



Upgrading the SMW Base Operating System From SLES 11 SP1 to SLES 11 SP2

S-0021-20

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RECORD OF REVISION

S-0021-20 Published November 2012 Supports upgrading the SMW base operating system from SLES 11 SP1 to SLES 11 SP2.

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Changes to this Document

Upgrading the SMW Base Operating System From SLES 11 SP1 to SLES 11 SP2

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Added information

- It has been determined that the 1st-generation desk-side RoHS SMWs (motherboards identified as H8DCAi models) cannot reliably run SLES 11 SP2 as the SMW base operating system; see the Caution on page 1.
- [Appendix B, Rack-mount SMW Running SLES 11 SP2: Creating a Bootable Backup Drive on page 39](#)
- [Back Up Your Newly-installed Software on page 27](#)

Revised information

- [Back Up Your Current Software on page 8](#)

Contents

	<i>Page</i>
Upgrading the SMW Base Operating System From SLES 11 SP1 to SLES 11 SP2 [1]	7
1.1 Before You Start	7
1.2 Back Up Your Current Software	8
1.3 Shut Down the Cray System	8
1.4 Turn Off the Running Daemons	9
1.5 Back Up and Modify <code>/etc/fstab</code> File Systems	10
1.6 Ensure that <code>/boot/grub/menu.lst</code> Is Not Utilizing By-path Device Names	11
1.7 Ensure that <code>/boot/grub/device.map</code> Is Not Utilizing By-path Device Names	12
1.8 For Desk-side SMWs Only	13
1.8.1 Modifying the Desk-side SMW Ethernet <code>udev</code> Rules	13
1.8.2 Configuring the Desk-side SMW for SLES 11 SP2 Video Drivers	13
1.9 Upgrade the SMW Base Operating System to SLES 11 SP2	16
1.10 Re-enable the Disabled File Systems with New Device Mount Points	25
1.11 Back Up Your Newly-installed Software	27
Appendix A Rack-mount SMW Running SLES 11 SP1: Creating a Bootable Backup Drive	29
Appendix B Rack-mount SMW Running SLES 11 SP2: Creating a Bootable Backup Drive	39
B.1 Rack-mount SMW: Creating a Cray System Management Workstation (SMW) Bootable Backup Drive	39
Appendix C Desk-side SMW: Creating a Bootable Backup Drive	51
C.1 Desk-side SMW: Creating an System Management Workstation (SMW) Bootable Backup Drive . . .	51
Procedures	
Procedure 1. Shutting down the Cray system	8
Procedure 2. Turning off the running daemons	9
Procedure 3. Backing up and modifying <code>/etc/fstab</code> file systems	10
Procedure 4. Ensuring that <code>/boot/grub/menu.lst</code> is not utilizing by-path device names	11
Procedure 5. Ensuring that <code>/boot/grub/device.map</code> is not utilizing by-path device names	12

	<i>Page</i>
Procedure 6. Replacing the desk-side SMW 31-network.rules file	13
Procedure 7. Desk-side SMW: Configuring the SMW for SLES 11 SP2 Video Drivers	14
Procedure 8. Rack-mount SMW: Installing the base operating system	16
Procedure 9. Desk-side SMW: Upgrade the SMW base operating system	21
Procedure 10. Re-enabling the disabled file systems with new device mount points	25
Procedure 11. Rack-mount SMW Running SLES 11 SP1: Creating an SMW bootable backup drive	29
Procedure 12. Rack-mount SMW: Creating an SMW bootable backup drive	39
Procedure 13. Desk-side SMW: Creating an SMW bootable backup drive	51

Figures

Figure 1. Front View of the Rack-mount SMW Chassis Hard Drives	25
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Upgrading the SMW Base Operating System From SLES 11 SP1 to SLES 11 SP2 [1]

Important: Before you perform this upgrade process, your SMW must have the Cray System Management Workstation (SMW) 5.1.UP02 release or later SMW software installed and be running the SUSE Linux Enterprise Server 11 (SLES 11) Service Pack 1 (SP1) as the SMW base operating system. The SLES 11 SP2 SMW base operating system is supported **only** with the SMW 5.1.UP02 or later SMW software.



Caution: If you have a 1st-generation desk-side RoHS SMW that you want to upgrade to SLES 11 SP2, you must make arrangements with Cray Hardware Product Support to replace the SMW with a newer one. It has been determined that the 1st-generation desk-side RoHS SMWs (motherboards identified as H8DCAi models) cannot reliably run SLES 11 SP2 as the SMW base operating system. The problem lies in the BIOS available for the motherboards. The BIOS erroneously reports the size of the boot disk in LBA mode, causing the Linux bootloader (`grub`) to either hang with the text `GRUB` on the screen or halt with a `GRUB Error 18` when booting. There is no workaround known for this problem. While one of these SMWs may actually succeed with installation and booting initially, subsequent installs or reboots will eventually fail and the failure is unrecoverable.

To determine if your SMW is a 1st-generation desk-side RoHS SMW, look at the back of the SMW. On the connector panel of the motherboard, there are three audio connections below the two Ethernet ports. These three connectors (blue, green, and metal/uncolored) identify this particular SMW as a 1st-generation motherboard. If this were not a 1st-generation motherboard (that is, if the SMW has a 2nd-generation or a 3rd-generation motherboard), it will have six audio connectors of various colors.

Note: This upgrade process does not require a complete fresh (initial) installation, and it does not change the Cray SMW software version currently running on your SMW.

1.1 Before You Start

To determine whether there are any changes to this procedure, read the Field Notice and the *README* file associated with this SMW base operating system upgrade.

1.2 Back Up Your Current Software

Before you upgrade your SMW base operating system to SLES 11 SP2, back up your current SMW software. For a rack-mount SMW, see [Appendix A, Rack-mount SMW Running SLES 11 SP1: Creating a Bootable Backup Drive on page 29](#); for a desk-side SMW, see [Appendix C, Desk-side SMW: Creating a Bootable Backup Drive on page 51](#).

1.3 Shut Down the Cray System

Important: This upgrade process requires physical access to the SMW in order to shut down the SMW, boot the upgrade media, and install the SLES 11 SP2 software. Ensure that you have the SMW base operating system DVD that is labeled `Cray-SMWbase11SP2-yyyymmdd`. (If you are using a downloaded ISO file, the label will be `Cray-ULC11SP2-yyyymmddhhmm.iso`.)

Procedure 1. Shutting down the Cray system



Warning: The procedure to install the SMW base operating system breaks the connection from the SMW; shut down your Cray system now.

1. Log on to the SMW as `crayadm` and confirm that the Cray system is shut down.

```
crayadm@smw:~> ping boot
```

If the command responds with `alive`, it is up and needs to be shut down.

2. Shut down the system by executing the following command.

```
crayadm@smw:~> xtbootsys -s last -a auto.xtshutdown
```

For more information about using automation files, see the `xtbootsys(8)` man page.

Alternatively, you can execute these commands as `root` from the boot node to shutdown your system.

```
boot:~# xtshutdown -y  
boot:~# shutdown -h now;exit
```

1.4 Turn Off the Running Daemons

Procedure 2. Turning off the running daemons

1. Identify the daemons that are running on the system.

On the SMW, `su` to `root` and execute the `chkconfig` command.

Note: Your output will be different, depending on the type of ASIC in your Cray system.

```
crayadm@smw:~> su - root
smw:~ # chkconfig | egrep "rsms|mz|mysql|dbMonitor|syslog"
cray-mzlogmanagerd    off
cray-mzsd              off
cray-mzsyslogd        off
cray-mzwatcher        on
cray-syslog            on
dbMonitor              on
earlysyslog           on
mysql                  on
rsms                   on
syslog                 off
```

Save the output for reference when stopping, disabling, re-enabling, and starting services in the remaining steps of this procedure and in later procedures of this document.

2. Utilizing the list produced in [step 1](#), stop the SMW service daemons that are listed. An example of stopping services on a Cray system that has Gemini ASICs follows:

Important: The list of services that you stop should be based on the list from [step 1](#).

```
smw:~ # /etc/init.d/rsms stop
smw:~ # /etc/init.d/cray-syslog stop
smw:~ # /etc/init.d/cray-mzlogmanagerd stop
smw:~ # /etc/init.d/cray-mzsd stop
smw:~ # /etc/init.d/cray-mzsyslogd stop
smw:~ # /etc/init.d/cray-mzwatcher stop
smw:~ # /etc/init.d/dbMonitor stop
smw:~ # /etc/init.d/mysql stop
```

- Utilizing the same list produced in [step 1](#), turn off the SMW service daemons that are listed. An example of turning off services on a Cray system that has Gemini ASICs follows:

Important: The list of services to turn off should be based on the list from [step 1](#).

```
smw:~ # chkconfig rsms off
smw:~ # chkconfig cray-syslog -f off
smw:~ # chkconfig cray-mzlogmanagerd off
smw:~ # chkconfig cray-mzsd off
smw:~ # chkconfig cray-mzsyslogd off
smw:~ # chkconfig cray-mzwatcher off
smw:~ # chkconfig dbMonitor off
smw:~ # chkconfig mysql off
smw:~ # chkconfig earlysyslog off
```

1.5 Back Up and Modify /etc/fstab File Systems

Note: The SLES 11 SP2 upgrade package has changed the format of the disk device names used to access disk partitions for the /dev/disk/by-path device entries. Because the SLES 11 SP2 software and upgrade process are under vendor control, it is necessary to work around and accommodate changes to these device names.

Procedure 3. Backing up and modifying /etc/fstab file systems

- Back up /etc/fstab before you modify the /etc/fstab file systems.

```
smw:~ # cp -p /etc/fstab /etc/fstab-preSLES11SP2
```

- Except for root (/) and swap, add noauto to all /etc/fstab file systems, and comment out the lines for /var/opt/cray/disk/1 and /var/lib/mysql or any other SMW file systems as indicated below.

```
smw:~ # vi /etc/fstab
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1 \
swap swap defaults 0 0
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2 \
/ ext3 acl,user_xattr 1 1
proc /proc proc defaults 0 0
sysfs /sys sysfs noauto 0 0
debugfs /sys/kernel/debug debugfs noauto 0 0
usbfs /proc/bus/usb usbfs noauto 0 0
devpts /dev/pts devpts mode=0620,gid=5 0 0
# /dev/disk/by-path/pci-0000:05:00.0-sas-phy4:1-0x4433221104000000:0-lun0-part1 \
/var/opt/cray/disk/1 ext3 defaults 1 0
# /dev/disk/by-path/pci-0000:05:00.0-sas-phy5:1-0x4433221105000000:0-lun0-part1 \
/var/lib/mysql ext3 defaults 1 0
```

3. Ensure that the root file system and swap do **not** reference a by-path device. They should be changed to its equivalent `/dev/sdX2` entry, usually `/dev/sda2`. This device can be verified by performing an `ls -l` on the root device entry used in `/etc/fstab`; for example:

```
smw:~ # ls -l /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1
lrwxrwxrwx 1 root root 10 2012-04-26 10:20 \
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1 -> ../../sda1
smw:~ # ls -l /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2
lrwxrwxrwx 1 root root 10 2012-04-26 10:20 \
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2 -> ../../sda2
```

Thus, the swap device in the above `fstab` example should have the first field changed to `/dev/sda1` and the root file system should be change to `/dev/sda2`:

```
/dev/sda1 swap                swap          defaults      0 0
/dev/sda2 /                        ext3          acl,user_xattr 1 1
```

Edit `/etc/fstab` to perform the above changes, if necessary.

```
smw:~ # vi /etc/fstab
```

1.6 Ensure that `/boot/grub/menu.lst` Is Not Utilizing By-path Device Names

Procedure 4. Ensuring that `/boot/grub/menu.lst` is not utilizing by-path device names

Similar to the `/etc/fstab` changes described in [Procedure 3 on page 10](#), the primary boot entry in the `/boot/grub/menu.lst` must also be inspected and, if the boot drive is referenced by the `/dev/disk/by-path` device, it must be modified.

An example of a by-path reference in `menu.lst` is:

```
smw:~ # cat /boot/grub/menu.lst
# Modified by YaST2. Last modification on Thu Dec 15 07:44:10 CST 2011
default 0
timeout 8
##YaST - generic_mbr
gfxmenu (hd0,1)/boot/message
##YaST - activate

###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.49-0.3
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.49-0.3-default \
root=/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2 \
resume=/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1 splash=silent \
crashkernel=256M-:128M@16M showopts vga=0x31a
    initrd /boot/initrd-2.6.32.49-0.3-default
```

If either the `root=` or the `resume=` entries in the system boot entry reference `/dev/disk/by-path`, then it must be changed to **not** use a by-path device.

Complete the following steps to effect this change.

1. Back up the `menu.lst` file.

```
smw:~ # cp -p /boot/grub/menu.lst /boot/grub/menu.lst-preSLES11SP2
```

2. Edit the `menu.lst` file to replace the `/dev/disk/by-path/...` references. Using the method described in [Procedure 3 on page 10](#), determine the `/dev/sdX` device names and replace the by-path names in `menu.lst`. Under normal circumstances, the entries should be edited to read `root=/dev/sda2` and `resume=/dev/sda1`.

```
smw:~ # vi /boot/grub/menu.lst
```

1.7 Ensure that `/boot/grub/device.map` Is Not Utilizing By-path Device Names

Procedure 5. Ensuring that `/boot/grub/device.map` is not utilizing by-path device names

Any reference to the boot drive (`hd0`) in `/boot/grub/device.map` will also need to be changed.

An example of a `/boot/grub/device.map` file referencing a by-path device name for the boot drive would have an entry similar to the following:

```
smw:~ # cat /boot/grub/device.map
(fd0) /dev/fd0
(hd0) /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0
```

If your SMW references such a by-path device name for `hd0`, change that entry to:

```
(hd0) /dev/sda
```

Complete the following steps to effect this change.

1. Back up the `device.map` file.

```
smw:~ # cp -p /boot/grub/device.map /boot/grub/device.map-preSLES11SP2
```

2. Edit the `device.map` file as described above in this procedure.

```
smw:~ # vi /boot/grub/device.map
```

1.8 For Desk-side SMWs Only

Note: The procedures in this section must be performed **only** on desk-side SMWs (RoHS-type SMWs). If you have a rack-mount SMW, skip to [Upgrade the SMW Base Operating System to SLES 11 SP2 on page 16](#).

1.8.1 Modifying the Desk-side SMW Ethernet udev Rules

In order for the SMW quad-port Ethernet card (which is installed in the SMW) to function properly with SLES 11 SP2, the Cray-installed udev rules must be replaced prior to installing SLES 11 SP2.

The new rules file is distributed as part of the SLES 11 SP2 release as a separate text file. The file, which is named `31-network.rules`, replaces the file on the SMW at location `/etc/udev/rules.d/31-network.rules`. (For information about udev rules, see the `udev(7)` man page.)

Procedure 6. Replacing the desk-side SMW `31-network.rules` file

Replace the desk-side SMW `31-network.rules` file as follows:

1. Copy and rename the existing SLES 11 SP1 `31-network.rules` file.

```
smw:~ # cp -p /etc/udev/rules.d/31-network.rules /etc/udev/31-network.rules.SLES11SP1
```

2. Replace the `31-network.rules` file on the desk-side SMW with the SLES 11 SP2 file, which is provided with the SMW SLES 11 SP1 to SP2 migration package you downloaded through CrayPort.

```
smw:~ # cp 31-network.rules-SLES11SP2 /etc/udev/rules.d/31-network.rules
```

1.8.2 Configuring the Desk-side SMW for SLES 11 SP2 Video Drivers

[Procedure 7](#) must be performed via a login session to the SMW, using one of the following methods:

- Remote `ssh` login session
- Console text-mode login (`Ctrl-Alt-F1` to switch from the console GUI to a text-mode login screen)

Procedure 7. Desk-side SMW: Configuring the SMW for SLES 11 SP2 Video Drivers

1. The console X11 GUI session will be terminated during this procedure. Ensure that the SMW GUI console is logged out. To stop the X11 console GUI server, execute this command, which logs out the SMW console GUI session and returns it to a text-mode console.

```
smw:~ # /etc/init.d/xdm stop
Shutting down service gdm                done
```

2. If the ATI Radeon `fglrx` driver is installed, remove it.
 - a. Determine if the ATI Radeon `fglrx` video driver is installed.

```
smw:~ # rpm -qa | grep fglrx
fglrx64_7_4_0_SLE11-8.702-1
```

If the `fglrx64_7_4_0_SLE11` RPM is not reported as installed, skip to [step 3](#).

- b. Remove/uninstall the ATI Radeon `fglrx` driver.

```
smw:~ # rpm -e fglrx64_7_4_0_SLE11-8.702-1
```

Note: The following output may be produced because the X11 server was shut down:

```
cat: /var/run/atievents.pid: No such file or directory
kill: usage: kill [-s sigspec | -n signum | -sigspec] pid | jobspec ... or kill -l [sigspec]
..failed
```

This output is normal and you may disregard it.

3. Modify `/etc/X11/xorg.conf` to utilize the VESA X11 video driver.
 - a. Edit the `/etc/X11/xorg.conf` file.

```
smw:~ # cd /etc/X11
smw:~ # cp -p xorg.conf xorg.conf-YYYYMMDDHHMM
smw:~ # vi xorg.conf
```

- b. Locate the configuration section entitled Section "Device".
- c. Comment out the "Driver" specification and create a new one that specifies the "vesa" driver; that is, change:

```
Section "Device"
    BoardName      "Radeon X1300/X1550"
    Driver         "radeonhd"
    Identifier     "Device[0]"
    Option        "monitor-DVI-I_1/digital" "Monitor[0]"
    VendorName     "ATI"
EndSection
```

to:

```
Section "Device"
    BoardName      "Radeon X1300/X1550"
    #Driver        "radeonhd"
    Driver         "vesa"
    Identifier     "Device[0]"
    Option         "monitor-DVI-I_1/digital" "Monitor[0]"
    VendorName     "ATI"
EndSection
```

- d. Your Driver device may have been utilizing radeonhd or radeon. SLES 11 SP2 utilizes the vesa device driver. Regardless of the driver previously used, perform the following to configure for the vesa driver.

- 1) Locate the configuration section entitled Section "Screen".

The following lines (or similar) will be included:

```
Section "Screen"
    DefaultDepth 16
    SubSection "Display"
        Depth      15
        Modes      "1280x1024" "1280x960" "1280x800" "1152x864" "1280x768" ...
        Virtual    3840 1200
    EndSubSection
```

- 2) Ensure that the DefaultDepth directive specifies a value of 16; if it does not, modify the line to indicate 16.
- 3) The Screen section contains five "Display" subsections. If these subsections contain Virtual directives, they must be commented out; for example:

```
Section "Screen"
    DefaultDepth 16
    SubSection "Display"
        Depth      15
        Modes      "1280x1024" "1280x960" "1280x800" "1152x864" "1280x768" ...
        #Virtual    3840 1200
    EndSubSection
...

```

- e. Write/save the changes to the xorg.conf file and exit the editor.

4. Before proceeding with the upgrade, reboot the SMW to ensure proper operation of the GUI console.

```
smw:~ # reboot
```

1.9 Upgrade the SMW Base Operating System to SLES 11 SP2

This section provides procedures to upgrade the SMW SLES 11 SP1 base operating system to the SMW SLES 11 SP2 base operating system.

To upgrade a rack-mount SMW, see [Procedure 8 on page 16](#).

To upgrade a desk-side SMW, see [Procedure 9 on page 21](#).

Procedure 8. Rack-mount SMW: Installing the base operating system

1. If the SMW is up, shut it down.

```
smw:~ # shutdown -h now;exit
```

The SMW should now be powered off.

2. Disconnect all extra drives and the boot RAID connection to the SMW.



Caution: While the SMW is powered off, unplug the secondary SMW disks and the boot RAID connection, and place protective covers on the fibre optic cables and connectors (if present). Disconnect all but the primary SMW drive being upgraded to prevent corruption during the software upgrade process.

3. Power up the SMW. When the BIOS power-on self-test (POST) process begins, **quickly press the F2 key** after the following messages appear in the upper-right of the screen.

```
F2 = System Setup
F10 = System Services
F11 = BIOS Boot Manager
F12 = PXE Boot
```

When the F2 keypress is recognized, the F2 = System Setup line changes to Entering System Setup.

After the POST process completes and all disk and network controllers have been initialized, the **BIOS** set-up screen appears.

4. Use the down-arrow key to highlight **Boot Settings**. Press the Enter key.

A window listing the following appears:

```
Boot Mode ..... BIOS
Boot Sequence ..... <ENTER>
USB Flash Drive Emulation Type..... <ENTER>
Boot Sequence Retry ..... <Disabled>
```

5. Use the down-arrow key to highlight **Boot Sequence**. Press the Enter key.

A window listing the following appears.

```
√ 1. Hard Drive C: (Integrated SAS 500 ID0A LUN0 ATA)
√ 2. Virtual CD
√ 3. Sata Optical Drive
√ 4. Embedded NIC 1 MBA v6.0.11 Slot 0100
√ 5. Virtual Floppy
```

- Using the up-arrow and down-arrow keys to select, and using the space key to enable/disable entries, modify the list so that only the 1. Hard Drive C: entry has a check mark.

```
√ 1. Hard Drive C: (Integrated SAS 500 ID0A LUN0 ATA)
   2. Virtual CD
   3. Sata Optical Drive
   4. Embedded NIC 1 MBA v6.0.11 Slot 0100
   5. Virtual Floppy
```

- Press the Esc key to exit the **Boot Sequence** window.
- Press the Esc key again to exit the **Boot Settings** window.
- Insert the base operating system DVD labeled Cray-SMWbase11SP2-yyyymmdd into the CD/DVD drive.
- Press the Esc key a final time to save changes and exit the BIOS set up. A screen listing exit options appears.

```
Save changes and exit
Discard changes and exit
Return to Setup
```

- Ensure that Save changes and exit is highlighted. Then press the Enter key. The SMW resets automatically.
- When the BIOS POST process begins again, **within 5 seconds, press the F11 key** after the following messages appear in the upper-right of the screen.

```
F2 = System Setup
F10 = System Services
F11 = BIOS Boot Manager
F12 = PXE Boot
```

When the F11 keypress is recognized, the F11 = BIOS Boot Manager line changes to Entering BIOS Boot Manager.

13. Watch the screen carefully as text scrolls until you see iDRAC6 Configuration Utility 1.57. **Within 5 seconds, press the Ctrl-E key** when the prompt Press <Ctrl-E> for Remote Access Setup within 5 sec... displays.

```

0 5 0 ATA WDC WD5000BPVT-0 1A01 465 GB
LSI Corporation MPT2 boot ROM successfully installed!

```

```

iDRAC6 Configuration Utility 1.57
Copyright 2010 Dell Inc. All Rights Reserved

```

```

iDRAC6 Firmware Rivision version: 1.54.15
Primary Backplane Firmware Revision 1.07

```

```
-----
```

```

IPv6 Settings
-----

```

```

IPv6 Stack      : Disabled
Address 1      : ::
Default Gateway : ::
-----

```

```

IPv4 Settings
-----

```

```

IPv4 Stack      : Enabled
IP Address      : 172. 31. 73.142
Subnet mask     : 255.255.255. 0
Default Gateway : 172. 31. 73. 1
Press <Ctrl-E> for Remote Access Setup within 5 sec...

```

The **iDRAC6 Configuration Utility** window appears.

14. In the **iDRAC6 Configuration Utility**, select **Virtual Media Configuration**.

The **Virtual Media Configuration** window appears.

15. Select the **Virtual Media** line until it indicated **Detached**.

```

Virtual Media ..... Detached

```

16. Press the Esc key to exit the **Virtual Media Configuration** window.
17. Press the Esc key again to exit the **iDRAC6 Configuration Utility** window.

The **BIOS Boot Manager** screen appears.

18. Use the up-arrow and down-arrow keys to highlight the SATA Optical Drive entry.
19. Press the Enter key to boot from the installation DVD.

20. **Within 10 to 15 seconds** after the **SUSE Linux Enterprise Server** boot menu displays, use the down-arrow key to scroll down and select the **Cray SMW Upgrade Install** option.

- Boot from Hard Disk
- Cray SMW Initial Install
- Cray SMW Initial Install Rackmount
- **Cray SMW Upgrade Install**
- Repair Installed System
- Rescue System
- Check Installation Media

Then press the Enter key.

Otherwise, the first selection on this boot menu list is activated (that is, boot from the SMW's disk).

21. A Disclaimer is displayed, indicating that the distribution media is specifically for Cray, Inc. hardware installations. Click **OK**.

A **Welcome** window is displayed, including option settings for Language and Keyboard Layout and a License Agreement.

22. Confirm the language for the SMW.

English (US) is the default language. To change the primary language, select your language choice from the menu. Then click on **Next** at the bottom of the window.

23. Confirm the Keyboard Layout desired for the installed SMW.

24. You must accept the distribution license agreement to continue upgrading the SMW. Click the acceptance box next to the text **I Agree to the License Terms** to accept the agreement, and then click **Next**.

25. A **Media Check** window is presented. Cray recommends that you verify the distribution DVD media before you proceed to upgrade the SMW. This verification ensures that the media is fully readable and properly formatted.

To begin the media check, click **Start Check**. This check completes in about 4 minutes, and the **Progress** bar at the bottom of the screen indicates the media check progress to completion. When a successful media check has completed, the text **Result: OK – The medium has been successfully verified**, appears on the screen.

Click **Next**.

The installation process now analyzes and probes the SMW for hardware and installed software.

26. An **Installation Mode** screen appears to enable you to select the type of software installation process to perform:

```
Select mode
  New Installation
  Update
  Repair Installed System
```

Select **Update**.



Warning: You must select **Update**. Do **not** select **New Installation**; otherwise, all existing data on the disk drive will be lost.

27. Click **Next**.
28. The **Select for Update** window, which indicates the partition or system to update, should indicate `/dev/sda2`. Click **Next**.
29. A **Warning** window, stating that some partitions are mounted by kernel-device name may appear. Such partitions are acceptable on the Cray SMW. Click **OK**.
30. A **Previously Used Repositories** screen appears, indicating that repositories were found on the system being upgraded. Make no changes to this screen. Click **Next**.
31. The **Installation Settings** window appears. Verify that the `Update Options` indicates **Update to SUSE Linux Enterprise Server 11 SP2**. (If it does not, click **Back** to return to the **Installation Mode** window, and properly select **Update**.)
 - a. Click on **Update** at the bottom of the window. The **Confirm Update** window appears. If you want to check or change settings, click on **Back**; otherwise, click on **Start Update** to confirm the settings and to install the operating system.

Note: A pop-up window that confirms hardware detection may appear. If this occurs, click on **continue**.

Note: The installation completes in approximately 15 minutes. During the process, the SMW automatically reboots and continues with the system configuration.
32. A **Test Internet Connection** window appears. Do not use this function. Select **No, Skip this test**, and click on **Next**.
33. The SLES 11 SP2 release notes appear. Click on **Next** to continue.
34. The **installation completion** window appears. An option to **Clone This System for Autoyast** is located near the bottom of the display.

Deselect the **Clone This System for Autoyast** option.

35. Click **Finish**.

The SMW boots to multi-user mode for login on the console. The SMW SLES 11 SP2 base operating system is now installed. Continue with the next step.

36. Remove the protective covers from the fiber optic cables and connectors, clean the ends of the cables and connectors, and reconnect the data cables.
37. Continue to [Re-enable the Disabled File Systems with New Device Mount Points on page 25](#).

Procedure 9. Desk-side SMW: Upgrade the SMW base operating system

1. If the SMW is up, shut it down.

```
smw:~ # shutdown -h now;exit
```

The SMW should now be powered off.

2. Disconnect all extra drives and the boot RAID connection to the SMW.



Caution: While the SMW is powered off, unplug the secondary SMW disks and the boot RAID connection, and place protective covers on the fibre optic cables and connectors (if present). Disconnect all but the primary SMW drive being upgraded to prevent corruption during the software upgrade process.

3. Power up the SMW. When the BIOS power-on self-test (POST) process begins,
- quickly press the Del key**
- after the following messages appear on the screen.

```
Press DEL to run Setup
Press F12 if you want to boot from the network
Press F11 for BBS POPUP
Initializing USB Controllers .. Done.
...
USB Device(s): 1 Keyboard, 1 Mouse
```

(The last line in this example indicates that the SMW is ready to accept keyboard input.)

After the POST process completes, the **BIOS Setup Utility** screen appears.

4. Use the right arrow key to select the **Boot** menu. Use the down arrow to highlight **Boot Device Priority**. Press the Enter key.
5. Verify the boot priority list.

```
1st Boot Device [SATA:3M-ST3320613A]
2nd Boot Device [CD/DVD:PM-ATAPI DV]
3rd Boot Device [1st Floppy Drive]
```

If necessary, change the boot priority list so that the local hard drive is the first boot device and the local CD/DVD drive is the second boot device.

6. Press the Esc key to return to the
- BIOS Setup Utility**
- screen.

7. Press the down arrow key to select **Hard Disk Drives**, and press the Enter key.
8. Verify that the drive order shown corresponds to the physical placement of the hard drives in the SMW.

```
1st Drive    [SATA:3M-...]
2nd Drive    (disk was removed)
3rd Drive    (disk was removed)
```

Note: If any drives other than the 1st Drive are listed, local hard drives are still connected or the boot RAID is still connected. Power down the SMW and return to [step 2](#) of this procedure to disconnect these devices.

9. Press the Esc key to return to the **Boot** menu. Then press the left arrow key to select the **Main** menu. From the **Main** menu, use the down arrow key to select the **System Time** option. Set the system date and time to the time at the Coordinated Universal Time (UTC) time zone. Determine this time by running the command `date -u` on any system.
10. Insert the base operating system DVD labeled `Cray-SMWbase11SP2-yyyymmdd` into the CD/DVD drive. (If you are using a downloaded ISO file, the label will be `Cray-ULC11SP2-yyyymmddhhmm.iso`.)
11. Press the F10 key to save the BIOS changes. A dialog box displays the question **Save configuration changes and exit setup?**
 - Press the Enter key to save changes, exit the setup utility, and automatically reboot the SMW.
 - Alternatively, press Tab to highlight Cancel and then press the Enter key to cancel acceptance of BIOS changes, so that you can adjust a setting.
12. When the POST process begins again, **quickly press the F11 key** to enter Boot Device Selection mode.

```
Press DEL to run Setup
Press F12 if you want to boot from the network
Press F11 for BBS POPUP
Initializing USB Controllers .. Done.
...
USB Device(s): 1 Keyboard, 1 Mouse#:
```

(The last line in this example indicates that the SMW is ready to accept keyboard input.)

13. At the **Please select boot device** prompt, use the up arrow and down arrow keys to select the CD/DVD drive, and press the Enter key. A blue-backgrounded Cray logo screen with a **DVD-boot options** menu appears.

14. **Within 10 to 15 seconds**, after the **SUSE Linux Enterprise Server** boot menu displays, use the down arrow key to scroll down and select the **Cray SMW Upgrade Install** option.

- Boot from Hard Disk
- Cray SMW Initial Install
- Cray SMW Initial Install Rackmount
- **Cray SMW Upgrade Install**
- Repair Installed System
- Rescue System
- Check Installation Media

Then press the Enter key.

Otherwise, the first selection on this boot menu list is activated (that is, boot from the SMW's hard disk drive).

15. A Disclaimer is displayed, indicating that the distribution media is specifically for Cray, Inc. hardware installations. Click **OK**.

A **Welcome** window is displayed, including option settings for Language and Keyboard Layout and a License Agreement.

16. Confirm the language for the SMW.

English (US) is the default language. To change the primary language, select your language choice from the menu. Then click on **Next** at the bottom of the window.

17. Confirm the Keyboard Layout desired for the installed SMW.

18. You must accept the distribution license agreement to continue upgrading the SMW. Click the acceptance box next to the text **I Agree to the License Terms** to accept the agreement, and then click **Next**.

19. A **Media Check** window is presented. Cray recommends that you verify the distribution DVD media before you proceed to upgrade the SMW. This verification ensures that the media is fully readable and properly formatted.

To begin the media check, click **Start Check**. This check completes in about 4 minutes, and the **Progress** bar at the bottom of the screen indicates the media check progress to completion. When a successful media check has completed, the text **Result: OK – The medium has been successfully verified**, appears on the screen.

Click **Next**.

The installation process now analyzes and probes the SMW for hardware and installed software.

20. An **Installation Mode** screen appears to enable you to select the type of software installation process to perform:

```
Select mode
  New Installation
  Update
  Repair Installed System
```

Select **Update**.



Warning: You must select **Update**. Do **not** select **New Installation**; otherwise, all existing data on the disk drive will be lost.

21. Click **Next**.
22. The **Select for Update** window, which indicates the partition or system to update, should indicate `/dev/sda2`. Click **Next**.
23. A **Warning** window, stating that some partitions are mounted by kernel-device name may appear. Such partitions are acceptable on the Cray SMW. Click **OK**.
24. A **Previously Used Repositories** screen appears, indicating that repositories were found on the system being upgraded. Make no changes to this screen. Click **Next**.
25. The **Installation Settings** window appears. Verify that the **Update Options** indicates **Update to SUSE Linux Enterprise Server 11 SP2**. (If it does not, click **Back** to return to the **Installation Mode** window, and properly select **Update**.)
 - a. Click on **Update** at the bottom of the window. The **Confirm Update** window appears. If you want to check or change settings, click on **Back**; otherwise, click on **Start Update** to confirm the settings and to install the operating system.

Note: A pop-up window that confirms hardware detection may appear. If this occurs, click on **continue**.

Note: The installation completes in approximately 15 minutes. During the process, the SMW automatically reboots and continues with the system configuration.
26. A **Test Internet Connection** window appears. Do not use this function. Select **No, Skip this test**, and click on **Next**.
27. The SLES 11 SP2 release notes appear. Click on **Next** to continue.
28. The **installation completion** window appears. An option to **Clone This System for Autoyast** is located near the bottom of the display.

Deselect the **Clone This System for Autoyast** option.

29. Click **Finish**.

The SMW boots to multi-user mode for login on the console. The SMW SLES 11 SP2 base operating system is now installed. Continue with the next step.

30. Remove the protective covers from the fiber optic cables and connectors, clean the ends of the cables and connectors, and reconnect the data cables.

1.10 Re-enable the Disabled File Systems with New Device Mount Points

Procedure 10. Re-enabling the disabled file systems with new device mount points

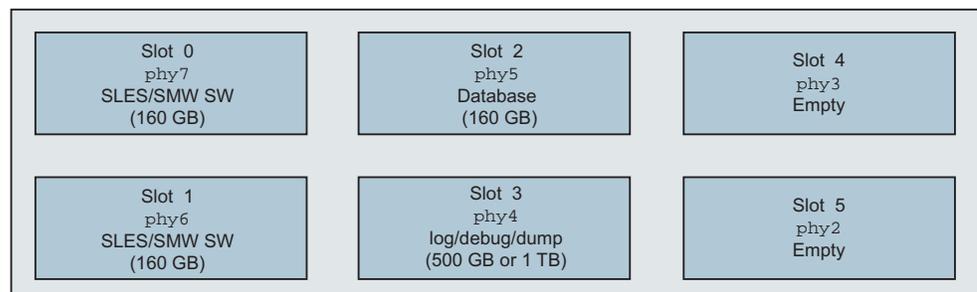
1. Revert your file system to the type of device names you use, either "by-id" or "by-path" device names.
2. The disabled file systems must be re-enabled with new device mount paths.

Note: The examples in [step 2](#) and [step 4](#) show how to determine the by-path device names needed for rack-mount systems; desk-side systems should use similar commands to determine the by-id names.

The identification of `phy` in the device name identifies the drive slot. For example, a rack-mount SMW has the following slot and device name mapping:

```
Slot  Device
----  -
0     phy7
1     phy6
2     phy5
3     phy4
4     phy3
5     phy2
```

Figure 1. Front View of the Rack-mount SMW Chassis Hard Drives



Determine the new device names for by-path, if necessary. The Linux /dev names change as shown below:

```
SLES 11 SP1: /dev/disk/by-path/pci-0000:05:00.0-sas-phyX:1-0x443322110X000000:0-lun0-part1
                ^^                                ^^
                Removed                            Removed

SLES 11 SP2: /dev/disk/by-path/pci-0000:05:00.0-sas-phyX-0x443322110X000000-lun-0-part1
                ^
                Added
```

For example,

```
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1
```

is now:

```
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0-part1
```

To identify these device names, execute the following command:

```
smw:~ # readlink -f \
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0-part1
```

3. Back up /etc/fstab.

```
smw:~ # cp -p /etc/fstab /etc/fstab-postSLES11SP2
```

4. Update /etc/fstab. If you modified the by-path disk names in /etc/fstab in [Procedure 3 on page 10](#) prior to updating the SMW to SLES 11 SP2, change the /etc/fstab entries affected by utilizing the new by-path mapping as described in [step 1](#) above.

Note: Cray recommends leaving swap and root (/) as "short" names in /etc/fstab; however, you must uncomment and modify the /var/opt/cray/disk/1 and /var/lib/mysql and any other file system names to use the new format.

Old names:

```
# /dev/disk/by-path/pci-0000:05:00.0-sas-phy4:1-0x4433221104000000:0-lun0-part1 \
/var/opt/cray/disk/1    ext3    defaults    1 0
# /dev/disk/by-path/pci-0000:05:00.0-sas-phy5:1-0x4433221105000000:0-lun0-part1 \
/var/lib/mysql        ext3    defaults    1 0
```

New names:

```
/dev/disk/by-path/pci-0000:05:00.0-sas-phy4-0x4433221104000000-lun-0-part1 \
/var/opt/cray/disk/1    ext3    defaults    1 0
/dev/disk/by-path/pci-0000:05:00.0-sas-phy5-0x4433221105000000-lun-0-part1 \
/var/lib/mysql        ext3    defaults    1 0
```

5. Update `/boot/grub/menu.lst`. The root (`/`) and swap sections should match whatever you set in your `/etc/fstab` file. If you used short names there, use short names here as well. By default, SLES updates leave the by-path name, so if you use by-path device names, change the `/boot/grub/menu.lst` entries affected by utilizing the new by-path mapping as described in [step 1](#) above.
6. Update `/boot/grub/device.map`. The format should match your `/etc/fstab` and `/boot/grub/menu.lst` files. If you used short names there, use short names here as well. If you use by-path device names, change the `/boot/grub/device.map` entries affected by utilizing the new by-path mapping as described in [step 1](#) above.
7. Re-enable services. Utilizing the list produced in [Procedure 2 on page 9](#), re-enable the SMW service daemons listed. An example of re-enabling services on a Cray system that has Gemini ASICs follows (your output will be different, depending on the type of ASIC in your Cray system).

Important: The list of services that you re-enable should be based on the list from [Procedure 2 on page 9](#).

```
smw:~ # chkconfig mysql on
smw:~ # chkconfig cray-syslog on
smw:~ # chkconfig rsms on
smw:~ # chkconfig cray-mzsd on
smw:~ # chkconfig cray-mzwatcher on
smw:~ # chkconfig dbMonitor on
```

Important: The `earlysyslog` service was disabled before the upgrade, but the upgrade re-enabled it; turn the `earlysyslog` service off.

```
smw:~ # chkconfig earlysyslog off
```

8. Reboot the SMW.

```
smw:~ # reboot
```

The upgrade is now complete.

1.11 Back Up Your Newly-installed Software

After you upgrade your SMW base operating system to SLES 11 SP2, back up your current SMW software. For a rack-mount SMW, see [Appendix B, Rack-mount SMW Running SLES 11 SP2: Creating a Bootable Backup Drive on page 39](#); for a desk-side SMW, see [Appendix C, Desk-side SMW: Creating a Bootable Backup Drive on page 51](#).

Rack-mount SMW Running SLES 11 SP1: Creating a Bootable Backup Drive [A]



Warning: You **must** be running the SUSE Linux Enterprise Server version 11 Service Pack 1 (SLES 11 SP1) SMW base operating system on your SMW in order to perform the procedures in this chapter. If you have completed migrating your SMW base operating system to SLES 11 SP2, see [Appendix B, Rack-mount SMW Running SLES 11 SP2: Creating a Bootable Backup Drive](#) on page 39.

The following procedure creates a bootable backup drive for a rack-mount SMW in order to replace the primary drive if the primary drive fails. When this procedure is completed, the backup drive on the SMW will be a bootable replacement for the primary drive when the backup drive is plugged in as or cabled as the primary drive.

Procedure 11. Rack-mount SMW Running SLES 11 SP1: Creating an SMW bootable backup drive

Important: The disk device names shown in this procedure are only examples. You should substitute the actual disk device names for your system. The boot disk is phy7 and is slot 0, and the bootable backup disk is phy6 and is slot 1.



Caution: Shut down the Cray system before you begin this procedure.

Also be aware that there may be a considerable load on the SMW while creating the SMW bootable backup drive.

1. Log on to the SMW as crayadm and su to root.

```
crayadm@smw:~> su -
Password:
smw:~ # ls -al /dev/disk/by-path
total 0
drwxr-xr-x 2 root root 380 Mar 15 13:21 .
drwxr-xr-x 6 root root 120 Mar 11 18:42 ..
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:11.0-scsi-0:0:0:0 -> ../../sr0
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.0-scsi-0:0:0:0 -> ../../sdf
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.1-scsi-0:0:0:0 -> ../../sr1
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.1-scsi-0:0:0:1 -> ../../sdg
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0 -> ../../sde
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0-part1 -> ../../sde1
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0-part2 -> ../../sde2
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy4:1-...
lrwxrwxrwx 1 root root 10 Mar 14 15:57 pci-0000:05:00.0-sas-phy4:1-...
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy5:1-...
lrwxrwxrwx 1 root root 10 Mar 14 16:00 pci-0000:05:00.0-sas-phy5:1-...
```

```
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy6:1-...
lrwxrwxrwx 1 root root 10 Mar 15 13:21 pci-0000:05:00.0-sas-phy6:1-...
lrwxrwxrwx 1 root root 10 Mar 15 13:21 pci-0000:05:00.0-sas-phy6:1-...
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy7:1-...
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:05:00.0-sas-phy7:1-...
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:05:00.0-sas-phy7:1-...
```

2. If the backup drive disk partition table already exists and the partition table on the backup drive matches the partition table that is on the primary boot drive, skip this step; otherwise, create the backup drive disk partition table.

In this example, the partition table consists of the following:

- Slice 1: 4 GB Linux swap partition
 - Slice 2: Balance of disk space used for the root file system
- a. Use the `fdisk` command to display the boot disk partition layout. (Example output spacing was modified to fit on the printed page.)

```
mw:~ # fdisk -lu /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors
Units = sectors of 1 * 512 = 512 bytes
Disk identifier: 0x00000082

Device
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part1 \
    Boot Start      End      Blocks Id System
           63 16771859  8385898+ 82  Linux swap / Solaris
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2 \
    Boot Start      End      Blocks Id System
    * 16771860 312576704 147902422+ 83  Linux
```

- b. Use the `fdisk` command to configure the bootable backup disk partition layout. Set the bootable backup disk partition layout to match the boot disk partition layout. First, clear all of the old partitions using the `d` command within `fdisk`; next create a Linux swap and a Linux partition; and then write your changes to the disk. For help, type `m` within `fdisk` (see the following sample output, spacing was modified to fit on the printed page.)

```
smw:~ # fdisk -u /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0
```

```
The number of cylinders for this disk is set to 19457.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK)
```

```
Command (m for help): p
```

```
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors
Units = sectors of 1 * 512 = 512 bytes
Disk identifier: 0x00000080
```

```
Device
```

```

/dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part1 \
      Boot   Start      End      Blocks  Id System
      63 16771859      83828  82 Linux swap / Solaris
Partition 1 does not end on cylinder boundary.
/dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part2 \
      Boot   Start      End      Blocks  Id System
      167719 312581807 156207044+ 83 Linux

Command (m for help): d
Partition number (1-4): 2

Command (m for help): d
Selected partition 1

Command (m for help): n
Command action
  e extended
  p primary partition (1-4)
P
Partition number (1-4): 1
First sector (63-312581807, default 63): (Press the Enter key)
Using default value 63
Last sector, +sectors or +size{K,M,G} (63-312581807, default 312581807): 16771859
Command (m for help): t
Selected partition 1
Hex code (type L to list codes): 82
Changed system type of partition 1 to 82 (Linux swap / Solaris)

Command (m for help): n
Command action
  e extended
  p primary partition (1-4)
P
Partition number (1-4): 2
First sector (16771860-312581807, default 16771860): (Press the Enter key)
Using default value 16771860
Last sector, +sectors or +size{K,M,G} (16771860-312581807, default 312581807): (Press the Enter key)
Using default value 312581807

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.

```

- c. Display the boot backup disk partition layout and confirm it matches your phy7 sector information.

```

smw:~ # fdisk -lu /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors

```

3. Initialize the swap device.

```

smw:~ # mkswap /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part1
mkswap: /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part1:
warning: don't erase bootbits sectors
(DOS partition table detected). Use -f to force.
Setting up swapspace version 1, size = 8385892 KiB
no label, UUID=c0ef22ac-b405-4236-855b-e4a09b6e94ed

```

4. Standardize the `/etc/fstab` and `grub` disk device names.

The device names that the installation process writes into the `/boot/grub/menu.lst` file are UDEV-based names (for example, `/dev/disk/by-id/scsi-SATA_ST3320620AS_922J3-part2` or `/dev/disk/by-id/ata-ST3320620A_9QFA85PV-part2`) instead of the more commonly used device names (for example, `/dev/sda2` or `/dev/hda2`). In the following procedures, edit the `/boot/grub/menu.lst` file to change **only** the long UDEV-based name to the shorter, commonly used device name reflected in the output of the `df` command on your system.

If the device names have already been standardized, skip to [step 5](#).



Caution: Mistakes in the `/boot/grub/menu.lst` file will affect your ability to boot the SMW.

- a. SLES 11 sets up `/etc/fstab` and `/boot/grub/menu.lst` with UDEV-based names for the root device. For example:

```
smw:~ # head -2 /etc/fstab
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2 /      ext3  acl,user_xattr  1 1
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1 swap  swap  defaults        0 0
```

```
smw:~ # more /boot/grub/menu.lst
###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default \
    root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 \
    resume=/dev/sdal splash=silent crashkernel=256M-:128M@16M
    showopts vga=0x31a initrd /boot/initrd-2.6.27.19-5-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default \
    root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 showopts \
    ide=nodma apm=off noresume edd=off powersaved=off nohz=off highres=off
    processor.max_cstate=1 x11failsafe vga=0x31a
    initrd /boot/initrd-2.6.27.19-5-default
```

- b. Execute the `df` command to get the name of the device to use in the `/etc/fstab` and `/boot/grub/menu.lst` files to replace the long UDEV-based device name. Then edit your `/etc/fstab` and `/boot/grub/menu.lst` files appropriately.

- 1) Execute the `df` command to get the name of the device to use in the `/etc/fstab` and `/boot/grub/menu.lst` files to replace the long UDEV-based device name. For example:

```
smw:# df
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/sda2        303528624    40652904 247457340  15% /
udev             1030780         460    1030320   1% /dev
```

- 2) Save a copy of your `/etc/fstab` and `/boot/grub/menu.lst` files.

```
smw:# cp -p /etc/fstab /etc/fstab.save
smw:# cp -p /boot/grub/menu.lst /boot/grub/menu.lst.save
```

- 3) Edit your `/etc/fstab` file appropriately; you will use the device name (dev) you got from the `df` command output. In this example, the "1" and "2" refer to the partition names on the device. Change the following lines, which changes the long name `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2` to `sda2` and changes `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1` to `sda1`. Ensure that your swap is on `sda1`:

```
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2 /      ext3  acl,user_xattr  1 1
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1 swap  swap  defaults          0 0
```

to:

```
/dev/sda2 /      ext3  acl,user_xattr  1 1
/dev/sda1 swap  swap  defaults          0 0
```

- 4) Edit your `/boot/grub/menu.lst` file appropriately; use the device name (dev) you got from the `df` command output. Change the long name `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2` to `sda2`. Change the following lines:

```
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 \
resume=/dev/sda1 splash=silent crashkernel=256M-:128M@16M showopts vga=0x31a
```

to:

```
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/sda2 resume=/dev/sda1 splash=silent \
crashkernel=256M-:128M@16M showopts vga=0x31a
```

and change the following lines:

```
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84part2 \
showopts ide=nodma apm=off noresume edd=off powersaved=off nohz=off \
highres=off processor.max_cstate=1 x11failsafe vga=0x31a
```

to:

```
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/sda2 showopts ide=nodma apm=off noresume edd=off \
powersaved=off nohz=off highres=off processor.max_cstate=1 x11failsafe vga=0x31a
```

- 5) Verify that the edited files are correct and matches the output of the `df` command.

```
smw:~ # head -2 /etc/fstab
/dev/sda2 / ext3 acl,user_xattr 1 1
/dev/sda1 swap swap defaults 0 0

smw:~ # more /boot/grub/menu.lst
###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default root=/dev/sda2 \
    resume=/dev/sda1 splash=silent crashkernel=256M-:128M@16M showopts
    initrd /boot/initrd-2.6.27.19-5-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default \
    root=/dev/sda2 showopts ide=nodma apm=off noresume edd=off
    powersaved=off nohz=off highres=off initrd /boot/initrd-2.6.27.19-5-default
```

5. Update the grub device table to recognize any new drives added since the initial operating system installation.



Caution: Although all of the disks connected to the SMW are available to the system, grub only detects the first 16 devices. Therefore, if you add a disk to the SMW **after** the SMW is connected to the boot RAID, it is advisable to reboot the SMW **before** continuing this procedure.

- a. Back up the current grub device mapping file.

```
smw:~ # mv /boot/grub/device.map /boot/grub/device.map-20110315
```

- b. Invoke the grub utility to create a new device mapping file.

```
smw:~ # grub --device-map=/boot/grub/device.map
Probing devices to guess BIOS drives. This may take a long time.

GNU GRUB version 0.97 (640K lower / 3072K upper memory)

[ Minimal BASH-like line editing is supported. For the first word, TAB
  lists possible command completions. Anywhere else TAB lists the possible
  completions of a device/filename. ]

grub> quit
```

The file `/boot/grub/device.map` is now updated to reflect all drives, utilizing the standardized drive naming. This file can be viewed for verification; for example:

```
smw:~ # cat /boot/grub/device.map
(fd0)  /dev/fd0
(hd0)  /dev/sda
(hd1)  /dev/sdb
(hd2)  /dev/sdc
(hd3)  /dev/sdd
(hd4)  /dev/sde
```

6. Create a new file system on the backup drive root partition by executing the `mkfs` command.

```
smw:~ # mkfs -t ext3 /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part2
mke2fs 1.41.9 (22-Aug-2009)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
9248768 inodes, 36976243 blocks
1848812 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
1129 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000, 7962624, 11239424, 20480000, 23887872

Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 37 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
```

7. Mount the new backup root file system on `/mnt`.

```
smw:~ # mount /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part2 /mnt
```

8. Confirm that the backup root file system is mounted.

```
smw:~ # df
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/sda2             303528624    6438700 281671544   3% /
udev                  1030332         116   1030216   1% /dev
/dev/sdb2             306128812    195568 290505224   1% /mnt
```

The running root file system device is the one mounted on `/`.

9. Dump the running root file system to the backup drive.

```
smw:~ # cd /mnt
smw:~ # dump 0f - /dev/disk/by-path/pci-0000:05:00.0-sas-phy7:1-0x4433221107000000:0-lun0-part2 \
| restore rf -
DUMP: WARNING: no file `/etc/dumpdates'
DUMP: Date of this level 0 dump: Tue Mar 15 13:43:17 2011
DUMP: Dumping /dev/sda2 (/) to standard output
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 7898711 blocks.
DUMP: Volume 1 started with block 1 at: Tue Mar 15 13:44:40 2011
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
restore: ./lost+found: File exists
DUMP: 79.34% done at 20890 kB/s, finished in 0:01
DUMP: Volume 1 completed at: Tue Mar 15 13:52:13 2011
DUMP: Volume 1 7908080 blocks (7722.73MB)
DUMP: Volume 1 took 0:07:33
DUMP: Volume 1 transfer rate: 17457 kB/s
DUMP: 7908080 blocks (7722.73MB)
DUMP: finished in 453 seconds, throughput 17457 kBytes/sec
DUMP: Date of this level 0 dump: Tue Mar 15 13:43:17 2011
DUMP: Date this dump completed: Tue Mar 15 13:52:13 2011
DUMP: Average transfer rate: 17457 kB/s
DUMP: DUMP IS DONE
```

10. Install the grub boot loader.

To make the backup drive bootable, reinstall the grub boot facility on that drive.



Caution: Although all of the disks connected to the SMW are available to the system, grub only detects the first 16 devices. Therefore, if you add a disk to the SMW **after** the SMW is connected to the boot RAID, it is advisable to reboot the SMW **before** continuing this procedure.

- a. Create a unique file on the backup drive to be used to identify that drive to grub boot facility.

```
smw:~ # cd /
smw:~ # touch /mnt/THIS_IS_6
```

- b. Invoke the grub boot utility. Within the grub boot utility:
 - 1) Execute the `find` command to locate the drive designation that grub uses.
 - 2) Select the drive to which the boot blocks will be installed with the `root` command.
 - 3) Use the `setup` command to set up and install the grub boot blocks on that drive.

Note: The Linux grub utility and boot system **always** refer to drives as `hd`, regardless of the actual type of drives.

For example:

```
smw:~ # grub
GNU GRUB version 0.97 (640K lower / 3072K upper memory)
[ Minimal BASH-like line editing is supported. For the first word, TAB
  lists possible command completions. Anywhere else TAB lists the possible
  completions of a device/filename. ]
grub> find /THIS_IS_6
(hd2,1)
grub> root (hd2,1)
root (hd2,1)
Filesystem type is ext2fs, partition type 0x83
grub> setup (hd2)
Checking if "/boot/grub/stage1" exists... yes
Checking if "/boot/grub/stage2" exists... yes
Checking if "/boot/grub/e2fs_stage1_5" exists... yes
Running "embed /boot/grub/e2fs_stage1_5 (hd2)"... 17 sectors are embedded.
succeeded
Running "install /boot/grub/stage1 (hd2) (hd2)l+17 p (hd2,1)/boot/grub/stage2 \
/boot/grub/menu.lst"... succeeded
Done.
grub> quit
```

Important: For rack-mount SMWs, grub recreates `device.map` with the short names, not the persistent names. The `/dev/sdx` names must not be trusted. Always use `find` the next time you execute `grub` because it is possible that `grub root` may **not** be `hd2` the next time you execute `grub`.

11. Unmount the backup root partition.

```
smw:~ # umount /mnt
```

The drive is now bootable once plugged in or cabled as the primary drive.

Rack-mount SMW Running SLES 11 SP2: Creating a Bootable Backup Drive [B]

Note the following changes for the by-path disk names between SLES 11 SP1 and SLES 11 SP2:

```
SLES 11 SP1: /dev/disk/by-path/pci-0000:05:00.0-sas-phyX:1-0x443322110X000000:0-lun0-part1
                ^^                ^^
                Removed            Removed

SLES 11 SP2: /dev/disk/by-path/pci-0000:05:00.0-sas-phyX-0x443322110X000000-lun-0-part1
                ^
                Added
```

B.1 Rack-mount SMW: Creating a Cray System Management Workstation (SMW) Bootable Backup Drive



Warning: You **must** be running the SUSE Linux Enterprise Server version 11 Service Pack 2 (SLES 11 SP2) SMW base operating system and a release of SMW 6.0 or SMW 7.0 on your SMW in order to perform the procedures in this chapter.

The following procedure creates a bootable backup drive for a rack-mount SMW in order to replace the primary drive if the primary drive fails. When this procedure is completed, the backup drive on the SMW will be a bootable replacement for the primary drive when the backup drive is plugged in as or cabled as the primary drive.

Procedure 12. Rack-mount SMW: Creating an SMW bootable backup drive

Important: The disk device names shown in this procedure are only examples. You should substitute the actual disk device names for your system. The boot disk is `phy7` and is slot 0, and the bootable backup disk is `phy6` and is slot 1.



Caution: Shut down the Cray system before you begin this procedure.

Also be aware that there may be a considerable load on the SMW while creating the SMW bootable backup drive.

1. Log on to the SMW as crayadm and su to root.

```
crayadm@smw:~> su -
Password:
smw:~ # ls -al /dev/disk/by-path
total 0
drwxr-xr-x 2 root root 380 Mar 15 13:21 .
drwxr-xr-x 6 root root 120 Mar 11 18:42 ..
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:11.0-scsi-0:0:0:0 -> ../../sr0
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.0-scsi-0:0:0:0 -> ../../sdf
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.1-scsi-0:0:0:0 -> ../../srl
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:12.2-usb-0:3:1.1-scsi-0:0:0:1 -> ../../sdg
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0 -> ../../sde
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0-part1 -> ../../sde1
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:00:13.2-usb-0:2.1:1.0-scsi-0:0:0:0-part2 -> ../../sde2
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy4-...
lrwxrwxrwx 1 root root 10 Mar 14 15:57 pci-0000:05:00.0-sas-phy4-...
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy5-...
lrwxrwxrwx 1 root root 10 Mar 14 16:00 pci-0000:05:00.0-sas-phy5-...
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy6-...
lrwxrwxrwx 1 root root 10 Mar 15 13:21 pci-0000:05:00.0-sas-phy6-...
lrwxrwxrwx 1 root root 10 Mar 15 13:21 pci-0000:05:00.0-sas-phy6-...
lrwxrwxrwx 1 root root 9 Mar 11 18:42 pci-0000:05:00.0-sas-phy7-...
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:05:00.0-sas-phy7-...
lrwxrwxrwx 1 root root 10 Mar 11 18:42 pci-0000:05:00.0-sas-phy7-...
```

2. **After you have installed SLES 11 SP2 as your SMW base operating system, complete this step to modify the configuration files on the SMW root drive, which will standardize the SMW's boot-time drive names with the Linux run-time drive names. If your SMW configuration files on the SMW root drive have been modified already (that is, your site has completed this step at least once after installing SLES 11 SP2 as your SMW base operating system, skip to [step 3](#).**

Set up ordered drives on your rack-mount SMW.

- a. Identify the installed SMW drive model numbers, serial numbers, and associated Linux device (`/dev`) names.

Provided with the SMW 7.0.UP01 release is a script named `smwmapdrives.sh`. This script will identify local (internal) drives mounted in the SMW and provide their Linux device (`/dev`) names. Execute the `smwmapdrives.sh` script on the SMW.

```
smw:~ # ./smwmapdrives.sh
List of SMW-installed disk drives
-----
Physical slot 0:
    /dev/sda
    /dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS
    /dev/disk/by-id/scsi-SATA_FUJITSU_MHZ2160_K85DTB227RDS
    /dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0
Physical slot 1:
    /dev/sdc
    /dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RD7
    /dev/disk/by-id/scsi-SATA_FUJITSU_MHZ2160_K85DTB227RD7
    /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0
Physical slot 2:
    /dev/sdd
    /dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RF3
    /dev/disk/by-id/scsi-SATA_FUJITSU_MHZ2160_K85DTB227RF3
    /dev/disk/by-path/pci-0000:05:00.0-sas-phy5-0x4433221105000000-lun-0
Physical slot 3:
    /dev/sdb
    /dev/disk/by-id/ata-ST9500620NS_9XF0665V
    /dev/disk/by-id/scsi-SATA_ST9500620NS_9XF0665V
    /dev/disk/by-path/pci-0000:05:00.0-sas-phy4-0x4433221104000000-lun-0
Physical slot 4:
    NOT INSTALLED
Physical slot 5:
    NOT INSTALLED
```

The device names for `by-id` are persistent and will reference the drive, regardless of the slot in which the drive is installed.

`by-path` names reference a physical drive slot only and do not identify the drive installed in that slot. This is the naming used by default for the logging and database drives when the SMW was installed. This `by-path` name is used to specifically install logging and database file systems because the `by-id` device names refer to the physical drive slots expected to be used for those file systems and are provided as the default examples in the SMW installation configuration process.

The `/dev/sdX` drive names are not persistent, except for the `/dev/sda` drive name, which always refers to the drive installed in physical slot 0 (zero) of the SMW; the other `/dev/sdX` names can change with each SMW boot

and **will** change if drives are added, removed, or reordered in the SMW slots. Only the `/dev/sda` drive name may ever be used for the rack-mount SMW for this reason.

Either the `by-id` naming or the `by-path` naming should be chosen for the site administrative policy for managing the SMW-install disk drives. The following documentation provides the steps necessary to implement this selection on the SMW prior to creating an SMW bootable backup drive.

- b. Back up the following files before proceeding:

```
smw# cp -p /boot/grub/device.map
      /boot/grub/device.map-YYYYMMDD
smw# cp -p /boot/grub/menu.lst /boot/grub/menu.lst-YYYYMMDD
smw# cp -p /etc/fstab /etc/fstab-YYYYMMDD
```

- c. Edit the `grub device.map` file to reflect physical drive locations.

To provide a direct mapping of the SMW disk drive physical slots to the boot loader (BIOS and GRUB) drive namings, the `device.map` mapping file used by `grub` should be replaced. Perform the following steps to install new `device.map` file entries to effect this mapping.

- 1) Edit the `grub device.map` file.
- 2) Delete all lines.
- 3) Enter the following lines into the file. These lines show each drive slot's physical location mapped to its boot-time `hd?` name.

Note: `by-id` names should not be used in the `device.map` file.

```
# Dell Rackmount r805 SMW
# grub(8) device mapping for boot-drive identification
# hd? numbers are being mapped to their physical
(hd0)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0
(hd1)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0
(hd2)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy5-0x4433221105000000-lun-0
(hd3)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy4-0x4433221104000000-lun-0
(hd4)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy3-0x4433221103000000-lun-0
(hd5)  /dev/disk/by-path/pci-0000:05:00.0-sas-phy2-0x4433221102000000-lun-0
```

- d. Modify the SMW boot drive `/etc/fstab` file to utilize `by-id` or `by-path` naming.

Modify the SMW file system mounting configuration file to utilize SMW disk `by-id` or `by-path` naming. Complete this step to replace any `/dev/sdX` disk partition references.

Note: The output of the `smwmapdrives.sh` script in [step 2.a](#) should be referenced for drive namings.

Edit `/etc/fstab`, replacing drive `/dev/sdX` references with either the `by-id` or `by-path` name's corresponding device name.

When a reference to `/dev/sda1` is being replaced, replace it with the corresponding "partition" file system suffixed with `-part1`. File system partitions for `/dev/sda` are indicated by the numeral appended to the device name; for example, `/dev/sda1` refers to partition 1 on `/dev/sda`. Replace it with the `by-id` and `by-path` device names and suffix the device name with `-part1`, keeping the same numeral identification.

For example, if the root and swap file systems are currently configured to mount `/dev/sda2`, they should be changed. Using the `by-id` device name from the example in [step 2.a](#), the `fstab` lines would change from:

```
/dev/sda1 swap                swap        defaults    0 0
/dev/sda2 /                        ext3        acl,user_xattr 1 1
```

to:

```
/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS-part1 swap swap defaults 0 0
/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS-part2 / ext3 acl,user_xattr 1 1
```

- e. Modify `/boot/grub/menu.lst` to reflect the `device.map` BIOS/boot-up drive changes for the `sdX` remapping.

The same device name replacement performed on `/etc/fstab` should also be performed on the GRUB bootloader `/boot/grub/menu.lst` configuration file. All references to `/dev/sdX` devices should be replaced with corresponding `by-id` or `by-path` device names.

- f. Invoke the `grub` utility to reinstall the SMW boot loader on the primary boot drive.

Once the changes to `device.map`, `fstab`, and `menu.lst` have been completed, the GRUB bootloader boot blocks must be updated to reflect changes to the device names. Complete this step to update the boot loader on the boot drive.

Invoke the `grub` utility and reinstall SMW root-drive boot blocks.

```
smw:~ # grub --no-curses
GNU GRUB version 0.97 (640K lower / 3072K upper memory)
[ Minimal BASH-like line editing is supported. For the first word, TAB
  lists possible command completions. Anywhere else TAB lists the possible
  completions of a device/filename. ]
grub> root (hd0,1)
root (hd0,1)
Filesystem type is ext2fs, partition type 0x83
grub> setup (hd0)
Checking if "/boot/grub/stage1" exists... yes
Checking if "/boot/grub/stage2" exists... yes
Checking if "/boot/grub/e2fs_stage1_5" exists... yes
Running "embed /boot/grub/e2fs_stage1_5 (hd0)"... 17 sectors \
are embedded. Succeeded
Running "install /boot/grub/stage1 (hd0) (hd0)1+17 p (hd0,1)/boot/grub/stage2 \
/boot/grub/menu.lst"... succeeded
Done.
grub> quit
```

3. If the backup drive disk partition table already exists and the partition table on the backup drive matches the partition table that is on the primary boot drive, skip this step; otherwise, create the backup drive disk partition table.

In this example, the partition table consists of the following:

- Slice 1: 4 GB Linux swap partition
 - Slice 2: Balance of disk space used for the root file system
- a. Use the `fdisk` command to display the boot disk partition layout. (Example output spacing was modified to fit on the printed page.)

```
mw:~ # fdisk -lu /dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors
Units = sectors of 1 * 512 = 512 bytes
Disk identifier: 0x00000082
```

```

Device
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0-part1 \
    Boot Start      End      Blocks Id System
                63 16771859  8385898+ 82 Linux swap / Solaris
/dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0-part2 \
    Boot Start      End      Blocks Id System
    * 16771860 312576704 147902422+ 83 Linux
```

- b. Use the `fdisk` command to configure the bootable backup disk partition layout. Set the bootable backup disk partition layout to match the boot disk partition layout. First, clear all of the old partitions using the `d` command within `fdisk`; next create a Linux swap and a Linux partition; and then write your changes to the disk. For help, type `m` within `fdisk` (see the following sample output, spacing was modified to fit on the printed page.)

```
smw:~ # fdisk -u /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0
```

```
The number of cylinders for this disk is set to 19457.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK)
```

Command (m for help): **p**

```
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors
Units = sectors of 1 * 512 = 512 bytes
Disk identifier: 0x00000080
```

```

Device
/dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0-part1 \
    Boot Start      End      Blocks Id System
                63 16771859  83828 82 Linux swap / Solaris
Partition 1 does not end on cylinder boundary.
/dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0-part2 \
    Boot Start      End      Blocks Id System
    167719 312581807 156207044+ 83 Linux
```

```

Command (m for help): d
Partition number (1-4): 2

Command (m for help): d
Selected partition 1

Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)
P
Partition number (1-4): 1
First sector (63-312581807, default 63): (Press the Enter key)
Using default value 63
Last sector, +sectors or +size{K,M,G} (63-312581807, default 312581807): 16771859
Command (m for help): t
Selected partition 1
Hex code (type L to list codes): 82
Changed system type of partition 1 to 82 (Linux swap / Solaris)

Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)
P
Partition number (1-4): 2
First sector (16771860-312581807, default 16771860): (Press the Enter key)
Using default value 16771860
Last sector, +sectors or +size{K,M,G} (16771860-312581807, default 312581807): (Press the Enter key)
Using default value 312581807

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.

```

c. Display the boot backup disk partition layout and confirm it matches your phy7 sector information.

```

smw:~ # fdisk -lu /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0
Disk /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0: 160.0 GB, \
160041885696 bytes
255 heads, 63 sectors/track, 19457 cylinders, total 312581808 sectors

```

4. Initialize the swap device.

```

smw:~ # mkswap /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0-part1
mkswap: /dev/disk/by-path/pci-0000:05:00.0-sas-phy6:1-0x4433221106000000:0-lun0-part1:
warning: don't erase bootbits sectors
(DOS partition table detected). Use -f to force.
Setting up swapspace version 1, size = 8385892 KiB
no label, UUID=c0ef22ac-b405-4236-855b-e4a09b6e94ed

```

5. Create a new file system on the backup drive root partition by executing the `mkfs` command.

```
smw:~ # mkfs -t ext3 /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0-part2
mke2fs 1.41.9 (22-Aug-2009)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
9248768 inodes, 36976243 blocks
1848812 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
1129 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000, 7962624, 11239424, 20480000, 23887872

Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 37 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
```

6. Mount the new backup root file system on `/mnt`.

```
smw:~ # mount /dev/disk/by-path/pci-0000:05:00.0-sas-phy6-0x4433221106000000-lun-0-part2 /mnt
```

7. Confirm that the backup root file system is mounted.

```
smw:~ # df
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/sda2              303528624    6438700 281671544   3% /
udev                  1030332         116   1030216   1% /dev
/dev/sdb2              306128812    195568 290505224   1% /mnt
```

The running root file system device is the one mounted on `/`.

8. Dump the running root file system to the backup drive.

```

smw:~ # cd /mnt
smw:~ # dump 0f - /dev/disk/by-path/pci-0000:05:00.0-sas-phy7-0x4433221107000000-lun-0-part2 \
| restore rf -
DUMP: WARNING: no file `/etc/dumpdates'
DUMP: Date of this level 0 dump: Tue Mar 15 13:43:17 2011
DUMP: Dumping /dev/sda2 (/) to standard output
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 7898711 blocks.
DUMP: Volume 1 started with block 1 at: Tue Mar 15 13:44:40 2011
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
restore: ./lost+found: File exists
DUMP: 79.34% done at 20890 kB/s, finished in 0:01
DUMP: Volume 1 completed at: Tue Mar 15 13:52:13 2011
DUMP: Volume 1 7908080 blocks (7722.73MB)
DUMP: Volume 1 took 0:07:33
DUMP: Volume 1 transfer rate: 17457 kB/s
DUMP: 7908080 blocks (7722.73MB)
DUMP: finished in 453 seconds, throughput 17457 kBytes/sec
DUMP: Date of this level 0 dump: Tue Mar 15 13:43:17 2011
DUMP: Date this dump completed: Tue Mar 15 13:52:13 2011
DUMP: Average transfer rate: 17457 kB/s
DUMP: DUMP IS DONE

```

9. Modify the backup drive's `fstab` and `menu.lst` files to reflect the backup drive's device, replacing the primary drive's device name.

Note: This step is only necessary if `by-id` names are used. If `by-path` names are being utilized for the `root` and `swap` devices, changes are not necessary; these devices reference physical slots, and the backup drive will be moved to the same physical slot (slot 0) when replacing a failed primary boot drive.

- a. Edit `/mnt/etc/fstab`; replace the `root` and `swap` partitions' `by-id` device names with those used for this backup device, replacing the original disk device name.

For example, change:

```

/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS-part1 swap swap defaults
/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS-part2 / ext3 acl,user_xattr

```

to:

```

/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RD7-part1 swap swap defaults
/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RD7-part2 / ext3 acl,user_xattr

```

- b. Edit `/mnt/boot/grub/menu.lst`; replace the `root=` and `resume=` device names with those used for this backup device, replacing the original disk device name.

Note: The `root=` entry normally refers to partition `-part2`, and the `resume=` entry normally refers to partition `-part1`; these partition references **must** be maintained.

For example, replace the `menu.lst` configuration references of:

```
root=/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RDS-part2
```

with:

```
root=/dev/disk/by-id/ata-FUJITSU_MHZ2160BK_G2_K85DTB227RD7-part2
```

or similarly with the `by-id` device names, if those are preferred.

Replace the `resume=` references similarly.

10. Install the `grub` boot loader.

To make the backup drive bootable, reinstall the `grub` boot facility on that drive.



Caution: Although all of the disks connected to the SMW are available to the system, `grub` only detects the first 16 devices. Therefore, if you add a disk to the SMW **after** the SMW is connected to the boot RAID, it is advisable to reboot the SMW **before** continuing this procedure.

- a. Create a unique file on the backup drive to be used to identify that drive to `grub` boot facility.

```
smw:~ # cd /  
smw:~ # touch /mnt/THIS_IS_6
```

- b. Invoke the `grub` boot utility. Within the `grub` boot utility:

- 1) Execute the `find` command to locate the drive designation that `grub` uses.
- 2) Select the drive to which the boot blocks will be installed with the `root` command.
- 3) Use the `setup` command to set up and install the `grub` boot blocks on that drive.

Note: The Linux `grub` utility and boot system **always** refer to drives as `hd`, regardless of the actual type of drives.

For example:

```
smw:~ # grub
GNU GRUB version 0.97 (640K lower / 3072K upper memory)
[ Minimal BASH-like line editing is supported. For the first word, TAB
  lists possible command completions. Anywhere else TAB lists the possible
  completions of a device/filename. ]
grub> find /THIS_IS_6
(hd2,1)
grub> root (hd2,1)
root (hd2,1)
Filesystem type is ext2fs, partition type 0x83
grub> setup (hd2)
Checking if "/boot/grub/stage1" exists... yes
Checking if "/boot/grub/stage2" exists... yes
Checking if "/boot/grub/e2fs_stage1_5" exists... yes
Running "embed /boot/grub/e2fs_stage1_5 (hd2)"... 17 sectors are embedded.
succeeded
Running "install /boot/grub/stage1 (hd2) (hd2)l+17 p (hd2,1)/boot/grub/stage2 \
/boot/grub/menu.lst"... succeeded
Done.
grub> quit
```

Important: For rack-mount SMWs, grub recreates `device.map` with the short names, not the persistent names. The `/dev/sdx` names must not be trusted. Always use `find` the next time you execute `grub` because it is possible that `grub root` may **not** be `hd2` the next time you execute `grub`.

11. Unmount the backup root partition.

```
smw:~ # umount /mnt
```

The drive is now bootable once plugged in or cabled as the primary drive.

Desk-side SMW: Creating a Bootable Backup Drive [C]

C.1 Desk-side SMW: Creating an System Management Workstation (SMW) Bootable Backup Drive

The following procedure creates a System Management Workstation (SMW) bootable backup drive for a desk-side SMW in order to replace the primary drive if the primary drive fails. When this procedure is completed, the backup drive on the SMW will be a bootable replacement for the primary drive when the backup drive is plugged in as or cabled as the primary drive.

Note: In the following procedure, `/dev/sdX2` is the SMW disk (either `/dev/sdb2` or `/dev/sdc2`).

Procedure 13. Desk-side SMW: Creating an SMW bootable backup drive

Important: The disk device names shown in this procedure are only examples. You should substitute the actual disk device names for your system. For example, on an SMW with three SMW disks, the boot disk is `/dev/sda` and the bootable backup disk is `/dev/sdc`; on an SMW with two SMW disks, the boot disk is `/dev/sda` and the bootable backup disk is `/dev/sdb`.



Caution: Shut down the Cray system before you begin this procedure.

Also be aware that there may be a considerable load on the SMW while creating the SMW bootable backup drive.

1. Log on to the SMW as `crayadm` and `su` to `root`.

```
crayadm@smw:~> su - root
smw:~ #
```

2. If the backup drive disk partition table already exists and the partition table on the backup drive matches the partition table that is on the primary boot drive, skip this step; otherwise, create the backup drive disk partition table.

Note: For optimal performance, the source and destination disks should be on different buses; drive slots 0 and 1 are on a different bus than drive slots 2 and 3.

In this example, the partition table consists of the following:

- Slice 1: 4 GB Linux swap partition

- Slice 2: Balance of disk space used for the root file system
 - a. Use the `fdisk` command to display the boot disk partition layout.

```
smw:~ # fdisk -lu /dev/sda
Disk /dev/sda: 320.0 GB, 320072933376 bytes
255 heads, 63 sectors/track, 38913 cylinders, total 625142448 sectors
Units = sectors of 1 * 512 = 512 bytes

   Device   Boot      Start          End      Blocks   Id  System
/dev/sda1                63       8401994    4200966   82  Linux swap / Solaris
/dev/sda2   *    8401995    625137344    308367675   83  Linux
```

- b. Use the `fdisk` command to configure the bootable backup disk partition layout. Set the bootable backup disk partition layout to match the boot disk partition layout. First, clear all of the old partitions using the `d` command within `fdisk`; next create a Linux swap and a Linux partition; and then write your changes to the disk. For help, type `m` within `fdisk` (see the following sample output).

```
smw:~ # fdisk -u /dev/sdb
```

```
The number of cylinders for this disk is set to 38913.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK).
```

```
Command (m for help): p
Disk /dev/sdb: 320.0 GB, 320072933376 bytes
255 heads, 63 sectors/track, 38913 cylinders, total 625142448 sectors
Units = sectors of 1 * 512 = 512 bytes
```

```
   Device Boot      Start          End      Blocks   Id  System
/dev/sdb1                63       8401994    4200966   82  Linux swap
/dev/sdb2            8401995    625105214    308351610   83  Linux
```

```
Command (m for help): d
Partition number (1-5): 2
Command (m for help): d
Selected partition 1
Command (m for help): n
Command action
e extended
p primary partition (1-4)
p
Partition number (1-4): 1
First sector (63-625105215, default 63): (Press the Enter key)
Using default value 63
Last sector or +size or +sizeM or +sizeK (63-625105215, default 625105215): 8401994
```

```
Command (m for help): t
Selected partition 1
Hex code (type L to list codes): 82
Changed system type of partition 1 to 82 (Linux swap / Solaris)
```

```

Command (m for help): n
Command action
e extended
p primary partition (1-4)
P
Partition number (1-4): 2
First sector (8401995-625105215, default 8401995): (Press the Enter key)
Using default value 8401995
Last sector or +size or +sizeM or +sizeK (8401995-625105215, default 625105215): \
(Press the Enter key)
Using default value 625105215

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.

```

c. Display the boot backup disk partition layout.

```

smw:~ # fdisk -lu /dev/sdb
Disk /dev/sdb: 320.0 GB, 320072933376 bytes
255 heads, 63 sectors/track, 38913 cylinders, total 625142448 sectors
Units = sectors of 1 * 512 = 512 bytes

```

Device	Boot	Start	End	Blocks	Id	System
/dev/sdc1		63	8401994	4200966	82	Linux swap / Solaris
/dev/sdc2	*	8401995	625137344	308367675	83	Linux

3. Initialize the swap device.

```

smw:~ # mkswap /dev/sdb1

```

4. Standardize the /etc/fstab and grub disk device names.

The device names that the installation process writes into the `/boot/grub/menu.lst` file are UDEV-based names (for example, `/dev/disk/by-id/scsi-SATA_ST3320620AS_922J3-part2` or `/dev/disk/by-id/ata-ST3320620A_9QFA85PV-part2`) instead of the more commonly used device names (for example, `/dev/sda2` or `/dev/hda2`). In the following procedures, edit the `/boot/grub/menu.lst` file to change **ONLY** the long UDEV-based name to the shorter, commonly used device name reflected in the output of the `df` command on your system.

If the device names have already been standardized, skip to [step 5](#).



Caution: Mistakes in the `/boot/grub/menu.lst` file will affect your ability to boot the SMW.

- a. SLES 11 sets up `/etc/fstab` and `/boot/grub/menu.lst` with UDEV-based names for the root device. For example:

```
smw:~ # head -2 /etc/fstab
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2 /      ext3  acl,user_xattr  1 1
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1 swap  swap  defaults        0 0

smw:~ # more /boot/grub/menu.lst
###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default \
    root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 \
    resume=/dev/sda1 splash=silent crashkernel=256M-:128M@16M
    showopts vga=0x31a initrd /boot/initrd-2.6.27.19-5-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.27.19-5-default \
    root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 showopts \
    ide=nodma apm=off noresume edd=off powersaved=off nohz=off highres=off
    processor.max_cstate=1 x11failsafe vga=0x31a
    initrd /boot/initrd-2.6.27.19-5-default
```

- b. Execute the `df` command to get the name of the device to use in the `/etc/fstab` and `/boot/grub/menu.lst` files to replace the long UDEV-based device name. Then edit your `/etc/fstab` and `/boot/grub/menu.lst` files appropriately.

- 1) Execute the `df` command to get the name of the device to use in the `/etc/fstab` and `/boot/grub/menu.lst` files to replace the long UDEV-based device name. For example:

```
smw:# df
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/sda2        303528624    40652904 247457340  15% /
udev             1030780         460    1030320   1% /dev
```

- 2) Save a copy of your `/etc/fstab` and `/boot/grub/menu.lst` files.

```
smw:# cp -p /etc/fstab /etc/fstab.save
smw:# cp -p /boot/grub/menu.lst /boot/grub/menu.lst.save
```

- 3) Edit your `/etc/fstab` file appropriately; you will use the device name (`dev`) you got from the `df` command output. In this example, the "1" and "2" refer to the partition names on the device. Change the following lines, which changes the long name `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2` to `sda2` and changes `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1` to `sda1`. Ensure that your swap is on `sda1`:

```
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2 /      ext3  acl,user_xattr  1 1
/dev/disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part1 swap  swap  defaults        0 0
```

to:

```
/dev/sda2 / ext3 acl,user_xattr 1 1
/dev/sda1 swap swap defaults 0 0
```

- 4) Edit your `/boot/grub/menu.lst` file appropriately; use the device name (dev) you got from the `df` command output. Change the long name `disk/by-id/scsi-SATA_ST3320620AS_9QF922J3-part2` to `sda2`. Change the following lines:

```
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84-part2 \
resume=/dev/sda1 splash=silent crashkernel=256M-:128M@16M showopts vga=0x31a
```

to:

```
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/sda2 resume=/dev/sda1 splash=silent \
crashkernel=256M-:128M@16M showopts vga=0x31a
```

and change the following lines:

```
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/disk/by-id/ata-ST3320620AS_5QF00F84part2 \
showopts ide=nodma apm=off noresume edd=off powersaved=off nohz=off \
highres=off processor.max_cstate=1 x11failsafe vga=0x31a
```

to:

```
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/sda2 showopts ide=nodma apm=off noresume edd=off \
powersaved=off nohz=off highres=off processor.max_cstate=1 x11failsafe vga=0x31a
```

- 5) Verify that the edited files are correct and matches the output of the `df` command.

```
smw:~ # head -2 /etc/fstab
```

```
/dev/sda2 / ext3 acl,user_xattr 1 1
/dev/sda1 swap swap defaults 0 0
```

```
smw:~ # more /boot/grub/menu.lst
```

```
###Don't change this comment - YaST2 identifier: Original name: linux###
```

```
title SUSE Linux Enterprise Server 11 - 2.6.27.19-5
root (hd0,1)
kernel /boot/vmlinuz-2.6.27.19-5-default root=/dev/sda2 \
resume=/dev/sda1 splash=silent crashkernel=256M-:128M@16M showopts
initrd /boot/initrd-2.6.27.19-5-default
```

```
###Don't change this comment - YaST2 identifier: Original name: failsafe###
```

```
title Failsafe -- SUSE Linux Enterprise Server 11 - 2.6.27.19-5
root (hd0,1)
kernel /boot/vmlinuz-2.6.27.19-5-default \
root=/dev/sda2 showopts ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off initrd /boot/initrd-2.6.27.19-5-default
```

5. Update the `grub` device table to recognize any new drives added since the initial operating system installation.



Caution: Although all of the disks connected to the SMW are available to the system, `grub` only detects the first 16 devices. Therefore, if you add a disk to the SMW **after** the SMW is connected to the boot RAID, it is advisable to reboot the SMW **before** continuing this procedure.

- a. Back up the current `grub` device mapping file.

```
smw:~ # mv /boot/grub/device.map /boot/grub/device.map-YYYYMMDD
```

- b. Invoke the `grub` utility to create a new device mapping file.

```
smw:~ # grub --device-map=/boot/grub/device.map
Probing devices to guess BIOS drives. This may take a long time.
GNU GRUB version 0.97 (640K lower / 3072K upper memory)
grub> quit
```

The file `/boot/grub/device.map` is now updated to reflect all drives, utilizing the standardized drive naming. This file can be viewed for verification; for example:

```
smw:~ # cat /boot/grub/device.map
(fd0) /dev/fd0
(hd0) /dev/sda
(hd1) /dev/sdc
```

6. Create a new file system on the backup drive root partition by executing the `mkfs` command.

```
smw:~ # mkfs -t ext3 /dev/sdb2
mke2fs 1.41.1 (01-Sep-2008)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
19275776 inodes, 77091918 blocks
3854595 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
2353 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000, 7962624, 11239424, 20480000, 23887872, 71663616

Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 33 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
smw:~ #
```

7. Mount the new backup root file system on /mnt.

```
smw:~ # mount /dev/sdb2 /mnt
```

8. Confirm the running root file system device.

```
smw:~ # df
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/sda2             303528624    6438700 281671544   3% /
udev                  1030332        116   1030216   1% /dev
/dev/sdb2             306128812    195568 290505224   1% /mnt
```

The running root file system device is the one mounted on /.

9. Dump the running root file system to the backup drive.

```
smw:~ # cd /mnt
smw:~ # dump 0f - /dev/sda2 | restore rf -
DUMP: WARNING: no file `/etc/dumpdates'
DUMP: Date of this level 0 dump: Thu Nov 11 06:55:29 2010
DUMP: Dumping /dev/sda2 (/) to standard output
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 4003398 blocks.
DUMP: Volume 1 started with block 1 at: Thu Nov 11 06:57:38 2010
DUMP: dumping (Pass III) [directories]
DUMP: dumping (Pass IV) [regular files]
restore: ./lost+found: File exists
DUMP: 81.99% done at 10941 kB/s, finished in 0:01
DUMP: Volume 1 completed at: Thu Nov 11 07:04:01 2010
DUMP: Volume 1 4008910 blocks (3914.95MB)
DUMP: Volume 1 took 0:06:23
DUMP: Volume 1 transfer rate: 10467 kB/s
DUMP: 4008910 blocks (3914.95MB)
DUMP: finished in 383 seconds, throughput 10467 kBytes/sec
DUMP: Date of this level 0 dump: Thu Nov 11 06:55:29 2010
DUMP: Date this dump completed: Thu Nov 11 07:04:01 2010
DUMP: Average transfer rate: 10467 kB/s
DUMP: DUMP IS DONE
```

10. Install the grub boot loader.

To make the backup drive bootable, reinstall the grub boot facility on that drive.



Caution: Although all of the disks connected to the SMW are available to the system, grub only detects the first 16 devices. Therefore, if you add a disk to the SMW **after** the SMW is connected to the boot RAID, it is advisable to reboot the SMW **before** continuing this procedure.

- a. Create a unique file on the backup drive to be used to identify that drive to grub boot facility.

```
smw:~ # cd /
smw:~ # touch /mnt/THIS_IS_SDX
```

- b. Invoke the grub boot utility. Within the grub boot utility:

- 1) Execute the `find` command to locate the drive designation that `grub` uses.
- 2) Select the drive to which the boot blocks will be installed with the `root` command.
- 3) Use the `setup` command to set up and install the `grub` boot blocks on that drive.

Note: The Linux `grub` utility and boot system **always** refer to drives as `hd`, regardless of the actual type of drives.

For example:

```
smw:~ # grub
GNU GRUB  version 0.97  (640K lower / 3072K upper memory)
[ Minimal BASH-like line editing is supported.  For the first word, TAB^[]
lists possible command completions.  Anywhere else TAB lists the possible
completions of a device/filename. ]
grub> find /THIS_IS_SDX
find /THIS_IS_SDX
(hd1,1)
grub> root (hd1,1)
root (hd1,1)
Filesystem type is ext2fs, partition type 0x83
grub> setup (hd1)
setup (hd1)
Checking if "/boot/grub/stage1" exists... yes
Checking if "/boot/grub/stage2" exists... yes
Checking if "/boot/grub/e2fs_stage1_5" exists... yes
Running "embed /boot/grub/e2fs_stage1_5 (hd1)"...  17 sectors are embedded.
succeeded
Running "install /boot/grub/stage1 (hd1) (hd1)1+17 p
(hd1,1)/boot/grub/stage2 /boot/grub/menu.lst"... succeeded
Done.
grub> quit
```

11. Unmount the backup root partition.

```
smw:~ # umount /dev/sdb2
```

The drive is now bootable once plugged in or cabled as the primary drive.