warning: ./etc: File exists
```

- When building the target kernel for your system, the software displays the following informative message:

```
*** PERFORMING KERNEL BUILD ***
min. free vnode limit too small; 150 assumed
maximum vnode limit too small; 10000 assumed
```

- After an upgrade installation, while the system is booting, the following

message may be printed to the console:

```
WARNING: lost battery backup clock -- CHECK AND RESET THE DATE!
```

For more information about this message, see Section 2.1.12.

4.3.2 Installation Procedures

The following sections provide information on performing a full or upgrade installation of the Digital UNIX Version 3.2G software from CD–ROM or from a Remote Installation Services (RIS) server.

For information on setting up a RIS area for Version 3.2G software, see Appendix A.

To install the Version 3.2G software into a DMS Environment, see the manual *Sharing Software on a Local Area Network*, specifically one of the following sections:

- Section 10.2, *Installing Software in a New DMS Environment*
- Section 10.3, *Adding Software to an Existing DMS Environment*

To configure Version 3.2G into a Version 3.2C DMS environment, see Appendix B.

Note

The DMS server for Version 3.2G clients must be running Digital UNIX Version 3.2C or later.

4.3.2.1 Verifying Firmware, ECU, and RCU Versions

Before installing the Digital UNIX Version 3.2G software, verify that your system has the required console firmware, ECU, and RCU (where applicable) already installed. For information about the required versions needed for Digital UNIX Version 3.2G software, refer to the information provided in Chapter 2 and Chapter 3.

4.3.2.2 Setting Console Firmware Environment Variables

Before starting the boot procedure for CD–ROM or RIS installations, you should complete the following steps:

1. Clear the console firmware `boot_osflags` and `boot_file` variables. This ensures that the installation software boots the correct installation

kernel file and selects the correct boot file.

```
>>> set boot_osflags

>>> set boot_file
```

2. Set the console firmware `auto_action` variable to `halt`. This will halt the system at the console prompt each time it is turned on, when it crashes, or when you press the Halt button.

   ```
   >>> set auto_action halt
   ```

These steps may not be needed for some Digital Alpha systems. However, completing them prior to a CD–ROM or RIS installation ensures that the Digital UNIX installation software boots and installs the correct software for your system.

4.3.2.3 Using CD–ROM Media to Install

If you are installing using the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM, refer to the appropriate sections in the Digital UNIX Version 3.2C *Installation Guide* for your system information. If your system is one of the following newly-supported hardware systems, then use the corresponding section of the *Installation Guide*:

- For installation instructions for the Digital AlphaServer 1000A class systems, refer to the section on installing the Digital AlphaServer 1000 class systems.
- For installation instructions for the Digital AlphaServer 2100A class systems, refer to the section on installing the Digital AlphaServer 2100 class systems.
- For installation instructions for the Digital AlphaServer 4000 class systems, refer to the section on installing the Digital AlphaServer 2100 class systems.
- For installation instructions for the Digital AlphaServer 8200/8400 class systems, refer to the section on installing the DEC 7000 class systems.
- For installation instructions for the Digital AlphaStation 500/400 systems, refer to the section on installing the AlphaStation 600 class systems.
- For installation instructions for the Digital DMCC EBM4x class SBCs, refer to the section on installing the AXPpci 33 SBCs.
- For installation instructions for the AlphaPC64, EB64+, EB66+, and EB164 SBCs, refer to the section on installing the AlphaPC64, EB64+, EB66+, and EB164 SBCs.
- For installation instructions for the Alpha VME 4/224 and 4/288 SBCs, refer to the section on installing the AXPvme 64/100/160/233 SBCs.

4.3.2.3.1 CD–ROM Drive May Be Offered as Installation Target Disk –

During an installation from CD–ROM or during a RIS installation, if a CD is present in the CD–ROM drive, the CD reader may be listed in the installation menu as a possible target disk. This can happen if the vendor model number does not begin with the letters RRD. All supported Digital CD–ROM drives have the RRD model designation, but other vendor drives may not and may be listed as an installation target.

If you select a CD–ROM drive as the installation disk, the installation will fail.

4.3.2.4 Installing from the Network

To install Version 3.2G onto your system using the Remote Installation Services (RIS), make sure it is registered as a client on a RIS server. Note that you should register your system for all products offered as part of the base operating system. That is, register for both Version 3.2C and Version 3.2G. See the *Sharing Software on a Local Area Network* manual for information on registering a client. Note that the client must be on the same subnet as the RIS server.

Set your device protocols to allow booting from either a Digital UNIX server or an ULTRIX server.

To boot the RIS installation from a Digital UNIX server, see Section 4.3.2.4.1. To boot the RIS installation from an ULTRIX server, see Section 4.3.2.4.2.

4.3.2.4.1 Booting from a Digital UNIX Server –

Use the `show device` console firmware command to determine which network adapter your system is using. The network adapter will have a value such as `ewa0` or `era0`.

```
>>> show device
```

The `show device` command will display output similar to the following:

```
dka400.4.0.6.0          DKA400      RRD43  2893
dva0.0.0.0.1            DVA0
ewa0.0.0.13.0           EWA0        08-00-2B-3E-B6-C8
pka0.7.0.6.0            PKA0        SCSI Bus ID 7
```

Use the following console firmware command syntaxes to boot your system over the network:

set *device*_**inet_init bootp**

set *device*_**protocols bootp**

For example, if the device you are booting from with the `bootp`

protocol is ewa0, enter the following console firmware commands:

```
>>> set ewa0_inet_init bootp
>>> set ewa0_protocols bootp
>>> boot ewa0
```

4.3.2.4.2 Booting from an ULTRIX Server – Use the show device console firmware command to determine which network adapter your system is using. The network adapter will have a value such as ewa0 or era0.

```
>>> show device
```

The show device command will display output similar to the following:

```
dka400.4.0.6.0          DKA400      RRD43  2893
dva0.0.0.0.1            DVA0
ewa0.0.0.13.0           EWA0        08-00-2B-3E-B6-C8
pka0.7.0.6.0            PKA0        SCSI Bus ID 7
```

Use the following command syntax to boot your system over the network:

set *device*_**protocols mop**

For example, if the device you are booting from with the mop network protocol is ewa0, enter the following commands:

```
>>> set ewa0_protocols mop
>>> boot -fi "" ewa0
```

Note that this is the last release of Digital UNIX that will support ULTRIX-served RIS.

4.3.3 Upgrading to Version 3.2G

Your system must be running Digital UNIX Version 3.2C or higher before you can upgrade to Version 3.2G.

The instructions in the following sections cover the following tasks:

- Preparing your system for the software upgrade
- Upgrading the software
- Rebuilding the system's target kernel

Digital recommends that you back up your root, /usr, and /var directories before installing Version 3.2G in case you need to restore your system.

Note that if you are upgrading to Version 3.2G as a required part of your hardware upgrade, you must upgrade the operating system before upgrading your hardware or firmware.

4.3.3.1 Preparing your System for the Software Upgrade

To prepare your system for the software upgrade, follow these steps:

1. Log in as root or become superuser.
2. If you are upgrading your system from a RIS server, verify that your system is registered for the Version 3.2G upgrade product.
3. Shut down the system to single-user mode:

   ```
   # /usr/sbin/shutdown +5 "Upgrading system software"
   ```

4. After the system shuts down to single-user mode, or after you reboot to single-user mode, mount the file system that contains the `/usr` and `/var` directories. Use the `bcheckrc` command to check and mount all the UFS and AdvFS file systems, then issue the `update` command and activate your swap partition with `swapon`.

   ```
   # /sbin/bcheckrc
   # /sbin/update
   # /sbin/swapon -a
   ```

   If you are using the Logical Storage Manager, you should also run `lsmbstartup`.

   ```
   # /sbin/lsmbstartup
   ```

4.3.3.2 Upgrading the Software

If you are upgrading from CD–ROM media, follow step A. If you are upgrading from a RIS area, proceed to step B.

A. Upgrading from CD–ROM media

1. Load the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM into the CD–ROM drive.
2. Use the following command to determine the mount device of your CD–ROM drive:

   ```
   # file /dev/rrz*c
   /dev/rrz1c: character special (8/1026) SCSI #0 RZ25 disk #8
   /dev/rrz2c: character special (8/2050) SCSI #0 RZ25 disk #16
   /dev/rrz3c: character special (8/3074) SCSI #0 RZ26 disk #24
   /dev/rrz4c: character special (8/4098) SCSI #0 RRD42 disk #32
   ```

   Locate the CD–ROM entry. In this example, the CD–ROM entry is `RRD42`, which is a character device named `/dev/rrz4c`.

3. The syntax for mounting a block device is as follows:

   /usr/sbin/mount –rd /dev/*block-device mount-point*

   In the following example, the CD–ROM is mounted using the block

device name of the CD–ROM device-special file /dev/rz4c. The mount point is shown as /mnt. Replace *block-device* with the actual block device of your CD–ROM device-special file. Replace /mnt with the actual name of the system's mount point.

```
# /usr/sbin/mount –rd /dev/rz4c /mnt
```

4. Use the setld command to load the maintenance supplement subsets.

   Enter the following command:

   ```
   # setld –l /mnt/ALPHA/hUPDATE
   ```

5. At a minimum, choose all of the mandatory subsets for the Version 3.2G product.

Proceed to Section 4.3.3.3.

B. Upgrading from a RIS server

1. Perform the steps in Section 4.3.3.1. Then use the following command to start the network:

   ```
   # /usr/sbin/rcinet start
   ```

   Informational messages will appear on the screen.

2. Use the setld command to load the new subsets:

   ```
   # setld –l RIS_server:
   ```

   Substitute the name of your RIS server for the *RIS_server* parameter. For example, if the name of your RIS server is cloud, you would use the following command:

   ```
   # setld –l cloud:
   ```

   Note that if you have not registered as a client on the appropriate RIS server, either the previous command will fail or you may install the wrong product. To install the Digital UNIX Version 3.2G software, register for the Version 3.2G (OSF375) product only.

3. Choose all of the mandatory subsets for the Version 3.2G product. If you are offered the following choices, choose ALL:

   ```
   ALL
   NONE
   EXIT
   ```

If you are offered the following choices, choose MANDATORY ONLY:

```
MANDATORY ONLY
ALL
NONE
EXIT
```

4.3.3.3 Rebuilding the System's Target Kernel

Whether you install Version 3.2G locally, from a RIS server, or in a DMS environment, you must rebuild the system kernel after you upgrade to the Version 3.2G software in order for these software changes to take effect. To build your system's target kernel, follow these steps:

1. Log in as root.
2. Switch to single-user mode if there is any chance that someone might try to log into the system while the kernel is rebuilding.
3. Use the bcheckrc command to check and mount all the UFS and AdvFS file systems, then start update and activate your swap partition with swapon.

   ```
   # /sbin/bcheckrc
   # /sbin/update
   # /sbin/swapon -a
   ```

   If you are using Logical Storage Manager, you should also run lsmbstartup.

   ```
   # /sbin/lsmbstartup
   ```

4. Use the cp command to make a backup copy of your new kernel. For example:

   ```
   # cp /vmunix /vmunix.old
   ```

   On a dataless client, enter:

   ```
   # cp /.vmunix /.vmunix.old
   ```

5. The next step taken to rebuild your system kernel will depend on if you are upgrading as a required part of your hardware upgrade or upgrading software only.

   A. Upgrading Hardware and Software

      1. Ensure that the Version 3.2G software has been installed and that your hardware has been upgraded (in that order).

2. Shut down the system to boot the newly delivered generic kernel:

   ```
   # /usr/sbin/shutdown -h now
   ```

3. Boot the Version 3.2G generic kernel, replacing *sys_disk* with the name of your system disk:

   ```
   >>> boot sys_disk -fi genvmunix
   ```

   Note that *sys_disk* is the hardware mnemonic for the system disk (root file system).

4. Build your system kernel:

   ```
   # doconfig
   ```

   You will be prompted for the name of a kernel configuration file to use. You should use the default configuration file name. Next, the system displays a message stating that a configuration file by that name already exists, but asks if you want to replace it. Answer y (yes) to this question:

   ```
   Do you want to replace it? (y/n) [n]: y
   ```

   By doing so, you will replace the configuration file with one that supports the new hardware and rebuild your target kernel appropriately.

B. Upgrading Software Only

   Use the doconfig command to rebuild your system kernel:

   ```
   # doconfig -c HOSTNAME
   ```

   On a dataless client, enter:

   ```
   # doconfig -n -c HOSTNAME
   ```

   When you run doconfig, any user customizations to the configuration file are preserved in *MACHINE_NAME*.bck. You can restore these customizations when the doconfig program asks if you want to edit the configuration file. For example, if your system is named COFFEE, you would enter the following command:

   ```
   # doconfig -c COFFEE
   Saving /sys/conf/COFFEE as /sys/conf/COFFEE.bck
   Do you want to edit the configuration file (y/n) [n]: n
   ```

   The kernel build process begins:

   ```
   *** PERFORMING KERNEL BUILD ***
          .
          .
          .
   ```

6. Because you already made a backup copy of the original kernel, you can now move the system kernel from the /sys/*MACHINE_NAME* directory

into the root directory. For example, if your system is named COFFEE, you would enter the following command:

```
# mv /sys/COFFEE/vmunix /
```

On a dataless client, you must also move `.vmunix` to your root directory. For example:

```
# mv /sys/COFFEE/.vmunix /
```

7. Use the `shutdown -r` command to shut down your system and automatically reboot it with the new kernel:

```
# /usr/sbin/shutdown -r now
```

The upgrade is now complete.

Once you are completely satisfied that your system is running correctly and that you have no possible need for the `vmunix` backup copy, `vmunix.old`, you might want to delete that file from the root directory to conserve disk space. On a dataless client, you should also delete `.vmunix.old`.

4.3.4 Verifying the Installation

To verify that you have installed all the correct elements from the Digital UNIX Version 3.2G supplement, check the Digital UNIX revision level that appears in the `/etc/motd` file. The correct version string is:

```
Digital UNIX V3.2G
Digital UNIX V3.2G Worksystem Software
```

Installing Using the Remote Installation Services (RIS) A

This appendix describes how to install the Digital UNIX Version 3.2G supplement into a Remote Installation Services (RIS) area. The following topics are covered:

- Requirements
- Setting up a RIS area on a Digital UNIX server
- Setting up a RIS area on an ULTRIX server

Refer to the Digital UNIX Version 3.2C *Sharing Software on a Local Area Network* manual for information on how to set up a RIS area.

A.1 Requirements

The total RIS area for Digital UNIX Version 3.2G requires approximately 108464 512-byte blocks of disk space.

If your RIS server does not have Digital UNIX Version 3.2C installed, the following products must be installed from the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM for the software to work correctly:

```
ALPHA/BASE
ALPHA/hUPDATE
```

Both products must be installed into the same RIS area. If your RIS server is running Digital UNIX Version 2.0 or higher, the products do not have to be installed in any specific order. If your RIS server is running a version prior to Version 2.0 or ULTRIX, the products must be installed in the order that is shown.

If you have an existing Digital UNIX Version 3.2C RIS area, you can install just the ALPHA/hUPDATE product into this existing RIS area.

Note

If your RIS server is running Digital UNIX Version 2.0 or earlier, the products will not be installed in the proper order if only ALPHA is specified. If the products are not installed in the specified order, clients that require Digital UNIX Version 3.2G software enhancements will boot the incorrect kernel and Version 3.2G will not be installed.

A.2 Installation CD–ROM Contains a "Dirty" File System

The Digital UNIX Version 3.2G software kit CD–ROMs contain what appears to ULTRIX to be a ‘‘dirty’’ file system. To mount the CD–ROM on an ULTRIX system so that you can load the software for RIS use, you must specify the `–o force` flag for the `mount` command. For example:

```
# mount -o force -r /dev/rz4c /cdrom
```

To mount the CD–ROM on a DEC OSF/1 system older than Version 2.0, use the following command:

```
# mount -dr /dev/rz4c /cdrom
```

A.3 Setting Up a Version 3.2G RIS Area on a Digital UNIX Server

If you are using a Digital UNIX server that is running Digital UNIX Version 1.2, 1.2A, 1.3, 1.3A, or 1.3B, you must make sure the appropriate NFS server capabilities are enabled before you install the Digital UNIX Version 3.2G software. These capabilities must be enabled because the Digital UNIX Version 3.2G client systems access part of the kit from the server using NFS. (See the `nfssetup`(8) reference page.)

Your Digital UNIX server contains an `/etc/exports` file for each of its RIS clients, and each file contains a pathname to the kit directory in the RIS area. These pathnames must not have symbolic links. Before installing clients, add one of the following lines to the `/etc/exports` file:

- If your server’s `var` area is separate from the `usr` area, there will be a symbolic link to it at `/usr/var`. In this case, add a line similar to the following:

  ```
  /var/adm/ris/ris2.alpha/kit    -r=0 -o
  ```

- If your `var` area is part of your `usr` area, add a line similar to the following:

  ```
  /usr/var/adm/ris/ris2.alpha/kit –r=0 –o
  ```

  In these examples, `ris2.alpha` is the RIS product area where the Digital UNIX Version 3.2G kit is installed.

A.4 Setting Up a Version 3.2G RIS Area on an ULTRIX Server

Before setting up a RIS area on an ULTRIX server, be sure to read the instructions for setting up such a RIS area in the Digital UNIX *Sharing Software on a Local Area Network* manual.

When using an ULTRIX RIS server, use the RIS Install Software option to extract or link to the Digital UNIX Version 3.2G kit. Then move to the directory where the product was installed, extract the ROOT files, and create the directory structure required for Digital UNIX clients. (Note that the *n* is the number of the directory where the product is installed on the ULTRIX server, for example, ris0.mips).

```
# cd /var/adm/ris/risn.mips
# restore xf */ROOT ./RisFiles
# /usr/bin/sh5 RisFiles Extract */ROOT
```

Note

At this point, if you get an egrep error message, see Section A.4.2.

If you are copying the software directly from the CD–ROM media, you must perform the following operation:

```
# cp /mnt/ALPHA/hUPDATE/hROOT product_2
```

The /mnt element is the mount point at which the CD–ROM is mounted. The product_2 element refers to the directory where the hUPDATE product is installed. Note that if you are adding the Digital UNIX Version 3.2G software to an already existing RIS area, the number following product_ might not be 2. If you choose the Create symbolic link to /mnt/ALPHA/BASE option, you do not need to perform this copy operation.

Next, extract the hROOT files and create the directory structure required for Digital UNIX clients:

```
# restore xf */hROOT ./RisFiles
# /usr/bin/sh5 RisFiles Extract */hROOT
```

You must make sure the appropriate NFS server capabilities are enabled before you install the Digital UNIX Version 3.2G software. These capabilities must be enabled because the Digital UNIX Version 3.2G client systems access part of the kit from the server using NFS. (See the nfssetup(8) reference page.)

Your ULTRIX server contains an /etc/exports file for each of its RIS clients, and each file contains a pathname to the kit directory in the RIS area. These pathnames must not have symbolic links. Before installing clients, add one of the following lines to the /etc/exports file:

- If your server's var area is separate from the usr area, there will be a symbolic link to it at /usr/var. In this case, add a line similar to the following to the /etc/exports file:
  - If your RIS server is running a version earlier than ULTRIX Version

4.4, add the following line:

```
/var/adm/ris/ris2.mips/kit    -r=0 -o
```

– If your RIS server is running ULTRIX Version 4.4, add the following line:

```
/var/adm/ris/ris2.alpha/kit    -r=0 -o
```

- If your `var` area is part of your `usr` area, add a line similar to the following to the `/etc/exports` file:
  – If your RIS server is running a version earlier than ULTRIX Version 4.4, add the following line:

```
/usr/var/adm/ris/ris2.mips/kit –r=0 –o
```

  – If your RIS server is running ULTRIX Version 4.4, add the following line:

```
/usr/var/adm/ris/ris2.alpha/kit –r=0 –o
```

A.4.1 Updating the boot File for New Clients

After registering each client, you must add the appropriate node for each one.

Use the following `addnode` command for ULTRIX servers:

```
# addnode <hostname> -t /usr/var/adm/ris/risn.mips/hvmunix
```

The `ris`*`0`*`.mips` location is the area into which the product was installed.

A.4.2 hUPDATE Error Message

During the extraction of the subsets from the `ALPHA/hUPDATE` directory onto an ULTRIX Version 4.4 RIS server, you may encounter an error message similar to the following:

```
Media extraction complete.
egrep: can't open product_2/instctrl/hROOT.ctrl
```

This error message means that a product name is missing from the `ProdNames` file. This section provides a workaround to this problem.

This error message lists `product_2` as the area where the product name was not configured. The error message you see may have a different value. Be sure to note which product area (directory) the error message displays.

The following steps will have to be repeated each time you add products to the RIS area:

1. As superuser, run the `ris` program. When the program prompts you for a choice, enter `s`. The program displays a numbered list that provides the directory name and the names of products available in that directory.

Take note of the directory name; you will use it in the next step.

2. Exit from the RIS menu and change to the directory that you took note of in Step 1. If there is more than one RIS area, be sure to choose the one you selected when you used the RIS utility to install the Version 3.2G product. If the server has Digital UNIX Version 3.2C installed, the Version 3.2G product will be in the same RIS area. For example:

   ```
   # cd /usr/var/adm/ris/risn.alpha/product_n/instctrl
   ```

   Note that *n* is the number of the directory where the product is installed on the ULTRIX server.

3. Look at one of the `.ctrl` files to find the product name. The product name is the string assigned to `NAME`. The following example is taken from the `OSFBIN375.ctrl` file:

   ```
   NAME='Digital UNIX V3.2G Operating System ...'
   ```

4. Move to the appropriate directory and edit the `ProdNames` file. For example:

   ```
   # cd ../../
   # vi ProdNames
   ```

5. Add the product name on the line where only a number shows. For example,

   ```
   2   'Digital UNIX V3.2G Operating System  ...'
   ```

   Be sure to enter the information in the same manner as the other products, remembering to add the quotes around the product name.

Dataless Management Services B

To configure Version 3.2G into a Version 3.2C DMS environment, you need to do the following:

1. You must have installed the Version 3.2C Additional Networking Services and the Dataless Management Services subsets when you installed Version 3.2C in your new software environment. Otherwise, you will see a message similar to the following when you attempt to configure the software environment:

   ```
   These required subsets have not been installed into the environment:
      OSFDMS OSFINET

   Configuration of /usr/var/adm/dms/dms0.alpha cannot be performed.
   ```

   Before configuring the software environment, return to the INSTALL software step, select option 2 to add software into an existing area, and add the Version 3.2C Additional Networking Services and Dataless Management Services subsets (OSFINET and OSFDMS).

2. You may perform the appropriate manual changes in the various `.proto..` files installed by Version 3.2C before you install and configure Version 3.2G. Changes you make to the Version 3.2C `.proto..` files will be preserved by the Version 3.2G update merge process unless there are conflicts, in which case you will be instructed by the procedure to perform manual merges before adding client systems.

3. When a Version 3.2G update is added to a DMS environment, the `dmu` utility will fail during configuration of the software. The following error message will be displayed:

   ```
   /usr/sbin/dmu: test: unknown operator 375
   ```

   To work around this, complete the following steps:

   a. Log in as root or become superuser.

   b. Change to the `/usr/sbin` directory.

c. Make a copy of the dmu script.

```
# cp dmu dmu.original
```

d. Edit the dmu script (/usr/sbin/dmu) and search for the following line. Note that the backslash in this example is for line continuation and is not in the actual display.

```
ENVER='(cd $DMSROOT/root/usr/.smdb.; ls OSFBASE???.ctrl | \
cut -d. -f1 |sed "s/OSFBASE//")'
```

Replace the line shown in the previous example with the following. Note that the backslash in this example is for line continuation and is not in the actual display.

```
ENVER='(cd $DMSROOT/root/usr/.smdb.; ls OSFBASE???.ctrl | \
tail -n 1 | cut -d. -f1 |sed "s/OSFBASE//")'
```

e. Write and quit the file.

4. After you have installed Version 3.2C and Version 3.2G, the dmu utility fails to report that you have both subsets installed. When you select the SHOW software options from the main menu, the information displayed will be similar to the following:

```
 1  /var/adm/dms/dms0.alpha
       'Digital UNIX V3.2C Operating System ...'
```

instead of this:

```
 3  /var/adm/dms/dms2.alpha
       'Digital UNIX V3.2C Operating System ...'
       'Digital UNIX V3.2G Operating System ...'
```

To work around this, you can use the setld utility to get a complete list of the installed subsets. For example, to examine the dms2.alpha environment, enter the following command and examine the output for installed subsets.

```
# setld -D /var/adm/dms/dms2.alpha/root -i
```

5. You cannot have a symbolic link in the path from /var/adm/dms to the dmsn.alpha/root/usr directory. If a symbolic link is present in this path and you have installed any X font subsets, the configuration of the software will fail.

6. When you are setting up a DMS environment, the dmu utility will offer a menu of available software components that is based on your server's system type. Depending on the client systems you will be supporting, some of these components may not be necessary, so they can be removed to reclaim disk space. Conversely, components that would be considered mandatory for the client systems may not be mandatory for the server on which you are installing the software, so you may need to install subsets

that the server normally would not require.

During installation, you must determine the software components that should be present so your server/client combination will function correctly.

For example, if you have a DEC 3000 workstation, the software subsets such as LK401 Keyboard Support (Windowing Hardware Support) and X Servers for TurboChannel (Windowing Hardware Support) will be mandatory. If you will be supporting AlphaStation 200 or 400 clients from your DEC 3000 as a server, you will need to install the PCXAL Keyboard Suport (Windowing Hardware Support) subset, the X Servers for PCI (Windowing Hardware Support) subset, and perhaps others as well. These subsets will be listed as optional in the installation menus because they are not required by the DEC 3000, but you will still need to install them if you intend to support AlphaStation 200 and 400 clients.

If you fail to load a hardware support subset that is needed by the client systems, then the clients will not be able to build custom kernels or run X Window System software.

After you have installed the software, but before you have configured it into the DMS environment, you can determine which subsets are superfluous for the server/client combination and remove them to reclaim disk space. For instance, following the DEC 3000 server example, you can remove the subsets that would be considered mandatory for your DMS server if it were a client (LK401 Keyboard Support and X Servers for TurboChannel) if you will not need them.

To identify the subsets that you have installed, use the SHOW option in the `dmu` menu to obtain the full path to the DMS environment, then exit from the `dmu` utility and use the `setld` utility to list the installed subsets.

If the `dmu` software environment is in `/var/adm/dms/dms1.alpha`, you would use the following command:

```
# setld -D /var/adm/dms/dms1.alpha/root -i | grep installed
```

The output would include lines similar to those in the following example (the backslashes in this example indicate line continuation and are not in the actual display):

```
OSFKBDLK401350  installed  LK401 Keyboard Support (Windowing Hardware \
Support)
OSFKBDPCXAL350  installed  PCXAL Keyboard Support (Windowing Hardware \
Support)
 ...
OSFSER350    installed  X Servers (Windowing Environment)
OSFSERPCI350 installed  X Servers for PCI (Windowing Hardware Support)
OSFSERTC350  installed X Servers for TurboChannel (Windowing Hardware \
Support)
```

Use the `setld` utility to delete the unnecessary subsets:

```
# setld -D /var/adm/dms/dms1.alpha/root -d OSFKBDLK401350 OSFSERTC350
```

You will see output similar to the following:

```
Deleting "LK401 Keyboard Support " (OSFKBDLK401350).

Deleting "X Servers for TurboChannel " (OSFSERTC350).
```

7. When you configure software environments with the `dmu` utility after you have removed one or more subsets by using `setld`, you will see messages suggesting there is a problem with the installation. For example:

```
Configuring "X Servers for PCI " (OSFSERPCI350)
setld: OSFSERTC350 not currently installed, cannot configure.

Configuring "Basic X Environment " (OSFX11350)
setld: OSFKBDLK401350 not currently installed, cannot configure.
```

These messages do not mean there was a problem configuring X Servers for PCI (OSFSERPCI350) or the Basic X Environment (OSFX11350). They mean that the OSFSERTC350 X Servers for TurboChannel (Windowing Hardware Support) and OSFKBDLK401350 LK401 Keyboard Support (Windowing Hardware Support) subsets were removed from the software environment.

To avoid the display of these messages, edit the `cinst.data` file in the DMS environment. For example, if the DMS environment is in `/var/adm/dms/dms1.alpha`, the full path to the `cinst.data` file will be the following:

```
/var/adm/dms/dms1.alpha/root/sbin/it.d/data/cinst.data
```

Be careful to delete only the names of subsets that were removed with the `setld` utility. Do not change the order of the other lines in the file.

If you do not remove the names of the deleted subsets from the `cinst.data` file, then client systems will see similar messages when they are booted for the first time from the DMS environment.

8. After you have installed V3.2C and Version 3.2G into a DMS environment, you must rebuild the GENERIC vmunix kernel. This step must be performed after you have carried out the CONFIGURE software environments step, which will set up all the files correctly for rebuilding the GENERIC kernel.

If you do not perform these steps, dataless clients configured to use the software environment containing the V3.2C and Version 3.2G software will run the V3.2C genvmunix kernel until they build a customized kernel. Although the V3.2C genvmunix kernel can be used for this purpose, it is not intended for use as a production kernel.

Clients that do not build a custom kernel, either by choice or because

they are not permitted to do so, would use the V3.2C genvmunix kernel as a production kernel. By rebuilding the GENERIC kernel in the DMS software environment and then installing it as the default kernel for all clients, you will create a correctly configured software environment using the V3.2C and Version 3.2G software.

To rebuild the GENERIC kernel in the DMS software environment, log in as root on the DMS server system. Identify the full path to the directory containing the V3.2C and Version 3.2G software environment. You can use the SHOW software environments command in `dmu` to display the path names to the software environments. Refer to Step 4 for additional information.

In the example that follows, `/var/adm/dms/dms3.alpha` contains the V3.2C and Version 3.2G software environment. Enter the following commands to rebuild the GENERIC vmunix kernel, strip out local symbols, and install it in the DMS software environment's root area and in the DATALESS area from which client's default boot kernels are copied during client setup:

To rebuild the GENERIC vmunix kernel, enter:

```
# DMS_DATALESS=1
# DMSROOT=/var/adm/dms/dms3.alpha
# DMS_KERNEL=$DMSROOT/root/usr/sys
# export DMS_DATALESS DMS_KERNEL DMSROOT
# doconfig -c GENERIC
```

The system will display a message similar to the following:

```
*** KERNEL CONFIGURATION AND BUILD PROCEDURE ***

Saving /var/adm/dms/dms3.alpha/root/usr/sys/conf/GENERIC as
/var/adm/dms/dms3.alpha/root/usr/sys/conf/GENERIC.bck
```

Next, the system will ask if you want to edit the configuration file:

```
Do you want to edit the configuration file? (y/n) [n]: n
```

The system will display messages similar to the following. Note that the backslash in this example is for line continuation and is not in the actual display.

```
*** PERFORMING KERNEL BUILD ***
<Note> multiple cpus defined-building generic kernel
Working....Thu Dec  7 13:04:49 EST 1995
Working....Thu Dec  7 13:06:50 EST 1995
Working....Thu Dec  7 13:08:50 EST 1995
Working....Thu Dec  7 13:10:51 EST 1995
Working....Thu Dec  7 13:12:52 EST 1995

The new kernel is /var/adm/dms/dms3.alpha/root/usr/sys/ \
GENERIC/vmunix
```

To strip out local symbols, complete the following:

```
# /usr/bin/ostrip -x $DMS_KERNEL/GENERIC/vmunix
# cp $DMS_KERNEL/GENERIC/vmunix $DMSROOT/root/genvmunix
# mkdir -p $DMS_KERNEL/DATALESS
# cp $DMS_KERNEL/GENERIC/vmunix $DMS_KERNEL/DATALESS
# $DMS_KERNEL/bin/pmerge $DMS_KERNEL/bin/sboot >
$DMS_KERNEL/DATALESS/vmunix $DMS_KERNEL/DATALESS/.vmunix
```

The system will display output similar to the following

```
Image requires 20832 bytes
Loading /var/adm/dms/dms3.alpha/root/usr/sys/bin/sboot
text at         20000000        len=4600
data at         20004600        len=b60
entry at         20000000
Image requires 6304352 bytes
Loading /var/adm/dms/dms3.alpha/root/usr/sys/DATALESS/vmunix
text at fffffc0000230000        len=4c93d0
data at fffffc00006f93d0        len=139e90
entry at fffffc0000239410
```

Enter the following command:

```
# DMS_DATALESS=0
```

At this point, you have set up the new GENERIC vmunix for use by client systems. You can now add clients to your DMS software environment.

Software Subset Information C

This appendix specifies the disk space requirements for the various Version 3.2G subsets offered on the *Digital UNIX V3.2G (Includes V3.2C)* CD–ROM. Table C-1 lists the subset names and sizes in 512-byte blocks for Version 3.2G. The sizes listed in the table represent approximate disk usage. These values assume that the files being delivered were not already on your system.

In this table, disk space is defined in terms of the number of 512-byte blocks required to install each Digital UNIX subset. The figures for each group of files within a subset (listed as being in `root`, `/usr`, and `/var`) have been rounded up to the next higher 512-byte increment; this means that the total space requirements listed are slightly greater than the space that the software actually requires.

Make sure that you have sufficient free space in both the `root` and the `/usr` directories.

For information on the contents of each subset, see the Digital UNIX Version 3.2C *Installation Guide*. If you want to add optional subsets after installation, use the `df` command to determine free disk space in blocks.

Table C-1: Subset Names and Sizes for Version 3.2G

Digital UNIX Version 3.2G Operating System				
Subset	**root**	**/usr**	**/var**	**Total**
OSFACCT375	—	67.00	—	67.00
OSFADVFS375	2969.00	5045.02	—	8014.02
OSFADVFSBIN375	—	2453.72	—	2453.72
OSFATMBIN375	—	1850.70	—	1850.70
OSFBASE375	5301.60	16135.70	—	21437.30
OSFBIN375	—	8839.51	—	8839.51
OSFBINCOM375	—	4332.95	—	4332.95
OSFC2SEC375	7.66	739.91	—	747.58
OSFCDAPGMR375	—	1858.28	—	1858.28
OSFCLINET375	595.00	3454.89	19.00	4068.89
OSFCMPLRS375	—	4280.46	—	4280.46
OSFCMPLRSEXT375	—	1298.37	—	1298.37
OSFCOMAGENT375	—	1030.00	—	1030.00
OSFDECC375	—	8851.00	—	8851.00

Table C-1: (continued)

Digital UNIX Version 3.2G Operating System

Subset	root	/usr	/var	Total
OSFDMS375	—	563.00	—	563.00
OSFHWBASE375	17068.30	403.00	—	17471.30
OSFHWBIN375	—	10757.80	—	10757.80
OSFHWBINCOM375	—	787.15	—	787.15
OSFINET375	819.00	2123.46	—	2942.46
OSFLAT375	—	630.00	—	630.00
OSFLSMBASE375	1214.29	—	—	1214.29
OSFLSMBIN375	—	614.87	—	614.87
OSFLSMBINCOM375	—	84.36	—	84.36
OSFNFS375	—	524.00	—	524.00
OSFOBSOLETE375	—	614.00	—	614.00
OSFPGMR375	—	3780.95	—	3780.95
OSFPRINT375	—	642.00	—	642.00
OSFSER375	—	7247.00	—	7247.00
OSFSERPCI375	—	2489.00	—	2489.00
OSFSERTC375	—	1843.00	—	1843.00
OSFSVID2375	—	51.00	—	51.00
OSFX11375	—	13091.70	—	13091.70
OSFXC2SEC375	—	99.00	—	99.00
OSFXDEV375	—	13625.80	—	13625.80
TOTALS	27974.85	120208.61	19.00	148202.46

Patch for Large Shared Memory Hang D

This appendix describes the process for enabling the granularity hints patch. If your system is a large database server that shows any of the symptoms as described in Section 2.1.7, you should enable this patch.

The granularity hints patch is actually implemented in four separate parts, as described in the following sections. Each of these parts contributes to reducing greatly the shared memory detach time.

In order to enable this patch, you will need to manipulate kernel tuning and configuration parameters in the `/etc/sysconfigtab` file once Digital UNIX Version 3.2G is installed. In order to realize the full benefits of this patch, granularity hints must be enabled and the shared memory used must be 8MB aligned.

D.1 Granularity Hints for Shared Memory Segments

The granularity hints fix uses the granularity hints bits in the page table entry (PTE) as specified in the Alpha architecture. Granularity hints is a Translation Buffer (TB) optimization that allows the TB to map more than a single page. Enabling the granularity hints fix also enables the shared PTE fix described in Section D.2.

The granularity hints fix is enabled by setting the `gh-chunks` parameter in `/etc/sysconfigtab`. The value of `gh-chunks` represents the number of 4MB chunks reserved at boot time for shared memory use. In `/etc/sysconfigtab`, add one of the following lines:

```
vm:
        gh-chunks=512

vm:
        gh-chunks=0x200
```

The addition of one of these lines reserves 2GB for shared memory, which

you would calculate in the following manner:

```
In decimal:  4194304 * 512 = 2147483648
In Hex:      0x400000 * 0x200 = 0x80000000
```

Note that the memory that is set aside at boot time for shared memory by specifying a value for `gh-chunks` will not be used for anything other than shared memory. Unused memory from this region is not given back to the system.

There is a short sequence of `dbx` commands that you can use to determine if extra memory (beyond that required by the application) is being allocated at boot time with `gh-chunks`. You would use these commands in the following manner, while the application that allocates shared memory is running:

```
# dbx -k /vmunix /dev/mem
(dbx) px &gh_free_counts
0xfffffc0000681748
(dbx) 0xfffffc0000681748/4X
fffffc0000681748:  0000000000000402 0000000000000004
fffffc0000681758:  0000000000000000 0000000000000002
(dbx) q
#
```

The first number (402) is the number of 512 page chunks (4MB), the second number (4) is the 64 page chunks, the 0 is the 8 page chunks and the 2 is the number of 1 page chunks. The size of `gh-chunks` can be lowered such that there are only a few (1 or 2) 512 page chunks still free with the application running.

You can adjust the following parameters in your `/etc/sysconfigtab` file in order to further tune the performance of shared memory segments:

- `gh-min-seg-size`

  Specifies the size threshold where shared memory will start being allocated from the memory reserved by `gh-chunks`. The default is 8MB.

- `gh-fail-if-no-mem`

  When set to 1, `shmget()` will return a failure if the requested size is larger than `gh-min-seg-size` and there is insufficient memory in the `gh-chunks` area to satisfy the request. If this flag is set to zero, the entire request will be satisfied from the pageable memory area if the request exceeds the `gh-chunks` area. The default is 1.

D.2 Shared PTEs for Shared Memory Segments

The shared PTEs fix enables sharing of Level 3 page table entries in the memory specified by `gh-chunks`, resulting in a substantial savings of system memory. To be able to use Level 3 PTEs, the shared memory

segment attach address (in the `shmat()` system call) and the size of the shared memory segment (in `shmget()`) must be aligned on an 8MB boundary. This means that the lowest 23 bits of the address and size must be zero. The attached address and the total size of the shared memory segment are specified by the application being used.

System V shared memory semantics allow a maximum shared memory segment size of 2GB minus 1 byte. Applications that need shared memory segments larger than 2GB construct such regions by using multiple segments.

The total shared memory size specified by the user to an application must be 8MB aligned. In addition, `shm-max`, the size specifying the maximum System V shared memory segment size, must be 8MB aligned.

If the total shared memory size specified for the application is greater than 2GB, it is reasonable to set `shm-max` with one of the following lines:

```
ipc:
        shm-max=2139095040


ipc:
        shm-max=0x7f800000
```

This is the maximum value of `shm-max` that will allow the sharing of PTEs. The maximum value for `shm-max` in this example was calculated in the following manner: `shm-max = 2GB - 8MB`

You can use the `dbx` command to determine if PTEs are being shared. You would execute it in in the following manner, while the application that allocates shared memory is running:

```
# dbx -k /vmunix /dev/mem
(dbx) p *(vm_granhint_stats *)&gh_stats_store
struct {
    total_mappers = 21
    shared_mappers = 21
    unshared_mappers = 0
    total_unmappers = 21
    shared_unmappers = 21
    unshared_unmappers = 0
    unaligned_mappers = 0
    access_violations = 0
    unaligned_size_requests = 0
    unaligned_attachers = 0
    wired_bypass = 0
    wired_returns = 0
       }
(dbx) q
#
```

The fields of interest are:

- `shared_mappers`
- `unshared_mappers`

- `unaligned_attachers`
- `unaligned_size_requests`

For best performance you should see:

```
shared_mappers = <the number of shared memory segments>
unshared_mappers = 0
unaligned_attachers = 0
unaligned_size_requests = 0
```

The following list provides general notes and restrictions about shared PTEs:

- Due to how shared memory gets broken up into shared memory segments, there may be some unshared segments. This is due to the starting address or the size not being 8MB aligned. This may be unavoidable in some cases.
- In many cases the `total_unmappers` will be greater than the number of `total_mappers`. This is normal behavior.
- Messages will be displayed on the system console for unaligned size and attach-address requests. The unaligned attach messages are throttled to one per shared memory segment.

D.3 Rework of Shared Memory Locking for Better Parallelism

The shared memory locking rework changes a lock that was a single lock to a hashed array of locks. The size of the hashed array of locks is tunable with `vm-page-lock-count` in `/etc/sysconfigtab`:

```
vm:
        vm-page-lock-count=64
```

D.4 Improvements in Kernel malloc Garbage Collection

There are no tunable parameters relating to the improved kernel `malloc` garbage collection. It is enabled by default and cannot be disabled.

Calcomp DrawingBoard III Tablet E

This appendix provides information about how configure a CalComp DrawingBoard III tablet, an input device supported by the Xinput extension to the Xserver, on a Digital UNIX Version 3.2G system. Once the software for the tablet is installed on your system, you can configure it to emulate a system mouse.

E.1 Configuring the CalComp DrawingBoard III Tablet

If you intend to use the CalComp DrawingBoard III tablet software, you must edit `/usr/var/X11/Xserver.conf` to turn on support for the X Input extension. To do this, remove the comment characters surrounding the following lines. The backslash in this example indicates line continuation and is not in the actual display:

```
input <
< _dec_xi_db3  lib_dec_xi_db3.so  XiDb3Init /dev/tty00:1:12:12:16:\
1:8:1000:1:1 >
>
```

You should also review these lines to ensure that the options specified for the tablet are correct, especially the `tty` that is specified as the serial port where the tablet is connected to your system.

The last line of this file has the following syntax. The backslash in this example indicates line continuation and is not in the actual display:

```
device:mode:tabletWidth:tabletHeight:numbtns:corePointer:mouseScale:\
resolution:Xincrement:Yincrement
```

Table E-1 can help you determine how to set up the entries for the tablet in the `/usr/var/X11/Xserver.conf` file.

Table E-1: CalComp DrawingBoard III Tablet Configuration Options and Values

Option	Description
device	The port (`tty`) to which the device is connected. The default is tty00.

Table E-1: (continued)

Option	Description
mode	This should be set to 1 for absolute motion.
tabletWidth	Width of the active tablet area in inches, not the physical size.
	The default is 12.
tabletHeight	Height of the active tablet area in inches, not the physical size.
	The default is 12.
numbtns	Number of buttons on the puck or pen.
	The maximum number is 16 and the default is 16.
corePointer	0 indicates a native tablet mode (no system mouse).
	1 indicates emulate core pointer (the mouse and tablet are both core pointer devices.
	The default is 1 (emulate core pointer).
mouseScale	1 to 50 scaling factor in relative mode. Determines the speed of the cursor; the higher the number, the slower the cursor moves.
	The default is 8.
resolution	1 to 2540 lines per inch (lpi).
	The default is 1000.
Xincrement	How much the X axis must be incremented to cause the tablet to send new coordinates to the Xserver. The range is 0 to 65536.
	The default is 1.
Yincrement	How much the Y axis must be incremented to cause the tablet to send new coordinates to the Xserver. The range is 0 to 65536.
	The default is 1.

The device option is required and specifies which `tty` device should be associated with the tablet. By default, the installation software assigns the CalComp DrawingBoard III tablet to tty00, which you may want to change if that `tty` is already allocated. For information on how to determine which serial port your tablet is connected to, see the hardware documentation that was shipped with your processor.

Note that when the stylus or puck is moved as far as the minimum Xincrement or Yincrement value, the value of the corresponding axis is

updated. For example, if the Xincrement value is set to 10 and the tablet is moved 10 units along the X axis, the value of the Y axis will also be updated simultaneously with the X axis, even if the Yincrement value has not been reached. Keep this in mind when setting the Xincrement and Yincrement options.

After you have configured the `/usr/var/X11/Xserver.conf` file, you must follow these steps to turn on support for the tablet in the Xserver:

1. Plug the tablet into your system and turn it on.
2. Enter the following command to restart the Xserver so that the Xinput extension can recognize the tablet (the backslash in this example indicates line continuation and is not in the actual display):

   ```
   # /usr/sbin/shutdown -r +5 "Turning on support for the Calcomp \
   Drawingboard III tablet"
   ```

   When the system comes back up, the tablet will be configured into the Xserver and ready to use.

When the Xserver first accesses the tablet, it performs some hardware-specific initialization that can be saved in the on-board memory of the tablet. To save these settings, follow these steps:

1. Press the EXIT CONFIG button on the tablet's menu.
2. Under the SAVE button, press the DEFAULT button.
3. Press the EXIT CONFIG button to save the settings.

E.2 Notes and Restrictions

The following notes and restrictions apply to the CalComp DrawingBoard III tablet.

- If the puck or stylus is not used within a 5 minute period, the tablet will automatically shut off. To reactivate it, press any button on the puck or stylus while they are in close proximity to the tablet.
- If you configure the tablet as the system's core pointer, moving the puck and the system mouse simultaneously will cause the cursor to move in an unpredictable fashion.
- Use only one puck or stylus at a time. If you try to use both input devices simultaneously, you will encounter unpredictable behavior.
- Digital UNIX does not support manual configuration of the tablet via the tablet buttons. If you try to use these buttons to configure the tablet, the Xserver will malfunction and may even crash. If you need to reconfigure the tablet, edit the `/usr/var/X11/Xserver.conf` file and then reboot the Xserver.

- You can modify some parts of the tablet setup by programming the Xinput extension. For more information on how to do this, see the XInput specification provided by the X Consortium.

Index

Numbers

2000 (year), 2–10

A

addnode command, A–4
AdvFS, 2–5
  mount command, 2–3
Alpha VME 4/2xx SBCs
  configuration parameter, 3–11
  firmware, 3–10
  system identifier, 3–10
AlphaPC64, EB64+, EB66+, and EB164
  firmware, 3–13
  system identifier, 3–13
AlphaServer 1000A class system
  firmware, 3–2
  KZPSA PCI SCSI adapter, 3–3
  PB2GA-JA video cards, 3–3
  PCI NVRAM, 3–3
  resolution restrictions, 3–3
  system identifier, 3–1
  upgrade recommended, 3–2
AlphaServer 2100A class system
  EISA NVRAM, 3–5
  firmware, 3–4
  KZPSA PCI SCSI adapter, 3–4
  PBXGB-xx video cards, 3–4
AlphaServer 2100A class system (cont.)
  PCI NVRAM, 3–5
  system identifier, 3–4
AlphaServer 4000 class system
  EISA NVRAM, 3–6
  firmware, 3–5
  PBXGB-xx video cards, 3–6
  PCI NVRAM, 3–6
  system identifier, 3–5
AlphaServer 8200/8400 class system
  firmware, 3–6
  system identifier, 3–6
AlphaStation 500/400 system
  firmware, 3–7
  PBXGB-xx video cards, 3–8
  setting os_type variable, 3–8
  special installation requirement, 3–7
  system identifier, 3–7

B

battery backed-up clock, 2–5, 4–3

C

CalComp DrawingBoard support, 2–9, E–1
cc -migrate
  See DEC C Compiler

D

dataless clients, B–1
date command, 2–10
DEC C Compiler
  new switches, 2–9
dirty file system, A–2
DMCC EBM4x class SBCs
  firmware, 3–8
  general restrictions, 3–10
  option card restrictions, 3–9
  system identifier, 3–8
DMS
  hardware supplement, 4–4
documentation, 1–4

E

egrep error message, A–4
EISA Configuration Utility, 2–1
EISA NVRAM
  AlphaServer 2100A class system, 3–5
  AlphaServer 4000 class system, 3–6

F

file exists warning message, 4–3
firmware, 2–1
  Alpha VME 4/2xx SBCs, 3–10
  AlphaPC64, EB64+, EB66+, and EB164, 3–13
  AlphaServer 1000A class system, 3–2
  AlphaServer 2100A class system, 3–4
  AlphaServer 4000 class system, 3–5
  AlphaServer 8200/8400 class system, 3–6
  AlphaStation 500/400 system, 3–7
  DMCC EBM4x class SBCs, 3–8

I

installation
  Version 3.2G, 4–3 to 4–12
    full installation, 4–4 to 4–7
    installing into RIS area, A–1
    upgrade installation, 4–7 to 4–12
    verifying, 4–12
    warning messages, 4–3

K

kernel build warning message, 4–3
KZPSA PCI SCSI adapter
  AlphaServer 1000A class system, 3–3
  AlphaServer 2100A class system, 3–4

M

madvise extensions
  MADV_DONTNEED option, 2–13
  madvise function, 2–13
  malloc function, 2–13
mount command
  AdvFS, 2–3

N

network-related features, 2–9
new features, 2–8 to 2–13

O

option card restrictions
  DMCC EBM4x class SBCs, 3–9
os_type variable
  AlphaStation 500/400 system, 3–8

P

patch for large shared memory hang, 2–3, D–1
PB2GA-JA video cards
AlphaServer 1000A class system, 3–3
PBXGB-xx video cards, 2–5
AlphaServer 2100A class system, 3–4
AlphaServer 4000 class system, 3–6
AlphaStation 500/400 system, 3–8
PCI, 2–2
PCI NVRAM
AlphaServer 1000A class system, 3–3
AlphaServer 2100A class system, 3–5
AlphaServer 4000 class system, 3–6
PCI RAID controller
firmware requirements, 2–1
PCI token ring
restrictions, 2–2

R

Remote Installation Services
See RIS
resolution restrictions
AlphaServer 1000A class system, 3–3
RIS
dirty file system
ULTRIX server, A–2
disk space requirements, A–1
general requirements, A–1 to A–2
installing Version 3.2G via, 4–6 to 4–7, 4–9
setting up, A–1 to A–5
RZxx-VA drives, 2–3
RZxx-VW drives, 2–3

S

setld
removing subsets, 4–2
subset sizes
Version 3.2G, C–1
system identifier
Alpha VME 4/2xx SBCs, 3–10
AlphaPC64, EB64+, EB66+, and EB164, 3–13
AlphaServer 1000A class system, 3–1
AlphaServer 2100A class system, 3–4
AlphaServer 4000 class system, 3–5
AlphaServer 8200/8400 class system, 3–6
AlphaStation 500/400 system, 3–7
DMCC EBM4x class SBCs, 3–8

U

ULTRIX RIS server
dirty file system, A–2
setting up a RIS area on, A–2 to A–5
update installation restrictions, 4–1
upgrade recommended
AlphaServer 1000A class system, 3–2

Y

year 2000, 2–10

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