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Linux Installation and Configuration Guide for AlphaServer DS10, DS20, DS20E, ES40, and AlphaStation XP1000 Computers

Abstract: The purpose of this guide is to provide the basic installation and configuration guidelines for the Linux operating system on AlphaServer DS10, DS20, DS20E, ES40 and AlphaStation XP1000 computers.

*This guide limits its testing to two prominent Linux distributions, **Red Hat version 6.0** and **SuSE version 6.1**. Much of the information contained in this document should be applicable to most other Linux distributions for AlphaServer and AlphaStation computers too.*

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Installation and Configuration Guide for Linux and Apache Web Server on Intel
Installation Guide prepared by Internet and E-Commerce Business Unit

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Special thanks to Anthony Ronghi and Norberto Collado for their time and effort in creating the original Linux document on which this is largely based on.

Introduction

The purpose of this guide is to discuss the basics of installation and configuration of the Linux operating system on the Compaq AlphaServer DS10, DS20, DS20E, ES40 and AlphaStation XP1000 computers. Numerous references to external sources and materials are used in this guide, and Compaq recommends that you refer to these sources where additional detail is needed. You can find an extensive list of these in Appendix A of this document.

Management Summary

Each distribution vendor includes operating system and application management tools that form a common base across one or more distributions. Red Hat's Package Management (RPM) format, for instance, is a commonly used software distribution mechanism. Other tools, such as each vendor's setup program, are specific to a particular distribution. This guide does not provide discussion of the Operating System Management (OSM). For detailed information on the OSM, you should refer to the particular distribution vendor.

Document Structure

The structure of this document is intended to be convenient for users to follow when installing Linux software on the AlphaServer and AlphaStation computers. There is a major section dedicated to each platform, with subsections, which discuss hardware options, software distributions, and software installation procedures. At the end of the document readers will find an extensive list of external sources of information and a glossary of terms.

Distributions Overview

The discussion in this document focuses on the following two Linux distributions:

- Red Hat Software, Inc., version 6.0 only
- SuSE, Inc., version 6.1 only

All of these distributions include large amounts of software that can run in conjunction with Linux. This guide will not analyze the available software by distribution nor give a comparison of the software from one distribution to another. The focus of the guide is exclusively on the base Linux operating system and the process required configuring and installing the software.

Red Hat

Red Hat is one of the most popular distributions of Linux in the United States. It is created by Red Hat Software, Inc. and is available through its website located at <http://www.Red.Hat.com>. The distribution used in the creation of this document was 6.0. **This document does not accurately reflect procedures and requirements for any other Red Hat software version!**

SuSE

SuSE is one of the most popular distributions of Linux in Europe and is gaining in popularity in the United States. It is maintained by SuSE, Inc. and is available through its website located at <http://www.suse.com>. The distribution used in the creation of this document was 6.1. **This document does not accurately reflect procedures and requirements for any other SuSE software version!**

Overview of Installation

The process of installing Linux on your Compaq AlphaServer or AlphaStation follows these general steps:

1. Creation of BOOT and RAMDISK floppies.
2. Firmware revision inspection and upgrade.
3. SRM configuration for installation.
4. Linux software installation and configuration.
5. SRM reconfiguration for booting the installed software.
6. Post installation configuration.

The sections that follow discuss each of the above steps in more detail, specific to each platform and distribution vendor.

Compaq AlphaServer DS10

Hardware Options

Tested Saleable Hardware Options

Tested saleable hardware options for the DS10 is outlined in Table 1. All of the systems used come equipped with standard bus-interface devices for which drivers already exist for Linux. All bus-interface devices detailed use the PCI bus. Detailed information on each particular bus-interface device can be found in a subsection of the appropriate software. Only the installation and configuration details that are necessary to clarify the hardware explanation are provided in this table. Unless otherwise specified, the Linux kernel version used in qualifying each component is version 2.2.5.

Table 1. Tested Saleable Options List

Compaq PN	Description	Comments
3X-MS310-BA	DS10 128MB Memory Option	
3X-MS310-CA	DS10 256MB Memory Option	
3X-MS310-DA	DS10 512MB Memory Option	
DE500-BA	PCI 1 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DE504-BA	PCI 4 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DS-RZ1DA-VW	9.1 GB UltraSCSI 7200RPM	
DS-RZ1DD-WA	9.1 GB UltraSCSI 10000 RPM	
DS-RZ1DD-VW	9.1 GB UltraSCSI 10000 RPM	
DS-RZ2DA-WA	9.1 GB UltraSCSI 7200 RPM	
3X-RE56A-AA	10 GB IDE, 10000 RPM	
DS-RZ1EA-VW	18.2 GB UltraSCSI 7200 RPM	
DS-RZ1ED-VW	18.2 GB UltraSCSI 10000 RPM	
DS-RZ2EA-WA	18.2GB UltraSCSI 7200 RPM	
DS-RZ1FB-VW	36.4 GB UltraSCSI 7200 RPM	
KZPCM-DA	UltraSCSI, 2 CH, SE, 1 CH 10/100 Ethernet	Need the 2.2.12 kernel from ftp site to perform install.
KZPBA-CA	UltraSCSI, 1 CH, SE	Must be installed in slots 15 or 16 if not using 2.2.12 kernel
KZPBA-CB	UltraSCSI, 1CH, Diff.	Must be installed in slots 15 or 16 if not using 2.2.12 kernel
PBXGK-BB	Elsa Gloria 8MB	use XF86_3Dlabs; Must be installed in slot 14 or 15 on bus 00
3X-AVH10-01	Ensonic Sound Adapter	Needs 2.2.12 kernel to work.

For up-to-date information about configuration options, you should refer to the following web sites, which are updated regularly with the latest information:

For Alpha Systems QuickSpecs: <http://www.digital.com/info/SOHOME/>

For Alpha Systems Supported Options List:
<http://www.digital.com/alphaserver/products/options.html>

Red Hat Version 6.0 Distribution

Pre-Installation

Creating The BOOT Floppy

Before you can begin to install the Linux software on your AlphaServer or AlphaStation, you will need to create a BOOT floppy. This floppy contains the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

An important note: Our experience has shown that the vendor supplied floppy images sometimes do not work properly. You are therefore encouraged to create your own BOOT floppy using the images available over the Internet, as described in the sections that follow.

Creating floppies using a MS/Windows system

To create the BOOT floppy, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Connect to the URL <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> which is a directory containing the boot floppy image files.
3. Copy the generic-up.2.2.12.img file to your PC.
4. Rename the file to generic.img (DOS has an 8.3 file name limitation)
5. Insert the Linux CD-ROM into the PC.
6. Copy the file "\dosutils\rwrite.exe" from the CD-ROM to the \Linux directory on the PC.
7. Insert a blank, formatted floppy into the PC.
8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: generic.img
```

```
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Creating floppies using an Unix system

To create the BOOT floppy, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital Unix, and should be similar to most other popular unix systems.

1. Copy the generic kernel images from the Internet to your computer:

```
$ mkdir /var/tmp/Linux
```

```

$ cd /var/tmp/Linux
$ ftp ftp.digital.com
login: ftp
Password: user@
ftp> bin
ftp> cd /pub/DEC/Linux-Alpha/Images/
ftp> get generic-up-2.2.12.img
ftp> quit

```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=generic-up-2.2.12.img of=/dev/fd0
```

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaServer or AlphaStation computer, type the command "show version". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt ">>>", as shown here:

```

1024 Meg of system memory
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
probing PCI-to-PCI bridge, bus 2
probing PCI-to-PCI bridge, bus 3
bus 0, slot 9 -- ewa -- DE500-BA Network Controller
bus 0, slot 11 -- ewb -- DE500-BA Network Controller
bus 0, slot 13 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 13 -- dqb -- Acer Labs M1543C IDE
bus 0, slot 14 -- vga -- ELSA GLoria Synergy
bus 2, slot 4 -- eia -- Intel 82558 Ethernet
bus 2, slot 5 -- eib -- Intel 82558 Ethernet
bus 2, slot 6 -- eic -- Intel 82558 Ethernet
bus 2, slot 7 -- eid -- Intel 82558 Ethernet
bus 3, slot 0 -- pka -- NCR 53C875
bus 3, slot 1 -- pkb -- NCR 53C875
bus 3, slot 2 -- ewc -- DE500-AA Network Controller
System Temperature is 31 degrees C

```

```

AlphaServer DS 10 466 MHz Console V5.4-2, May 19 1999 14:25:16
>>>

```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

>>>show device
dka0.0.0.3000.0                DKA0                RZ1CF-CF 1614

```

dka100.1.0.3000.0	DKA100	RZ1CF-CF	1614
dka200.2.0.3000.0	DKA200	COMPAQ BB00911CA0	3B05
dka300.3.0.3000.0	DKA300	COMPAQ BB00911CA0	3B05
dqa0.0.0.13.0	DQA0	TOSHIBA CD-ROM XM-6302B	1017
dva0.0.0.0.0	DVA0		
eia0.0.0.2004.0	EIA0	00-50-8B-6F-62-AA	
eib0.0.0.2005.0	EIB0	00-50-8B-6F-62-AB	
eic0.0.0.2006.0	EIC0	00-50-8B-6F-38-84	
eid0.0.0.2007.0	EID0	00-50-8B-6F-38-85	
ewa0.0.0.9.0	EWA0	08-00-2B-86-1F-64	
ewb0.0.0.11.0	EWB0	08-00-2B-86-1F-63	
ewc0.0.0.3002.0	EWCO	00-06-2B-00-0A-5C	
pka0.7.0.3000.0	PKA0	SCSI Bus ID 7	
pkb0.7.0.3001.0	PKB0	SCSI Bus ID 7	

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross-referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```
>>>set bootdef_dev dva0
>>>set boot_file vmlinux.gz
>>>set boot_osflags "root=/dev/hda"
>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/hda
boot_reset        OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the "boot" command. The result should be that the system boots from the floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

The Red Hat version used in the testing for this guide has a simple installation program. Most of the devices available with the AlphaServers can be correctly autodetected by Red Hat. Testing for this Solutions Guide was performed using Red Hat Linux version 6.0.

During the boot process, you may see messages about "IDE STO" errors. These can be safely ignored.

When configuring "Timezones", do not select "Hardware clock set to GMT", nor "Startup through ARC console". Instead select "EST" for the timezone, or the value that is appropriate for your location.

Disk Partitioning

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368      0     boot   # (Cyl.  1 - 2)
b:   212784  16368    ext2   # (Cyl.  3 - 28)
c:  4272048  229152    swap   # (Cyl.  29 - 550)
d:  3871032  4501200    ext2   # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Arrow to the drive you will be installing the software to and press the **ENTER key**. You will now be in the fdisk command line
2. Type **“m”** for help.
3. Type **“p”** to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the **“d”** option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type **“b”** to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: `“/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)”` – Answer **Y**.
7. Type **“m”** for more help.
8. Type **“p”** to print the partition table. You should see a **“c”** partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type **“d”** to delete a BSD partition
10. Type **“c”** to delete the c partition

11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the */usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

45. Tab to **DONE** and press **ENTER**.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. **Before it begins the bootup process, press the front panel reset button.** This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, ">>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
>>>set boot_file 2/boot/vmlinux.gz
>>>set bootdef_dev dka0
      (or whatever device you installed on. It could also be dqa0 for an
      IDE drive. See Appendix C for further information on systems with
      IDE controllers.)
>>>set boot_osflags "root=/dev/sda2"
>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/TdZ /boot/bootlx** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dqa0=hda, dka0=sda).
2. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /mnt/floppy**
3. Now go to the /boot directory. Type: **cd /boot**
4. Copy the kernel. Type: **cp /mnt/floppy/vmlinux.gz .**
5. Unmount the floppy. Type: **umount /dev/fd0**
6. Reboot the system. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive.

```
>>>boot
```

SuSE Version 6.1 Distribution

Pre-Installation

Creating The BOOT and RAMDISK Floppies

Before you can begin to install the Linux software on your AlphaServer, you will need to create a BOOT floppy and RAMDISK. These floppies contain the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

Creating floppies using a MS/Windows system

To create the BOOT and RAMDISK floppies, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Insert the Linux CD-ROM into the PC.
3. Copy the file ftp://tsx-11.mit.edu/pub/linux/dos_utils/rawrite.exe to "\Linux\rawrite.exe" on the PC. This utility is required to build the floppies.
4. Copy the file "about_dualncr-qlogic" from <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> to the \Linux directory on the PC and rename the file to about.
5. Copy the file "\disks\install" from the CD-ROM to the \Linux directory on the PC.
6. Insert a blank, formatted floppy into the PC.
7. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: aboot
```

```
Enter destination drive: a
```

```
Label this floppy "AlphaServer Linux BOOT Floppy".
```

8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: install
```

```
Enter destination drive: a
```

9. Label this floppy "AlphaServer Linux RAMDISK Floppy".

With those two floppies in hand, you are now prepared to begin the installation process on your AlphaServer.

Creating floppies using an UNIX system

To create the BOOT and RAMDISK floppies, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Insert the Linux CD-ROM into the computer, and mount it:

```
$ mount /cdrom
```


2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=/cdrom/disks/about of=/dev/fd0
```

3. Insert a blank, formatted floppy into the computer, and copy the RAMDISK to it:

```
$ dd if=/cdrom/disks/install of=/dev/fd0
```

With those two floppies in hand, and the CD-ROM removed from the computer, you are now prepared to begin the installation process on your AlphaServer.

Firmware Inspection and Upgrade

After powering up your AlphaServer computer, type the command "show version". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt ">>>", as shown here:

```
1024 Meg of system memory
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
probing PCI-to-PCI bridge, bus 2
probing PCI-to-PCI bridge, bus 3
bus 0, slot 9 -- ewa -- DE500-BA Network Controller
bus 0, slot 11 -- ewb -- DE500-BA Network Controller
bus 0, slot 13 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 13 -- dqb -- Acer Labs M1543C IDE
bus 0, slot 14 -- vga -- ELSA GLoria Synergy
bus 2, slot 4 -- eia -- Intel 82558 Ethernet
bus 2, slot 5 -- eib -- Intel 82558 Ethernet
bus 2, slot 6 -- eic -- Intel 82558 Ethernet
bus 2, slot 7 -- eid -- Intel 82558 Ethernet
bus 3, slot 0 -- pka -- NCR 53C875
bus 3, slot 1 -- pkb -- NCR 53C875
bus 3, slot 2 -- ewc -- DE500-AA Network Controller
System Temperature is 31 degrees C
```

```
AlphaServer DS 10 466 MHz Console V5.4-2, May 19 1999 14:25:16
>>>
```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```
>>>show device
dka0.0.0.3000.0          DKA0          RZ1CF-CF 1614
dka100.1.0.3000.0       DKA100        RZ1CF-CF 1614
dka200.2.0.3000.0       DKA200        COMPAQ BB00911CA0 3B05
dka300.3.0.3000.0       DKA300        COMPAQ BB00911CA0 3B05
dqa0.0.0.13.0           DQA0          TOSHIBA CD-ROM XM-6302B 1017
dva0.0.0.0.0            DVA0
eia0.0.0.2004.0         EIA0          00-50-8B-6F-62-AA
eib0.0.0.2005.0         EIB0          00-50-8B-6F-62-AB
eic0.0.0.2006.0         EIC0          00-50-8B-6F-38-84
```

```

eid0.0.0.2007.0      EIDO      00-50-8B-6F-38-85
ewa0.0.0.9.0        EWA0      08-00-2B-86-1F-64
ewb0.0.0.11.0       EWB0      08-00-2B-86-1F-63
ewc0.0.0.3002.0     EWC0      00-06-2B-00-0A-5C
pka0.7.0.3000.0     PKA0      SCSI Bus ID 7
pkb0.7.0.3001.0     PKB0      SCSI Bus ID 7

```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```

>>>set bootdef_dev dva0
>>>set boot_file vmlinux.gz
>>>set boot_osflags "root=/dev/fd0 load_ramdisk=1"
>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/fd0 load_ramdisk=1
boot_reset        OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags

```

4. Insert the boot floppy into the drive.
5. Boot the system using the "boot" command. The result should be that the system boots from the floppy. You will eventually be prompted to replace the BOOT floppy with the RAMDISK floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

SuSE's installation program is flexible. While it allows for autodetection of devices and autoloading of device drivers, it allows you to override the automatically configured parameters. Compaq's testing this Solutions Guide was performed using SuSE Version 6.1.

The software installation process requires that the system be rebooted at two critical places in the process. The first time is just after completing the partitioning of the disk, and the second happens automatically after all of the software components are installed on the disk. Be certain not to skip the reboot after the disk partition process is completed.

Disk Partitioning

In preparation to partition your disk, you should boot your AlphaServer via the BOOT floppy and following the process for selecting a language, display color, keyboard type, and installation media. At this stage, you should select the "Install From Scratch" menu option, and proceed to the

window titled "Partition Hard Drives". At this point, press the **ALT+F2** keys, which will change the display to show a shell-command prompt. At this prompt, type the command "**fdisk**" followed by the enter key.

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using **fdisk**. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by **fdisk**). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which **fdisk** shows as having 1023 cylinders:

```

4 partitions:
#          size      offset      fstype    [fsize bsize  cpg]
a:      16368         0         boot      # (Cyl.   1 - 2)
b:     212784     16368         ext2      # (Cyl.   3 - 28)
c:    4272048    229152         swap      # (Cyl.  29 - 550)
d:    3871032   4501200         ext2      # (Cyl.  551 - 1023)

```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commmend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Now you are at the **fdisk** command line
2. Type "**m**" for help.
3. Type "**p**" to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the "**d**" option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type "**b**" to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: "/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)" – Answer **Y**.
7. Type "**m**" for more help.
8. Type "**p**" to print the partition table. You should see a "**c**" partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type "**d**" to delete a BSD partition
10. Type "**c**" to delete the c partition
11. Type "**p**" to print the partition table and verify no partitions exist

12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the *usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – *usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

At this point, the partitions have been created, and the system **must** be rebooted. You can reboot by either pressing the RESET or POWER buttons on the front of the AlphaServer system. Once the system returns to the SRM prompt, follow the preceding instructions to return to the "Partition Hard Drives" window. Select the "Do Not Partition" option at this screen.

You will now be presented a window that allows you to select and format the disk for the software to be installed, entitled "Creating Filesystems". You should use the **F4** key to define the mount point of "/" for *sda2* and "/usr" for *sda4*. Use the **F6** key to select the "Normal" formatting of the drive for both partitions. Once those steps are complete, press **enter** to continue.

When the window "Change/Create Configuration" is presented we recommend that you make certain to select the "about" package from the "a: Linux Base System" group, and the "xglint" package from the "xsrv: X Server Software" group. Ensure that you depress the **F10** key after each selection to add it to the installation. If you forget to select these packages, you will not be able to boot directly from the hard drive, nor be able to run the X Window System software. Once these are selected, and you have selected any other software options that you require, begin the installation. If you encounter a message indicating that the xglint software depends upon other packages, select "**Continue**", which will ignore that situation.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. Before it begins the bootup process, press the front panel reset button. This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, ">>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
>>>set boot_file 2/boot/vmlinux.gz
>>>set bootdef_dev dka0
>>>set boot_osflags "root=/dev/sda2"
>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -fl /dev/TdZ /boot/bootlx** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type: **mkswap /dev/TdZW** (where T is the type of drive, s for SCSI or h for IDE; Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda); and W is the swap partition

- number (I.e. `mkswap /dev/sda3` or `mkswap /dev/hda3`.) This is required to work around a problem of the swap.
3. Mount the floppy disk to copy the kernel from the floppy to the `/boot/` directory on the system disk. Type: `mount /dev/fd0 /floppy`
 4. Now go to the `/boot` directory. Type: `cd /boot`
 5. Copy the kernel. Type: `cp /floppy/vmlinux.gz .`
 6. Unmount the floppy. Type: `umount /dev/fd0`
 7. Type: `shutdown -h now`

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
>>>boot
```

The system should now boot and prompt you to login. Upon logging in, you will probably want to configure the X Window System. To do so, login as the user "**root**", and then run the command "**xf86config**". Following the prompts answering the questions appropriately for your system. In most cases, you will need to select "3Dlabs Oxygen GMX" as the graphics adapter, which is usually configured with 8192K bytes of memory. Once this process is completed, you should be able to run the command "**startx**" to make use of the graphical interface.

Compaq AlphaServer DS20

Hardware Options

Tested Saleable Hardware Options

Tested saleable hardware options for the DS20 is outlined in Table 1. All of the systems used come equipped with standard bus-interface devices for which drivers already exist for Linux. All bus-interface devices detailed use the PCI bus. Detailed information on each particular bus-interface device can be found in a subsection of the appropriate software. Only the installation and configuration details that are necessary to clarify the hardware explanation are provided in this table. Unless otherwise specified, the Linux kernel version used in qualifying each component is version 2.2.5.

Table 2. Tested Saleable Options List

Compaq PN	Description	Comments
H7899-AA	DS20 Power Supply	
3X-KN310-AD	DS20 6/500 SMP UPG Linux only	
MS340-BA	DS20 128MB Memory Option	
MS340-CA	DS20 256MB Memory Option	
MS340-DA	DS20 512MB Memory Option	
MS340-EA	DS20 1GB Memory Option	
DE500-BA	PCI 1 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DE504-BA	PCI 4 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
RZ1DA-VW	9.1 GB UltraSCSI 7200RPM	
RZ1DD-VW	9.1 GB UltraSCSI 10000 RPM	
RZ1EA-VW	18.2 GB UltraSCSI 7200 RPM	
RZ1ED-VW	18.2 GB UltraSCSI 10000 RPM	
KZPCM-DA	UltraSCSI, 2 CH, SE, 1 CH 10/100 Ethernet	Need the 2.2.12 kernel from ftp site to perform install.
KZPBA-CA	UltraSCSI, 1 CH, SE	
KZPBA-CB	UltraSCSI, 1CH, Diff.	
PBXGK-BB	Elsa Gloria 8MB	use XF86_3DLabs

For up-to-date information about configuration options, you should refer to the following web sites, which are updated regularly with the latest information:

For Alpha Systems QuickSpecs: <http://www.digital.com/info/SOHOME/>

For Alpha Systems Supported Options List:
<http://www.digital.com/alphaserver/products/options.html>

Red Hat Version 6.0 Distribution

Pre-Installation

Creating The BOOT Floppy

Before you can begin to install the Linux software on your AlphaServer or AlphaStation, you will need to create a BOOT floppy. This floppy contains the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

***An important note:** Our experience has shown that the vendor supplied floppy images sometimes do not work properly. You are therefore encouraged to create your own BOOT floppy using the images available over the Internet, as described in the sections that follow.*

Creating floppies using a MS/Windows system

To create the BOOT floppy, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Connect to the URL <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> which is a directory containing the boot floppy image files.
3. Copy the generic-smp-2.2.12.img file to your PC.
4. Rename the file to generic.img (DOS has an 8.3 file name limitation)
5. Insert the Linux CD-ROM into the PC.
6. Copy the file "\dosutils\rwrite.exe" from the CD-ROM to the \Linux directory on the PC.
7. Insert a blank, formatted floppy into the PC.
8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite  
Enter source file name: generic.img  
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Creating floppies using an Unix system

To create the BOOT floppy, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital Unix, and should be similar to most other popular unix systems.

1. Copy the generic kernel images from the Internet to your computer:

```
$ mkdir /var/tmp/Linux  
$ cd /var/tmp/Linux  
$ ftp ftp.digital.com  
login: ftp
```



```

Password: user@
ftp> bin
ftp> cd /pub/DEC/Linux-Alpha/Images/
ftp> get generic-smp-2.2.12.img
ftp> quit

```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=generic-smp-2.2.12.img of=/dev/fd0
```

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaServer or AlphaStation computer, type the command "show version". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt "P00>>>", as shown here:

```

1024 Meg of system memory
probing hose 1, PCI
bus 0, slot 7 -- ewa -- DE500-AA Network Controller
bus 0, slot 8 -- pka -- QLogic ISP1020
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 8 -- pkb -- QLogic ISP1020
bus 0, slot 9 -- vga -- ELSA GLoria Synergy
System Temperature is 24 degrees C
initializing GCT/FRU at offset 1d0000

AlphaServer DS 20 Console V5.4-2, May 19 1999 14:25:16
P00>>>

```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

P00>>>show device
dka0.0.0.8.1          DKA0          RZ1DF-CB  0371
dkb500.5.0.8.0       DKB500        RRD46   1337
dva0.0.0.0.0         DVA0
ewa0.0.0.7.1         EWA0          00-00-F8-10-AE-C5
pka0.7.0.8.1         PKA0          SCSI Bus ID 7  5.57
pkb0.7.0.8.0         PKB0          SCSI Bus ID 7  5.57

```

In the output above, the first line shows that DKA0 is a hard disk, DKB500 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
P00>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross-referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```
P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/scd0"
P00>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/scd0
boot_reset        OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the "**boot**" command. The result should be that the system boots from the floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

The Red Hat version used in the testing for this guide has a simple installation program. Most of the devices available with the AlphaServers can be correctly autodetected by Red Hat. Testing for this Solutions Guide was performed using Red Hat Linux version 6.0.

During the boot process, you may see messages about "IDE STO" errors. These can be safely ignored.

When configuring "Timezones", do not select "Hardware clock set to GMT", nor "Startup through ARC console". Instead select "EST" for the timezone, or the value that is appropriate for your location.

Disk Partitioning

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368     0     boot   # (Cyl.  1 - 2)
b:    212784  16368    ext2   # (Cyl.  3 - 28)
```

```

c:  4272048  229152  swap  # (Cyl.  29 - 550)
d:  3871032  4501200  ext2  # (Cyl.  551 - 1023)

```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Arrow to the drive you will be installing the software to and press the **ENTER** key. You will now be in the fdisk command line
2. Type “**m**” for help.
3. Type “**p**” to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.

22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the */usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.
45. Tab to **DONE** and press **ENTER**.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. **Before it begins the bootup process, press the front panel reset button.** This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, "P00>>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/sdZ /boot/bootlx** (where Z is the letter of the drive you are booting; ex: dka0=sda, dka100=sdb).
2. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /mnt/floppy**
3. Now go to the /boot directory. Type: **cd /boot**
4. Copy the kernel. Type: **cp /mnt/floppy/vmlinux.gz .**
5. Unmount the floppy. Type: **umount /dev/fd0**
6. Reboot the system. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

SuSE Version 6.1 Distribution

Pre-Installation

Creating The BOOT and RAMDISK Floppies

Before you can begin to install the Linux software on your AlphaServer, you will need to create a BOOT floppy and RAMDISK. These floppies contain the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

Creating floppies using a MS/Windows system

To create the BOOT and RAMDISK floppies, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Insert the Linux CD-ROM into the PC.
3. Copy the file ftp://tsx-11.mit.edu/pub/linux/dos_utils/rawrite.exe to "\Linux\rarwrite.exe" on the PC. This utility is required to build the floppies.
4. Copy the file "about_dualncr-qlogic" from <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> to the \Linux directory on the PC and rename the file to about.

4. Copy the file "\disks\install" from the CD-ROM to the \Linux directory on the PC.
5. Insert a blank, formatted floppy into the PC.
6. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: about
```

```
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

7. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: install
```

```
Enter destination drive: a
```

8. Label this floppy "AlphaServer Linux RAMDISK Floppy".

With those two floppies in hand, you are now prepared to begin the installation process on your AlphaServer.

Creating floppies using an UNIX system

To create the BOOT and RAMDISK floppies, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Insert the Linux CD-ROM into the computer, and mount it:

```
$ mount /cdrom
```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=/cdrom/disks/about of=/dev/fd0
```

3. Insert a blank, formatted floppy into the computer, and copy the RAMDISK to it:

```
$ dd if=/cdrom/disks/install of=/dev/fd0
```

With those two floppies in hand, and the CD-ROM removed from the computer, you are now prepared to begin the installation process on your AlphaServer.

Firmware Inspection and Upgrade

After powering up your AlphaServer computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

Power up your system. After several diagnostics are completed, you will be presented an SRM prompt "P00>>>", as shown here:

```

1024 Meg of system memory
probing hose 1, PCI
bus 0, slot 7 -- ewa -- DE500-AA Network Controller
bus 0, slot 8 -- pka -- QLogic ISP1020
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 8 -- pkb -- QLogic ISP1020
bus 0, slot 9 -- vga -- ELSA GLoria Synergy
System Temperature is 24 degrees C
initializing GCT/FRU at offset 1d0000

```

```

AlphaServer DS 20 Console V5.4-2, May 19 1999 14:25:16
P00>>>

```

Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

P00>>>show device
dka0.0.0.8.1          DKA0          RZ1DF-CB 0371
dkb500.5.0.8.0       DKB500        RRD46 1337
dva0.0.0.0.0         DVA0
ewa0.0.0.7.1         EWA0          00-00-F8-10-AE-C5
pka0.7.0.8.1         PKA0          SCSI Bus ID 7 5.57
pkb0.7.0.8.0         PKB0          SCSI Bus ID 7 5.57

```

In the output above, the first line shows that DKA0 is a hard disk, DKB500 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```

P00>>>show config | more

```

Configure the system SRM parameters to boot from your installation device. The commands for configuring to boot from the floppy device are shown here:

```

P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/fd0 load_ramdisk=1"
P00>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/fd0 load_ramdisk=1
boot_reset       OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags

```

Insert the boot floppy into the drive.

Boot the system using the "boot" command. The result should be that the system boots from the floppy. You will eventually be prompted to replace the BOOT floppy with the RAMDISK floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

SuSE's installation program is flexible. While it allows for autodetection of devices and autoloading of device drivers, it allows you to override the automatically configured parameters. Compaq's testing this Solutions Guide was performed using SuSE Version 6.1.

The software installation process requires that the system be rebooted at two critical places in the process. The first time is just after completing the partitioning of the disk, and the second happens automatically after all of the software components are installed on the disk. Be certain not to skip the reboot after the disk partition process is completed.

Disk Partitioning

In preparation to partition your disk, you should boot your AlphaServer via the BOOT floppy and following the process for selecting a language, display color, keyboard type, and installation media. At this stage, you should select the "Install From Scratch" menu option, and proceed to the window titled "Partition Hard Drives". At this point, press the **ALT+F2** keys, which will change the display to show a shell-command prompt. At this prompt, type the command **"fdisk"** followed by the enter key.

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368    0      boot   # (Cyl.  1 - 2)
b:   212784  16368   ext2   # (Cyl.  3 - 28)
c:  4272048  229152   swap   # (Cyl.  29 - 550)
d:  3871032  4501200  ext2   # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Now you are at the fdisk command line
2. Type **"m"** for help.
3. Type **"p"** to print the partition table.

4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the *usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.

35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

At this point, the partitions have been created, and the system **must** be rebooted. You can reboot by either pressing the RESET or POWER buttons on the front of the AlphaServer system. Once the system returns to the SRM prompt, follow the preceding instructions to return to the "Partition Hard Drives" window. Select the "Do Not Partition" option at this screen.

You will now be presented a window that allows you to select and format the disk for the software to be installed, entitled "Creating Filesystems". You should use the **F4** key to define the mount point of "/" for *sda2* and */usr* for *sda4*. Use the **F6** key to select the "Normal" formatting of the drive for both partitions. Once those steps are complete, press enter to continue.

When the window "Change/Create Configuration" is presented we recommend that you make certain to select the "aboot" package from the "a: Linux Base System" group, and the "xglint" package from the "xsrv: X Server Software" group. Ensure that you depress the **F10** key after each selection to add it to the installation. If you forget to select these packages, you will not be able to boot directly from the hard drive, nor be able to run the X Window System software. Once these are selected, and you have selected any other software options that you require, begin the installation. If you encounter a message indicating that the xglint software depends upon other packages, select "**Continue**", which will ignore that situation.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. Before it begins the bootup process, press the front panel reset button. This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, "P00>>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

system.map - incorrect version

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type **swriteboot -f1 /dev/TdZ /boot/bootlx** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type: **mkswap /dev/TdZW** (where T is the type of drive, s for SCSI or h for IDE; Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda); and W is the swap partition number (I.e. mkswap /dev/sda3 or mkswap /dev/hda3.) This is required to work around a problem of the swap.
3. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /floppy**
4. Now go to the /boot directory. Type: **cd /boot**
5. Copy the kernel. Type: **cp /floppy/vmlinux.gz .**
6. Unmount the floppy. Type: **umount /dev/fd0**
7. Type **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

The system should now boot and prompt you to login. Upon logging in, you will probably want to configure the X Window System. To do so, login as the user "**root**", and then run the command "**xf86config**". Following the prompts answering the questions appropriately for your system. In most cases, you will need to select "3Dlabs Oxygen GMX" as the graphics adapter, which is usually configured with 8192K bytes of memory. Once this process is completed, you should be able to run the command "**startx**" to make use of the graphical interface.

Compaq AlphaServer DS20E

Hardware Options

Tested Saleable Hardware Options

Tested saleable hardware options for the DS20E is outlined in Table 1. All of the systems used come equipped with standard bus-interface devices for which drivers already exist for Linux. All bus-interface devices detailed use the PCI bus. Detailed information on each particular bus-interface device can be found in a subsection of the appropriate software. Only the installation and configuration details that are necessary to clarify the hardware explanation are provided in this table. Unless otherwise specified, the Linux kernel version used in qualifying each component is version 2.2.5.

Table 3. Tested Saleable Options List

Compaq PN	Description	Comments
H7899-AA	DS20E Power Supply	
3X-KN310-AD	DS20E 6/500 SMP UPG Linux only	
MS340-BA	DS20E 128MB Memory Option	
MS340-CA	DS20E 256MB Memory Option	
MS340-DA	DS20E 512MB Memory Option	
MS340-EA	DS20E 1GB Memory Option	
DE500-BA	PCI 1 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DE504-BA	PCI 4 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
RZ1DA-VW	9.1 GB UltraSCSI 7200RPM	
RZ1DD-VW	9.1 GB UltraSCSI 10000 RPM	
RZ1EA-VW	18.2 GB UltraSCSI 7200 RPM	
RZ1ED-VW	18.2 GB UltraSCSI 10000 RPM	
KZPCM-DA	UltraSCSI, 2 CH, SE, 1 CH 10/100 Ethernet	Need the 2.2.12 kernel from ftp site to perform install.
KZPBA-CA	UltraSCSI, 1 CH, SE	
KZPBA-CB	UltraSCSI, 1CH, Diff.	
PBXGK-BB	Elsa Gloria 8MB	Use XF86_3DLabs

For up-to-date information about configuration options, you should refer to the following web sites, which are updated regularly with the latest information:

For Alpha Systems QuickSpecs: <http://www.digital.com/info/SOHOME/>

For Alpha Systems Supported Options List:
<http://www.digital.com/alphaserver/products/options.html>

Red Hat Version 6.0 Distribution

Pre-Installation

Creating The BOOT Floppy

Before you can begin to install the Linux software on your AlphaServer or AlphaStation, you will need to create a BOOT floppy. This floppy contains the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

***An important note:** Our experience has shown that the vendor supplied floppy images sometimes do not work properly. You are therefore encouraged to create your own BOOT floppy using the images available over the Internet, as described in the sections that follow.*

Creating floppies using a MS/Windows system

To create the BOOT floppy, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Connect to the URL <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> which is a directory containing the boot floppy image files.
3. Copy the generic-smp-2.2.12.img file to your PC.
4. Rename the file to **generic.img** (DOS has an 8.3 file name limitation)
5. Insert the Linux CD-ROM into the PC.
6. Copy the file "\dosutils\rawrite.exe" from the CD-ROM to the \Linux directory on the PC.
7. Insert a blank, formatted floppy into the PC.
8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
Enter source file name: generic.img
Enter destination drive: a
```

Label this floppy "**AlphaServer Linux BOOT Floppy**".

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Creating floppies using an Unix system

To create the BOOT floppy, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of UNIX and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Copy the generic kernel images from the Internet to your computer:

```
$ mkdir /var/tmp/Linux
$ cd /var/tmp/Linux
$ ftp ftp.digital.com
login: ftp
```

```

Password: user@
ftp> bin
ftp> cd /pub/DEC/Linux-Alpha/Images/
ftp> get generic-smp-2.2.12.img
ftp> quit

```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=generic-smp-2.2.12.img of=/dev/fd0
```

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaServer or AlphaStation computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt "P00>>>", as shown here:

```

256 Meg of system memory
probing hose 1, PCI
bus 0, slot 9 -- ewa -- DE500-AA Network Controller
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 6, function 0 -- pka -- Adaptec AIC-7895
bus 0, slot 6, function 1 -- pkb -- Adaptec AIC-7895
bus 0, slot 7 -- vga -- ELSA GLoria Synergy
os_type: UNIX - console CIPCA driver not started
System Temperature is 30 degrees C
initializing GCT/FRU at 1ec000

COMPAQ AlphaServer DS20E 500 MHz Console V5.5-21, Oct 18 1999 13:33:24
P00>>>

```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

P00>>>show device
dka0.0.0.6.0          DKA0          COMPAQ BA03611C9B  3B05
dka100.1.0.6.0       DKA100        COMPAQ BB01811C9C  3B05
dka200.2.0.6.0       DKA200        COMPAQ BB01811C9C  3B05
dqa0.0.0.105.0       DQA0          CD-224E 9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.1         EWA0          00-00-F8-01-F5-DA
pka0.7.0.6.0         PKA0          SCSI Bus ID 7
pkb0.7.0.106.0       PKB0          SCSI Bus ID 7

```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
P00>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross-referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```
P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/hda"
P00>>>show boot*
boot_dev                dva0.0.0.0.0
boot_file               vmlinux.gz
boot_osflags            root=/dev/hda
boot_reset              OFF
bootdef_dev             dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the "boot" command. The result should be that the system boots from the floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

The Red Hat version used in the testing for this guide has a simple installation program. Most of the devices available with the AlphaServers can be correctly autodetected by Red Hat. Testing for this Solutions Guide was performed using Red Hat Linux version 6.0.

During the boot process, you may see messages about "IDE STO" errors. These can be safely ignored.

When configuring "Timezones", do not select "Hardware clock set to GMT", nor "Startup through ARC console". Instead select "EST" for the timezone, or the value that is appropriate for your location.

Disk Partitioning

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368      0    boot   # (Cyl.  1 - 2)
```

```

b:   212784   16368   ext2   # (Cyl.   3 - 28)
c:   4272048  229152   swap   # (Cyl.  29 - 550)
d:   3871032  4501200   ext2   # (Cyl. 551 - 1023)

```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300MB minimum and a maximum of 900 MB.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Arrow to the drive you will be installing the software to and press the ENTER key. You will now be in the **fdisk** command line
2. Type “**m**” for help.
3. Type “**p**” to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the **boot** partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the **swap** partition in this case.

21. Type “c” for partition c.
22. First cylinder: Type “29”.
23. Last cylinder: Type “550”.
24. Type “n” to add a new BSD partition – the */usr* partition in this case.
25. Type “d” for partition d.
26. First cylinder: Type “551”.
27. Last cylinder: Type “1023” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “p” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “t” to change the partitions filesystem id.
30. Type “a” for partition a – *boot* partitions use a “boot” code.
31. Type “L” to list the codes you can use.
32. Enter “d” for boot type.
33. Type “t” to change the partitions filesystem id.
34. Type “b” for partition b – / (root) partitions use a “ext2” code.
35. Enter “8” for ext2 type.
36. Type “t” to change the partitions filesystem id.
37. Type “c” for partition c – *swap* partitions use a “swap” code.
38. Enter “1” for swap type.
39. Type “t” to change the partitions filesystem id.
40. Type “d” for partition d – */usr* partitions use a “ext2” code.
41. Enter “8” for ext2 type.
42. Type “p” to print the partition table – Please verify all your settings.
43. Type “w” to write the disklabel to the disk.
44. Type “q” to quit.
45. Tab to **DONE** and press **ENTER**.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. **Before it begins the bootup process, press the front panel reset button.** This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, "P00>>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **writeboot -f1 /dev/sdZ /boot/bootlx** (where Z is the letter of the drive you are booting; ex: dka0=sda, dka100=sdb).
2. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /mnt/floppy**
3. Now go to the /boot directory. Type: **cd /boot**
4. Copy the kernel. Type: **cp /mnt/floppy/vmlinux.gz .**
5. Unmount the floppy. Type: **umount /dev/fd0**
6. Reboot the system. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

SuSE Version 6.1 Distribution

Pre-Installation

Creating The BOOT and RAMDISK Floppies

Before you can begin to install the Linux software on your AlphaServer, you will need to create a BOOT floppy and RAMDISK. These floppies contain the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

Creating floppies using a MS/Windows system

To create the BOOT and RAMDISK floppies, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Insert the Linux CD-ROM into the PC.
3. Copy the file ftp://tsx-11.mit.edu/pub/linux/dos_utils/rawrite.exe to "\Linux\rwrite.exe" on the PC. This utility is required to build the floppies.

4. Copy the file "about_dualncr-qlogic" from ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/ to the \Linux directory on the PC and rename the file to about.
5. Copy the file "\disks\install" from the CD-ROM to the \Linux directory on the PC.
6. Insert a blank, formatted floppy into the PC.
7. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: about
```

```
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: install
```

```
Enter destination drive: a
```

9. Label this floppy "**AlphaServer Linux RAMDISK Floppy**".

With those two floppies in hand, you are now prepared to begin the installation process on your AlphaServer.

Creating floppies using an UNIX system

To create the BOOT and RAMDISK floppies, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Insert the Linux CD-ROM into the computer, and mount it:

```
$ mount /cdrom
```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=/cdrom/disks/about of=/dev/fd0
```

3. Insert a blank, formatted floppy into the computer, and copy the RAMDISK to it:

```
$ dd if=/cdrom/disks/install of=/dev/fd0
```

With those two floppies in hand, and the CD-ROM removed from the computer, you are now prepared to begin the installation process on your AlphaServer.

Firmware Inspection and Upgrade

After powering up your AlphaServer computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

Power up your system. After several diagnostics are completed, you will be presented an SRM prompt "P00>>>", as shown here:

```
256 Meg of system memory
probing hose 1, PCI
bus 0, slot 9 -- ewa -- DE500-AA Network Controller
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 5, function 1 -- dqa -- Cypress 82C693 IDE
bus 0, slot 5, function 2 -- dqb -- Cypress 82C693 IDE
bus 0, slot 6, function 0 -- pka -- Adaptec AIC-7895
bus 0, slot 6, function 1 -- pkb -- Adaptec AIC-7895
bus 0, slot 7 -- vga -- ELSA GLoria Synergy
os_type: UNIX - console CIPCA driver not started
System Temperature is 30 degrees C
initializing GCT/FRU at 1ec000
```

```
COMPAQ AlphaServer DS20E 500 MHz Console V5.5-21, Oct 18 1999 13:33:24
P00>>>
```

Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```
P00>>>show device
dka0.0.0.6.0          DKA0          COMPAQ BA03611C9B 3B05
dka100.1.0.6.0       DKA100        COMPAQ BB01811C9C 3B05
dka200.2.0.6.0       DKA200        COMPAQ BB01811C9C 3B05
dqa0.0.0.105.0      DQA0          CD-224E 9.5B
dva0.0.0.0.0         DVA0
ewa0.0.0.9.1         EWA0          00-00-F8-01-F5-DA
pka0.7.0.6.0         PKA0          SCSI Bus ID 7
pkb0.7.0.106.0      PKB0          SCSI Bus ID 7
```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
P00>>>show config | more
```

Configure the system SRM parameters to boot from your installation device. The commands for configuring to boot from the floppy device are shown here:

```
P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/fd0 load_ramdisk=1"
P00>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/fd0 load_ramdisk=1
boot_reset        OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

Insert the boot floppy into the drive.

Boot the system using the "boot" command. The result should be that the system boots from the floppy. You will eventually be prompted to replace the BOOT floppy with the RAMDISK floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

SuSE's installation program is flexible. While it allows for autodetection of devices and autoloading of device drivers, it allows you to override the automatically configured parameters. Compaq's testing this Solutions Guide was performed using SuSE Version 6.1.

The software installation process requires that the system be rebooted at two critical places in the process. The first time is just after completing the partitioning of the disk, and the second happens automatically after all of the software components are installed on the disk. Be certain not to skip the reboot after the disk partition process is completed.

Disk Partitioning

In preparation to partition your disk, you should boot your AlphaServer via the BOOT floppy and following the process for selecting a language, display color, keyboard type, and installation media. At this stage, you should select the "Install From Scratch" menu option, and proceed to the window titled "Partition Hard Drives". At this point, press the **ALT+F2** keys, which will change the display to show a shell-command prompt. At this prompt, type the command "**fdisk**" followed by the enter key.

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#          size  offset  fstype  [fsize bsize  cpg]
a:    16368      0      boot   # (Cyl.  1 - 2)
b:   212784  16368     ext2   # (Cyl.  3 - 28)
c:  4272048  229152     swap   # (Cyl.  29 - 550)
d:  3871032  4501200     ext2   # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300MB minimum and a maximum of 900MB.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Now you are at the fdisk command line
2. Type “**m**” for help.
3. Type “**p**” to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the */usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.

29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

At this point, the partitions have been created, and the system **must** be rebooted. You can reboot by either pressing the RESET or POWER buttons on the front of the AlphaServer system. Once the system returns to the SRM prompt, follow the preceding instructions to return to the "Partition Hard Drives" window. Select the "**Do Not Partition**" option at this screen.

You will now be presented a window that allows you to select and format the disk for the software to be installed, entitled "Creating Filesystems". You should use the **F4** key to define the mount point of "/" for *sda2* and "*/usr*" for *sda4*. Use the **F6** key to select the "Normal" formatting of the drive for both partitions. Once those steps are complete, press **enter** to continue.

When the window "Change/Create Configuration" is presented we recommend that you make certain to select the "aboot" package from the "a: Linux Base System" group, and the "xglint" package from the "xsrv: X Server Software" group. Ensure that you depress the **F10** key after each selection to add it to the installation. If you forget to select these packages, you will not be able to boot directly from the hard drive, nor be able to run the X Window System software. Once these are selected, and you have selected any other software options that you require, begin the installation. If you encounter a message indicating that the xglint software depends upon other packages, select "Continue", which will ignore that situation.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. Before it begins the bootup process, press the front panel reset button. This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of

the floppy or CD-ROM. You should now be at the SRM prompt, "P00>>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/TdZ /boot/boot1x** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type: **mkswap /dev/TdZW** (where T is the type of drive, s for SCSI or h for IDE; Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda); and W is the swap partition number (I.e. mkswap /dev/sda3 or mkswap /dev/hda3.) This is required to work around a problem of the swap.
3. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /floppy**
4. Now go to the /boot directory. Type: **cd /boot**
5. Copy the kernel. Type: **cp /floppy/vmlinux.gz .**
6. Unmount the floppy. Type: **umount /dev/fd0**
7. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

The system should now boot and prompt you to login. Upon logging in, you will probably want to configure the X Window System. To do so, login as the user "**root**", and then run the command "**xf86config**". Following the prompts answering the questions appropriately for your system. In most cases, you will need to select "**3Dlabs Oxygen GMX**" as the graphics adapter, which is usually configured with 8192K bytes of memory. Once this process is completed, you should be able to run the command "**startx**" to make use of the graphical interface.

Compaq AlphaServer ES40

Hardware Options

Tested Saleable Hardware Options

Tested saleable hardware options for the ES40 is outlined in Table 1. All of the systems used come equipped with standard bus-interface devices for which drivers already exist for Linux. All bus-interface devices detailed use the PCI bus. Detailed information on each particular bus-interface device can be found in a subsection of the appropriate software. Only the installation and configuration details that are necessary to clarify the hardware explanation are provided in this table. Unless otherwise specified, the Linux kernel version used in qualifying each component is version 2.2.5.

Table 4. Tested Saleable Options List

Compaq PN	Description	Comments
BA610-4D	ES40 4 Bay Drive Cage	
H7906-A9	ES40 Power Supply	
KN610-AA	ES40 SMP CPU, 500MHz	
MS610-CA	ES40 512MB Memory Option, 100 MHz	
MS610-DA	ES40 1GB Memory Option, 100 MHz	
MS610-EA	ES40 2GB Memory Option, 100 MHz	
DE500-BA	PCI 1 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DE504-BA	PCI 4 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
RZ1DA-VW	9.1 GB UltraSCSI 7200RPM	
RZ1DD-VW	9.1 GB UltraSCSI 10000 RPM	
RZ2DD-16	9.1 GB Ultra2 SCSI 10000 RPM	
RZ1EA-VW	18.2 GB UltraSCSI 7200 RPM	
RZ1ED-VW	18.2 GB UltraSCSI 10000 RPM	
RZ2ED-16	18.2 GB Ultra2 SCSI 10000 RPM	
RZ1FB-VW	36.4 GB UltraSCSI 10000 RPM	
KZPCM-DA	UltraSCSI, 2 CH, SE, 1 CH 10/100 Ethernet	Need the 2.2.12 kernel from ftp site to perform install.
KZPBA-CA	UltraSCSI, 1 CH, SE	
KZPBA-CB	UltraSCSI, 1CH, Diff.	
PBXGK-BB	Elsa Gloria 8MB	use XF86_3DLabs

For up-to-date information about configuration options, you should refer to the following web sites, which are updated regularly with the latest information:

For Alpha Systems QuickSpecs: <http://www.digital.com/info/SOHOME/>

For Alpha Systems Supported Options List:
<http://www.digital.com/alphaserver/products/options.html>

Red Hat Version 6.0 Distribution

Pre-Installation

Creating The BOOT Floppy

Before you can begin to install the Linux software on your AlphaServer or AlphaStation, you will need to create a BOOT floppy. This floppy contains the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

An important note: Our experience has shown that the vendor supplied floppy images sometimes do not work properly. You are therefore encouraged to create your own BOOT floppy using the images available over the Internet, as described in the sections that follow.

Creating floppies using a MS/Windows system

To create the BOOT floppy, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Connect to the URL `ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images` which is a directory containing the distribution boot floppy image files.
3. Copy the `generic-smp-2.2.12.img` file to your PC.
4. Rename the file to `generic.img` (DOS has an 8.3 file name limitation)
5. Insert the Linux CD-ROM into the PC.
6. Copy the file "`dosutils\rwrite.exe`" from the CD-ROM to the \Linux directory on the PC.
7. Insert a blank, formatted floppy into the PC.
8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: generic.img
```

```
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Creating floppies using an UNIX system

To create the BOOT floppy, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of UNIX and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Copy the generic kernel images from the Internet to your computer:

```
$ mkdir /var/tmp/Linux
```

```
$ cd /var/tmp/Linux
$ ftp ftp.digital.com
login: ftp
Password: user@
ftp> bin
ftp> cd /pub/DEC/Linux-Alpha/Images/
ftp> get generic-smp-2.2.12.img
ftp> quit
```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=generic-smp-2.2.12.img of=/dev/fd0
```

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaServer or AlphaStation computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt "P00>>>", as shown here:

```
OpenVMS PALcode V1.61-2, Tru64 UNIX PALcode V1.54-2
starting console on CPU 0
initialized idle PCB
initializing semaphores
initializing heap
initial heap 200c0
memory low limit = 166000
heap = 200c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing hardware
initializing timer data structures
lowering IPL
CPU 0 speed is 500 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Memory size 4608 MB
testing memory
...
probe I/O subsystem
probing hose 1, PCI
bus 0, slot 4 -- pka -- NCR 53C895
bus 0, slot 6 -- ewa -- DE500-BA Network Controller
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
```

```

bus 0, slot 1 -- vga -- ELSA GLoria Synergy
bus 0, slot 15 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 15 -- dqb -- Acer Labs M1543C IDE
starting drivers
entering idle loop
initializing keyboard
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 500 MHz
create powerup
starting console on CPU 2
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 2 speed is 500 MHz
create powerup
starting console on CPU 3
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 3 speed is 500 MHz
create powerup
Memory Testing and Configuration Status
  Array      Size      Base Address
-----
  0          512Mb    0000000100000000
  1         2048Mb    0000000000000000
  2         1024Mb    0000000080000000
  3         1024Mb    00000000c0000000

      4608 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
Partition 0, Memory base: 000000000, size: 120000000
initializing GCT/FRU at 1a2000

AlphaServer ES40 Console V5.5-68, built on Jul 21 1999 at 17:02:39
P00>>>

```

- Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

P00>>>show dev
dka0.0.0.4.1          DKA0          RZ2ED-LS  0306
dka100.1.0.4.1       DKA100        RZ2DD-LS  0306
dka200.2.0.4.1       DKA200        RZ2DD-LS  0306
dka300.3.0.4.1       DKA300        RZ2DD-LS  0306
dqa0.0.0.15.0        DQA0          COMPAQ CDR-8435 0013
dva0.0.0.1000.0      DVA0
ewa0.0.0.6.1         EWA0          08-00-2B-C4-56-8E
pka0.7.0.4.1         PKA0          SCSI Bus ID 7

```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
P00>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross-referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```
P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/hda"
P00>>>show boot*
boot_dev                dva0.0.0.0.0
boot_file                vmlinux.gz
boot_osflags            root=/dev/hda
boot_reset              OFF
bootdef_dev             dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the **"boot"** command. The result should be that the system boots from the floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

The Red Hat version used in the testing for this guide has a simple installation program. Most of the devices available with the AlphaServers can be correctly autodetected by Red Hat. Testing for this Solutions Guide was performed using Red Hat Linux version 6.0.

During the boot process, you may see messages about "IDE STO" errors. These can be safely ignored.

When configuring "Timezones", do not select "Hardware clock set to GMT", nor "Startup through ARC console". Instead select "EST" for the timezone, or the value that is appropriate for your location.

Disk Partitioning

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). This section provides an example of how perform the partitioning process using fdisk. The disk used for this example is an 18.2GB drive (RZ2ED-LS) which fdisk shows as having 17365 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    4096     0      boot   # (Cyl.   1 - 2)
b:   241664   4096    ext2   # (Cyl.   3 - 120)
c: 16547840 245760    swap   # (Cyl.  121 - 8200)
d: 18769920 16793600  ext2   # (Cyl. 8201 - 17365)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Arrow to the drive you will be installing the software to and press the **ENTER** key. You will now be in the fdisk command line
2. Type “**m**” for help.
3. Type “**p**” to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**120**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**121**”.
23. Last cylinder: Type “**8200**”.

24. Type “**n**” to add a new BSD partition – the */usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**8201**”.
27. Last cylinder: Type “**17365**” ; *last cylinder - one. Do NOT accept the program generated default of "17366" here, because of possible disk corruption).*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.
45. Tab to **DONE** and press **ENTER**.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. **Before it begins the bootup process, press the front panel reset button.** This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, ">>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
```

```
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/sdZ /boot/boot1x** (where Z is the letter of the drive you are booting; ex: dka0=sda, dka100=sdb).
2. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /mnt/floppy**
3. Now go to the /boot directory. Type: **cd /boot**
4. Copy the kernel. Type: **cp /mnt/floppy/vmlinux.gz .**
5. Unmount the floppy. Type: **umount /dev/fd0**
6. Reboot the system. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

SuSE Version 6.1 Distribution

Pre-Installation

Creating The BOOT and RAMDISK Floppies

Before you can begin to install the Linux software on your AlphaServer, you will need to create a BOOT floppy and RAMDISK. These floppies contain the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

Creating floppies using a MS/Windows system

To create the BOOT and RAMDISK floppies, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Insert the Linux CD-ROM into the PC.
3. Copy the file ftp://tsx-11.mit.edu/pub/linux/dos_utils/rawrite.exe to "\Linux\rwrite.exe" on the PC. This utility is required to build the floppies.
4. Copy the file "about_dualncr-qlogic" from <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> to the \Linux directory on the PC and rename the file to about.
5. Copy the file "\disks\install" from the CD-ROM to the \Linux directory on the PC.
6. Insert a blank, formatted floppy into the PC.

7. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: about
```

```
Enter destination drive: a
```

Label this floppy "AlphaServer Linux BOOT Floppy".

8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: install
```

```
Enter destination drive: a
```

9. Label this floppy "AlphaServer Linux RAMDISK Floppy".

With those two floppies in hand, you are now prepared to begin the installation process on your AlphaServer.

Creating floppies using an UNIX system

To create the BOOT and RAMDISK floppies, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Insert the Linux CD-ROM into the computer, and mount it:

```
$ mount /cdrom
```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=/cdrom/disks/about of=/dev/fd0
```

3. Insert a blank, formatted floppy into the computer, and copy the RAMDISK to it:

```
$ dd if=/cdrom/disks/install of=/dev/fd0
```

With those two floppies in hand, and the CD-ROM removed from the computer, you are now prepared to begin the installation process on your AlphaServer.

Firmware Inspection and Upgrade

After powering up your AlphaServer computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt ">>>", as shown here:

```
OpenVMS PALcode V1.61-2, Tru64 UNIX PALcode V1.54-2
starting console on CPU 0
```

```

initialized idle PCB
initializing semaphores
initializing heap
initial heap 200c0
memory low limit = 166000
heap = 200c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing hardware
initializing timer data structures
lowering IPL
CPU 0 speed is 500 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Memory size 4608 MB
testing memory
...
probe I/O subsystem
probing hose 1, PCI
bus 0, slot 4 -- pka -- NCR 53C895
bus 0, slot 6 -- ewa -- DE500-BA Network Controller
probing hose 0, PCI
probing PCI-to-ISA bridge, bus 1
bus 0, slot 1 -- vga -- ELSA GLoria Synergy
bus 0, slot 15 -- dqa -- Acer Labs M1543C IDE
bus 0, slot 15 -- dqb -- Acer Labs M1543C IDE
starting drivers
entering idle loop
initializing keyboard
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 500 MHz
create powerup
starting console on CPU 2
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 2 speed is 500 MHz
create powerup
starting console on CPU 3
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 3 speed is 500 MHz
create powerup
Memory Testing and Configuration Status
  Array      Size      Base Address
-----
    0      512Mb    0000000100000000
    1     2048Mb    0000000000000000
    2     1024Mb    0000000080000000
    3     1024Mb    00000000c0000000

    4608 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
Partition 0, Memory base: 000000000, size: 120000000
initializing GCT/FRU at 1a2000

```

```
AlphaServer ES40 Console V5.5-68, built on Jul 21 1999 at 17:02:39
P00>>>
```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```
P00>>>show dev
dka0.0.0.4.1          DKA0          RZ2ED-LS  0306
dka100.1.0.4.1       DKA100        RZ2DD-LS  0306
dka200.2.0.4.1       DKA200        RZ2DD-LS  0306
dka300.3.0.4.1       DKA300        RZ2DD-LS  0306
dqa0.0.0.15.0        DQA0          COMPAQ CDR-8435 0013
dva0.0.0.1000.0      DVA0
ewa0.0.0.6.1         EWA0          08-00-2B-C4-56-8E
pka0.7.0.4.1         PKA0          SCSI Bus ID 7
```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
P00>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. The commands for configuring to boot from the floppy device are shown here:

```
P00>>>set bootdef_dev dva0
P00>>>set boot_file vmlinux.gz
P00>>>set boot_osflags "root=/dev/fd0 load_ramdisk=1"
P00>>>show boot*
boot_dev          dva0.0.0.0.0
boot_file         vmlinux.gz
boot_osflags      root=/dev/fd0 load_ramdisk=1
boot_reset       OFF
bootdef_dev       dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the "boot" command. The result should be that the system boots from the floppy. You will eventually be prompted to replace the BOOT floppy with the RAMDISK floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

SuSE's installation program is flexible. While it allows for autodetection of devices and autoload of device drivers, it allows you to override the automatically configured parameters. Compaq's testing this Solutions Guide was performed using SuSE Version 6.1.

The software installation process requires that the system be rebooted at two critical places in the process. The first time is just after completing the partitioning of the disk, and the second happens

automatically after all of the software components are installed on the disk. Be certain not to skip the reboot after the disk partition process is completed.

Disk Partitioning

In preparation to partition your disk, you should boot your AlphaServer via the BOOT floppy and following the process for selecting a language, display color, keyboard type, and installation media. At this stage, you should select the "Install From Scratch" menu option, and proceed to the window titled "Partition Hard Drives". At this point, press the **ALT+F2** keys, which will change the display to show a shell-command prompt. At this prompt, type the command "**fdisk**" followed by the enter key.

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is an 18.2GB drive (RZ2ED-LS) which fdisk shows as having 17365 cylinders:

```
4 partitions:
#          size      offset    fstype   [fsize bsize  cpg]
a:      16368         0      boot    # (Cyl.   1 -  2)
b:     212784     16368     ext2    # (Cyl.   3 - 28)
c:     4272048    229152     swap    # (Cyl.  29 - 550)
d:     3871032    4501200     ext2    # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Now you are at the fdisk command line
2. Type "**m**" for help.
3. Type "**p**" to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the "**d**" option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type "**b**" to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: "/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)" – Answer **Y**.
7. Type "**m**" for more help.

8. Type **"p"** to print the partition table. You should see a **"c"** partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type **"d"** to delete a BSD partition
10. Type **"c"** to delete the c partition
11. Type **"p"** to print the partition table and verify no partitions exist
12. Type **"n"** to add a new BSD partition – the *boot* partition in this case
13. Type **"a"** for partition a.
14. First cylinder: Type **"1"**.
15. Last cylinder: Type **"2"**.
16. Type **"n"** to add a new BSD partition – the / (root) partition in this case.
17. Type **"b"** for partition b.
18. First cylinder: Type **"3"**.
19. Last cylinder: Type **"120"**.
20. Type **"n"** to add a new BSD partition – the *swap* partition in this case.
21. Type **"c"** for partition c.
22. First cylinder: Type **"121"**.
23. Last cylinder: Type **"8200"**.
24. Type **"n"** to add a new BSD partition – the *usr* partition in this case.
25. Type **"d"** for partition d.
26. First cylinder: Type **"8201"**.
27. Last cylinder: Type **"17365"** ; *last cylinder - one. Do NOT accept the program generated default of "17366" here, because of possible disk corruption.*
28. Type **"p"** to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via "toggle" – see next step.
29. Type **"t"** to change the partitions filesystem id.
30. Type **"a"** for partition a – *boot* partitions use a "boot" code.
31. Type **"L"** to list the codes you can use.
32. Enter **"d"** for boot type.
33. Type **"t"** to change the partitions filesystem id.
34. Type **"b"** for partition b – / (root) partitions use a "ext2" code.
35. Enter **"8"** for ext2 type.
36. Type **"t"** to change the partitions filesystem id.
37. Type **"c"** for partition c – *swap* partitions use a "swap" code.
38. Enter **"1"** for swap type.
39. Type **"t"** to change the partitions filesystem id.
40. Type **"d"** for partition d – *usr* partitions use a "ext2" code.

41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

At this point, the partitions have been created, and the system **must** be rebooted. You can reboot by either pressing the RESET or POWER buttons on the front of the AlphaServer system. Once the system returns to the SRM prompt, follow the preceding instructions to return to the "Partition Hard Drives" window. Select the "Do Not Partition" option at this screen.

You will now be presented a window that allows you to select and format the disk for the software to be installed, entitled "Creating Filesystems". You should use the **F4** key to define the mount point of "/" for *sda2* and "/usr" for *sda4*. Use the **F6** key to select the "Normal" formatting of the drive for both partitions. Once those steps are complete, press enter to continue.

When the window "Change/Create Configuration" is presented we recommend that you make certain to select the "about" package from the "a: Linux Base System" group, and the "xglint" package from the "xsrv: X Server Software" group. Ensure that you depress the **F10** key after each selection to add it to the installation. If you forget to select these packages, you will not be able to boot directly from the hard drive, nor be able to run the X Window System software. Once these are selected, and you have selected any other software options that you require, begin the installation. If you encounter a message indicating that the xglint software depends upon other packages, select "**Continue**", which will ignore that situation.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. Before it begins the bootup process, press the front panel reset button. This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, "P00>>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
P00>>>set boot_file 2/boot/vmlinux.gz
P00>>>set bootdef_dev dka0
P00>>>set boot_osflags "root=/dev/sda2"
P00>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/TdZ /boot/boot1x** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type: **mkswap /dev/TdZW** (where T is the type of drive, s for SCSI or h for IDE; Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda); and W is the swap partition number (I.e. mkswap /dev/sda3 or mkswap /dev/hda3.) This is required to work around a problem of the swap.
3. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /floppy**
4. Now go to the /boot directory. Type: **cd /boot**
5. Copy the kernel. Type: **cp /floppy/vmlinux.gz .**
6. Unmount the floppy. Type: **umount /dev/fd0**
7. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
P00>>>boot
```

The system should now boot and prompt you to login. Upon logging in, you will probably want to configure the X Window System. To do so, login as the user "**root**", and then run the command "**xf86config**". Following the prompts answering the questions appropriately for your system. In most cases, you will need to select "3Dlabs Oxygen GMX" as the graphics adapter, which is usually configured with 8192K bytes of memory. Once this process is completed, you should be able to run the command "**startx**" to make use of the graphical interface.

Compaq AlphaStation XP1000

Hardware Options

Tested Saleable Hardware Options

Tested saleable hardware options for the XP1000 is outlined in Table 1. All of the systems used come equipped with standard bus-interface devices for which drivers already exist for Linux. All bus-interface devices detailed use the PCI bus. Detailed information on each particular bus-interface device can be found in a subsection of the appropriate software. Only the installation and configuration details that are necessary to clarify the hardware explanation are provided in this table. Unless otherwise specified, the Linux kernel version used in qualifying each component is version 2.2.5.

Table 5. Tested Saleable Options List

Compaq PN	Description	Comments
SN-MSP01-KA	XP1000 128MB SDRAM (4x32)	
SN-MSP01-KB	XP1000 256MB SDRAM (4x64)	
SN-MSP01-KC	XP1000 512MB SDRAM (4x128)	
SN-MSP01-KD	XP1000 1024MB SDRAM (4x256)	
SN-DE500-BA	PCI 1 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
DE504-BA	PCI 4 CH 10/100 Ethernet	Red Hat - Use DE4*5 or Tulip driver
SN-PBXRW-RB	4.3 GB Ultra Wide 10000 RPM	
DS-RZ1DA-VW	9.1 GB UltraSCSI 7200RPM	
DS-RZ1DD-VW	9.1 GB UltraSCSI 10000 RPM	
SN-PBXRW-SB	9.1 GB Ultra Wide 7200 RPM	
DS-RZ1EA-VW	18.2 GB UltraSCSI 7200 RPM	
DS-RZ1ED-VW	18.2 GB UltraSCSI 10000 RPM	
SN-PBXRW-TA	18.2 GB UltraSCSI 7200 RPM	
KZPCM-DA	UltraSCSI, 2 CH, SE, 1 CH 10/100 Ethernet	Need the 2.2.12 kernel from ftp site to perform install.
SN-KZPBA-CA	UltraSCSI, 1 CH, SE	
SN-KZPBA-CB	UltraSCSI, 1CH, Diff.	
SN-PBXGK-BB	Elsa Gloria 8MB	use XF86_3DLabs
SN-VRQP7-23	COMPAQ P75 17" CLR Monitor,SH	
SN-VRQP7-24	COMPAQ P75 17" CLR Monitor,NH	
SN-VRQP1-23	COMPAQ P110 21" CLR Monitor,SH	
SN-VRQP1-24	COMPAQ P110 21" CLR Monitor,NH	

For up-to-date information about configuration options, you should refer to the following web sites, which are updated regularly with the latest information:

For Alpha Systems QuickSpecs: <http://www.digital.com/info/SOHOME/>

For Alpha Systems Supported Options List:
<http://www.digital.com/alphaserver/products/options.html>

Red Hat Version 6.0 Distribution

Pre-Installation

Creating The BOOT Floppy

Before you can begin to install the Linux software on your AlphaServer or AlphaStation, you will need to create a BOOT floppy. This floppy contains the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

***An important note:** Our experience has shown that the vendor supplied floppy images sometimes do not work properly. You are therefore encouraged to create your own BOOT floppy using the images available over the Internet, as described in the sections that follow.*

Creating floppies using a MS/Windows system

To create the BOOT floppy, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Connect to the URL `ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images` which is a directory containing the distribution boot floppy image files.
3. Copy the `generic-up.2.2.12.img` file to your PC.
4. Rename the file to `generic.img` (DOS has an 8.3 file name limitation)
5. Insert the Linux CD-ROM into the PC.
6. Copy the file "`dosutils\rwrite.exe`" from the CD-ROM to the \Linux directory on the PC.
7. Insert a blank, formatted floppy into the PC.
8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: generic.img
```

```
Enter destination drive: a
```

Label this floppy "AlphaStation Linux BOOT Floppy".

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Creating floppies using an UNIX system

To create the BOOT floppy, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of UNIX and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Copy the generic kernel images from the Internet to your computer:

```
$ mkdir /var/tmp/Linux
```

```

$ cd /var/tmp/Linux
$ ftp ftp.digital.com
login: ftp
Password: user@
ftp> bin
ftp> cd /pub/DEC/Linux-Alpha/Images/
ftp> get generic-up-2.2.12.img
ftp> quit

```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=generic-up-2.2.12.img of=/dev/fd0
```

With this floppy in hand, you are now prepared to begin the installation process on your AlphaServer or AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaServer or AlphaStation computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt ">>>", as shown here:

```

OpenVMS PALcode V1.61-22, Digital UNIX PALcode V1.54-20
FF.FE.FD.FC.FB.FA.F9.F8.F7.F6.F5.F3.F2.F1.F0.EF.EE.ED.EC.EB.EA.E9.F4.E8.E
7.E6.E5.E4.
COMPAQ Professional Workstation XP1000 Console V5.5-7
built on Jul 22 1999 at 11:10:07
>>>

```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

>>>show device
dka0.0.0.6.1           DKA0           RZ2CC-KA  5520
dka100.1.0.6.1        DKA100         RZ2CC-KA  5520
dqa0.0.0.107.0        DQA0           TOSHIBA CD-ROM XM-6202B 1110
dva0.0.0.0.0          DVA0
ewa0.0.0.3.1          EWA0           00-00-F8-71-53-F5
ewb0.0.0.12.0         EWB0           00-00-F8-1E-86-8F
pka0.7.0.6.1          PKA0           SCSI Bus ID 7  5.57
pkb0.7.0.2009.1       PKB0           SCSI Bus ID 7  5.57

```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. A table providing cross-referenced device names is located in Appendix C, for your convenience. Example commands for configuring to boot from the floppy device are shown here:

```
>>>set bootdef_dev dva0
>>>set boot_file vmlinux.gz
>>>set boot_osflags "root=/dev/hda"
>>>show boot*
boot_dev                dva0.0.0.0.0
boot_file               vmlinux.gz
boot_osflags            root=/dev/hda
boot_reset              OFF
bootdef_dev             dva0.0.0.0.0
booted_dev
booted_file
booted_osflags
```

4. Insert the boot floppy into the drive.
5. Boot the system using the **"boot"** command. The result should be that the system boots from the floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

The Red Hat version used in the testing for this guide has a simple installation program. Most of the devices available with the AlphaStations can be correctly autodetected by Red Hat. Testing for this Solutions Guide was performed using Red Hat Linux version 6.0.

During the boot process, you may see messages about "IDE STO" errors. These can be safely ignored.

When configuring "Timezones", do not select "Hardware clock set to GMT", nor "Startup through ARC console". Instead select "EST" for the timezone, or the value that is appropriate for your location.

Disk Partitioning

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA (or whatever) disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368      0    boot   # (Cyl.  1 - 2)
b:   212784  16368   ext2   # (Cyl.  3 - 28)
c:  4272048  229152   swap   # (Cyl.  29 - 550)
d:  3871032  4501200  ext2   # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Arrow to the drive you will be installing the software to and press the **ENTER** key. You will now be in the fdisk command line
2. Type “**m**” for help.
3. Type “**p**” to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the “**d**” option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type “**b**” to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.

24. Type “**n**” to add a new BSD partition – the */usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.
39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.
45. Tab to **DONE** and press **ENTER**.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. **Before it begins the bootup process, press the front panel reset button.** This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, ">>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
>>>set boot_file 2/boot/vmlinux.gz
>>>set bootdef_dev dka0
>>>set boot_osflags "root=/dev/sda2"
```

```
>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/sdZ /boot/boot1x** (where Z is the letter of the drive you are booting; ex: dka0=sda, dka100=sdb).
2. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /mnt/floppy**
3. Now go to the /boot directory. Type: **cd /boot**
4. Copy the kernel. Type: **cp /mnt/floppy/vmlinux.gz .**
5. Unmount the floppy. Type: **umount /dev/fd0**
6. Reboot the system. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on. Please reset or power cycled the system to continue with installation.

At the SRM prompt, you can now boot directly from the hard drive:

```
>>>boot
```

SuSE Version 6.1 Distribution

Pre-Installation

Creating The BOOT and RAMDISK Floppies

Before you can begin to install the Linux software on your AlphaStation, you will need to create a BOOT floppy and RAMDISK. These floppies contain the information required to initiate the installation of Linux. The process varies depending upon what software distribution you are using.

Creating floppies using a MS/Windows system

To create the BOOT and RAMDISK floppies, you will need to make use of a PC, which has Internet access. The instructions below detail the process:

1. Create a directory on the PC into which you will copy files for Linux, for example \Linux.
2. Insert the Linux CD-ROM into the PC.
3. Copy the file ftp://tsx-11.mit.edu/pub/linux/dos_utils/rawrite.exe to "\Linux\rwwrite.exe" on the PC. This utility is required to build the floppies.
4. Copy the file "about_dualncr-qlogic" from <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images/> to the \Linux directory on the PC and rename the file to about.
5. Copy the file "\disks\install" from the CD-ROM to the \Linux directory on the PC.
6. Insert a blank, formatted floppy into the PC.

7. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: aboot
```

```
Enter destination drive: a
```

Label this floppy "AlphaStation Linux BOOT Floppy".

8. Run the following command from the DOS command shell:

```
C:\Linux> rawrite
```

```
Enter source file name: install
```

```
Enter destination drive: a
```

9. Label this floppy "AlphaStation Linux RAMDISK Floppy".

With those two floppies in hand, you are now prepared to begin the installation process on your AlphaStation.

Creating floppies using an UNIX system

To create the BOOT and RAMDISK floppies, you will need to make use of a computer, which has Internet access. The instructions below detail the process. Note that depending upon what version of unix and vendor computer you are using to perform this process, some minor variations in the process may be required. The exact commands shown here are for Digital UNIX, and should be similar to most other popular UNIX systems.

1. Insert the Linux CD-ROM into the computer, and mount it:

```
$ mount /cdrom
```

2. Insert a blank, formatted floppy into the computer, and copy the BOOT kernel to it:

```
$ dd if=/cdrom/disks/aboot of=/dev/fd0
```

3. Insert a blank, formatted floppy into the computer, and copy the RAMDISK to it:

```
$ dd if=/cdrom/disks/install of=/dev/fd0
```

With those two floppies in hand, and the CD-ROM removed from the computer, you are now prepared to begin the installation process on your AlphaStation.

Firmware Inspection and Upgrade

After powering up your AlphaStation computer, type the command "**show version**". Check that the version string printed is "V5.4-2 May 19 1999 14:25:16" or newer, and that the first letter of the version string is a "V". If this is not the case, you should upgrade your firmware. Instructions on how to do this can be found at <http://ftp.digital.com/pub/Digital/Alpha/firmware/> along with the latest firmware images.

System Resource Manager Configuration

There are several pieces of information that you need to configure in the SRM subsystem, as well as device identifiers that you should make note of, prior to beginning the installation process. The steps that follow take you through that process.

1. Power up your system. After several diagnostics are completed, you will be presented an SRM prompt ">>>", as shown here:

```

OpenVMS PALcode V1.61-22, Digital UNIX PALcode V1.54-20
FF.FE.FD.FC.FB.FA.F9.F8.F7.F6.F5.F3.F2.F1.F0.EF.EE.ED.EC.EB.EA.E9.F4.E8.E
7.E6.E5.E4.
  COMPAQ Professional Workstation XP1000 Console V5.5-7
    built on Jul 22 1999 at 11:10:07
>>>

```

2. Determine what devices your system has installed. In particular you will need to note your installation device (a floppy and/or CD-ROM), and your target disk drive. Entering the command "show devices" as shown below will print out the information about your system:

```

>>>show device
dka0.0.0.6.1           DKA0           RZ2CC-KA  5520
dka100.1.0.6.1        DKA100         RZ2CC-KA  5520
dqa0.0.0.107.0        DQA0           TOSHIBA CD-ROM XM-6202B 1110
dva0.0.0.0.0          DVA0
ewa0.0.0.3.1          EWA0           00-00-F8-71-53-F5
ewb0.0.0.12.0         EWB0           00-00-F8-1E-86-8F
pka0.7.0.6.1          PKA0           SCSI Bus ID 7  5.57
pkb0.7.0.2009.1       PKB0           SCSI Bus ID 7  5.57

```

In the output above, the first line shows that DKA0 is a hard disk, DQA0 is a CD-ROM, and DVA0 is a floppy drive.

Also useful for inspecting the computer configuration is the "show config" command, as shown here:

```
>>>show config | more
```

3. Configure the system SRM parameters to boot from your installation device. The commands for configuring to boot from the floppy device are shown here:

```

>>>set bootdef_dev dva0
>>>set boot_file vmlinux.gz
>>>set boot_osflags "root=/dev/fd0 load_ramdisk=1"
>>>show boot*
boot_dev           dva0.0.0.0.0
boot_file          vmlinux.gz
boot_osflags       root=/dev/fd0 load_ramdisk=1
boot_reset         OFF
bootdef_dev        dva0.0.0.0.0
booted_dev
booted_file
booted_osflags

```

4. Insert the boot floppy into the drive.
5. Boot the system using the "boot" command. The result should be that the system boots from the floppy. You will eventually be prompted to replace the BOOT floppy with the RAMDISK floppy.

If during this process you encounter a problem, such as due to a typographic error in the setting of the SRM parameters, you will probably be stopped with an "aboot>" prompt. The best way to deal with this situation is to reset the system using the reset button on the front panel. Then using the SRM commands, correct the mistake, and repeat the "boot" process.

Software Installation

SuSE's installation program is flexible. While it allows for autodetection of devices and autoloading of device drivers, it allows you to override the automatically configured parameters. Compaq's testing this Solutions Guide was performed using SuSE Version 6.1.

The software installation process requires that the system be rebooted at two critical places in the process. The first time is just after completing the partitioning of the disk, and the second happens automatically after all of the software components are installed on the disk. Be certain not to skip the reboot after the disk partition process is completed.

Disk Partitioning

In preparation to partition your disk, you should boot your AlphaStation via the BOOT floppy and following the process for selecting a language, display color, keyboard type, and installation media. At this stage, you should select the "Install From Scratch" menu option, and proceed to the window titled "Partition Hard Drives". At this point, press the **ALT+F2** keys, which will change the display to show a shell-command prompt. At this prompt, type the command **fdisk** followed by the enter key.

The process of partitioning your boot disk for Linux on your AlphaServer can be somewhat involved. This section provides an example of how perform the partitioning process using fdisk. Note, the partition recommendations used in steps 14-27 are based on a RZ1DD-AA disk geometry. If your disk has a different geometry you will need to use different starting/ending cylinder numbers for each partition. The correct starting/ending cylinder numbers can be computed by using these size recommendations and the number of bytes/cylinder for the disk that you are using (this figure is reported by fdisk). The disk used for this example is a 4.3GB drive (DS-RZ1CF) which fdisk shows as having 1023 cylinders:

```
4 partitions:
#      size  offset  fstype  [fsize bsize  cpg]
a:    16368      0    boot   # (Cyl.  1 - 2)
b:   212784  16368   ext2   # (Cyl.  3 - 28)
c:  4272048  229152   swap   # (Cyl.  29 - 550)
d:  3871032  4501200  ext2   # (Cyl.  551 - 1023)
```

We strongly recommend the following multi-partition layout:

A boot partition – A boot partition is used to reserved the first 2 cylinders (1-2) to write the bootloader in order to boot the disk from SRM.

A root partition – The root partition is where the / (root directory) resides. Always starts at cylinder 3. We recommend creating a root partition of 300Mb minimum and 900Mb maximum.

A swap partition – A swap partition is used to support virtual memory. We commend creating a swap partition of 2 times the computer RAM.

A /usr partition – The /usr partition is where the software of the system resides. This partition should use all of the space left on the hard drive.

To perform the partitioning operation on the disk, when prompted, follow these steps:

1. Now you are at the fdisk command line
2. Type **"m"** for help.
3. Type **"p"** to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the **"d"** option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type **"b"** to edit the BSD disklabel.

6. If you completed the last step correctly, you should see the following: “/tmp/sda contains no disklabel. Do you want to create a disklabel? (y/n)” – Answer **Y**.
7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition – the *boot* partition in this case
13. Type “**a**” for partition a.
14. First cylinder: Type “**1**”.
15. Last cylinder: Type “**2**”.
16. Type “**n**” to add a new BSD partition – the / (root) partition in this case.
17. Type “**b**” for partition b.
18. First cylinder: Type “**3**”.
19. Last cylinder: Type “**28**”.
20. Type “**n**” to add a new BSD partition – the *swap* partition in this case.
21. Type “**c**” for partition c.
22. First cylinder: Type “**29**”.
23. Last cylinder: Type “**550**”.
24. Type “**n**” to add a new BSD partition – the *usr* partition in this case.
25. Type “**d**” for partition d.
26. First cylinder: Type “**551**”.
27. Last cylinder: Type “**1023**” ; *last cylinder - one. Do NOT accept the program generated default of "1024" here, because of possible disk corruption.*
28. Type “**p**” to print the partition table. You should notice that the fstype is set to unused for each of the partitions. This will have to be changed via “toggle” – see next step.
29. Type “**t**” to change the partitions filesystem id.
30. Type “**a**” for partition a – *boot* partitions use a “boot” code.
31. Type “**L**” to list the codes you can use.
32. Enter “**d**” for boot type.
33. Type “**t**” to change the partitions filesystem id.
34. Type “**b**” for partition b – / (root) partitions use a “ext2” code.
35. Enter “**8**” for ext2 type.
36. Type “**t**” to change the partitions filesystem id.
37. Type “**c**” for partition c – *swap* partitions use a “swap” code.
38. Enter “**1**” for swap type.

39. Type “**t**” to change the partitions filesystem id.
40. Type “**d**” for partition d – */usr* partitions use a “ext2” code.
41. Enter “**8**” for ext2 type.
42. Type “**p**” to print the partition table – Please verify all your settings.
43. Type “**w**” to write the disklabel to the disk.
44. Type “**q**” to quit.

For further information on creating partitions please refer to the Installation Guide provided by the software distribution vendor.

At this point, the partitions have been created, and the system **must** be rebooted. You can reboot by either pressing the RESET or POWER buttons on the front of the AlphaServer system. Once the system returns to the SRM prompt, follow the preceding instructions to return to the "Partition Hard Drives" window. Select the "Do Not Partition" option at this screen.

You will now be presented a window that allows you to select and format the disk for the software to be installed, entitled "Creating Filesystems". You should use the **F4** key to define the mount point of "/" for *sda2* and */usr* for *sda4*. Use the **F6** key to select the "Normal" formatting of the drive for both partitions. Once those steps are complete, press enter to continue.

When the window "Change/Create Configuration" is presented we recommend that you make certain to select the "about" package from the "a: Linux Base System" group, and the "xglint" package from the "xsrv: X Server Software" group. Ensure that you depress the **F10** key after each selection to add it to the installation. If you forget to select these packages, you will not be able to boot directly from the hard drive, nor be able to run the X Window System software. Once these are selected, and you have selected any other software options that you require, begin the installation. If you encounter a message indicating that the xglint software depends upon other packages, select "**Continue**", which will ignore that situation.

Post-Installation

System Resource Manager Configuration

After the software has been loaded to the disk, the system will attempt to reboot. Before it begins the bootup process, press the front panel reset button. This will stop the bootup process, and allow you to make the final configuration changes to be able to boot directly from the disk, instead of the floppy or CD-ROM. You should now be at the SRM prompt, ">>>". Enter the following commands to finalize the configuration.

You need to enter these commands, such that the drive reference on the second line needs to refer to the drive which you installed to:

```
>>>set boot_file 2/boot/vmlinux.gz
>>>set bootdef_dev dka0
>>>set boot_osflags "root=/dev/sda2"
>>>boot dva0 -fi vmlinux.gz
```

Note - When the system boots, you may see a series of warnings similar to the following:

```
system.map - incorrect version
```

This warning indicates that the kernel version that you installed (i.e. the latest version that you copied from Compaq's ftp site) was not built at the same time as the rest of the kernel. This will not impact your use of Linux in any way. This warning can be eliminated by installing the kernel sources, all currently recommended patches and rebuilding the kernel.

Once the system is up, login and do the following:

1. Type: **swriteboot -f1 /dev/TdZ /boot/bootlx** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type: **mkswap /dev/TdZW** (where T is the type of drive, s for SCSI or h for IDE; Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda); and W is the swap partition number (I.e. mkswap /dev/sda3 or mkswap /dev/hda3.) This is required to work around a problem of the swap.
3. Mount the floppy disk to copy the kernel from the floppy to the /boot/ directory on the system disk. Type: **mount /dev/fd0 /floppy**
4. Now go to the /boot directory. Type: **cd /boot**
5. Copy the kernel. Type: **cp /floppy/vmlinux.gz .**
6. Unmount the floppy. Type: **umount /dev/fd0**
7. Type: **shutdown -h now**

The system may or may not hang here. This is a known issue and is being worked on.

At the SRM prompt, you can now boot directly from the hard drive:

```
>>>boot
```

The system should now boot and prompt you to login. Upon logging in, you will probably want to configure the X Window System. To do so, login as the user "**root**", and then run the command "**xf86config**". Following the prompts answering the questions appropriately for your system. In most cases, you will need to select "3Dlabs Oxygen GMX" as the graphics adapter, which is usually configured with 8192K bytes of memory. Once this process is completed, you should be able to run the command "**startx**" to make use of the graphical interface.

Appendix A

Linux Links

This is a partial list of available links. If you would like to submit additional sites, please e-mail to the author at chris.stewart@compaq.com. Every attempt will be made to include pertinent sites in future document revisions.

- <http://compaq.com/alphaserver/Linux> : Compaq's AlphaServer information page.
- <ftp://ftp.digital.com/pub/DEC/Linux-Alpha/Images>; Compaq's Alpha kernel images site
- <http://ftp.digital.com/pub/Digital/Alpha/firmware/> : Compaq's AlphaServer firmware information page
- <http://www.alphalinux.org> : A web site dedicated to information about Linux and Alpha-based computer systems.
- <http://www.linux.org> : The web site of Linux Online.
- <http://www.li.org> : The web site of Linux International.
- <http://www.gnu.org> : The web site of the GNU Project.
- <http://www.fsf.org> : The web site of the Free Software Foundation.
- <http://metalab.unc.edu/LDP> : The web site of the Linux Documentation Project.
- <http://www.redhat.com> : The web site of the Red Hat Linux distribution.
- <http://www.suse.com> : The web site of the SuSE Linux distribution.
- <http://www.insync.net/~frantzc/cpqarray.html> : The Compaq SMART/2 Array Controller device driver site.
- <http://www slashdot.org/> : A useful site for Linux news.
- <http://www.linux.org.uk/SMP/title.html> : Link to useful information on Symmetric Multi-Processing under Linux.
- <http://www.phy.duke.edu/brahma/smp-faq> : Linux SMP FAQ (mirrored from <http://www.irisa.fr/prive/dmentre/smp-faq>).
- <http://www.cs.cmu.edu/People/AUIS/ftp/web/andrew-home.html> : The Andrew Consortium site. You can obtain the Andrew EZ program for viewing Andrew EZ format documents (such as the SMP document posted on the <http://www.linux.org.uk> site).
- <http://www.xfree86.org> : The XFree86 Project. Most Linux distributions (including Caldera, SuSE and Red Hat) include the free X server developed by this organization.
- <http://www.kde.org/> : The K Desktop Environment web site, one of the more popular desktop software packages available for Linux.
- <http://www.freshmeat.net> : An large index of ports of software for Linux and other platforms. If you are looking for a particular utility or program, try looking here first.

Appendix B

AlphaServer Configurations

Compaq AlphaServer DS10

- Uni Processor Alpha 21264 6/466MHz
- 2MB L2 Cache
- 2GB Max Memory
- 2 Integrated 10/100 Ethernet Ports
- 4 PCI slots
- IDE or SCSI Disk Support

Compaq AlphaServer DS20

- Dual Processor Capable Alpha 21264 6/500MHz
- 4MB L2 Cache
- 4GB max memory capable
- NIC PCI Interface
- 6 PCI Slots
- SCSI Storage

Compaq AlphaServer ES40

- Quad Processor Capable Alpha 21264 6/500MHz
- 4MB L2 Cache
- 16GB max memory capable
- NIC PCI Interface
- 6 PCI Slots
- SCSI Storage

Compaq AlphaStation XP1000

- Uni Processor Alpha 21264 6/500MHz
- 4MB L2 Cache
- 2GB max memory
- Integrated 10/100 Ethernet Port
- 5 PCI Slots
- SCSI Storage

Appendix C

SCSI and IDE Configurations

SCSI Only

Depending on the configuration, your internal drives may be either dkax or dkbx - where x is the value assigned by the SRM console (i.e. dkb100). Usually, the SCSI CDROM is on its own controller/channel, so the SRM will usually report it as dka500 or dkb500. Disks will be on the other controller (for example dka500 is an RRD46 - a SCSI CDROM, then dkb0 would be the first SCSI harddrive - possibly RZ2DD-xx).

Mixed - IDE and SCSI

On the AlphaServer DS10, ES40 and AlphaStation XP1000, the CDROM is IDE based, so the device information passed in the "root=/dev/devicename" has several possibilities. If you check the configuration under SRM console prompt (>>>show config | more), you should find the IDE devices under dqa and dqb device names. The following table is useful to map IDE SRM device names to the Linux device name used for the same device.

SRM console	Linux device
dqa0	hda
dqa1	hdb
dqb0	hdc
dqb1	hdd

Adding a second drive to your system

This section provides an example of how perform the partitioning process using fdisk in order to add a second drive to the system. The disk used for this example is an 18.2GB drive (RZ2ED-LS) which fdisk shows as having 17365 cylinders:

To perform the partitioning operation on the second disk, follow these steps:

1. Open a terminal window and issue the following command; # **fdisk /dev/TdZ** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
2. Type "**m**" for help.
3. Type "**p**" to print the partition table.
4. If there is partition information already configured for the disk, you will need to delete it using the "**d**" option. Please be sure that you want to zero out this drive. All data will be lost on the drive doing this.
5. Type "**b**" to edit the BSD disklabel.
6. If you completed the last step correctly, you should see the following: "/tmp/TdZ contains no disklabel. Do you want to create a disklabel? (y/n)" – Answer **Y**.

7. Type “**m**” for more help.
8. Type “**p**” to print the partition table. You should see a “**c**” partition that takes up the whole disk. This will have to be removed to install Linux correctly
9. Type “**d**” to delete a BSD partition
10. Type “**c**” to delete the c partition
11. Type “**p**” to print the partition table and verify no partitions exist
12. Type “**n**” to add a new BSD partition
13. Type “**a**” for partition a.
14. First cylinder: Type “**3**”.
15. Last cylinder: Type “**17365**” ; *last cylinder - one. Do NOT accept the program generated default of "17366" here, because of possible disk corruption).*
16. Type “**w**” to write the disklabel to the disk.
17. Type “**q**” to quit.
18. Please shutdown the system in order to recognize the new partition on a second drive.
19. Once the system as rebooted and the user has log in, open a terminal window and issue the following command; # **mkfs /dev/TdZ1** (where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are booting; ex: dka0=sda, dqa0=hda)
20. The device is now ready to be mounted by the OS.

Reusing a previously installed hard drive

In some rare cases, you may find yourself needing to install onto a disk drive that has previously been installed to. It is important that you re-create the boot records on the drive. If you followed the rest of the instructions in this manual, you will have allocated the first three sectors of the drive for this purpose. Assuming that is the case, you can destroy the contents of those sectors prior to installing, using this command:

```
dd if=/dev/zero of=/dev/TdZ count=2 bs=512
```

where T is the type of drive, s for SCSI or h for IDE; and Z is the letter of the drive you are using; ex: dka0=sda, dqa0=hda.

TLZ07 and TLZ09 Errata

Problems have been observed when trying to install to systems that have TLZ07 and TLZ09 tape devices installed. Specifically, when booting from the floppy, the system will hang during the SCSI probe phase of the boot process. The suggested work around is to power down the system, remove the power plug from the tape device, and then repower and boot the system. After the system has been installed, you can reconnect the tape device.

Glossary

A

Availability - Refers to the amount of time that an application is available to perform work, typically measured in percentage of uptime.

B

Bootstrap – The act of passing control over a computer to an operating system following system power-up.

C

CPU – Central Processing Unit

D

E

F

G

GB – Gigabytes

H

I

IDE – Integrated Development Environment

IP – Internet Protocol – The part of TCP/IP Protocol set that provides the routing mechanism.

J

K

L

M

Man pages - Manual pages

MIB – Management Information Base – Set of monitored items that management application and management agents use to monitor, analyze, and control the operation of managed devices.

MB - Megabytes

N

NIC – Network Interface Card

O

P

Q

R

RAID – Redundant Array of Independent Disks

S

SRM – System Resource Manager, used to configure the bootup parameters of Compaq AlphaServers.

System Partition – The name of the bootable partition used to configure Compaq AlphaServers.

Switch – A switch is a network device that selects a path or circuit for sending a unit of data to its next destination.

T

TCP/IP – Protocol that manages the transmission of packets on a network and checks for errors.

U

URL – Universal Resource Locator – the name of a specific resource on the Internet.

V

W

XYZ

YaST – The setup and configuration utility provided by SuSE for their Linux distribution.

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