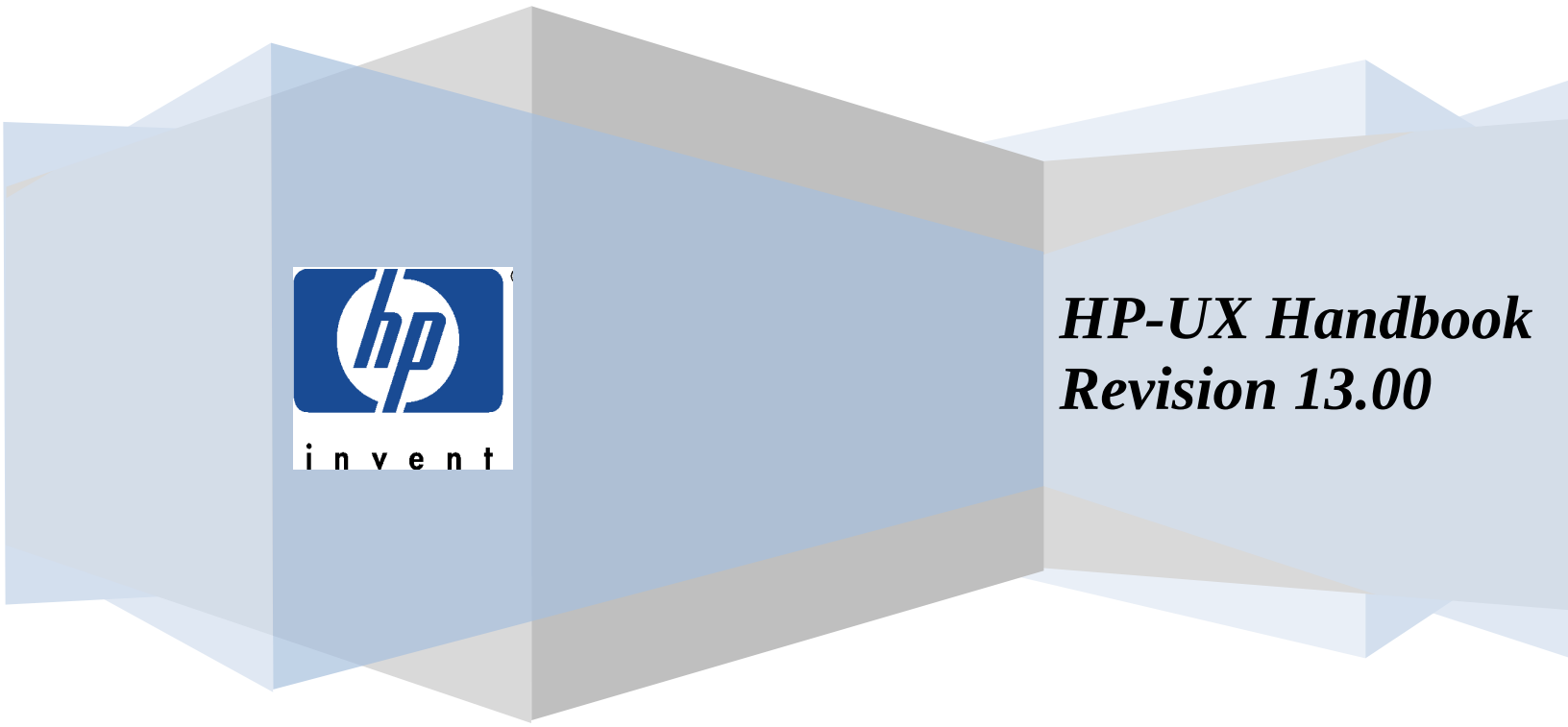
Chapter 04

System Recovery



HP-UX Handbook
Revision 13.00

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This chapter deals with several kinds of HP-UX boot problems and offers different approaches how to get the system up and running again. First of all it is always useful to know the general sequence of events that occure when an HP 9000 system boots up the HP-UX operating system.

ATTENTION: The boot process is different on Itanium system. Refer to the Itanium chapter.

How an HP-UX System boots

1. The firmware determines from which device to boot via either user input or primary boot path.

2. The firmware looks for a LIF header on that device, and if it finds it, it looks in the LIF header for where the ISL starts. A typical LIF header residing at the start of a LVM boot disk looks like this:

```
# lifls -l /dev/rdsk/c2t0d0
volume ISL10 data size 7984 directory size 8
filename    type    start    size     implement  created
=============================================================
ISL         -12800 584      306      0          00/11/08 20:49:59
HPUX        -12928 896      848      0          00/11/08 20:50:00
LABEL       BIN    1744     8        0          01/05/31 06:54:08
AUTO        -12289 1752     1        0          01/05/31 06:54:10
```

   The values represent 256 Byte units, so the ISL starts e.g. at offset 146 K. All LVM boot disks (created with `pvcreate -B`) reserve space between their PVRA and VGRA to hold a BDRA and the LIF files. Their LVM header size is always 2912K. In addition to the files above there may be additional files, e.g. for the Offline diagnostics. A PAD file may be used to fill (pad) unneeded space with zeros.

3. The firmware loads the ISL into memory from the boot device and executes it. It passes a flag to it that indicates whether to run interactively or to autoboot.

4. If the ISL is interactive then it gives the `ISL>` prompt and waits for user input before proceeding.

5. If the ISL is not interactive, then it looks for the AUTO file on the boot device to determine what to run next. Since the AUTO file is also listed in the LIF header we can have look at it using `lifcp(1)`:

```
# lifcp /dev/rdsk/c2t0d0:AUTO -
hpux
```

6. The AUTO file or user input usually supplies the hpux command's arguments. This tells ISL to load the program HPUX from the LIF header on the boot device and to run it with the given arguments.

NOTE: Things are different on a virtual partition (vPars) system. You do not load the kernel directly but through the vPars monitor `vpmon`. Refer to the vPars Chapter for details.

7. The HPUX program (also known as the *secondary loader* or *Mongoose*) figures out what HP-UX kernel to load, and what arguments to pass to it (like init state).

8. The secondary loader relocates itself to the end of the initial memory module, loads the kernel at the beginning and starts running it. The kernel needs to fit into that area!

9. Kernel initialization (real mode):
   initialize all of the memory, read `/stand/ioconfig` and `/stand/rootconf` files using the hpux loader's system calls, initialize all modules (1st level I/O configuration), allocate equivalently-mapped data structures, PDIR and hash table, optimize assembly, craft process 0, go virtual.

10. Kernel initialization (virtual mode):
    start the clock, start up the other processors, finish the I/O configuration (2nd level), initialize subsystems, initialize LVM/swap/dump, mount root file system read-only, fork() off system daemons.

11. fork() off `/sbin/pre_init_rc` and mount root file system read-write afterwards.

12. Start `/etc/init` process which, depending on the passed init state, starts working through `/etc/inittab` or launches a shell in the case of a *Single User* or *LVM Maintenance* boot.

13. Become `swapper` as process with PID 0.

Do also refer to the Boot Chapter.

Automated Recovery Procedures

If your system should become so compromised or corrupt that it will not boot at the login prompt, or the system boots, but critical files are corrupted, adversely affecting overall system performance, it may be useful to restore system elements with core recovery media. Before you attempt to recover an HP-UX system, you should have the following information about your system disk available:

- Revision of the HP-UX system which you are attempting to recover. Generally you should only attempt to recover HP-UX systems that match the version number of the recovery tools you are using. Data corruption could occur if you attempt to recover e.g. a 9.X file system with 11.X recovery tools.

- The address of the root filesystem on the disk (i.e., what file system you will be checking/repairing using fsck).
- The address of the bootlif path of that disk.
- Whether you have an LVM or non-LVM system.

The more you know about the system disk and its partitioning scheme, before you encounter major damage or corruption, the easier it will be for you to recover. The procedures which follow assume that both fsck and mount can be run successfully on the system disk; otherwise, the following procedures are not applicable. The original documentation can be found in the *Ignite-UX Administration Guide*, HP Part Number: B2355-90772, section *System Recovery*, subsection *Expert Recovery using the Core Media*. The manual is downloadable from http://docs.hp.com.

There are possible expert recovery situations, each of which has its associated automated recovery procedure:

- If, after a system problem, you can't get the system to the `ISL>` prompt from the system disk, you will want to rebuild the bootlif on the system disk.
- If you can get the system to the `ISL>` prompt, but cannot boot vmunix, then depending on the error(s) this might be any of the following problems such as missing vmunix, corrupted vmunix, corrupted LVM BDRA configuration, incorrect syntax in the LIF's AUTOEXEC file, or possible system disk corruption, etc.
- If you believe your kernel is corrupted, you will want to replace only the kernel on the boot filesystem.

Automated Procedure 1: Rebuilding bootlif and Installing Critical Files

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu select ***Recover an unbootable HP-UX system***. The following menu is presented:

```
                        HP-UX Recovery MENU

        Select one of the following:
        a.  Rebuild the bootlif (ISL, HPUX, and the AUTO file) and install
            all files required to boot and recover HP-UX on the
            root file system.
        b.  Do not rebuild the bootlif, but install files required to boot
            and recover HP-UX on the root file system.
        c.  Rebuild only the bootlif.
        d.  Replace only the kernel on the root file system.

        m.  Return to 'HP-UX Recovery Media Main Menu'.
        x.  Exit to the shell.

    Use this menu to select the level of recovery desired.

    Selection:
```

3. Select **a** to install both the bootlif and critical files; the following menu is then displayed:

```
                        DEVICE FILE VERIFICATION
                                MENU

    This menu is used to specify the path of the root file system.
    When the information is correct, select 'a'.

         INFORMATION to verify:
               Device file used for '/'(ROOT) is c0t1d0s1lvm

               The path to disk is 0/0/1/0.1.0

         Select one of the following:
               a.  The above information is correct.
               b.  WRONG!! The device file used for '/'(ROOT) is incorrect.

               m.  Return to the 'HP-UX Recovery MENU.'
               x.  Exit to the shell.

       NOTE: If '/' is an LVM, use an 's1lvm' suffix (e.g. c0t1d0s1lvm).

      Selection:
```

Carefully check if the path is the correct one, enter **a** in this case. In doubt choose ***Exit to shell*** and verify the path using ioscan. If you enter **b**; the following is then displayed:

```
Enter the device file associated with the '/'(ROOT) file system
 (example: c0t1d0s1lvm )
```

4. Enter the appropriate device file, in our case we choose `c2t0d0s1lvm` since we try to recover a system with LVM layout. The following menu is displayed next:

```
                        BOOTLIF PATH VERIFICATION
                                MENU

    This menu must be used to determine the path to the bootlif (ISL, HPUX
    and the AUTO file).
    When the information is correct, select 'a'.

       INFORMATION to verify:
            Path to the bootlif is 0/0/2/0.0.0

       Select one of the following:
            a.  The above information is correct.
            b.  WRONG!! The path to bootlif is incorrect.

            m.  Return to the 'HP-UX Recovery MENU.'
            x.  Exit to the shell.

      Selection:
```

5. Confirm the path entering ***a***, otherwise correct it after entering ***b***. The following menu is displayed next:

```
                        BOOT STRING VERIFICATION
                                MENU
```

```
      This menu must be used to verify the system's boot string.
      When the information is correct, select 'a'.

         INFORMATION to verify:
              The system's boot string should be:
                       'hpux -lm  /stand/vmunix'
              NOTE: The Boot address is {0/0/2/0.0.0}
                    the Root address is {0/0/1/0.1.0}.

          Select one of the following:
              a.  The above information is correct.
              b.  WRONG!! Prompt the user for the system's boot string.

              m.  Return to the 'HP-UX Recovery MENU.'
              x.  Exit to the shell.

         NOTE: For an LVM '/'(ROOT) the '-lm' option MUST be specified
               (example: 'hpux -lm /stand/vmunix' )

      Selection:
```

6. Confirm the boot string entering `a`, otherwise correct it after entering `b`. The following or similar messages are displayed next:

```
       *********** Installing bootlif  ***********

mkboot -a  hpux -lm  /stand/vmunix /dev/rdsk/c2t0d0

        After bringing the system back online the SWAP, BOOT and DUMP
        volume information in the BOOTLIF should be restored.

          For example:
            BOOT:
               If '/stand' is on a separate logical volume, then use
                 lvlnboot -b  /dev/<rootvg>/<lv of '/stand'> .
               Otherwise BOOT and ROOT are considered identical.

            DUMP:
               lvlnboot -d /dev/<rootvg>/<lv0 of dump>
               lvlnboot -d /dev/<rootvg>/<lv2 of dump>

            SWAP:
               lvlnboot -s /dev/<rootvg>/<lv0 of swap>

          Refer to the lvlnboot man page for more information.

           <Press return to continue>


                           FILE SYSTEM CHECK
                                 MENU
   The file system check '/sbin/fs/hfs/fsck -y /dev/rdsk/c2t0d0s1lvm'
   will now be run.

        Select one of the following:
             a.  Run fsck -y .
             b.  Prompt for the fsck run string on c2t0d0s1lvm.

             m.  Return to the 'HP-UX Recovery MENU.'
```

7. Select `a` to run fsck -y to check your file system for corruption; you will see a display similar to the following:

```
** /dev/rdsk/c2t0d0s1lvm
** Last Mounted on /ROOT/stand
** Phase 1 - Check Blocks and Sizes
```

```
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
63 files, 0 icont, 74047 used, 54185 free (97 frags, 6761 blocks)

Mounting c2t0d0s1lvm to the /ROOT directory...

/sbin/fs/vxfs/fsck -y /dev/rdsk/c2t0d0s2lvm
file system is clean - log replay is not required
/sbin/fs/vxfs/mount /dev/dsk/c2t0d0s2lvm /ROOT
/sbin/fs/hfs/mount /dev/dsk/c2t0d0s1lvm /ROOT/stand


Is the system being recovered installed with at least release 11.00 (Y\N)?
```

8. Assuming you use the right media you should answer `y` to confirm. Otherwise you get this error:

```
WARNING! files downloaded to this system will be 11.00
  versions. If your system is pre 11.00, installing 11.00
  files can create incompatibilities during the boot process
  For this reason, this part of the process is being skipped.

  The only operation that should be performed when the
  client is not installed with at least 11.00, is rebuilding
  the bootlif.

  To recover a pre 11.00 system use the diagnostic media to
  rebuild your system.
```

   Unfortunately the initial 11.11 Core CD talks about 11.00 also…

9. After confirmation the system starts to download the critical files to your root VG.

```
   ***** Downloading files to disk *****

x ./sbin/fs/hfs/mkfs, 290816 bytes, 568 tape blocks
x ./sbin/fs/hfs/newfs, 212992 bytes, 416 tape blocks
x ./sbin/fs/vxfs/mkfs, 393216 bytes, 768 tape blocks
x ./sbin/fs/vxfs/newfs, 327680 bytes, 640 tape blocks
x ./sbin/mkfs symbolic link to /sbin/fs_wrapper
x ./sbin/newfs symbolic link to /sbin/fs_wrapper
x ./sbin/fs_wrapper, 233472 bytes, 456 tape blocks
x ./sbin/sh, 401408 bytes, 784 tape blocks
x ./sbin/lvchange, 811008 bytes, 1584 tape blocks
./sbin/lvcreate linked to ./sbin/lvchange
./sbin/lvdisplay linked to ./sbin/lvchange
./sbin/lvextend linked to ./sbin/lvchange
./sbin/lvlnboot linked to ./sbin/lvchange
./sbin/lvreduce linked to ./sbin/lvchange
./sbin/lvremove linked to ./sbin/lvchange
./sbin/lvrmboot linked to ./sbin/lvchange
./sbin/pvchange linked to ./sbin/lvchange
./sbin/pvcreate linked to ./sbin/lvchange
./sbin/pvdisplay linked to ./sbin/lvchange
./sbin/pvmove linked to ./sbin/lvchange
./sbin/vgcfgbackup linked to ./sbin/lvchange
./sbin/vgcfgrestore linked to ./sbin/lvchange
./sbin/vgchange linked to ./sbin/lvchange
./sbin/vgcreate linked to ./sbin/lvchange
./sbin/vgdisplay linked to ./sbin/lvchange
./sbin/vgexport linked to ./sbin/lvchange
./sbin/vgextend linked to ./sbin/lvchange
./sbin/vgimport linked to ./sbin/lvchange
```

```
./sbin/vgreduce linked to ./sbin/lvchange
./sbin/vgremove linked to ./sbin/lvchange
./sbin/vgscan linked to ./sbin/lvchange
x ./sbin/awk, 397312 bytes, 776 tape blocks
x ./sbin/cat, 208896 bytes, 408 tape blocks
x ./sbin/chmod, 249856 bytes, 488 tape blocks
x ./sbin/chown, 258048 bytes, 504 tape blocks
x ./sbin/frecover, 339968 bytes, 664 tape blocks
x ./sbin/fsck symbolic link to /sbin/fs_wrapper
x ./sbin/init, 299008 bytes, 584 tape blocks
x ./sbin/insf, 385024 bytes, 752 tape blocks
x ./sbin/ioinit, 221184 bytes, 432 tape blocks
x ./sbin/ioscan, 229376 bytes, 448 tape blocks
x ./sbin/ls, 286720 bytes, 560 tape blocks
x ./sbin/mkboot, 262144 bytes, 512 tape blocks
x ./sbin/mkdir, 200704 bytes, 392 tape blocks
x ./sbin/mount, 274432 bytes, 536 tape blocks
x ./sbin/mv, 241664 bytes, 472 tape blocks
x ./sbin/pax, 380928 bytes, 744 tape blocks
x ./sbin/reboot, 245760 bytes, 480 tape blocks
x ./sbin/stty, 208896 bytes, 408 tape blocks
x ./sbin/umount, 221184 bytes, 432 tape blocks
x ./usr/lib/uxbootlf, 707584 bytes, 1382 tape blocks
Filesystem          kbytes    used   avail %cap iused   ifree iused Mounted on
/ROOT               163840   70173   87840  44%  2486   23414  10%   ?
Filesystem          kbytes    used   avail %cap iused   ifree iused Mounted on
/ROOT/stand         128232   74047   41361  64%    65   20415   0%   ?
```

10. You need to decide if the current kernel in `/stand` should be replaced by a generic recovery kernel.

```
Should the existing kernel be
 'left', 'overwritten', or 'moved'?[overwritten]
```

To skip this simply enter `left`. To backupyour existing kernel before writing a new one to your new file system, enter `moved`. To overwrite your existing kernel enter `overwritten`. After entering `moved` the following is displayed:

```
    -- '/stand/vmunix' has been renamed '/stand/vmunixBK' --

 downloading WINSTALL to /stand/vmunix

    **** Creating device files on the customer's disk ****

WARNING: ioctl: DLKM is not initialized

    ******* Renaming the following customer files: *******

    -- '/etc/passwd' has been renamed '/etc/passwdBK' --
    -- '/sbin/pre_init_rc' has been renamed '/sbin/pre_init_rcBK' --
    -- '/etc/inittab' has been renamed '/etc/inittabBK' --
    -- '/etc/ioconfig' has been renamed '/etc/ioconfigBK' --
    -- '/.profile' has been renamed '/.profileBK' --
    -- '/etc/fstab' has been renamed '/etc/fstabBK' --
    -- '/stand/ioconfig' has been renamed '/stand/ioconfigBK' --
    -- '/etc/profile' has been renamed '/etc/profileBK' --

       During the reboot process interrupt auto boot and
        bring the kernel up in 'maintenance mode' and continue
        with lvm recovery.

        For example, at the ISL prompt enter:
                          ISL>   hpux -lm (0/0/2/0.0.0)/stand/vmunix


           <Press return to continue>
```

```
                        RECOVERY COMPLETION
                               MENU

      Use this menu after the recovery process has installed all requested
      files on your system.

         Select one of the following:
              a.  REBOOT the customer's system and continue with recovery.
              b.  Return to the HP-UX Recovery Media Main Menu.

      Selection:
```

11. Once you find yourself at the Recovery Completion menu, complete the recovery process by selecting `a`. The system should automatically come up in *LVM Maintenance* Mode if `-lm` was included in the Boot String Verification menu. Type the following command from the shell prompt for more information about completing the recovery process:

```
# cat /RECOVERY.DOC
# cat /LVM.RECOVER
```

These two files are also part of this document.

Automated Procedure 2: Installing Critical Files only

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu select *Recover an unbootable HP-UX system*. The following menu is presented:

```
                        HP-UX Recovery MENU

      Select one of the following:
      a.  Rebuild the bootlif (ISL, HPUX, and the AUTO file) and install
          all files required to boot and recover HP-UX on the
          root file system.
      b.  Do not rebuild the bootlif, but install files required to boot
          and recover HP-UX on the root file system.
      c.  Rebuild only the bootlif.
      d.  Replace only the kernel on the root file system.

      m.  Return to 'HP-UX Recovery Media Main Menu'.
      x.  Exit to the shell.

    Use this menu to select the level of recovery desired.

    Selection:
```

3. Select `b` to install critical files only; the following menu is then displayed:

```
                        DEVICE FILE VERIFICATION
                               MENU

    This menu is used to specify the path of the root file system.
    When the information is correct, select 'a'.

         INFORMATION to verify:
               Device file used for '/'(ROOT) is c0t1d0s1lvm
```

```
              The path to disk is 0/0/1/0.1.0

         Select one of the following:
               a.  The above information is correct.
               b.  WRONG!! The device file used for '/'(ROOT) is incorrect.

               m.  Return to the 'HP-UX Recovery MENU.'
               x.  Exit to the shell.

        NOTE: If '/' is an LVM, use an 's1lvm' suffix (e.g.,c0t1d0s1lvm).

      Selection:
```

Carefully check if the patch is the correct one, enter `a` in this case. In doubt choose *Exit to shell* and verify the path using ioscan(1M). If you enter `b`; the following is then displayed:

```
Enter the device file associated with the '/'(ROOT) file system
 (example: c0t1d0s1lvm )
```

4. Enter the appropriate device file, in our case we choose `c2t0d0s1lvm` since we try to recover a system with LVM layout. The following menu is displayed next:

```
                          FILE SYSTEM CHECK
                                MENU
   The file system check '/sbin/fs/hfs/fsck -y /dev/rdsk/c2t0d0s1lvm'
   will now be run.

        Select one of the following:
             a.  Run fsck -y .
             b.  Prompt for the fsck run string on c2t0d0s1lvm.

             m.  Return to the 'HP-UX Recovery MENU.'
```

5. Select `a` to run fsck -y to check your file system for corruption; you will see a display similar to the following:

```
** /dev/rdsk/c2t0d0s1lvm
** Last Mounted on /ROOT/stand
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
63 files, 0 icont, 74047 used, 54185 free (97 frags, 6761 blocks)

Mounting c2t0d0s1lvm to the /ROOT directory...

/sbin/fs/vxfs/fsck -y /dev/rdsk/c2t0d0s2lvm
file system is clean - log replay is not required
/sbin/fs/vxfs/mount /dev/dsk/c2t0d0s2lvm /ROOT
/sbin/fs/hfs/mount /dev/dsk/c2t0d0s1lvm /ROOT/stand


Is the system being recovered installed with at least release 11.00 (Y\N)?
```

6. Assuming you use the right media you should answer `y` to confirm. Otherwise you get this error:

```
WARNING! files downloaded to this system will be 11.00
  versions. If your system is pre 11.00, installing 11.00
  files can create incompatibilities during the boot process
```

```
For this reason, this part of the process is being skipped.

The only operation that should be performed when the
client is not installed with at least 11.00, is rebuilding
the bootlif.

To recover a pre 11.00 system use the diagnostic media to
rebuild your system.
```

Unfortunately, the initial 11.11 Core CD talks about 11.00 also…

7. After confirmation the system starts to download the critical files to your root VG.

```
   ***** Downloading files to disk *****

x ./sbin/fs/hfs/mkfs, 290816 bytes, 568 tape blocks
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./sbin/pvchange linked to ./sbin/lvchange
./sbin/pvcreate linked to ./sbin/lvchange
./sbin/pvdisplay linked to ./sbin/lvchange
./sbin/pvmove linked to ./sbin/lvchange
./sbin/vgcfgbackup linked to ./sbin/lvchange
./sbin/vgcfgrestore linked to ./sbin/lvchange
./sbin/vgchange linked to ./sbin/lvchange
./sbin/vgcreate linked to ./sbin/lvchange
./sbin/vgdisplay linked to ./sbin/lvchange
./sbin/vgexport linked to ./sbin/lvchange
./sbin/vgextend linked to ./sbin/lvchange
./sbin/vgimport linked to ./sbin/lvchange
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x ./sbin/awk, 397312 bytes, 776 tape blocks
x ./sbin/cat, 208896 bytes, 408 tape blocks
x ./sbin/chmod, 249856 bytes, 488 tape blocks
x ./sbin/chown, 258048 bytes, 504 tape blocks
x ./sbin/frecover, 339968 bytes, 664 tape blocks
x ./sbin/fsck symbolic link to /sbin/fs_wrapper
x ./sbin/init, 299008 bytes, 584 tape blocks
x ./sbin/insf, 385024 bytes, 752 tape blocks
x ./sbin/ioinit, 221184 bytes, 432 tape blocks
x ./sbin/ioscan, 229376 bytes, 448 tape blocks
x ./sbin/ls, 286720 bytes, 560 tape blocks
x ./sbin/mkboot, 262144 bytes, 512 tape blocks
x ./sbin/mkdir, 200704 bytes, 392 tape blocks
x ./sbin/mount, 274432 bytes, 536 tape blocks
x ./sbin/mv, 241664 bytes, 472 tape blocks
x ./sbin/pax, 380928 bytes, 744 tape blocks
x ./sbin/reboot, 245760 bytes, 480 tape blocks
x ./sbin/stty, 208896 bytes, 408 tape blocks
x ./sbin/umount, 221184 bytes, 432 tape blocks
x ./usr/lib/uxbootlf, 707584 bytes, 1382 tape blocks
Filesystem          kbytes    used   avail %cap iused   ifree iused Mounted on
```

```
/ROOT                163840   70173   87840  44%  2486   23414  10%   ?
Filesystem           kbytes    used   avail %cap iused   ifree iused Mounted on
/ROOT/stand          128232   74047   41361  64%    65   20415   0%   ?
```

8. You need to decide if and how the current kernel in `/stand` should be replaced by a generic recovery kernel.

```
Should the existing kernel be
 'left', 'overwritten', or 'moved'?[overwritten]
```

To skip the replacement, simply enter `left`. To back up your existing kernel before writing a new one to your new file system, enter `moved`. To overwrite your existing kernel enter `overwritten`. After entering `moved`, the following is displayed:

```
    -- '/stand/vmunix' has been renamed '/stand/vmunixBK' --

 downloading WINSTALL to /stand/vmunix

    **** Creating device files on the customer's disk ****

WARNING: ioctl: DLKM is not initialized

    ******* Renaming the following customer files: *******

    -- '/etc/passwd' has been renamed '/etc/passwdBK' --
    -- '/sbin/pre_init_rc' has been renamed '/sbin/pre_init_rcBK' --
    -- '/etc/inittab' has been renamed '/etc/inittabBK' --
    -- '/etc/ioconfig' has been renamed '/etc/ioconfigBK' --
    -- '/.profile' has been renamed '/.profileBK' --
    -- '/etc/fstab' has been renamed '/etc/fstabBK' --
    -- '/stand/ioconfig' has been renamed '/stand/ioconfigBK' --
    -- '/etc/profile' has been renamed '/etc/profileBK' --

       During the reboot process interrupt auto boot and
        bring the kernel up in 'maintenance mode' and continue
        with lvm recovery.

        For example, at the ISL prompt enter:
                          ISL>   hpux -lm /stand/vmunix


           <Press return to continue>

                        RECOVERY COMPLETION
                               MENU

     Use this menu after the recovery process has installed all requested
     files on your system.

        Select one of the following:
             a.  REBOOT the customer's system and continue with recovery.
             b.  Return to the HP-UX Recovery Media Main Menu.

     Selection:
```

9. Once you find yourself at the Recovery Completion menu, complete the recovery process by selecting `a`. The system should automatically come up in *LVM Maintenance* Mode if `-lm` was included in the Boot String Verification menu. Type the following command from the shell prompt for more information about completing the recovery process:

```
# cat /RECOVERY.DOC
# cat /LVM.RECOVER
```

These two files are also part of this document.

Automated Procedure 3: Rebuilding the bootlif only

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu, select *Recover an unbootable HP-UX system*. The following menu is presented:

```
                        HP-UX Recovery MENU

      Select one of the following:
      a.  Rebuild the bootlif (ISL, HPUX, and the AUTO file) and install
          all files required to boot and recover HP-UX on the
          root file system.
      b.  Do not rebuild the bootlif, but install files required to boot
          and recover HP-UX on the root file system.
      c.  Rebuild only the bootlif.
      d.  Replace only the kernel on the root file system.

      m.  Return to 'HP-UX Recovery Media Main Menu'.
      x.  Exit to the shell.

   Use this menu to select the level of recovery desired.

   Selection:
```

3. Select c to rebuild only the bootlif. The following menu is displayed:

```
                        BOOTLIF PATH VERIFICATION
                                MENU

    This menu must be used to determine the path to the bootlif (ISL, HPUX
    and the AUTO file).
    When the information is correct, select 'a'.

       INFORMATION to verify:
            Path to the bootlif is 0/0/1/0.1.0

       Select one of the following:
            a.  The above information is correct.
            b.  WRONG!! The path to bootlif is incorrect.

            m.  Return to the 'HP-UX Recovery MENU.'
            x.  Exit to the shell.


    Selection:
```

4. Carefully check the displayed path. If it's incorrect type `b` to enter the correct path at the prompt:

```
Enter the path to bootlif (e.g., ISL):
 (example: 0/0/1/0.1.0):
```

   In our example we enter `0/0/2/0.0.0`; the system displays the menu again, but now with corrected information:

```
                        BOOTLIF PATH VERIFICATION
                                MENU

      This menu must be used to determine the path to the bootlif (ISL, HPUX
      and the AUTO file).
      When the information is correct, select 'a'.

         INFORMATION to verify:
              Path to the bootlif is 0/0/2/0.0.0

         Select one of the following:
              a.  The above information is correct.
              b.  WRONG!! The path to bootlif is incorrect.

              m.  Return to the 'HP-UX Recovery MENU.'
              x.  Exit to the shell.

      Selection:
```

5. Confirm the path by entering `a`. The following menu is displayed next:

```
                        BOOT STRING VERIFICATION
                                MENU

      This menu must be used to verify the system's boot string.
      When the information is correct, select 'a'.

         INFORMATION to verify:
              The system's boot string should be:
                      'hpux -lm  /stand/vmunix'
              NOTE: The Boot address is {0/0/2/0.0.0}
                    the Root address is {0/0/1/0.1.0}.

          Select one of the following:
              a.  The above information is correct.
              b.  WRONG!! Prompt the user for the system's boot string.

              m.  Return to the 'HP-UX Recovery MENU.'
              x.  Exit to the shell.

         NOTE: For an LVM '/'(ROOT) the '-lm' option MUST be specified
               (example: 'hpux -lm /stand/vmunix' )

      Selection:
```

6. Confirm the boot string by entering `a`, otherwise correct it by entering `b`. The following or similar messages are displayed next:

```
       *********** Installing bootlif  ***********

mkboot -a  "hpux -lm /stand/vmunix" /dev/rdsk/c2t0d0

         After bringing the system back online the SWAP, BOOT and DUMP
         volume information in the BOOTLIF should be restored.

           For example:
             BOOT:
                If '/stand' is on a separate logical volume, then use
                  lvlnboot -b  /dev/<rootvg>/<lv of '/stand'>
                Otherwise BOOT and ROOT are considered identical.

             DUMP:
                lvlnboot -d /dev/<rootvg>/<lv1 of dump>
                lvlnboot -d /dev/<rootvg>/<lv2 of dump>
```

```
        SWAP:
           lvlnboot -s /dev/<rootvg>/<lv1 of swap>

      Refer to the lvlnboot man page for more information.

       <Press return to continue>


                        RECOVERY COMPLETION
                              MENU

   Use this menu after the recovery process has installed all requested
   files on your system.

      Select one of the following:
           a.  REBOOT the customer's system and continue with recovery.
           b.  Return to the HP-UX Recovery Media Main Menu.

   Selection:
```

7. Once you find yourself at the Recovery Completion menu, complete the recovery process by selecting a, rebooting your system. This completes the process for rebuilding the bootlif only.

Automated Procedure 4: Replacing the Kernel only

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu, select *Recover an unbootable HP-UX system*. The following menu is presented:

```
                          HP-UX Recovery MENU

      Select one of the following:
      a.  Rebuild the bootlif (ISL, HPUX, and the AUTO file) and install
          all files required to boot and recover HP-UX on the
          root file system.
      b.  Do not rebuild the bootlif, but install files required to boot
          and recover HP-UX on the root file system.
      c.  Rebuild only the bootlif.
      d.  Replace only the kernel on the root file system.

      m.  Return to 'HP-UX Recovery Media Main Menu'.
      x.  Exit to the shell.

   Use this menu to select the level of recovery desired.

   Selection:
```

3. Select `d` to replace only the kernel on the root file system; the following menu is then displayed:

```
                          DEVICE FILE VERIFICATION
                                  MENU

   This menu is used to specify the path of the root file system.
   When the information is correct, select 'a'.

        INFORMATION to verify:
              Device file used for '/'(ROOT) is c0t1d0s1lvm
```

```
              The path to disk is 0/0/1/0.1.0

         Select one of the following:
               a.  The above information is correct.
               b.  WRONG!! The device file used for '/'(ROOT) is incorrect.

               m.  Return to the 'HP-UX Recovery MENU.'
               x.  Exit to the shell.

        NOTE: If '/' is an LVM, use an 's1lvm' suffix (e.g. c0t1d0s1lvm).

      Selection:
```

Carefully check if the patch is the correct one, enter `a` in this case. In doubt choose *Exit to shell* and verify the path using ioscan(1M). If you enter `b`; the following is then displayed:

```
Enter the device file associated with the '/'(ROOT) file system
 (example: c0t1d0s1lvm )
```

4. Enter the appropriate device file, in our case we choose `c2t0d0s1lvm` since we try to recover a system with LVM layout. The following menu is displayed next:

```
                          FILE SYSTEM CHECK
                                MENU
   The file system check '/sbin/fs/hfs/fsck -y /dev/rdsk/c2t0d0s1lvm'
   will now be run.

        Select one of the following:
             a.  Run fsck -y .
             b.  Prompt for the fsck run string on c2t0d0s1lvm.

             m.  Return to the 'HP-UX Recovery MENU.'
```

5. Select `a` to run fsck -y to check your file system for corruption; you will see a display similar to the following:

```
** /dev/rdsk/c2t0d0s1lvm
** Last Mounted on /ROOT/stand
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
63 files, 0 icont, 74047 used, 54185 free (97 frags, 6761 blocks)

Mounting c2t0d0s1lvm to the /ROOT directory...

/sbin/fs/vxfs/fsck -y /dev/rdsk/c2t0d0s2lvm
file system is clean - log replay is not required
/sbin/fs/vxfs/mount /dev/dsk/c2t0d0s2lvm /ROOT
/sbin/fs/hfs/mount /dev/dsk/c2t0d0s1lvm /ROOT/stand


Is the system being recovered installed with at least release 11.00 (Y\N)?
```

6. Assuming you use the right media you should answer `y` to confirm. Otherwise you get this error:

```
WARNING! files downloaded to this system will be 11.00
  versions. If your system is pre 11.00, installing 11.00
```

```
files can create incompatibilities during the boot process
For this reason, this part of the process is being skipped.

The only operation that should be performed when the
client is not installed with at least 11.00, is rebuilding
the bootlif.

To recover a pre 11.00 system use the diagnostic media to
rebuild your system.
```

Unfortunately the initial 11.11 Core CD talks about 11.00 also…

7. You need to decide if and how the current kernel in `/stand` should be replaced by a generic recovery kernel.

```
Filesystem          kbytes    used   avail %cap iused   ifree iused Mounted on
/ROOT               163840   70173   87840  44%  2486   23414  10%   ?
Filesystem          kbytes    used   avail %cap iused   ifree iused Mounted on
/ROOT/stand         128232   74047   41361  64%    65   20415   0%   ?

Should the existing kernel be
 'left', 'overwritten', or 'moved'?[overwritten]
```

To skip the replacement, simply enter `left`. To back up your existing kernel before writing a new one to your new file system, enter `moved`. To overwrite your existing kernel, enter `overwritten`. After entering `moved` the following is displayed:

```
   -- '/stand/vmunix' has been renamed '/stand/vmunixBK' --

 downloading WINSTALL to /stand/vmunix

          <Press return to continue>

                       RECOVERY COMPLETION
                              MENU

    Use this menu after the recovery process has installed all requested
    files on your system.

       Select one of the following:
            a.  REBOOT the customer's system and continue with recovery.
            b.  Return to the HP-UX Recovery Media Main Menu.

    Selection:
```

Once you find yourself at the Recovery Completion menu, complete the recovery process by selecting a, reboot the target system. This completes the process for replacing the kernel only.

Co-Procedure: Booting to Single User and LVM Maintenance Mode

In the following section, we show only the user interface that newer systems like N- or L-Class offer. If your system displays different messages during bootup you may find appropriate information in the section Different Boot Modes for Different Machine Types.

1. During the system's boot sequence it will usually wait and display the following or similar messages if *Autoboot* is enabled:

```
Processor is booting from first available device.

To discontinue, press any key within 10 seconds.
```

2. Press any key before the 10 seconds elapses. The system console will display the following or a similar prompt:

```
Boot terminated.

---- Main Menu -------------------------------------------------------------

     Command                           Description
     -------                           -----------
     BOot [PRI|ALT|<path>]             Boot from specified path
     PAth [PRI|ALT] [<path>]           Display or modify a path
     SEArch [DIsplay|IPL] [<path>]     Search for boot devices

     COnfiguration menu                Displays or sets boot values
     INformation menu                  Displays hardware information
     SERvice menu                      Displays service commands

     DIsplay                           Redisplay the current menu
     HElp [<menu>|<command>]           Display help for menu or command
     RESET                             Restart the system
----
Main Menu: Enter command or menu >
```

3. If the primary or alternate boot path is set correctly, you may boot using the commands `boot pri` or `boot alt`, respectively. If you know the exact path of your boot disk you may e.g. choose the command `boot 0/0/2/0.0` at the prompt.

4. Otherwise, you may first search for potential boot devices using the `SEA` command. The system presents you the following or similar listing.

```
Searching for potential boot devices.

To discontinue search, press any key (termination may not be immediate).

   Path#  Device Path (dec)  Device Path (mnem)  Device Type
   -----  -----------------  ------------------  -----------
   P0     0/0/0/0            lan.15.140.10.113   LAN Module
   P1     0/0/1/0.6          extscsi.6           Random access media
   P2     0/0/1/0.3          extscsi.3           Sequential access media
   P3     0/0/1/0.1          extscsi.1           Random access media
   P4     0/0/1/1.0          intscsib.0          Random access media
   P5     0/0/2/0.0          intscsia.0          Random access media

Search terminated.
```

If you are trying to boot a V-Class system refer to the Boot Modes section later in this chapter. Otherwise, you can boot from here using the displayed path #, e.g.:

```
boot p5
```

The system console will display a message similar to the following:

```
Interact with IPL (Y, N, or Cancel)?>
```

Enter `y` at the prompt, otherwise, the command specified in the *Auto-File String* is

executed.

```
Booting...
Boot IO Dependent Code (IODC) revision 1

HARD Booted.

ISL Revision A.00.43  Apr 12, 2000

ISL>
```

5. At the the `ISL>` prompt you have many possible options to continue.

   - For standard *Multi User* Mode boot:
     `hpux`
   - For Single User Mode boot (if the root passwd is lost):
     `hpux -is`
   - For *LVM Maintenance* Mode:
     `hpux -lm`
   - To boot without LVM quorum check:
     `hpux -lq`
   - To boot an alternate kernel:
     `hpux /stand/vmunix.prev`
   - That may be combined with other options, e.g.:
     `hpux -is -lq /stand/vmunix.prev`
   - To simply have a look at the contents of /stand:
     `hpux ll`

Co-Procedure: Booting from CD-ROM, Tape or Network

1. Make sure to have the appropriate CD loaded into the CD-ROM drive.

2. Reboot the system using reboot(1M) or shutdown(1M), or Reset the System Processor Unit (SPU) using the reset button or the `RS` command, as appropriate. The console will display boot path information. If *Autoboot* is enabled, the system console will eventually display the following or similar messages:

```
Processor is booting from first available device.

To discontinue, press any key within 10 seconds.
```

3. Press any key before the 10 seconds elapses. The system console will display the following or a similar prompt:

```
Boot terminated.

---- Main Menu -------------------------------------------------------------

     Command                         Description
     -------                         -----------
     BOot [PRI|ALT|<path>]           Boot from specified path
     PAth [PRI|ALT] [<path>]         Display or modify a path
```

```
     SEArch [DIsplay|IPL] [<path>]     Search for boot devices

     COnfiguration menu                Displays or sets boot values
     INformation menu                  Displays hardware information
     SERvice menu                      Displays service commands

     DIsplay                           Redisplay the current menu
     HElp [<menu>|<command>]           Display help for menu or command
     RESET                             Restart the system
----
Main Menu: Enter command or menu >
```

4. If you know the exact path of your CD-ROM or tape drive you may directly boot from there entering e.g. the command:

   ```
   boot 0/0/1/0.1
   ```

5. If you plan to boot from an Ignite/UX installation server you need to know the IP address of that server. Boot from there entering e.g. the command:

   ```
   boot lan.15.140.11.156 install
   ```

6. Otherwise you may first search for potential boot devices unsing the `SEA` command. The system presents you a listing like the following:

   ```
   Searching for potential boot devices.

   To discontinue search, press any key (termination may not be immediate).

      Path#  Device Path (dec)  Device Path (mnem)  Device Type
      -----  -----------------  ------------------  -----------
      P0     0/0/0/0            lan.15.140.10.113   LAN Module
      P1     0/0/1/0.6          extscsi.6           Random access media
      P2     0/0/1/0.3          extscsi.3           Sequential access media
      P3     0/0/1/0.1          extscsi.1           Random access media
      P4     0/0/1/1.0          intscsib.0          Random access media
      P5     0/0/2/0.0          intscsia.0          Random access media
   ```

   Now you are able to boot using the *Path#*, e.g. using the command `boot p3`. The system console will prompt a message similar to the following:

   ```
   Interact with IPL (Y, N, or Cancel)?>
   ```

   On V-Class systems no ISL interaction is possible. Instead the system starts to boot immediately after entering the `boot` command.

7. Enter `n` at the prompt. Only with old-fashioned Support CDs you have to answer `y`. If the system reaches the `ISL>` prompt enter `800SUPPORT` or `700SUPPORT` respectively. The system starts to boot.

   ```
   Booting...
   Boot IO Dependent Code (IODC) revision 1

   HARD Booted.

   ISL Revision A.00.43  Apr 12, 2000
   ```

```
ISL booting  hpux (;0):INSTALL

Boot
: disk(0/0/1/0.1.0.0.0.0.0;0):WINSTALL
8941568 + 1642496 + 2596176 start 0x1fef68
```

8. If you are booting from an Ignite/UX recovery tape you need to cancel the non-interactive installation by pressing any key when you see the following message (unless an automated install session is what you intend to do):

```
WARNING: The configuration information calls for a non-interactive
          Installation.

Press <Return> within 10 seconds to cancel batch-mode installation:

Really cancel non-interactive install and start the
User-interface? ([y]/n): y
```

9. After several minutes (approximately), and after displaying several screens of status information, something like the following should be displayed:

```
            Welcome to the HP-UX installation/recovery process!

  Use the <tab> key to navigate between fields, and the arrow keys
  within fields.  Use the <return/enter> key to select an item.
  Use the <return> or <space-bar> to pop-up a choices list.  If the
  menus are not clear, select the "Help" item for more information.

  Hardware Summary:          System Model: 9000/800/L1000-36
  +---------------------+----------------+--------------------+ [ Scan Again  ]
  | Disks: 17 (271.3GB) |  Floppies: 0   | LAN cards:   4     |
  | CD/DVDs:        1   |  Tapes:    1   | Memory:     256Mb  |
  | Graphics Ports: 0   |  IO Buses: 8   | CPUs:        1     | [ H/W Details ]
  +---------------------+----------------+--------------------+

                       [      Install HP-UX       ]

                       [   Run a Recovery Shell   ]

                       [    Advanced Options      ]


           [  Reboot  ]                              [  Help  ]
```

Co-Procedure: Booting a System to Recovery Main Menu

There are several ways to get to a recovery environment. Typically an installation or support CD is used as boot device, but it is also possible to boot from a tape created with the Ignite/UX tools make_recovery or make_tape_recovery. It is also possible to boot over the network from an Ignite/UX installation server.

1. If you plan to boot from CD, you should now mount the appropriate medium for your HP-UX to the CD-ROM drive. For 11i, this is the *Core OE Install and Recovery CD (1 of 2)*. For HP-UX 11.00 and recent 10.20 ACE/HWE releases, you can use the the *Install/CoreOS CD*. For older 10.X releases, you have usually an old-fashioned *Support CD*.

The menus and exact procedures presented in the following sections may vary, depending on how old your CD-ROM revision is and what type of machine you actually try to recover.

2. Boot the system from CD-ROM, tape or network (see Co-Procedure).

3. Select *Run a Recovery Shell*, the screen clears, and the following will be displayed, unless your are booting from the network:

```
Would you like to start up networking at this time? [n]
```

Typcally you don't need networking in this case, so enter `n` and the following or similar will be displayed:

```
   * Loading insf to create disk device files...
   * Creating disk device files...
   * Loading the recovery commands...

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                HP-UX CORE MEDIA SYSTEM RECOVERY

                  WARNING:  YOU ARE SUPERUSER !!

loading commands into memory....

NOTE: Commands residing in the RAM-based file system are unsupported 'mini'
        commands. These commands are only intended for recovery purposes.

Loading minimal set of commands needed for recovery...

        WARNING:  If ANYTHING is changed on a root(/) that is mirrored
                  a 'maintence mode'(HPUX -lm) boot MUST be done in
                  order to force the mirrored disk to be updated!!

     Press <return> to continue.
```

4. If you booted over the network you get the following or similar menu:

```
Networking must be enabled in order to load a shell.

(Press any key to continue.)

                           LAN Interface Selection

    More than one network interface was detected on the system.  You
    will need to select the interface to enable.  Only one interface
    can be enabled, and it must be the one connected to the network
    that can be used in contacting the install and/or SD servers.

    Use the <tab> and/or arrow keys to move to the desired LAN device
    to enable, then press <Return>.

       HW Path    Interface   Station Address  Description
       -------------------------------------------------------

     [ 0/0/0/0     lan0     0x001083FD763D   HP_PCI_10/100Base-TX_Core      ]

     [ 0/4/0/0/6/0 lan1     0x0010837B2A10   HP_A5838A_PCI_100Base-TX/SCSI_ ]
```

```
     [ 0/4/0/0/7/0 lan2     0x0010837B2A11   HP_A5838A_PCI_100Base-TX/SCSI_ ]

     [ 0/7/0/0     lan3     0x001083FC0354   HP_A4926A_PCI_1000Base-SX_Adap ]
```

Select the desired interface card, and press *return*. The system continues displaying the following messages:

```
       * Searching the network for a DHCP server to supply default networking
         information....

         This could take up to 30 seconds if a DHCP server cannot be found. If

         you wish to cancel the DHCP server search, you may press CTRL-C now.
```

Press Ctrl-C unless you want to fetch the network configuration from a DHCP server. After interruption this message is displayed:

```
       * Could not get DHCP information.  No host specific network defaults
         will be supplied.  (dhcpclient returned: 9)


                              NETWORK CONFIGURATION

                                   This system's hostname:

  Internet protocol address (eg. 15.2.56.1) of this host:

       Default gateway routing internet protocol address:

       The subnet mask (eg. 255.255.248.0 or 0xfffff800):

               IP address of the Ignite-UX server system: 15.140.11.156

          Is this networking information only temporary?  [ No  ]

   [   OK   ]                  [ Cancel ]                          [  Help  ]
```

Enter the configuration parameters and confirm them by selecting *OK*. The system continues, displaying the following or similar messages:

```
       * Bringing up Network (lan0)
add net default: gateway 15.140.8.65
       * Reading configuration information from server...

       * Loading insf to create disk device files...

       * Creating disk device files...
       * Loading the recovery commands...


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                  HP-UX NETWORK SYSTEM RECOVERY

                  WARNING:  YOU ARE SUPERUSER !!

Checking for required components on the Ignite Server........

loading commands into memory....
```

```
NOTE: Commands residing in the RAM-based file system are unsupported 'mini'
        commands. These commands are only intended for recovery purposes.

Loading minimal set of commands needed for recovery...

        WARNING:  If ANYTHING is changed on a root(/) that is mirrored
                  a 'maintence mode'(HPUX -lm) boot MUST be done in
                  order to force the mirrored disk to be updated!!

     Press <return> to continue.
```

5. Press *return* and the following or similar status message is displayed:

```
                HP-UX CORE MEDIA SYSTEM RECOVERY
                           MAIN MENU

        s.  Search for a file
        b.  Reboot
        l.  Load a file
        r.  Recover an unbootable HP-UX system
        x.  Exit to shell
        c.  Instructions on chrooting to a lvm /(root).

This menu is for listing and loading the tools contained on the core media.
Once a tool is loaded, it may be run from the shell. Some tools require other
files to be present in order to successfully execute.

Select one of the above:
```

   Now the system is booted to the recover main menu and is ready for recovery.

Co-Procedure: Cold Installing a Minimum OS from CD

You may use this procedure to get a minimum OS installed for your subequent recovery.

1. Mount the appropriate CD for your HP-UX to the CD-ROM drive. For 11i this is the *Core OE Install and Recovery CD (1 of 2)*. For HP-UX 11.00 and 10.X you need the *Install/CoreOS CD*. The menus and exact procedures presented in the following sections may vary depending on how old your CD-ROM revision is and what type of machine you actually try to install.

2. Boot the system from CD-ROM (see Co-Procedure).

3. Select *Install HP-UX*, the screen clears, and the following will be displayed:

```
Would you like to start up networking at this time? [n]
```

4. Unless you need networking, e.g. to ftp to other systems, enter `n` and the bootup continues. Finally you should reach the user interface for installation.

```
                        User Interface and Media Options

   This screen lets you pick from options that will determine if an
   Ignite-UX server is used, and your user interface preference.

 Source Location Options:
```

```
    [ * ]  Media only installation
    [   ]  Media with Network enabled (allows use of SD depots)
    [   ]  Ignite-UX server based installation

  User Interface Options:
    [   ]  Guided Installation   (recommended for basic installs)
    [ * ]  Advanced Installation (recommended for disk and filesystem management)
    [   ]  No user interface - use all the defaults and go

    Hint: If you need to make LVM size changes, or want to set the
          final networking parameters during the install, you will
          need to use the Advanced mode (or remote graphical interface).

    [   OK   ]                  [ Cancel ]                          [  Help  ]
```

5. Choose Media only installation. The option Advanced Installation is recommended since it allows the exact specification of the desired file system layout. It is important to choose appropriate file system sizes! The backup needs to fit into the created layout!

6. In the following screens only older HP-UX revisions allow the so-called Minimum Runtime installation of the OS. Since we plan to use our backup for a subsequent recovery this is a fine option to choose. With 11i the minimum option we should select is called *Base OS*.

```
/-------\/----------\/--------\/-------------\/----------\
  | Basic || Software || System || File System || Advanced |
  |       \-------------------------------------------------------------------\
  |                                                                            |
  | Configurations:  [ HP-UX B.11.11 Default    ->] [ Description...  ]        |
  |                                                                            |
  | Environments:    [ HP-UX 11i Base OS-64bit    ->] (HP-UX B.11.11)          |
  |                                                                            |
  | [ Root Disk...  ] SEAGATE_ST39103LC, 0/0/2/0.0.0, 8683 MB                  |
  |                                                                            |
  | File System:     [ Logical Volume Manager (LVM) with VxFS  ->]             |
  |                                                                            |
  | [ Root Swap (MB)... ] 512    Physical Memory (RAM) =  256 MB               |
  |                                                                            |
  | [  Languages...   ] English           [ Keyboards...  ] [ Additional...  ]|
  |                                                                            |
  \----------------------------------------------------------------------------/
       [ Show Summary...  ]                          [ Reset Configuration ]
 ------------------------------------------------------------------------------
  [  Go!   ]                      [ Cancel ]                        [  Help  ]
```

7. Select *Go!* after choosing the appropriate configuration. The installation starts.

8. We *may* use an optional trick if we need to save time during our recovery: Simply hit Ctrl-C (interrupt) just at the point where the installation routine plans to launch the Software Distributor:

```
        * Download_mini-system:  Complete
        * Loading_software:  Begin
        * Installing boot area on disk.
        * Enabling swap areas.
        * Backing up LVM configuration for "vg00".
        * Running the ioinit command ("/sbin/ioinit -c")
        * Creating device files via the insf command.
insf: Installing special files for sdisk instance 0 address 0/0/1/0.1.0
insf: Installing special files for sdisk instance 1 address 0/0/1/0.6.0
insf: Installing special files for sdisk instance 2 address 0/0/1/1.0.0
insf: Installing special files for sdisk instance 3 address 0/0/2/0.0.0
```

```
…
       * Constructing the bootconf file.
       * Setting primary boot path to "0/0/2/0.0.0".
       * Starting swinstall of the source (B7994-10001 Mission Critical).
```

Hit Ctrl-C to interrupt!

```
WARNING: Exiting due to keyboard interrupt.
WARNING: The task will continue in unattended mode on host "loopback".
ERROR:   Software load had one or more errors.

=======  03/30/01 09:51:55 EST  The operating system software has not been
         successfully loaded. The swinstall(1M) application was not completed
         or failed to load some key files. (exit status was = 1).

        1: Change the swinstall server and/or depot information.
        2: Retry software load process (non-interactive mode).
        3: Retry software load process (interactive mode).
        4: Run a shell.
Choose a recovery action from above:
```

9. We now can choose the option *Run a shell* to get a shell prompt. From here we are able to complete the full recovery. Please note that the installation is very incomplete yet! We really depend on a successful full recovery from backup!

Co-Procedure: Get more RAM File System Space

Sometimes the RAM file system offered during recovery is very small (e.g. 8MB). To have a more comfortable environment it is often useful to enlarge that RAM file system. With more space we are able to hold more commands in memory instead of freqently removing and reloading files with `rm` and `loadfile`.

NOTE: see the SAW document with ID emr_na-c00941760 at the following HP internal-only link http://saw.cce.hp.com/km/saw/view.do?docId=emr_na-c00941760

```
# bdf
Filesystem           kbytes    used   avail %cap iused   ifree iused Mounted on
/                      8532    6555    1977  77%   273    2607   9%   ?
```

```
# cd /
# mknod /dev/ram2 b 9 0x204001
# mknod /dev/rram2 c 9 0x204001
# mknod /dev/ram3 b 9 0x304001
# mknod /dev/rram3 c 9 0x304001
# loadfile -l SYSCMDS ./sbin/pax
# loadfile ./sbin/fs/vxfs/mkfs
# loadfile ./sbin/fs/vxfs/mount
# /sbin/fs/vxfs/mkfs -F vxfs /dev/rram2
# /sbin/fs/vxfs/mkfs -F vxfs /dev/rram3
# rm /sbin/fs/vxfs/mkfs
# mkdir /rootfs
# /sbin/fs/vxfs/mount -F vxfs /dev/ram2 /rootfs
# mkdir /rootfs/dev
# /sbin/fs/vxfs/mount -F vxfs /dev/ram3 /rootfs/dev
# rm /sbin/fs/vxfs/mount
# loadfile -l SYSCMDS ./usr/bin/find
# find . -xdev -print | pax -w -f - | $(cd /rootfs ; pax -r -f -)
# rm /usr/bin/find
# loadfile ./usr/sbin/chroot
```

```
# chroot /rootfs /sbin/sh
# rm -rf rootfs

Note: If you are using these instructions and are booting over the network from
an Ignite server you must provide the full path to the SYSCMDS file applicable
to the HP-UX revision you are attempting to recover. For example if you are
recovering an 11i Version 1 system you must use /opt/ignite/data/Rel_B.11.11/SYSCMDS.
```

Co-Procedure: Importing Root VG from a Recovery Shell

Sometimes the automated recovery procedures fail to check and mount the root file system. This happens e.g. if the `/stand/rootconf` file does not contain valid data. But it may still be possible to import the root VG and fsck/mount the file system manually.

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu select *Exit to shell*.

3. Optional: get more RAM file system space for recovery (see Co-Procedure).

4. Import and activate the root VG from the appropriate physical volumes. Use ***`ioscan -fnk -C disk`*** to get the devices. In our example, we import vg00 from c2t0d0 only. First we need to load some commands into our RAM file system using the `loadfile` command. Usually all LVM commands are linked to `lvchange`, so we need to load that command first. In some recovery environments, the `pvcreate` command needs to be loaded instead.

   ```
   # loadfile lvchange vgimport vgdisplay vgchange
   # loadfile lvlnboot lvrmboot ioscan

   # mkdir /dev/vg00

   # mknod /dev/vg00/group c 64 0x000000
     (NOTE: for LVM2 the major number is 128)

   # vgimport vg00 /dev/dsk/c2t0d0
   Creating "/etc/lvmtab".
   Warning: A backup of this volume group may not exist on this machine.
   Please remember to take a backup using the vgcfgbackup command after activating
   the volume group.

   # vgchange -a y /dev/vg00
   Activated volume group
   Volume group "vg00" has been successfully changed.
   ```

   You may now check and mount the file systems (see other Co-Procedure) or re-configure the LIF LABEL or whatever you plan to do with your imported root VG.

Co-Procedure: Mounting Volumes of an Imported Root VG

If you need to access the file systems of your root VG you may check and mount them now. In our example we assume a separate HFS boot volume /stand while all other volumes are VxFS.

1. Import the root VG (see Co-Procedure).

2. Load mount and fsck commands if needed.

```
# loadfile /sbin/fs/hfs/mount /sbin/fs/hfs/fsck
# loadfile /sbin/fs/vxfs/mount /sbin/fs/vxfs/fsck
```

3. Check the file systems using the appropriate fsck(1M) command.

```
# /sbin/fs/hfs/fsck /dev/vg00/rlvol1
** /dev/vg00/rlvol1
** Last Mounted on /stand
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Cyl groups
63 files, 0 icont, 74047 used, 54185 free (97 frags, 6761 blocks)

# /sbin/fs/vxfs/fsck -o full /dev/vg00/rlvol3
log replay in progress
pass0 - checking structural files
pass1 - checking inode sanity and blocks
pass2 - checking directory linkage
pass3 - checking reference counts
pass4 - checking resource maps
OK to clear log? (ynq)y
set state to CLEAN? (ynq)y
```

   Repeat that check for all remaining volumes.

4. Mount the file systems under `/ROOT`. Please note that your numbering of the logical volumes may differ from our example!

```
# mkdir /ROOT
# /sbin/fs/vxfs/mount /dev/vg00/lvol3 /ROOT
# /sbin/fs/hfs/mount /dev/vg00/lvol1 /ROOT/stand
# /sbin/fs/vxfs/mount /dev/vg00/lvol4 /ROOT/opt
# /sbin/fs/vxfs/mount /dev/vg00/lvol5 /ROOT/tmp
# /sbin/fs/vxfs/mount /dev/vg00/lvol6 /ROOT/usr
# /sbin/fs/vxfs/mount /dev/vg00/lvol7 /ROOT/home
# /sbin/fs/vxfs/mount /dev/vg00/lvol8 /ROOT/var
```

5. `/ROOT` should now represent your original file system layout. you should confirm that the logical volumes are mounted to the correct mount points. Then, you may chroot(1M) into `/ROOT` if needed.

```
# loadfile chroot
```

```
# cd /ROOT
# chroot /ROOT /sbin/sh
```

Please remember that your system is currently booted using a generic recovery kernel. This kernel may be incompatible with executables that reside inside your root VG. *Never* try to bring the system up to *Multi User* Mode from this state! Even basic LVM or VxFS commands are known to make trouble under such conditions.

Contents of RECOVERY.DOC and LVM.RECOVER files

After performing one of the automatic recovery procedures, you will find two files in the root file system of your recovered system: `/RECOVERY.DOC` and `/LVM.RECOVER`. These in instructions need to be followed to complete an automatic recovery procedure after reboot.

1. Contents of `/RECOVERY.DOC`:

```
# cat /RECOVERY.DOC
1) If you have an lvm root, refer to /LVM.RECOVER .

2) Restore valid copies of the following files (either from backup or
   from the <filename>BK files created during the recovery process).

   /etc/fstab,        /etc/inittab,      /stand/ioconfig,
   /etc/ioconfig,     /etc/passwd,       /sbin/pre_init_rc,
   /.profile,     and /etc/profile


  NOTE:  The backup archive may be extracted using '/sbin/frecover' or
   '/sbin/pax' (for backups made with 'tar' or  'cpio').
        If using '/sbin/pax', linking it to 'tar' or 'cpio' will force 'pax'
    to emulate the respective command line interface.

3) Replace /stand/vmunix from backup, since the present kernel is probably
   missing desired drivers.

4) Reboot the System Processing Unit (SPU) using the following commands:

   # sync
   # sync
   # reboot

5) Restore desired files from backup.
```

2. Contents of `/LVM.RECOVER`:

```
# cat /LVM.RECOVER
INSTRUCTIONS to complete your LVM recovery:

The system must now be up now in "maintenance mode".

NOTE: In order for the following steps to lead to a successful lvm recovery the
      LVM label information must be valid. If the bootlif was updated from the
      RAM-based recovery system, then "mkboot -l" has already been run to
      repair the this label.

step 1. If the autofile was altered to force the system to boot in
        maintenance mode, use "mkboot -a" to remove the "-lm" option.
```

```
        Example:

           to change            "hpux -lm (52.6.0;0)/stand/vmunix"
           to                   "hpux     (52.6.0;0)/stand/vmunix"

           use
            mkboot -a  "hpux (52.6.0;0)/stand/vmunix"  /dev/rdsk/<device file>

step 2.  Restore a valid copy /etc/fstab (either from backup or from
         the /etc/fstabBK file created during the recovery process).

step 3.  Restore a valid copy /etc/lvmtab, if needed.

step 4.  Restore a valid copy /dev, if needed.

step 5. Run '/lvmrec.scrpt' to repair the following LVM
        configuration information:
                     a. LVM records (lvmrec)
                     b. BDRA (Boot Data Reserve Area)
                     c. LABEL information

        Requirement:  The following files must reside on disk before
                      the script can complete:
                      a. /etc/lvmtab
                      b. /etc/fstab
                      c. /etc/lvmconf/<rootvg>.conf
                      d. all device files specified in /etc/fstab


        To run '/lvmrec.scrpt' provide the device filename used to
        access the bootlif as an argument to the script.

        Example:

                /lvmrec.scrpt c0t6d0

         In this example 'c0t6d0' is the device file used to
         access the bootlif.

step 6. Once '/lvmrec.scrpt' completes the recovery of the root LVM
        is complete.  If the '/lvmrec.scrpt' issued the
        following warning:

              "************ I M P O R T A N T *****************"
              "                                                "
              "Root logical volume has been repaired, but......."
              "you need to reboot the system and repair the Swap"
              "logical volume using the following LVM command:  "
              "   lvlnboot -A n -s /dev/<root lv>/<swap lvol>   "
              "because Recovery has no way to find out what is  "
              "the Swap logical volume information at this point"
              "                                                "
              "************************************************"

        The Swap and Dump logical volumes will need to be re-configured.

        The BDRA contains the "root", "swap" and "dump" logical volume
        information.  '/lvmrec.scrpt' only fixes the root logical volume
        information in the BDRA.  The "swap" and "dump" areas can be updated
        via the "lvlnboot" command.

        Example:

           lvlnboot -s /dev/<vg00>/lvol2
           lvlnboot -d /dev/<vg00>/lvol3

         In this example 'lvol2' and 'lvol3' are the "swap" and "dump"
         logical volumes respectively.
```

```
step 7: Refer back to RECOVERY.DOC step 2.

*** NOTE ***

  If the same volume group contains more than one corrupted boot disk,
  repeat the above steps for each disk that needs to be repaired.
```

Manual Procedure 1: Recovery after Minimum OS Cold Installation

This procedure can be used to restore a complete system upon an OS Cold Installation. It is sufficient to cold-install only the base components of the OS. Additional components and patched will be restored from backup.

1. Install a Minimum OS from installation media (see Co-Procedure).

2. All file systems of the root VG should be mounted now. Check what additional file systems outside the root VG are part of the backup. Either those file systems are also mounted or excluded from restore! Especially the root file system, could get overflowed otherwise.
   If VGs are imported at this point we need to take care that all names used for them and their logical volumes are *absolutely identical* with the ones contained in the backup! We need to ensure that all LVM device files in `/dev` are uniqe after restore.

3. Backup some important files before restoring

   ```
   # cp -p /etc/fstab /etc/fstab.min
   # cp -p /etc/ioconfig /etc/ioconfig.min
   # cp -p /etc/lvmtab /etc/lvmtab.min
   # cp -rp /etc/lvmconf /etc/lvmconf.min
   # cp -p /stand/rootconf /stand/rootconf.min
   # cp -p /stand/bootconf /stand/bootconf.min
   ```

4. Perform the full restore from backup. Usually you should use pax(1) to restore cpio(1) and tar(1) backups. We should take care to keep at least files as possible busy during restore. So we run `killall` and use our own shell with our own pax/frecover executable. In the following examples our tape drive is accessed as `/dev/rmt/0m`. Use `ioscan -fnkCtape` to find the appropriate device on your system.

   ```
   # cd /
   # init s
   # killall
   # cp /sbin/sh /sbin/sh.rec
   # exec /sbin/sh.rec
   ```

   e.g. for pax(1):
   ```
   # cp /sbin/pax /sbin/pax.rec
   ```

```
# /sbin/pax.rec -r -pe < /dev/rmt/0m
```

e.g. for frecover(1M):

```
# cp /sbin/frecover /sbin/frecover.rec
# /sbin/frecover.rec -r -f /dev/rmt/0m -os
```

5. Restore /stand/rootconf and /stand/bootconf from your previously created backup files. The valid `/stand/rootconf` file is required for booting into *LVM Maintenance* Mode later!

```
# cp -p /stand/rootconf.min /stand/rootconf
# cp -p /stand/bootconf.min /stand/bootconf
```

6. Modify your restored /etc/fstab file according to the saved /etc/fstab.min. This may be *very* important since the layout of the root VG may have changed during minimum OS installation!

```
# vi /etc/fstab
```

7. Create a map file to be used later for re-importing vg00. (Ignore the warning about vg00 still being active.)

```
# vgexport -p -s -m /etc/lvmconf/vg00.map vg00
```

8. Reboot your system to *LVM Maintenance* Mode (see Co-Procedure).

```
# reboot
```

9. Re-import the root VG to get the /etc/lvmtab file up-to-date. Otherwise LVM errors like *Cross-device link* would be the result.

```
# vgexport /dev/vg00
# mkdir /dev/vg00
# mknod /dev/vg00/group c 64 0x000000

# vgimport -s -m /etc/lvmconf/vg00.map /dev/vg00
Warning: A backup of this volume group may not exist on this machine.
Please remember to take a backup using the vgcfgbackup command after activating
the volume group.

# vgchange -a y /dev/vg00
Activated volume group
Volume group "vg00" has been successfully changed.
```

10. Perform a fresh vgcfgbackup(1M) of your root VG.

```
# vgcfgbackup /dev/vg00
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf
```

11. Reboot the system to *Multi User* Mode (see Co-Procedure). Additional tasks like mirroring the root VG may be necessary later on.

```
# reboot
```

Manual Procedure 2: Recovery from Scratch with Root VG Creation

This procedure is mainly for reference. It shows a complete recovery of a system that was booted from a recovery medium. It contains most of the configuration steps that are performed automatically during a cold installation. It is intended to help understanding these steps.

1. Boot the system to the Recovery Main Menu (see Co-Procedure).

2. From the main menu select *Exit to shell*.

3. Optional: get more RAM file system space for recovery (see Co-Procedure).

4. Create a new root VG on your desired installation disk(s). Use `ioscan -fnkCdisk` to get the devices. In our example we create vg00 with default options on c2t0d0 only. First we need to load some commands into our RAM file system using the `loadfile` command.

```
# loadfile lvchange vgdisplay vgchange pvcreate vgcreate
# loadfile lvcreate lvlnboot mkboot ioscan

# mkdir /dev/vg00

# mknod /dev/vg00/group c 64 0

# pvcreate -fB /dev/rdsk/c2t0d0
Creating "/etc/lvmtab".
Physical volume "/dev/rdsk/c2t0d0" has been successfully created.

# vgcreate vg00 /dev/dsk/c2t0d0
Increased the number of physical extents per physical volume to 2170.
Volume group "/dev/vg00" has been successfully created.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf
```

5. Create all needed logical volumes in the root VG. Be sure to choose appropriate sizes to hold the data to be recovered from your backup. The first 3 logical volumes are created with contiguos allocation policy and without bad block relocation.

```
# lvcreate -C y -r n -L 128 vg00                                  # /stand
Logical volume "/dev/vg00/lvol1" has been successfully created with
character device "/dev/vg00/rlvol1".
Logical volume "/dev/vg00/lvol1" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -C y -r n -L 512 vg00                                  # /
Logical volume "/dev/vg00/lvol2" has been successfully created with
character device "/dev/vg00/rlvol2".
Logical volume "/dev/vg00/lvol2" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -C y -r n -L 160 vg00                                  # swap
Logical volume "/dev/vg00/lvol3" has been successfully created with
character device "/dev/vg00/rlvol3".
Logical volume "/dev/vg00/lvol3" has been successfully extended.
```

```
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -L 1536 vg00                                          # /opt
Logical volume "/dev/vg00/lvol4" has been successfully created with
character device "/dev/vg00/rlvol4".
Logical volume "/dev/vg00/lvol4" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -L 1024 vg00                                          # /tmp
Logical volume "/dev/vg00/lvol5" has been successfully created with
character device "/dev/vg00/rlvol5".
Logical volume "/dev/vg00/lvol5" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -L 1024 vg00                                          # /usr
Logical volume "/dev/vg00/lvol6" has been successfully created with
character device "/dev/vg00/rlvol6".
Logical volume "/dev/vg00/lvol6" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -L 128 vg00                                           # /home
Logical volume "/dev/vg00/lvol7" has been successfully created with
character device "/dev/vg00/rlvol7".
Logical volume "/dev/vg00/lvol7" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvcreate -L 1024 vg00                                          # /var
Logical volume "/dev/vg00/lvol8" has been successfully created with
character device "/dev/vg00/rlvol8".
Logical volume "/dev/vg00/lvol8" has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf
```

6. Make the disk bootable and configure LABEL/BDRA.

```
# mkboot /dev/rdsk/c2t0d0

# mkboot -l /dev/rdsk/c2t0d0

# mkboot -a hpux /dev/rdsk/c2t0d0

# lvlnboot -b /dev/vg00/lvol1
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvlnboot -r /dev/vg00/lvol3
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvlnboot -s /dev/vg00/lvol2
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvlnboot -d /dev/vg00/lvol2
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf

# lvlnboot -v vg00
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group:
        /dev/dsk/c2t0d0 (0/0/2/0.0.0) -- Boot Disk
Boot: lvol1     on:     /dev/dsk/c2t0d0
Root: lvol3     on:     /dev/dsk/c2t0d0
Swap: lvol2     on:     /dev/dsk/c2t0d0
Dump: lvol2     on:     /dev/dsk/c2t0d0, 0
```

7. Create file systems inside the logical volumes. `lvol1` is supposed to hold `/stand`, so it

needs to be an HFS file system! `lvol2` will be the primary swap, so no file system is created there.

```
# loadfile /sbin/fs/hfs/mkfs /sbin/fs/vxfs/mkfs

# loadfile /sbin/fs/hfs/mount /sbin/fs/vxfs/mount

# /sbin/fs/hfs/mkfs /dev/vg00/rlvol1

# for i in 3 4 5 6 7 8; do /sbin/fs/vxfs/mkfs /dev/vg00/rlvol$i; done
    version 4 layout
   163840 sectors, 163840 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   163840 data blocks, 162712 free data blocks
   5 allocation units of 32768 blocks, 32768 data blocks
   version 4 layout
   1572864 sectors, 1572864 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   1572864 data blocks, 1571384 free data blocks
   48 allocation units of 32768 blocks, 32768 data blocks
   version 4 layout
   1048576 sectors, 1048576 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   1048576 data blocks, 1047224 free data blocks
   32 allocation units of 32768 blocks, 32768 data blocks
   version 4 layout
   1048576 sectors, 1048576 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   1048576 data blocks, 1047224 free data blocks
   32 allocation units of 32768 blocks, 32768 data blocks
   version 4 layout
   131072 sectors, 131072 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   131072 data blocks, 129952 free data blocks
   4 allocation units of 32768 blocks, 32768 data blocks
   version 4 layout
   1048576 sectors, 1048576 blocks of size 1024, log size 1024 blocks
   unlimited inodes, largefiles not supported
   1048576 data blocks, 1047224 free data blocks
   32 allocation units of 32768 blocks, 32768 data blocks
```

8. Create mount points and mount all the newly created file systems.

```
# mkdir /ROOT
# /sbin/fs/vxfs/mount /dev/vg00/lvol3 /ROOT
# mkdir /ROOT/stand
# mkdir /ROOT/opt
# mkdir /ROOT/tmp
# mkdir /ROOT/usr
# mkdir /ROOT/home
# mkdir /ROOT/var
# /sbin/fs/hfs/mount /dev/vg00/lvol1 /ROOT/stand
# /sbin/fs/vxfs/mount /dev/vg00/lvol4 /ROOT/opt
# /sbin/fs/vxfs/mount /dev/vg00/lvol5 /ROOT/tmp
# /sbin/fs/vxfs/mount /dev/vg00/lvol6 /ROOT/usr
# /sbin/fs/vxfs/mount /dev/vg00/lvol7 /ROOT/home
# /sbin/fs/vxfs/mount /dev/vg00/lvol8 /ROOT/var
```

9. All file systems of the root VG are mounted now. Check what additional file systems

outside the root VG are part of the backup. Either those file systems are also mounted or excluded from restore! Especially the root file system could get overflowed otherwise. If VGs are imported at this point we need to take care that all names used for them and their logical volumes are absolutely identical with the ones contained in the backup! We need to ensure that all LVM device files in /dev are unique after restore.

10. Perform the full restore from backup. Usually you should use pax(1) to restore cpio(1) and tar(1) backups also. In the following examples our tape drive is accessed as `/dev/rmt/0m`. Use ***`ioscan -fnk -C tape`*** to find the appropriate device on your system. The restore needs to be done relative to the `/ROOT` directory!

```
# cd /ROOT
```

e.g. for pax(1):

```
# loadfile pax
# pax -r -pe -s '|^/|./|' < /dev/rmt/0m
```

e.g. for frecover(1M):

```
# loadfile frecover
# frecover -r -f /dev/rmt/0m -Xos
```

11. Recreate a fresh /stand/rootconf file using lvlnboot(1M). A valid `/stand/rootconf` file is needed for booting into *LVM Maintenance* Mode later. Here it is important to chroot(1M) to the new root file system!

```
# cp /sbin/lvlnboot /ROOT
# chroot /ROOT /lvlnboot -c
# rm /ROOT/lvlnboot
```

12. Modify your restored `/ROOT/etc/fstab` file according to the layout of the newly created root VG. This can be *very* important since the ordering of the logical volumes may have changed!

```
# loadfile ex vi libcurses.1
# vi /ROOT/etc/fstab
```

13. Reboot your system to *LVM Maintenance* Mode (see Co-Procedure).

```
# reboot
```

14. Re-import the root VG to get the /etc/lvmtab file up-to-date. Otherwise LVM errors like *Cross-device link* could be the result. Of course you need to use the appropriate disk device(s) for your root VG instead of c2t0d0 that we used in our example.

```
# vgexport -m /tmp/vg00.map /dev/vg00
# mkdir /dev/vg00
# mknod /dev/vg00/group c 64 0

# vgimport -m /tmp/vg00.map /dev/vg00 /dev/dsk/c2t0d0
Warning: A backup of this volume group may not exist on this machine.
```

```
Please remember to take a backup using the vgcfgbackup command after activating
the volume group.

# vgchange -a y /dev/vg00
Activated volume group
Volume group "vg00" has been successfully changed.
```

15. Perform a fresh vgcfgbackup(1M) of your root VG.

```
# vgcfgbackup /dev/vg00
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/vg00.conf
```

16. Reboot the system to *Multi User* Mode (see Co-Procedure). Additional tasks like mirroring the root VG may be necessary later on.

```
# reboot
```

Different Boot Modes for Different Machine Types

In this section we summarize how different types, of machine can be booted from alternate disks, from alternate kernels, to LVM Maintenance Mode and to Single User Mode. Please note the exact messages may vary depending on firmware releases.

ATTENTION: The boot process is different on Itanium system. Refer to the Itanium chapter.

Series 700: Alternate Disk Boot

Step	Action
Interrupt the boot process	Hit the *escape* key when the following message appears: *Searching for a system to boot, press and hold the escape key to override*
Boot from an alternate disk	At the menu, type: **boot PATH** where PATH is the physical path of the disk you want to boot off of Answer "**y**" to: *interact with ISL ?*(if asked) Example: **boot 52.5.0**

Series 700: Alternate Kernel Boot

Step	Action
Interrupt the boot process	Hit the escape key when the following message appears: *Searching for a system to boot, press and hold the escape key to override*
Boot from primary path and interact with isl	At the menu, type: **boot pri isl** Answer "**y**" to: *interact with ISL ?*
Enter boot command	At the ISL prompt type:

	hpux ALTKERNEL where ALTKERNEL is the kernel name that you want to boot. The standard backup kernel name is /stand/vmunix.prev

Series 700: LVM Maintenance Mode Boot

Step	Action
Interrupt the boot process	Hit the escape key when the following message appears: *Searching for a system to boot, press and hold the escape key to override*
Boot from primary path and interact with isl	At the menu, type: **boot pri isl** Answer **"y"** to: *interact with ISL ?*
Enter boot command	At the ISL prompt type: **hpux -lm**

Series 700: Single User Mode Boot

Step	Action
Interrupt the boot process	Hit the escape key when the following message appears: *Searching for a system to boot, press and hold the escape key to override*
Boot from primary path and interact with isl	At the menu, type: **boot pri isl** Answer **"y"** to: *interact with ISL ?*
Enter boot command	At the ISL prompt type: **hpux -is**

Series 700: LVM No Quorum Mode Boot

Step	Action
Interrupt the boot process	Hit the escape key when the following message appears: *Searching for a system to boot, press and hold the escape key to override*
Boot from primary path and interact with isl	At the menu, type: **boot pri isl** Answer **"y"** to: *interact with ISL ?*
Enter boot command	At the ISL prompt type: **hpux -lq**

Series 800 (except T-Class, V-Class): Alternate Disk Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears:

	Booting from primary path, press any key to override
800 Series except T-Class, V-Class, Nova: Boot from an alternate disk	At the menu, type: **boot PATH** where PATH is the physical path of the disk you want to boot off of Answer "**y**" to: *interact with ISL ?*(if asked) Example: **boot 52.5.0**
800 Series Nova: Boot from an alternate disk	Answer **"n"** to *boot from primary path ?* Answer **"n"** to: *boot from alternate path ?* Enter the path when you get the prompt: *Enter path,command, or ?* Example: **52.5.0** (to boot off of 52.5.0) Enter **"n"** to: *interact with IPL ?*

Series 800 (except T-Class/V-Class): Alternate Kernel Boot

Step	**Action**
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
800 Series except T-Class, V-Class, Nova: Boot from primary path and interact with isl	At the menu, type: **boot pri isl** And answer **"y" to** *Interact with ISL ?*
800 Series Nova: Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?* And Answer **"y"** to: *Interact with IPL ?*
Enter boot command	At the ISL prompt type: **hpux ALTKERNEL** where ALTKERNEL is the kernel name that you want to boot. The standard backup kernel name is /stand/vmunix.prev **hpux /stand/vmunix.prev**

Series 800 (except T-Class/V-Class): LVM Maintenance Mode Boot

Step	**Action**
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
800 Series except T-Class, V-Class, Nova: Boot from primary path and interact with isl	At the menu, type: **boot pri isl** And answer "y" to *Interact with ISL ?*
800 Series Nova:	Answer **"y" to** *boot from primary path ?*

Boot from primary path and interact with isl	Answer **"y" to** *Interact with IPL ?*
Enter boot command	At the ISL prompt type: **hpux -lm**

Series 800 (except T-Class/V-Class): Single User Mode Boot

Step	**Action**
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
800 Series except T-Class, V-Class, Nova: Boot from primary path and interact with isl	At the menu, type: **boot pri isl** And answer "y" to *Interact with ISL ?*
800 Series Nova: Boot from primary path and interact with isl	And Answer **"y'** to: ***boot from primary path ?*** And Answer **"y'** to: *Interact with IPL ?*
Enter boot command	At the ISL prompt type: **hpux -is**

Series 800 (except T-Class/V-Class): LVM No Quorum Mode Boot

Step	**Action**
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
800 Series except T-Class, V-Class, Nova: Boot from primary path and interact with isl	At the menu, type: **boot pri isl** And answer "y" to *Interact with ISL ?*
800 Series Nova: Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?* And Answer **"y"** to: *Interact with IPL ?*
Enter boot command	At the ISL prompt type: **hpux -lq**

V-Class: Alternate Disk Boot

Step	**Action**
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
Boot from an alternate disk	At the menu, type:

	boot PATH where PATH is your alternate disk path Example**: boot 10/52.5.0**

V-Class: Alternate Kernel Boot

Step	Action
Interrupt the boot process	Hit any key when the f ollowing message appears: *Booting from primary path, press any key to o verride*
Boot from primary path and select an alternate kernel in o ne easy step.	At the menu, type: **boot pri ALTKERNEL** where ALTKERNEL is the kernel name that you want to boot. The standard backup kernel name is /stand/vmunix.prev **boot pri /stand/vmunix**

V-Class: LVM Maintenance Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
Boot from primary path and select lm mode in one easy step .	At the menu, type: **boot pri -lm**

V-Class: Single User Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
Boot from primary path and select Single User mode in one easy step.	At the menu, type: **boot pri -is**

V-Class: LVM No Quorum Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override*
Boot from primary path and select LVM No Quorum mode in one easy step.	At the menu, type: **boot pri -lq**

T-Class: Alternate Disk Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override* NOTE: On a T-Class box, there will be initial question about interrupting the boot process to change the configuration prior to the above message. Do NOT interrupt the boot process at that time
Boot from an alternate disk	Answer **"n"** to *boot from primary path ?* Answer **"n"** to: *boot from alternate path ?* Enter the path when you get the prompt: *Enter path,command, or ?* Example: **52.5.0** (to boot off of 52.5.0) Enter **"n"** to: *interact with IPL ?*

T-Class: Alternate Kernel Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override* NOTE: On a T-Class box, there will be initial question about interrupting the boot process to change the configuration prior to the above message. Do NOT interrupt the boot process at that time
Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?*
Enter boot command	At the ISL prompt type: **hpux (;0)/ALTKERNEL** where ALTKERNEL is the kernel name that you want to boot. The standard backup kernel name is /stand/vmunix.prev **hpux (;0)/stand/vmunix.prev**

T-Class: LVM Maintenance Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override* NOTE: On a T-Class box, there will be initial question about interrupting the boot process to change the configuration prior to the above message. Do NOT interrupt the boot process at that time
Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?*
Enter boot command	At the ISL prompt type: **hpux -lm**

T-Class: Single User Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override* NOTE: On a T-Class box, there will be initial question about interrupting the boot process to change the configuration prior to the above message. Do NOT interrupt the boot process at that time
Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?*
Enter boot command	At the ISL prompt type: **hpux -is**

T-Class: LVM No Quorum Mode Boot

Step	Action
Interrupt the boot process	Hit any key when the following message appears: *Booting from primary path, press any key to override* NOTE: On a T-Class box, there will be initial question about interrupting the boot process to change the configuration prior to the above message. Do NOT interrupt the boot process at that time
Boot from primary path and interact with isl	Answer **"y"** to *boot from primary path ?*
Enter boot command	At the ISL prompt type: **hpux -lq**

Recovery with VxVM Boot Disks (Itanium)

This section describes some basic recovery steps using the VxVM Maintenance Mode Boot (MMB) in HP-UX 11i Version 1.5 (B.11.20). It is based on the Whitepaper located on https://h20566.www2.hp.com/portal/site/hpsc/template.BINARYPORTLET/public/kb/docDisplay/resource.process/?spf_p.tpst=kbDocDisplay_ws_BI&spf_p.rst_kbDocDisplay=wsrp-url%3Dhttp%253A%252F%252F16.193.224.133%253A25654%252Fsp4tssearch%252FbinaryDocDisplay%253FdocId%253Demr_na-c01037105-5%2526docLocale%253Den%26wsrp-requiresRewrite%3Dfalse&javax.portlet.begCacheTok=com.vignette.cachetoken&javax.portlet.endCacheTok=com.vignette.cachetoken (you can also search google for 'vxvm_mmb site:hp.com' and it should pull the document as well). VxVM MMB is intended for use on systems where the boot disk is a VxVM disk and a bootup has failed due to problems in starting the VxVM configuration daemon. A VxVM boot disk is a disk that is made up of VxVM volumes that contain the root, stand and possibly other file systems. On such a system, you must resolve the VxVM problem before being able to perform a standard boot once again.

Booting to VxVM MMB prevents the VxVM configuration daemon (vxconfigd) from being started during system initialization. When booted to VxVM MMB, the system will be in single user mode with only the root volume mounted.
Several conditions will prevent the system from being booted in a normal way. This section provides symptoms that accompany such conditions and procedures that may be used to repair the system to once again allow normal operation.

Missing LABEL File

A missing LIF LABEL file will prevent successful bootup of the system. During system bootup, the LABEL file is used to determine the offset and length of the root, stand and swap/dump volumes before the VxVM configuration daemon may be started.

Symptoms of a missing LABEL file during bootup

```
Welcome to HP-UX for IA64
setting hpux path(\EFI\HPUX)...
type 'fs[x]:' where x is your bootdisk (0, 1, 2...)
type 'hpux' to start hpux bootloader

Shell> fs2:
fs2:\> hpux
Could not open :LABEL file
Could not read VxVM LABEL file from LIF FS.
```

Restoring the LABEL file

Boot to VxVM Maintenance Mode Boot. This will use the `/stand/rootconf` file to locate the root volume, bypassing making use of the LABEL file.

Boot the system to VxVM maintenance mode:

```
fs2:\> hpux -vm
VxVM maintenance mode

*** HP-UX Boot Loader for IA-64 ****
*** Version 1.639 ****
*** Type 'help' for help ****

HPUX> boot vmunix -vm
Booting kernel...

Console is on Serial COM1
PAL_DEBUG_FEATURE [CPU 0]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 1]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 2]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 3]: 0x4, multi-dispersal
NOTICE: nfs3_link(): File system was registered at index 4.
NOTICE: cachefs_link(): File system was registered at index 5.
NOTICE: autofs_link(): File system was registered at index 6.
qlisp_multi(0): QLogic 12160 dual Ultra3 SCSI
qlisp(3): Loaded QLogic ISP, Ver: 10.04.08, Mode: NV-AUTO DMA64 FP
Boot device's HP-UX HW path is: 0.18.1.2.0.1.8.0

System Console is on the Built-In Serial Interface
Swap device table: (start & size given in 512-byte blocks)
entry 0 - auto-configured on root device; ignored - no room
WARNING: no swap device configured, so dump cannot be defaulted to primary swap.
WARNING: No dump devices are configured. Dump is disabled.
Starting the STREAMS daemons-phase 1
```

```
Starting vxconfigd in boot mode (pre_init_rc).
INFO: VxVM Maintenance Mode Boot - vxconfigd aborted
Checking root file system.
file system is clean - log replay is not required
Root check done.
Create STCP device files
Starting the STREAMS daemons-phase 2
$Revision: vmunix: vw: njl selectors: CUPI80_BL2001_0223 xxx_xxx 'CU$
Memory Information:
physical page size = 4096 bytes, logical page size = 4096 bytes
Physical: 4190020 Kbytes, lockable: 2968036 Kbytes, available: 3122284 Kbyts

/sbin/ioinitrc:
vxfs fsck: Cannot open /dev/vx/dsk/rootdg/standvol: No such device or address
file system check failure, aborting ...
/dev/vx/dsk/rootdg/standvol: No such device or address
Unable to mount /stand - please check entries in /etc/fstab
Skipping KRS database initialization - /stand can't be mounted

INFO: VxVM Maintenance Mode Boot - vxconfigd aborted

INIT: Overriding default level with level 's'

INIT: SINGLE USER MODE
…
Value of TERM has been set to "vt100".
WARNING: YOU ARE SUPERUSER !!
```

At the prompt run the vxconfigd:

```
# vxconfigd
NOTICE: vxvm:vxdmp: added disk array OTHER_DISKS
```

Mount the file systems:

```
# vxdisk list
DEVICE TYPE DISK GROUP STATUS
c4t8d0s2 simple rootdisk01 rootdg online
# vxvol startall
# mountall
```

Write the LABEL file:

```
# mkboot -l /dev/rdsk/c4t8d0s2
# vxvmboot -v /dev/rdsk/c4t8d0s2
LIF Label File @ (1k) block # 846 on LVM Disk /dev/rdsk/c4t8d0s2:
Label Entry: 0, Boot Volume start: 2912; length: 3992 MB
# /etc/vx/bin/vxbootsetup rootdisk01
# vxvmboot -v /dev/rdsk/c4t8d0s2
LIF Label File @ (1k) block # 846 on VxVM Disk /dev/rdsk/c4t8d0s2:
Label Entry: 0, Boot Volume start: 3168; length: 512 MB
Label Entry: 1, Root Volume start: 1576032; length: 256 MB
Label Entry: 2, Swap Volume start: 527456; length: 1024 MB
Label Entry: 3, Dump Volume start: 527456; length: 1024 MB
```

Reboot the system.

Corrupted or Incorrect LABEL File

A corrupted LABEL file or a LABEL file containing incorrect data for a VxVM boot disk will prevent successful boot up of the system. An incorrect LABEL file can occur, for example, if the mkboot command has been invoked improperly or without a

subsequent invocation of the vxbootsetup command prior to the latest system reboot.

NOTE: Running the mkboot command alone will result in a LABEL not suitable for booting a system with a VxVM boot disk. To create a LABEL file suitable for a VxVM boot disk, one must run the vxbootsetup command after having run the '`mkboot -l </dev/rdsk/<HP-UX partition>'` (see example under Missing LABEL file section above) .

Symptoms of a corrupted or incorrect LABEL file during bootup

```
Welcome to HP-UX for IA64
setting hpux path(\EFI\HPUX)...
type 'fs[x]:' where x is your bootdisk (0, 1, 2...)
type 'hpux' to start hpux bootloader

Shell> fs1:
fs1:\> hpux
No root vol information found in VxVM LABEL file.

*** HP-UX Boot Loader for IA-64 ****
*** Version 1.639 ****
*** Type 'help' for help ****

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 0
AUTOBOOTING...
AUTO BOOT> boot vmunix

Could not open /stand/vmunix
```

Or, to list contents of the LIF volume:

```
fs1:\> hpux
No root vol information found in VxVM LABEL file.

*** HP-UX Boot Loader for IA-64 ****
*** Version 1.639 ****
*** Type 'help' for help ****

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 10
```

Break out to list contents

```
HPUX> ls
FILENAME
ISL
AUTO
HPUX
PAD
LABEL
```

Restoring the LABEL file

See Missing LABEL file section above.

Missing or Corrupt /etc/vx/volboot File

During system bootup, the VxVM configuration daemon is started. It makes use of the file `/etc/vx/volboot`. If for any reason that file is somehow missing or somehow corrupted, the configuration daemon will fail and abort the boot sequence.

Symptoms of missing or corrupt /etc/vx/volboot file

```
Welcome to HP-UX for IA64
setting hpux path(\EFI\HPUX)...
type 'fs[x]:' where x is your bootdisk (0, 1, 2...)
type 'hpux' to start hpux bootloader

Shell> fs1:
fs1:\> hpux

*** HP-UX Boot Loader for IA-64 ****
*** Version 1.639 ****
*** Type 'help' for help ****

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 0
AUTOBOOTING...
AUTO BOOT> boot vmunix

> System Memory = 4091 MB
loading section 0
..............................
loading section 1
....
Loading symbol table. Num of Sec Header(29)
Loading System Directory(boot.sys) to MFS
......
Loading Kernel Boot Directory(boot.3AB7B59C4184) to MFS.
.....
Launching /stand/vmunix
SIZE: Text:16182K + Data:1558K + BSS:1409K = Total:19151K
Booting kernel...

Console is on Serial COM1
PAL_DEBUG_FEATURE [CPU 0]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 1]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 2]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 3]: 0x4, multi-dispersal
NOTICE: nfs3_link(): File system was registered at index 4.
NOTICE: cachefs_link(): File system was registered at index 5.
NOTICE: autofs_link(): File system was registered at index 6.
qlisp_multi(0): QLogic 12160 dual Ultra3 SCSI
qlisp(3): Loaded QLogic ISP, Ver: 10.04.08, Mode: NV-AUTO DMA64 FP
Boot device's HP-UX HW path is: 0.18.1.2.0.0.1.0

System Console is on the Built-In Serial Interface
Swap device table: (start & size given in 512-byte blocks)
entry 0 - major is 99, minor is 0x1; start = 0, size = 2097152
Starting the STREAMS daemons-phase 1
Starting vxconfigd in boot mode (pre_init_rc).
NOTICE: vxvm:vxdmp: added disk array SEAGATE_DISKS

vxvm:vxconfigd: ERROR: enable failed: Volboot file not loaded
transactions are disabled.
vxvm:vxconfigd: FATAL ERROR: Rootdg cannot be imported during boot
Error returned from vxconfigd -m boot, halting
```

```
sync'ing disks (0 buffers to flush):
0 buffers not flushed
0 buffers still dirty

System has halted
OK to turn off power or reset system
```

Restoring the volboot file

Boot the system to VxVM maintenance mode.

```
fs1:\> hpux -vm
VxVM maintenance mode

*** HP-UX Boot Loader for IA-64 ****
*** Version 1.639 ****
*** Type 'help' for help ****

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 10

HPUX> boot vmunix -vm
> System Memory = 4091 MB
loading section 0
.............................
loading section 1
....
Loading symbol table. Num of Sec Header(29)
Loading System Directory(boot.sys) to MFS
......
Loading Kernel Boot Directory(boot.3AB7B59C4184) to MFS.
.....
Launching /stand/vmunix
SIZE: Text:16182K + Data:1558K + BSS:1409K = Total:19151K

Booting kernel...

Console is on Serial COM1
PAL_DEBUG_FEATURE [CPU 0]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 1]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 2]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 3]: 0x4, multi-dispersal
NOTICE: nfs3_link(): File system was registered at index 4.
NOTICE: cachefs_link(): File system was registered at index 5.
NOTICE: autofs_link(): File system was registered at index 6.
qlisp_multi(0): QLogic 12160 dual Ultra3 SCSI
qlisp(3): Loaded QLogic ISP, Ver: 10.04.08, Mode: NV-AUTO DMA64 FP
Boot device's HP-UX HW path is: 0.18.1.2.0.0.1.0

System Console is on the Built-In Serial Interface
Swap device table: (start & size given in 512-byte blocks)
entry 0 - auto-configured on root device; ignored - no room
WARNING: no swap device configured, so dump cannot be defaulted to primary swap.
WARNING: No dump devices are configured. Dump is disabled.
Starting the STREAMS daemons-phase 1
Starting vxconfigd in boot mode (pre_init_rc).
INFO: VxVM Maintenance Mode Boot - vxconfigd aborted
Checking root file system.
file system is clean - log replay is not required
Root check done.
Create STCP device files
Starting the STREAMS daemons-phase2
$Revision: vmunix: vw: njl selectors: CUPI80_BL2001_0223 xxx_xxx 'CU$
Memory Information:
physical page size = 4096 bytes, logical page size = 4096 bytes
Physical: 4190020 Kbytes, lockable: 2966672 Kbytes, available: 3122952 Kbytes
```

```
/sbin/ioinitrc:
vxfs fsck: Cannot open /dev/vx/dsk/rootdg/standvol: No such device or address
file system check failure, aborting ...
/dev/vx/dsk/rootdg/standvol: No such device or address
Unable to mount /stand - please check entries in /etc/fstab
Skipping KRS database initialization - /stand can't be mounted

INFO: VxVM Maintenance Mode Boot - vxconfigd aborted

INIT: Overriding default level with level 's'

INIT: SINGLE USER MODE

INIT: Running /sbin/sh
…
Value of TERM has been set to "vt100".
WARNING: YOU ARE SUPERUSER !!
```

Start the vxconfigd:

```
# vxconfigd -m disable
NOTICE: vxvm:vxdmp: added disk array SEAGATE_DISKS

# vxdctl init <hostname>
# vxdctl add disk c3t1d0s2 privoffset=2144
# vxconfigd -kr reset -m boot

Confirm that VxVM is running

# vxdisk list
DEVICE TYPE DISK GROUP STATUS
c3t0d0s2     simple     -           -     FS wholedisk
c3t1d0s2     simple     rootdisk01 rootdg online
c4t8d0s2     simple     -           -     online
```

Now reboot the system.

Missing or Corrupt Device Files or Missing or Corrupt ioconfig File

The ioconfig file provides the mapping between information stored in devices files (major number and logical unit) and the information the I/O system uses to communicate with the devices via hardware paths. VxVM only interacts directly with device files.

If the I/O hardware configuration is changed and, at any time later, the ioconfig file is removed or corrupted, the mapping between the I/O system and device files will be changed. As a result, some or all device files may not map to valid I/O hardware paths. If these device files are either missing or stale, the VxVM configuration daemon (vxconfigd) will not start. This in turn will abort the system boot sequence.

Symptoms of missing or corrupt /stand/ioconfig file

```
Welcome to HP-UX for IA64
setting hpux path(\EFI\HPUX)...
type 'fs[x]:' where x is your bootdisk (0, 1, 2...)
type 'hpux' to start hpux bootloader
Shell> fs1:
fs1:\> hpux
```

```
*** HP-UX Boot Loader for IA-64 ****
*** Version 1.65 ****
*** Type 'help' for help ****

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 0
AUTOBOOTING...
AUTO BOOT> boot vmunix

System Memory = 4091 MB
loading section 0
..............................
loading section 1
.....
Loading symbol table. Num of Sec Header(29)
Loading System Directory(boot.sys) to MFS
.....
Loading Kernel Boot Directory(boot.3AD5C7894389) to MFS.
.....
Launching /stand/vmunix
SIZE: Text:16685K + Data:2071K + BSS:1410K = Total:20167K

Booting kernel...

PAL_DEBUG_FEATURE [CPU 0]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 1]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 2]: 0x4, multi-dispersal
PAL_DEBUG_FEATURE [CPU 3]: 0x4, multi-dispersal
WARNING: GIO: read_ioconfig_file(): /stand/ioconfig read error.
ioconfig = NULL
NOTICE: nfs3_link(): File system was registered at index 4.
NOTICE: cachefs_link(): File system was registered at index 5.
NOTICE: autofs_link(): File system was registered at index 6.
qlisp_multi(0): QLogic 12160 dual Ultra3 SCSI
qlisp(5): Loaded QLogic ISP, Ver: 10.04.08, Mode: NV-AUTO DMA64 FP
Boot device's HP-UX HW path is: 0.18.1.2.0.0.1.0

System Console is on the Built-In Serial Interface
Swap device table: (start & size given in 512-byte blocks)
entry 0 - major is 99, minor is 0x1; start = 0, size = 8388608
Starting the STREAMS daemons-phase 1
Starting vxconfigd in boot mode (pre_init_rc).
NOTICE: vxvm:vxdmp: added disk array SEAGATE_DISKS
```

If the ioconfig file is missing, the following two lines will be displayed.

```
ioconfig_lock: Cannot open /etc/ioconfig with specified flags.
ioconfig_lock: Cannot open /etc/ioconfig with specified flags.

Error returned from vxconfigd -m boot, halting
```

Restoring the device and ioconfig files

Boot the system to VxVM maintenance mode.

```
Welcome to HP-UX for IA64
setting hpux path(\EFI\HPUX)...
type 'fs[x]:' where x is your bootdisk (0, 1, 2...)
type 'hpux' to start hpux bootloader
Shell> fs1:
fs1:\> hpux -vm
VxVM maintenance mode
*** HP-UX Boot Loader for IA-64 ****
*** Version 1.65 ****
*** Type 'help' for help ****
```

```
Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix

Seconds left till autoboot - 10

HPUX> boot vmunix -vm
> System Memory = 4091 MB
loading section 0
loading section 1
.....
INFO: VxVM Maintenance Mode Boot - vxconfigd aborted
INIT: Overriding default level with level 's'
INIT: SINGLE USER MODE
INIT: Running /sbin/sh
```

Remove all disk device files:

```
# rm /dev/dsk/*
# rm /dev/rdsk/*
# ls /dev/rdsk /dev/dsk
/dev/dsk:
/dev/rdsk:
```

Re-create them with insf(1M):

```
# /sbin/insf -e
insf: Installing special files for sctl instance 0 address 0/16/1/2/0.7.0
…
```

Start vxconfigd:

```
# vxconfigd
NOTICE: vxvm:vxdmp: added disk array SEAGATE_DISKS
ioconfig_lock: /etc/ioconfig - permission denied.
ioconfig_lock: /etc/ioconfig - permission denied.
```

Mount the disks:

```
# vxdisk list
DEVICE TYPE DISK GROUP STATUS
c5t0d0s2     simple     -          -      FS_wholedisk
c5t1d0s2     simple     rootdisk01 rootdg online
c6t8d0s2     simple     -          -      online
# vxvol startall
# mountall
# mount
/ on /dev/vx/dsk/rootdg/rootvol log on Tue Apr 17 14:15:29 2001
/var on /dev/vx/dsk/rootdg/varvol delaylog,nodatainlog on Tue Apr 17 14:49:28 2
/usr on /dev/vx/dsk/rootdg/usrvol delaylog,nodatainlog on Tue Apr 17 14:49:28 2
/tmp on /dev/vx/dsk/rootdg/tmpvol delaylog,nodatainlog on Tue Apr 17 14:49:28 2
/stand on /dev/vx/dsk/rootdg/standvol delaylog,nodatainlog on Tue Apr 17 14:49:
/opt on /dev/vx/dsk/rootdg/optvol delaylog,nodatainlog on Tue Apr 17 14:49:29 2
/home on /dev/vx/dsk/rootdg/homevol delaylog,nodatainlog on Tue Apr 17 14:49:29
```

Re-create ioconfig:

```
# /sbin/ioinit -c
# ll /stand/ioconfig /etc/ioconfig
-rw-rw-r-- 1 root sys 3128 Apr 17 14:51 /etc/ioconfig
-rw-rw-r-- 1 root sys 3128 Apr 17 14:51 /stand/ioconfig
```

Reboot the system.

Additional Information

- Recovery Media Users Guide
  http://docs.hp.com/hpux/hw/index.html#General%20Guides
- Refer to the vPars Chapter to learn how a *virtual partition* is booted.
- Refer to the Itanium Chapter to learn how an *Itanium system* is booted.