HP-UX
CE Handbook

for

HP Precision Architecture-RISC
Computer Systems

HEWLETT
PACKARD

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Printing History

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

Edition 1 . . . . . June 1991

List of Effective Pages

The List of Effective Pages gives the date of the current edition and of any pages changed in updates to that edition. Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. No information is incorporated into a reprinting unless it appears as a prior update.

All pages: Edition 1 . . . . . June 1991

Safety Considerations

Review the hardware documentation to become familiar with safety markings used on the product. The following list shows some of the safety symbols used to indicate various safety considerations.

SAFETY SYMBOLS

Instruction manual symbol. The product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.

Indicates hazardous voltages.

Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

Warning

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

Caution

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Contents

Figures

1

HP-UX Basics

Introduction

This handbook provides fundamental reference information about the HP-UX operating system.

The information presented here is in abbreviated format, and is largely drawn from the instruction material of course, *CE42 HPUXB, Series 800 System Administration*, offered by the Customer Education Department of PrSD.

Users of this handbook are encouraged to seek other sources of information to acquire a broader understanding of HP-UX. The handbook is not a substitute for formal training, or self-initiated learning about HP-UX. Rather, it is assumed that to use this handbook, you will already be knowledgeable of basic HP-UX operating system principles.

HP-UX File Hierarchy

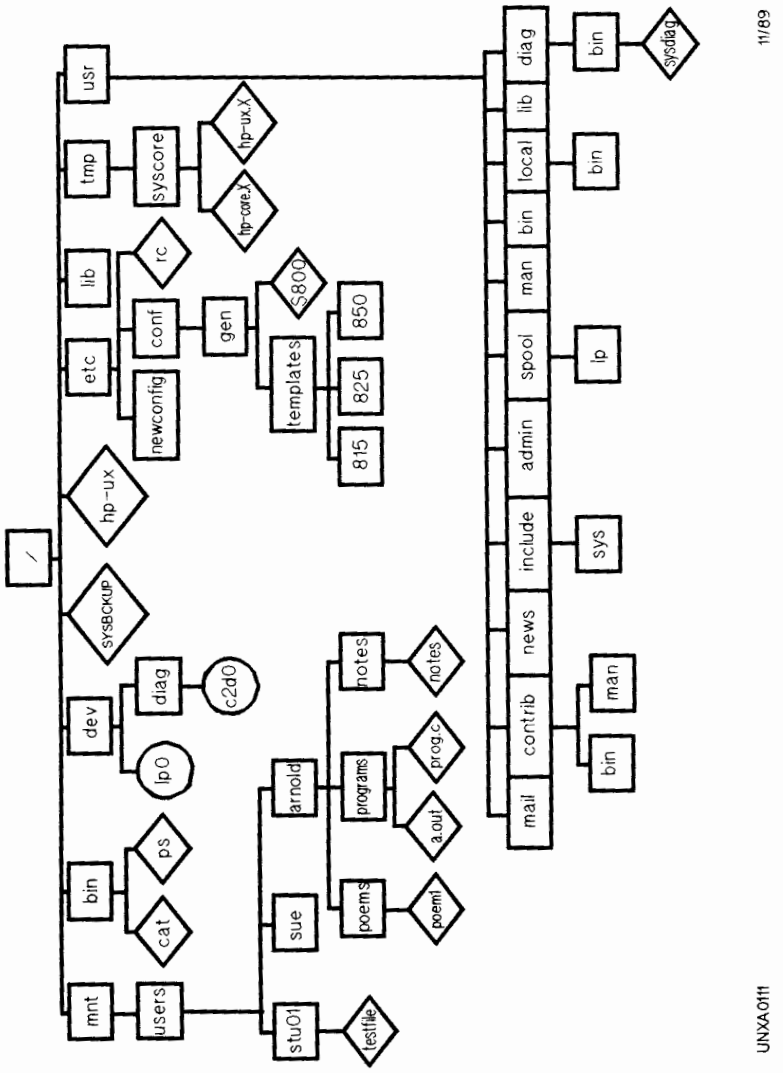


Figure 1-1. HP-UX File Hierarchy

HP-UX Directory Structure

HP-UX Directory Structure

Directory Name	Contents and Use
/	Root
/bin	Public commands
/dev	Special device files
/etc	Commands and files for system administration
/etc/conf	Contains object code for driver generation and system configuration
/etc/conf/gen	Contains the S800 file
/etc/newconfig	Contains new versions of configuration files and scripts after an update
/lib	Contains object code libraries and related utilities
/hp-ux	Contains the HP-UX operating system (kernel)
/tmp	Contains temporary files and system panic information
/mnt	User home directories
/usr	Contains less frequently used commands and miscellaneous files
/usr/lib	Overflow for /lib
/usr/mail	Mail directory used for depositing mail files
/usr/man /man1..man8	Contains unformatted man pages
/usr/man/cat1.. cat8,catlm	Contains formatted man pages
/usr/spool /uucppublic	Used for free access of files by other systems (uucp and LAN)

HP-UX Directory Structure (continued)

Directory Name	Contents and Use
/usr/spool	Spooled (queued) files for various programs
/usr/spool/uucp	Queued work files, lock files, log files, etc. for uucp
/usr/tmp	Alternate place for temporary files
/usr/contrib	Contains contributed files and commands
/usr/contrib/bin	Contains user contributed commands
/usr/contrib/lib	Contains contributed object libraries
/usr/contrib /man	On-line documentation for any contributed files
/usr/news	Contains news items about customer's system.
/usr/diag/bin	On-line diagnostics
/usr/include/sys	Low level (kernel related) C language header files
/usr/lib/uucp	Configuration files for uucp
/usr/adm	System administrative data files

Command Structure

$ command [options] [parameters]

- White space is used by HP-UX as the delimiter between the command, any options, or parameters.
- Most commands have several options.
- Most commands require at least one parameter.
- Example:

  ls -a /mnt/users/stu01

Full Path Names

- Full path names always begin from the root (/) directory.
- Full path names ALWAYS start with a / (slash).
- Examples:

  /etc/conf/gen/S800

  /etc/mount

  /mnt/users/stu01

Relative Path Names

- The path specified is with reference to the directory where you currently reside in the hierarchical file system.
- Use the HP-UX *pwd* command if you are unsure of your location in the file system.
- Relative path names must begin with one of the following:

Metacharacter or Name	Meaning
.	Path begins with current directory.
..	Path begins with parent directory.
filename or subname	Path begins at the current directory with the file *filename*, or the subdirectory named *subname*.

HP-UX Commands

File Commands

HP-UX File Commands

Command	Description
more file2	Displays the contents of file2 on screen
q	Quits display and returns to command line when using *more* command
RETURN	Displays one more line when using *more* command
SPACE	Displays another screen when using *more* command
h	Displays *help* menu when using *more* command
cat file1	Displays the contents of file1 on screen
cat > newtest	Takes whatever is typed at the terminal and puts it into the new file *newtest* until Ctrl-d is typed
cat >> oldtest	Takes whatever is typed at the terminal and adds it to the end of the existing file *oldtest* until Ctrl-d is typed
cat file1 file2 > file3	Combines *file1* and *file2* and puts them in *file3* with *file1* first
grep pattern file4	Displays the lines in which the string *pattern* occurs in *file4*
cp file5 filenew	Makes a copy of the file *file5* in *filenew*. If *filenew* is a directory, a copy of *file5* is put in that directory.
mv blue green	Changes the name of the file *blue* to *green*. If *green* is a directory, the file *blue* is moved into it.

HP-UX File Commands (continued)

Command	Description
rm useless1 useless2	Deletes the files *useless1* and *useless2*
lp file6	Sends the file *file6* to the default system line printer
vi file7	Creates or edits the file *file7* with the vi screen editor
diff file1 file2	Displays the difference between *file1* and *file2* on screen
chown stuxx file1	Changes ownership of file *file1* to stuXX
chgrp ces files1	Changes the group ID of *file1* to ces
chmod 755 file1	Changes the (r)ead-(w)rite-(e)xecute file permissions, for owner-group-other, of file *file1* to rwxr-xr-x

Directory Commands

HP-UX Directory Commands

Command	Description
ls	Lists the files and subdirectories of the current directory
lsf	Lists the files and subdirectories of the current directory; flags directories with a (/) and executable files with a (*)
ll	Long listing of the current directory; shows file type, permissions, ownership, size, etc.
lssf /dev/*	Displays all device files in */dev*; shows physical addresses and file descriptions (S800 only)
file*	Lists all files in current directory and attempts to show file type

HP-UX Directory Commands (continued)

Command	Description
pwd	Displays the name of the working directory on screen
cd	Returns you to your home directory
cd /user/stu01	Moves you to the directory */user/stu01*
cd ..	Moves you to your working directory's parent directory
mkdir servicenotes	Creates a new subdirectory in your current directory named *servicenotes*
rmdir letters	Deletes the directory *letters*, if the directory contains no files
rm -r *	Recursively removes all files in the current directory (know what directory you are in before typing this command).
find / -name cat -print	Searches all mounted file systems for *cat* and displays the path name

System Commands

HP-UX System Commands

Command	Description
who	Displays the users currently logged onto the system and the ports used
who -r	Displays the current system run-state
ps -ef	Displays all processes executing on the system; shows PIDs, PPIDs, etc.
man ls	Displays information about the *ls* command and its options
man -k mail	Lists the HP-UX commands that relate to the keyword *mail*
kill 4507	Terminates the process associated with process ID number 4507
history	Lists the last 20 commands entered from last to first (csh only)
!!	Repeats the last command entered (csh only)
exit	logout
bdf	Shows disk usage and percentage full
lpstat -t	Shows status of spooler
write	Writes to uses already logged on to system
wall	Broadcasts system wide announcement to all users
echo message	Echoes ASCII message *message* on screen

HP-UX System Commands (continued)

Command	Description
init s	Changes run level from multiuser to single user
init 2	Changes run level from single user to multiuser
mount	Lists what file systems are mounted
mount -a	Attempts to mount all file systems listed in /etc/checklist
umount /dev/dsk/c1d0s11	Manually unmounts /dev/dsk/c1d0s11 file system
insf	Makes special device files using /etc/devices (cd to /dev first)
ioscan	Identifies and lists hardware and path
rmsf	Removes a special file
tset hp2392	Initializes hp2392 terminal

Command Keys

HP-UX Command Keys

Command	Description
Ctrl-c or DEL	Interrupt. Stops a command from being executed
Ctrl-d	Removes you from the current environment. At the $, #, or % prompts, these keys log you off the system (if you are in your primary shell)
Ctrl-s	Temporarily stops output to the display
Ctrl-q	Resumes the output that was halted by Ctrl-s

Wild Card Characters

HP-UX Wild Card Characters

Command	Description
*	Designates all files in the current directory
s*	Designates all files beginning with s in the current directory
*.c	Designates all files ending with .c in the current directory
????	Designates any 4-character filename in the current directory
s???	Designates any 4-character filename beginning with s in the current directory

ll Command

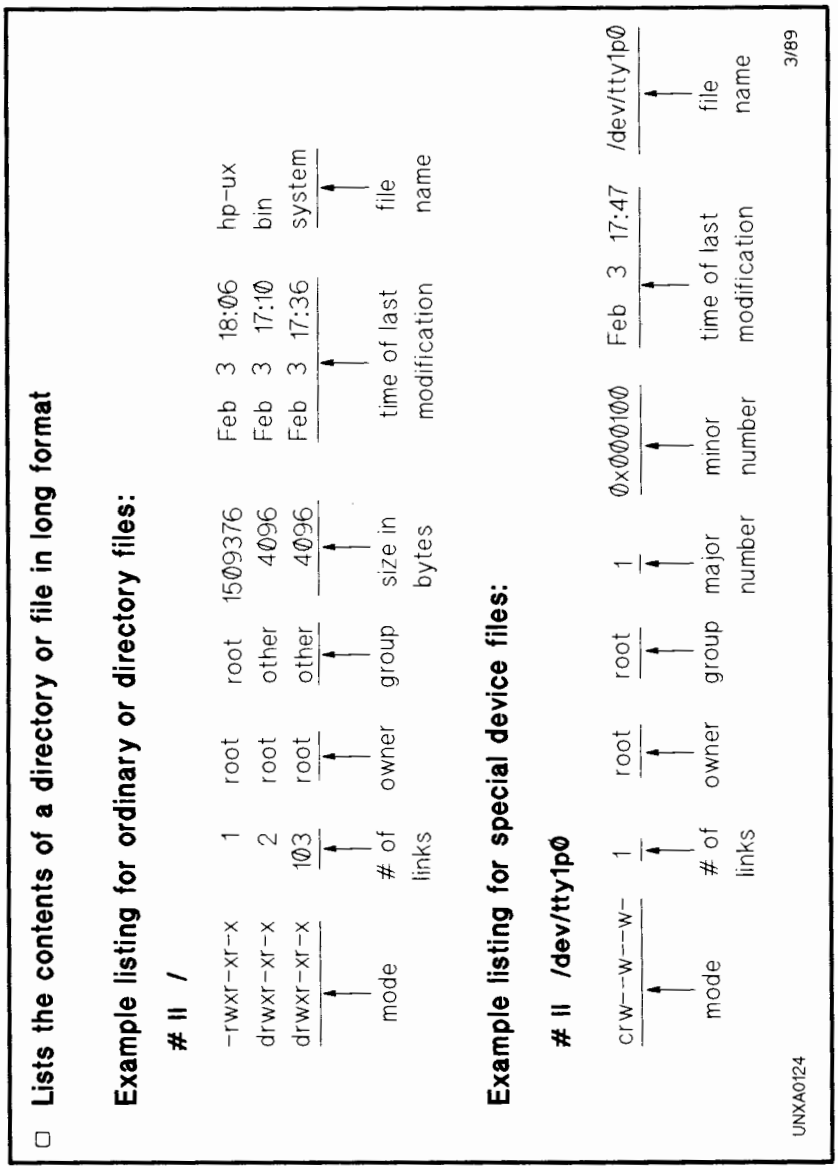


Figure 1-2. ll Command

Using vi

Figure 1-3. Using vi

ed in Review

- Modifying Text Within a Line

s/old pattern/new pattern/	Substitutes first occurrence of *old pattern* in a line with *new pattern*.
s/old pattern/new pattern/g	Substitutes all occurrence of *old pattern* in a line with *new pattern*.

- Moving Lines

General format: *x,ymz*

x	Beginning line argument.
y	Ending line argument.
m	Move command.
z	Destination argument (followed by the number of lines to move).

Example: *3,10m50*

Lines 3 through 10 move after line 50 (lines are automatically renumbered after the move).

- Searching a File for a Pattern

/pattern/	Forward Search.
?pattern?	Backward Search.
/^pattern/	Search forward for a *pattern* beginning a line.
/pattern$/	Search forward for a *pattern* ending a line.

• Making Commands Effective Globally

General format: *g/pattern/command list/g*

x	Beginning line argument.
y	Ending line argument.
g	Global command informs ed to perform *command list* on every line containing *pattern* in the file.
command list	List of ed commands to be performed on first *pattern* match on each line.
g	Informs ed that the *command list* is to be performed on all *pattern* matches on line.

• Line Arguments

General format: *x,y command list*	
x	Beginning line argument.
y	Ending line argument.
command list	List of ed commands to be performed.

o Common Arguments

.	Current line.
+	Move forward one line.
-	Move back one line.
$	Move to last line in file.
1	Move to first line in file.
/pattern/	Forward search for a pattern.
Examples:	
*1,$*command list	Perform command list on all lines in a file (same as *g* argument in *Making Commands Effective Globally*).
*1,$-3*command list	Perform command on all lines except last four.
/HP/,/products/ command list	Performs commands on all lines beginning with pattern *HP* and ending with line containing *products*.

- Invoking ed

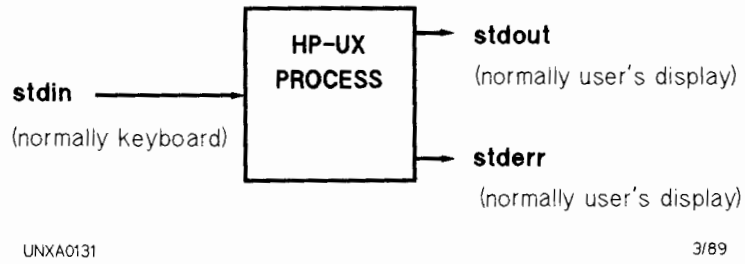
$ *ed*

$ *ed* oldfile

- Basic Commands

a	Append lines of text after current line (single period <.> at beginning of a line ends append mode).
i	Insert lines before current line (single period <.> at beginning of a line ends insert mode).
d	Delete line of text at cursor.
p	Print line.
g	Perform command list on selected lines of entire file.
s	Modify text on a line by substitution.
m	Move line(s) to new position in file (lines are renumbered after move.
n	Print line number of current line.
r	Read specified file into current line after the addressed line.
h	Terse help message.
u	Undo last command.
w	Write ed buffer to specified file (for example *w newfile*).
q	Quit ed.
qq	Abort ed without writing.

HP-UX Processes



UNXA0131 3/89

- Work in HP-UX is accomplished within a process. A unique process is created for each command or program executed.
- Process I/O.
  - Input is taken from the standard input file (stdin).
  - Output is directed to the standard output file (stdout).
  - Any errors generated are directed to standard error file (stderr).
- Each process has a unique Process ID (PID) number to identify the process to the HP-UX kernel.

Observing Process Status

- Use *ps -ef* to Display all System Processes

$*ps -ef*

UID	PID	PPID	C	STIME	TTY	TIME	COMMAND
root	89	1	0	Nov 18	console	0:00	-sh
root	3	0	0	Nov 18	?	0:01	statdaemon
root	2	0	0	Nov 18	?	0:00	pagedaemon
root	1	0	0	Nov 18	?	1:40	init
root	0	0	0	Nov 18	?	0:04	swapper
root	5965	89	0	09:28:30	console	1:00	ps ef
root	5964	89	0	09:27:58	console	0:00	sleep 100

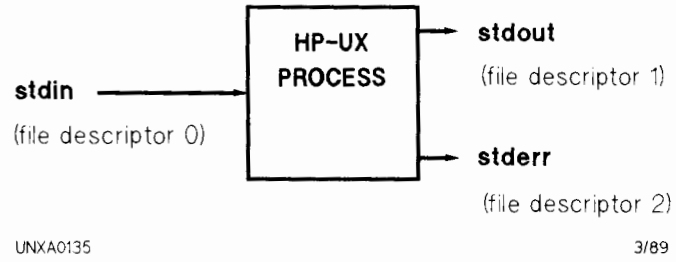
Field	Meaning
UID	User ID
PID	Process ID
PPID	PID of parent process that spawned this process
C	Processor utilization for scheduling
STIME	Starting time of process. Displays date if >24 hours
TTY	Terminal process started on
TIME	Cumulative CPU execution time in minutes and seconds
COMMAND	Nearest approximation of command typed that fits field

- Use *ps* to Display all User Processes $*ps*

```
  PID  TTY      TIME COMMAND
   89  tty0p2   0:00 sh
 5960  tty0p2   0:00 ps
```

Field	Meaning
PID	Process ID
TTY	Terminal process started on
TIME	Cumulative CPU execution time in minutes and seconds
COMMAND	Nearest approximation of command typed that fits field

Redirecting I/O



- Redirecting Standard Output.
  - Use > or *1>* to create or overwrite the specified output file. For example: *$cat file > newfile*
  - Use >> or *1>>* to append output to the end of the specified output file. For example: *$cat file >> appendedfile*
- Redirecting Standard Error.
  - Use *2>* to create or overwrite the specified error file. For example: *$cat file 2> errorfile*
  - Use *2>>* to append error output to the end of the specified error file. For example: *$cat file 2>> errorlogfile*
- Redirecting Standard Input.
  - Use < or *0<* to accept input from the specified input file. For example: *$mail < formletter*

Running a Process in the Background

- Use the *&* (ampersand) character following the command, options, and arguments to place a process in background.

```
$sleep 90 &
5964
$
$ps
  PID  TTY      TIME COMMAND
   89  tty0p2   0:00 sh
 5968  tty0p2   0:00 ps
 5964  tty0p2   0:00 sleep 90
```

- Use *kill* along with the Process ID number to terminate a process before it completes execution.

```
$kill 5964
```

Connecting Processes with Pipelines

- Pipelines connect the standard output (stdout) of one process to the standard input (stdin) of another process.
- The symbol | (vertical bar) is the pipe symbol. The standard output of the process to the left of | becomes standard input to the process on the right of |.
- The HP-UX kernel handles necessary buffering.
- Examples:

$who | wc -l	Counts the number of users on the system.
$ls -a1R / | wc -l	Counts the number of files on the system.
$cat /etc/passwd | lp	Directs */etc/passwd* to the default line printer.

Filters

- Filters take input, perform some filtering action, and finally output data according to the filtering criteria.
- Examples:
  - *$grep stu01 /etc/passwd *
    stu01:aq3jpzX:201:200::/mnt/users/stu01:/bin/sh

    Grep filtered out all lines containing the pattern *stu01* from the */etc/passwd* file.
  - *$who | sort*

    stu01 tty0p1 Jul 20 15:48
    stu02 tty0p5 Jul 20 11:32
    stu04 tty1p0 Jul 20 08:31

    Sort filtered *who* output into alphabetical order by logon name.

HP-UX Login Process

1. /etc/getty
   - Prints */etc/issue* at logoff.
   - Issues login prompt (uses */etc/gettydefs*).
   - Reads login name.
   - Invokes */bin/login* command.
2. /bin/login
   - Checks login name and password (uses */etc/passwd*).
   - Updates accounting files.
   - Sets working directory.
   - Invokes command given in last field of user entry in */etc/passwd*.
3. Initialize Shell
   - Bourne Shell (*/bin/sh*).
   - C Shell (*/bin/csh*).
   - Korn Shell (*/bin/ksh*).
   - Restricted Shell (*/bin/rsh*).

The */etc/gettydefs* File

- Fields: *label # initial-flags # final-flags #login-prompt # next-label*

Where:

label	-	Identifies the entry.
	-	Matches against "getty" speed argument .
initial-flags	-	Initial line and terminal settings (speed must be specified).
final-flags	-	Final line and terminal settings (speed must be specified).
login-prompt	-	Initial login prompt printed on the terminal.
next-label	-	Entry to try next if "break" is typed.

The */etc/passwd* File

- Fields:

user_name:passwd:user_id:group_id:comment:login_dir:cmd

Where:

user_name	-	User's login name.
password	-	User's password in encrypted form.
	-	Optional password aging sub-field.
user_id	-	Unique integer value between 1 and 6000.
	-	If user_id is zero, user has superuser capabilities.
group_id	-	Integer value identifying the group.
comment	-	User's full name and other ID information.
login_dir	-	Full path to user's login directory.
cmd	-	Command to execute at logon.
	-	Usually a shell is invoked.
	-	Default is */bin/sh*.

The */etc/group* File

- Fields:

group_name:password:group_id:members

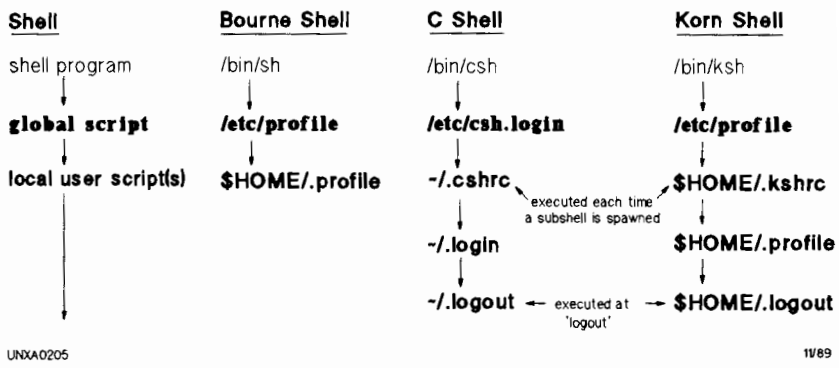
Where:

group_name	-	Contains the name of the group.
password	-	Generally not used and usually remains null.
group_id	-	Unique integer value identifying the group.
members	-	Comma separated list of members in the group.
	-	List of users who can change to the group with *newgrp*.

Shell Initialization

- */bin/login* invokes the user's shell. The three shells most frequently used are the Bourne Shell (*/bin/sh*), C Shell (*/bin/csh*), and Korn Shell (*/bin/ksh*).
- Once invoked, each shell executes customized scripts to set up the global user environment, and any user-created local environment.

The initialization flow is illustrated below:



The */etc/profile* File

Example:

```
# @(#) $Revision: 62.2 $
# Default (example of) system-wide profile file (/bin/sh initialization).
# This should be kept to the bare minimum every user needs.

     trap "" 1 2 3                                  # ignore HUP, INT, QUIT now.

PATH=/bin:/usr/bin:/usr/contrib/bin:/usr/local/bin  # default path.
TZ=MST7MDT                                          # change this for local time.

if [ "$TERM" = "" ]                                 # if term is not set,
then                                                #
     TERM=hp                                        # default the terminal type
fi
export PATH TZ TERM

# set erase to ^H
     stty erase

# Set up shell environment:

     trap "echo logout" 0

#This is to meet legal requirements...
   cat /etc/copyright
   cat /etc/motd                                  # message of the day.
if [ -f /bin/mail ]
then
     if mail -e                                    # notify if mail.
     then    echo "You have mail."
     fi
fi

if [ -f /usr/bin/news ]
then news -n                                       # notify if new news.
fi

if [ -r /tmp/changetape ]                          # might wish to delete this:
then
    echo "\ØØ7\nYou are the first to log in since backup:"
    echo "Please change the backup tape.\n"
    rm -f /tmp/changetape
fi
trap 1 2 3                                         # leave defaults in user environment.
```

UNXA0206 11/89

Figure 1-4. ***/etc/profile*** **Example**

Default Variable Settings

- Variables set by */bin/login*:

HOME	-	Contains default argument (login directory) for *cd* command.
MAIL	-	Set to the name of the user's mail file. If mail arrives in the specified file, the shell notifies the user of its presence.
SHELL	-	Set to last field of user's */etc/passwd* entry (normally Shell).
LOGNAME	-	First field of user's */etc/passwd* entry.

- Variables Set by the Bourne Shell:

PATH	-	Contains the search path for commands.
PS1	-	Contains primary prompt string. Default is *$* (dollar sign).
PS2	-	Contains secondary prompt string. Default is > (greater than sign).
MAILCHECK	-	A colon (:) separated list of file names. If mail arrives in any of these files, the user is notified. Overrides MAIL if set.
IFS	-	Internal field separators, normally space, tab, and newline.

Examining Variables with *set*

```
$ set
HOME=/mnt/users/stu13
IFS=

LOGNAME=stu13
MAIL=/usr/mail/stu13
MAILCHECK=600
PATH=/bin:/usr/bin:/usr/contrib/bin:/usr/local/bin
PS1=$
PS2=>
SHELL=/bin/sh
TERM=hp
TZ=PST8PDT
$
```

A *.profile* Example

```
.
.
(To search your HOME directory)
.
PATH=$PATH:/mnt/users/stu13
.
(To change your primary system prompt)
.
PS1='MY NAME:'
```

Note

Rather than construct a *.profile* file, the system administrator is encouraged to copy */etc/d.profile* into the user's HOME directory. The user can customize the script to meet login needs. To copy the file, type the following:

```
$ cp /etc/d.profile $HOME/.profile
```

The */etc/csh.login* File

Example:

```
# Default (example of) system-wide profile file (/bin/csh initialization).
# This should be kept to the bare minimum every user needs.

    # default path for all users.
    set path=(/bin /usr/bin /usr/contrib/bin /usr/local/bin)
    set prompt="[\!] % "

    setenv TZ MST7MDT                          # change this for local time.

    if ( ! $?TERM ) then                       # if TERM is not set,
        setenv TERM hp                         #  use the default
    endif

# This is to meet legal requirements...

        cat /etc/copyright                     # copyright message.

# Miscellaneous shell-only actions:

    cat /etc/motd                              # message of the day

    if ( -f /bin/mail ) then
        mail -e                                # notify if mail.
        if ( $status == 0 ) echo  "You have mail."
    endif

    if ( -f /usr/bin/news ) then
        news -n                                # nofify if new news.
    endif

    if ( -r /tmp/changetape ) then             # might wish to delete this:
        echo
        echo "You are the first to log in since backup:"
        echo "Please change the backup tape.\n"

        rm -f /tmp/changetape
    endif
```

UNXA0231 6/89

Figure 1-5. */etc/csh.login* Example

The ~/.cshrc File

```
# Default user .cshrc file ( /bin/csh initialization )
# Usage:  Copy this file to a user's home directory and edit it to
# customize it to taste.  It is run by csh each time it starts up.
# Set up default command search path:
     set path=( /bin /usr/bin )
# Set up C shell environment:

     if ( $?prompt ) then                  # shell is interactive.
       set history=20                      # previous commands to remember.
       set savehist=20                     # number to save across sessions.
       set system='hostname'               # name of this system.
       set prompt = "$system  \!: "        # command prompt.

       # Sample alias:
       alias        h        history
       # More sample aliases, commented out by default:
       # alias      d        dirs
       # alias      pd       pushd
       # alias      pd2      pushd +2
       # alias      po       popd
       # alias      m        more
     endif
```

UNXA0232 6/89

Figure 1-6. The ~/.cshrc File

The *~/.login* File

```
# Default user .login file ( /bin/csh initialization )

# Set up the default search paths:
set path=(. /bin /usr/bin /usr/contrib/bin /usr/local/bin)

# set up the terminal
eval 'tset -s -Q -m ':?hp' '
stty  erase "^H"  kill "^U"  intr "^C"  eof "^D"
stty  hupcl  ixon  ixoff
tabs
hp9000s800                  # Job control available on hp9000s800 only
if ( "$status" == "0" ) then
      stty  sup "^Z"  tostop
endif
# Set up shell environment:
set  noclobber
set  history=20
```

UNXA0233 6/89

Figure 1-7. The *~/.login* File

Setting up C Shell *history* Command

- The following sets up the C Shell *history* command:
  - To set the size of the history event buffer (this is normally done by the ~/.*cshrc* file at login):

    % set history = listsize
    (where *listsize* is an integer between 10 and 20)
  - To set the number of events to be saved at logout and restored on login (this is normally done by the ~/.*cshrc* file at login):

    % set savehist = listsize
    (where *listsize* is an integer between 10 and 20)
  - Set the login prompt to reflect history event numbers (this is normally done by the ~/.*cshrc* file at login):

    % set prompt = "[\!] %"
  - To save typing, alias the history command to h (this is normally done by the ~/.*cshrc* file at login): *% alias h history*

Examining the *history* Event Buffer

- The user's command sequence:

  [1]% ls
  testfile file1 file2
  [2]% pwd
  /mnt/users/stu01
  [3]% mv tesfile testfile.bak
  mv: tesfile : Cannot access : No such file or directory
  [4]%
- To view the event buffer:

  [4]% history
  1 ls
  2 pwd
  3 mv tesfile testfile.bak
  [5]%

Reusing Commands in the Event Buffer

- An explanation mark (!) is used to reference a command for reuse.
- The examples shown below assume the following event buffer contents:

```
[4]% history
1 ls
2 pwd
3 mv tesfile testfile.bak
4 history
[5]%
```

- Referencing and executing the last command using two explanation marks (!!):

```
[5]% !!
history
1 ls
2 pwd
3 mv tesfile testfile.bak
4 history
5 history
[6]%
```

- Referencing and executing a buffer event using an explanation mark (!) and the event number:

```
[6]% !1
ls
testfile file1 file2
[7]%
```

- Referencing and executing a buffer event by using an explanation mark (!) and a relative location number:

```
[7]% !-3
ls
testfile file1 file2
[8]%
```

- Referencing and executing a buffer event by using and explanation mark (!) and event text:

```
[8]% !p
pwd
/mnt/users/stu01
[9]%
```

Modifying Previous Events

- Correcting the previous event:

  Syntax: ^oldstring^newstring^ (to replace *oldstring* with *newstring*; omit the final circumflex (^) when a carriage return is used).

  Example:

```
[1]% ls
testfile file1 file2 file3!
[2]% mv tesfile testfile.bak
mv : tesfile : Cannot access : No such file or directory
[3]% ^tesfile^testfile.bak
[4]% mv testfile.bak
[5]%
```

- Correcting an event by string substitution:

  Syntax: !listnumber:s/oldstring/newstring (to substitute the first occurrence of *oldstring* with *newstring*).

  Example:

```
[1]% ls
testfile file1 file2 file3
[2]% mv tesfile testfile.bak
mv : tesfile : Cannot access : No such file or directory
[3]% pwd
/mnt/users/stu01
[4]% !2:s/tes/test
mv testfile.bak
[5]%
```

- Correcting an event using global string substitution:

  Syntax: !listnumber:gs/oldstring/newstring (to substitute all occurrences of *oldstring* for *newstring*).

  Example:

  [1]% ls
  testfile file1 file2 file3
  [2]% mv tesfile testfile.bak
  mv : tesfile : Cannot access : No such file or directory
  [3]% pwd
  /mnt/users/stu01
  [4]% !2:gs/tes/test
  cp testfile.bak
  [5]%

Modify an Event and Print Without Execution

- Printing a modified event without execution:

  Syntax: !listnumber:p:modification_command(s)

  Example:

  [4]% history
  1 ls
  2 pwd
  3 mv tesfile testfile.bak
  4 history
  [5]% !3:p:s/esf/estf
  mv testfile.bak
  [6]% history
  1 ls
  2 pwd
  3 mv tesfile testfile.bak
  4 history
  5 mv testfile.bak
  6 history
  [7]% !5
  mv testfile.bak
  [8]%

Booting

Initial System Load (ISL)

- Must reside in Section 6 of boot device.
- Operating system independent.
- Used to set default boot paths.
- Used to load HP-UX kernel.
- Diagnostic information:
  - Error messages on console.
  - Error codes on display panel.
  - See ISL(1M) for message detail.
  - See hpux_800(1M).

ISL> help

?	Help facility
HELP	Help facility
LISTF	List ISL Utilities
LS	List ISL Utilities
AUTOBOOT	Set or clear autoboot flag in stable storage
AUTOSEARCH	Set or clear autosearch flag in stable storage
PRIMPATH	Modify primary boot path in stable storage
ALTPATH	Modify alternate boot path in stable storage
CONSPATH	Modify system console path in stable storage
DISPALY	Display boot and console path in stable storage
LSAUTOFL	List contents of autoboot file
LISTAUTOFL	List contents of autoboot file
FASTSIZE	Sets or displays FASTSIZE
SUPPORT	Boot the Support Tape from the boot device
READNVM	Display contents of one word of NVM
READSS	Display contents of one word of stable storage

Utilities on this system are:

HPUX	
RDB	
IOMAP	}
CAEXR	}
CLKUTIL	}
SS_CONFIG	}
BCDIAG	}
A1002AI	} Off-line diagnostics found only on Support Tape
A1002AM	}
A1002AP	}
A1100AI	}
A1100AM	}
A1100AP	}
MPROC	}
UNIPROC	}

ISL *hpux* Utility

ISL>hpux [driver(BC/X.Y.Z;0xS)][kernelfile]

Use for normal system start-up.

ISL>hpux set autofile (;6) "hpux (;0xS)kernelfile"

Use to change autofile.

ISL>hpux -a[C|R|S|D]devicefile

Use to specify I/O configuration.

ISL>hpux -is driver(BC/X.Y.Z;0xS)kernelfile

Use if root password lost or */etc/inittab* defective.

ISL>hpux ls driver(BC/X.Y.Z;0xS)/[path]

Use to find kernelfile on specified disk section.

ISL>hpux -v

Use to get version numbers of hpux utility.

ISL>hpux -m[p|s|x] driver(BC/X.Y.Z;0xS)kernelfile

Use to boot from opposite side of mirrored root.

ISL>hpux -F

Use with SWITCHOVER/UX to ignore locks.

Note

Parameters for the ISL *hpux* utility are described on the following pages.

Where:

Key	Description
kernelfile	Name of kernel to be loaded (typically *hp-ux* or *SYSBCKUP*.
set autofile	Sets autofile to the string enclosed in double quotes.
devicefile	Hardware path of device. Example devicefile for swap device: *(BC/X.Y.Z;0xW)*, where *W* is the swap section number.
-a[C|R|S|D]	Configure the device as console, root, swap, or dump device.
-is	Load kernel in single-user mode. Gives user SU capabilities on the system console without going through */etc/passwd* or using */etc/inittab*.
ls	Lists the root-level files of the disk section specified or those specified, for example *ls -alFH*. Executable files names are appended with an asterisk (*).
path	Path to specified file or directory.
-v	Display release and version numbers of the hpux utility.
driver	Device adapter driver, for example: disc0, disc1, disc2, tape1, lan1.
BC/	SMB bus converter address (*BC/* required on 85X/860/87X only; usually *2/* or *6/*).
X	ISL MIDBUS module number (equals 4 x MIDBUS slot number).
Y	CIO slot number.
Z	HPIB or HP-FL address of device.
S	A hex digit indicating the disk section number from where to load *kernelfile*.
-m[-p|-s|-x]	Boot from opposite side of mirrored root (*-mp* = boot from primary; *-ms* = boot from secondary).
-F	Use with SWITCHOVER/UX to ignore any locks on boot disk.

Backup/Restore

Recovering from a Catastrophic Data Loss

To recover, perform the following:

1. Install HP-UX.
2. Perform applicable updates.
3. Create file systems on non-system disk drives.
4. Restore applicable incremental backup(s).
5. Restore last complete backup.

tar Tape File Archiver

- Saves and restores files on magnetic tape of flexible disk.
- When a directory is to be saved, *tar* recursively searches down the tree to save all related subdirectories and files.
- Files saved with full path names will be restored to the same locations. Directories are created as required.
- Files saved with relative path names (./file) can be restored on any directory.

Caution

- Default option is *N* (see following pages for full explanation).
- Due to internal limitations in the header structure, not all file names of fewer than 256 characters fit when using the *N* key. If a file name does not fit, *tar* prints an error message and does not archive the file.
- Symbolic link names are limited to 100 characters when using the *N* key.
- Tape errors are handled ungracefully.

tar Tape File Archiver Command Syntax

The *tar* command and common options are shown below:

 # tar key [arg . . .] [[file | -C directory]

Where:

Key	Operation
c	Creates an archive (save).
x	Extracts from an existing archive (restore).
v	Verbosely shows *tar* operations and displays each file accessed.
f fsname	Use device specified in *fsname* for save or restore (default special device file: */dev/rmt/0m*).
H	Cause all entries in hidden directories (context-dependent files) to be written in archive.
m	Restore files from archive with current system date and time stamp.
N	Default. Write a new (POSIX) format archive. New format allows file names up to 256 characters; archives and restores special files and symbolic links.
O	Write in old (pre-POSIX) format.
u	Update existing file in archive (very slow).
t	List all filenames in archive (with *v* option adds file mode and owner).
r	Append file(s) to end of existing archive.
-C directory	*tar* will change to *directory* and continue save or restore.
w	Wait for user confirmation of *tar* operations.
h	Treats symbolic links as normal files or directories.

tar Examples

- Create an archive of all files associated with your home directory (and subdirectories) to the default tape drive verbosely:

  ```
  $ cd
  $ tar cv *
  ```

- Create an archive of */full/path/file1* and */full/path/name/file2* to a high-density tape drive verbosely:

  ```
  # tar cvf /dev/rmt/0h /full/path/file1 /full/path/name/file2
  ```

- Create an archive of all files on */directory* using relative pathnames so it can be restored on any directory:

  # *tar cv ./directory*

- Create an archive of all files on two unrelated directories to a high-density tape drive:

  # *tar cvf /dev/rmt/0h /full/path/directory1 /full/path/directory2*

- List all archived files on the default tape drive to the printer:

  # *tar tv | lp*

- Restore the entire archive from the default tape drive verbosely:

  # *tar xv*

- Restore a single file from a high density tape drive:

  $ *tar xvf /dev/rmt/oh /full/path/name/file1*

- Restore all files saved by relative pathing to */my/directory*:

  # *cd /my/directory*
  # *tar xv*

- Restore a file saved by relative pathing to */my/directory*:

  # *cd /my/directory*
  # *tar xv ./subpath/file1*

Note

tar will not accept HP-UX wild card characters in pathnames when restoring files on a system.

---

cpio Copy File Archives In and Out

cpio copies files in or out of an archive. An archive may be a file or a *raw* physical device.

cpio -o	Reads STDIN to obtain a list of path names and copies those files to STDOUT along with path names and status information. Normally, redirection is used to make an archive file or tape. For example: *# ls | cpio -0 > /dev/rmt/0m*
cpio -i [pattern]	Extracts from STDIN (an archive file) those filenames that match zero or more patterns. The files are recreated based on the paths placed in the archive by *cpio -o*. For example: *# cpio -i chapter[1-5]* < /dev/rmt/0m*
cpio -p directory	Reads STDIN to obtain a list of path names and copies those files to the target directory. For example: *# ls | cpio -p archivedir*

cpio Command Syntax

The *cpio* command and common options are shown below:

```
# cpio -o [Bcxvh]
# cpio -i [Bdctuxv] [patterns]
# cpio -p [duxv] directory
```

Where:

Key	Operation
c	Write header information in ASCII for portability.
d	Create directories as needed.
t	Print only table of contents from the input.
x	Save or restore special device files. *mknod* recreates these files on restore (superuser only). Restoring special device files onto a different system can be dangerous; use only on HP-UX machines. Backups made for one system should not be restored on another.
v	Verbose; causes list of file names to be printed.
patterns	Only files that match *patterns* according to the rules of Pattern Matching Notation are selected. The default for *patterns* is *.
h	Follow symbolic links as if they were normal files or directories. Normally *cpio* archives the link.
B	I/O is blocked to 5120 bytes per record (meaningful only when data is directed to devices which support variable length data such as magnetic tape).
u	Copy unconditionally (older file will replace newer file).
directory	Destination directory tree.

cpio Examples

- Save all files in current directory in blocks with ASCII headers onto medium speed magnetic tape:

  # ls | cpio -ocBx > /dev/rmt/0m

- Use *find* command to save all files on your working directory recursively with ASCII headers onto high-speed magnetic tape:

  # find . -print | cpio -ocBx > /dev/rmt/0h

- Use *find* command to save all files on your working directory recursively with ASCII headers onto an archive directory:

  # find . -print | cpio -pdxv /archive_directory

- Print a listing of an archive to the printer:

  # cpio -icBtxv < /dev/rmt/0m | lp

- Restore */path/myfile* from tape:

  # cpio -icBxv /path/myfile < /dev/rmt/0m

tcio Tape Cartridge Formatter

tcio reads or writes data to a character Command Set 80 Cartridge Tape Unit special device file specified in *filename*.

tcio -o	Reads STDIN and writes data to the Command Set 80 Tape Unit.
tcio -i	Reads Command Set 80 Tape Unit and writes data to STDOUT.

tcio Tape Cartridge Formatter Command Syntax

The *tcio* command and common options are shown below:

 # tcio -o[drvV] [-S buffersize] devicefile
 # tcio -i[dvr] [-S buffersize] devicefile
 # tcio -u[rV] devicefile

Where:

Key	Operation
d	Prints checksum to STDERR (normally terminal). User may record this number for comparison of checksum value on restore. Checksum is not recorded on tape.
r	Release the tape from the mechanism, unlocking the door.
v	Verbose mode; prints information and errors to STDERR.
S buffersize	Forces memory of *buffersize* to be reserved for reading or writing the tape. Size of the buffer is 1014 times *buffersize* (range: 32-512). If *buffersize* is not specified, *tcio* defaults to the maximum size available.
devicefile	Special device file of tape unit.
V	Power OFF tape verification.
u	Perform utility function. Used with *r* to unlock tape cartridge door.

tcio Examples

- Save all files in current directory in blocks with ASCII headers onto an integrated disk and cartridge tape on single controller:

  # ls | cpio -ocBx | tcio -o /dev/rct/c1d1s2

- Use *find* command to save all files on your working directory with ASCII headers onto cartridge tape:

  # find . -print | cpio -ocBx | tcio -o /dev/rct/c1d0s2

- Print a listing of an archive to the printer:

  # tcio -iv /dev/rct/c1d1s2 | cpio -ict | lp

- Restore */path/myfile* from cartridge tape:

  # tcio -iv /dev/rct/c1d0s2 | cpio -icBxv /path/myfile

- To unlock tape cartridge door:

  # tcio -urV /dev/rct/c1d0s2

/etc/fbackup Backups

- The HP Recommended System Backup Utility
  - Syntax: *# fbackup -f devicefile [-0-9] [options]*

Common Options

Key	Operation
-f devicefile	Devicefile identifies the backup device (default is */dev/rmt/0h*).
[-0-9]	Backup level (0 = full backup; 1-9 indicates an incremental backup).
-i / e	Include/exclude file tree from backup (cannot be used with *-u*).
-I f_name	Create index of backup files in *f_name*.
-g f_name	Use *f_name* as graph file (must be used with *-u* option).
-u	Update */usr/adm/fbackupfiles/dates* (cannot be used with *-i* | *-e*).
-v	Verbose.
-H	Search hidden subdirectories (context-dependent files).

Note

- The user of *fbackup* need not be superuser. If the user does not have access to a given file, the file is NOT backed up.
- *fbackup* does not backup network special files.
- *fbackup* may not work correctly with NFS mounted file systems.

/etc/fbackup Backup Examples

- To backup all mounted files (assumes superuser capability):

  # fbackup -f /dev/rmt/0h -0vHi /

- To backup all files residing on */extra* tree except */extra/users*:

  # fbackup -f /dev/rmt/0h -0vHi /extra -e /extra/users

- To backup */users* file tree to cartridge tape:

  # fbackup -0vHi /users -f - | tcio -ov /dev/rct/c1d0s2

SAM Backups—System Administration Manager

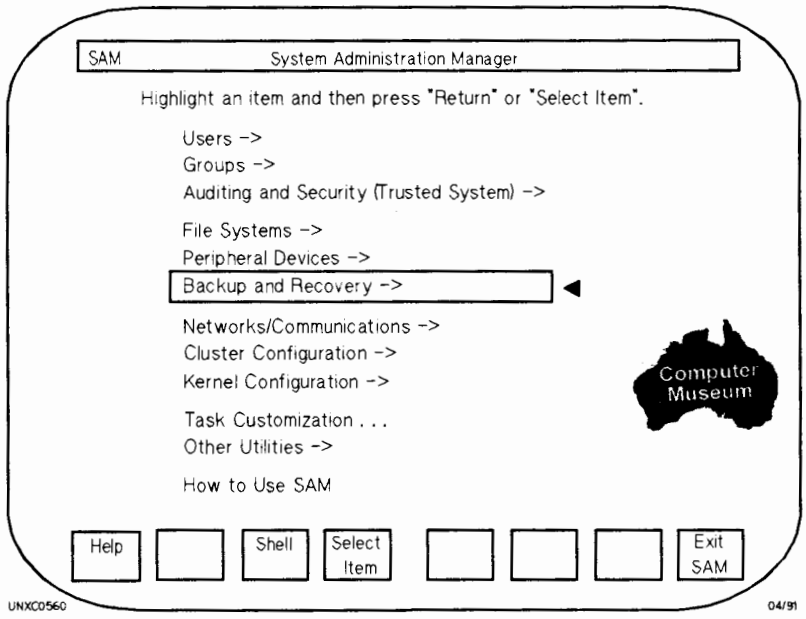


Figure 1-8. SAM (Backup): *System Administration Manager*

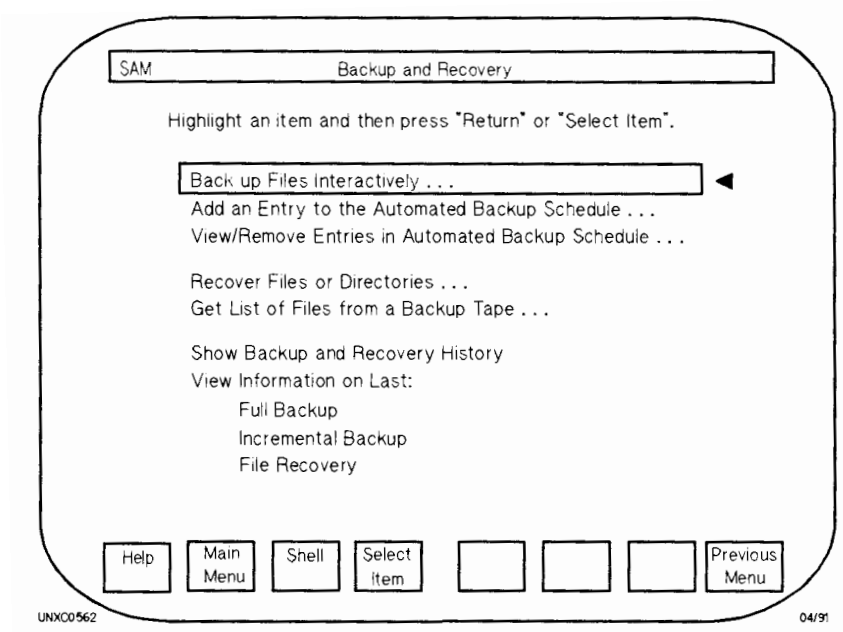


Figure 1-9. SAM (Backup): *Backup and Recovery*

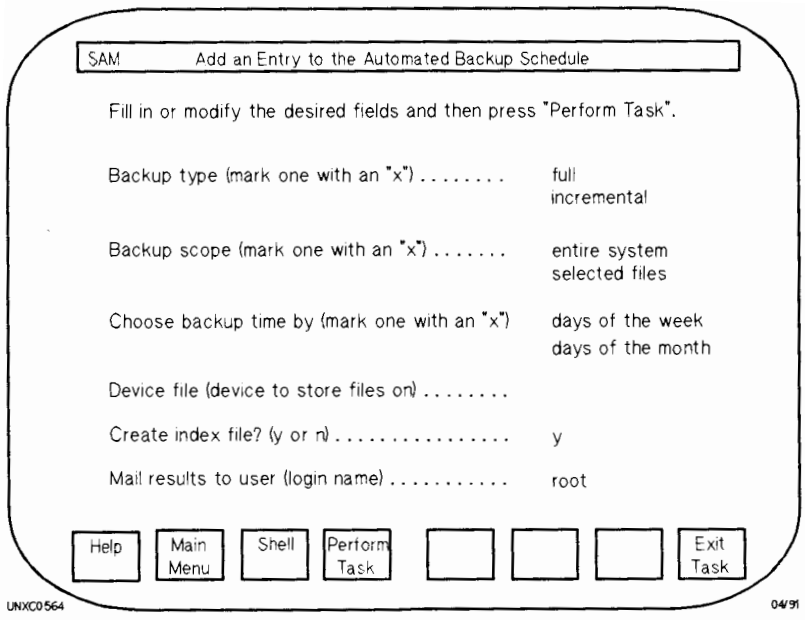


Figure 1-10.
SAM (Backup): *Add an Entry to the Automated Backup Schedule*

/etc/frecover Restores

- Works in Conjunction with *fbackup* Archives

o Syntax:

 # frecover -R path [-f devicefile]
 # frecover -r [ovX] [-f devicefile]
 # frecover -x [ovX] [-g f_name] [-i path] [-e path] [-f devicefile]
 # frecover -I path [-f devicefile] [-c config]
 # frecover -V path [-vy] [-f devicefile] [-c config]

Common Options

Key	Operation
-r	Recover all files on backup tape.
-f devicefile	Devicefile identifies the backup device (default is */dev/rmt/0h*).
-x	Files identified by *-i*, *-e*, or *-g* are extracted/not extracted.
-g f_name	Use *f_name* as graph file.
-i / e	Include/exclude file tree from backup.
-I path	Create index of backup tape and place it in the *path*.
-o	Recover file regardless of age.
-v	Verbose.
-X	Recover files relative to the current working directory.
-V path	The volume header from the backup is written to the *path*.
-R path	Restart interrupted *frecover*.
-c config	Use configuration file for error actions.

Note

- The user of *frecover* need not be superuser. If the user does not have access to a given file, the file is not restored.
- *frecover* does not work with network special files.

Recovering Files with *frecover*

- To recover all files from an fbackup archive tape (assumes superuser capability):

  # frecover [-r] -o -f /dev/rmt/0h

  The *-r* option is the default value. The *-o* option causes *frecover* to restore a file in the archive that is older than one existing within the file system.

- To restore all files archived on */extra* tree except */extra/users*:

  # frecover -x -i /extra -e /extra/users -f /dev/rmt/0h

- To restore the */users* file tree from cartridge tape:

  # tcio -iv /dev/rct/c1d0s2 | frecover -x -vi /users -f -

SAM Restores—System Administration Manager

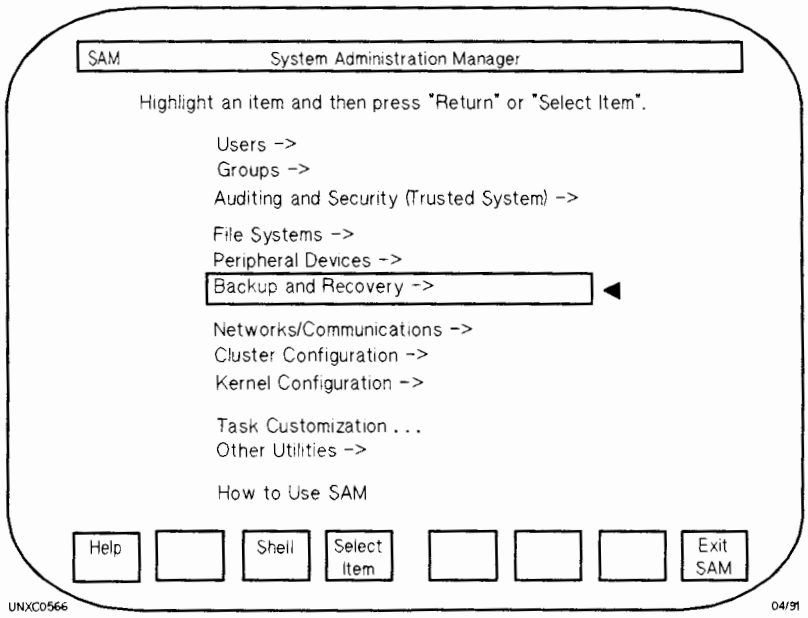


Figure 1-11. SAM (Restores): *System Administration Manager*

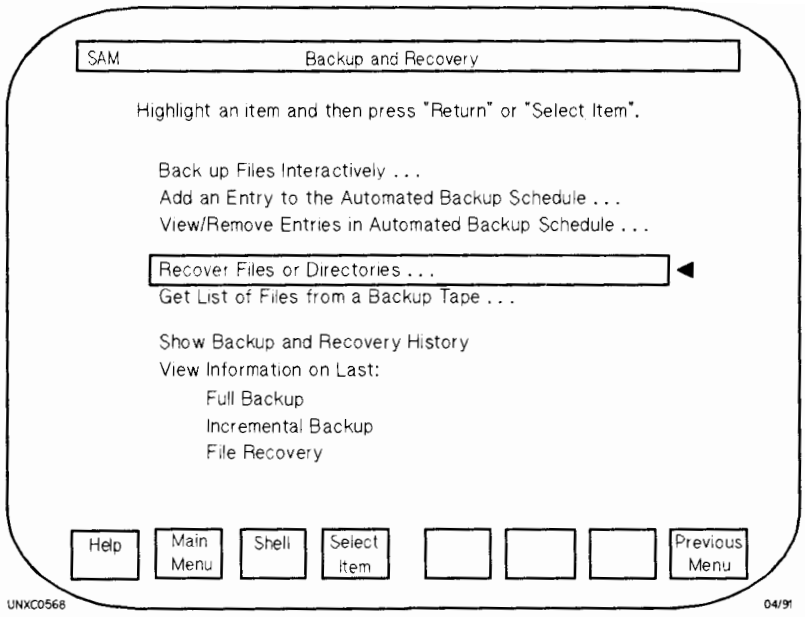


Figure 1-12. SAM (Restores): *Backup and Recovery*

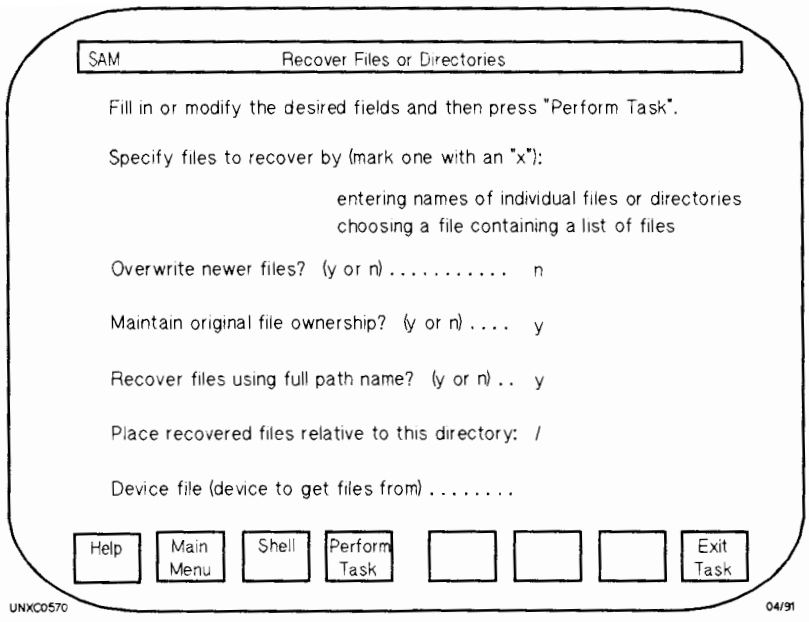


Figure 1-13. SAM (Restores): *Recover Files and Directories*

dd Device-to-Device Copy

- *dd* is an all purpose utility that copies the specified input file to the specified output file. Using *dd* options, data conversions are possible.
- Often used to save or restore information disk-to-disk.
- The following is an example of the *dd* command and syntax to copy a file system from one drive to another:

  # dd if=/dev/rdsk/c2000d0s6 of=/dev/rdsk/c2001d0s6 bs=512k

Where:

Key	Operation
if=	Specifies the input file name (default STDIN).
of=	Specifies the output file name (default STDOUT).
bs=	Specifies the I/O block size.

Note

When copying disk-to-disk file systems, both input and output file system section numbers and disk model numbers must match.

Disk Sectioning Scheme

Note Do not allocate file systems on sections that overlap.

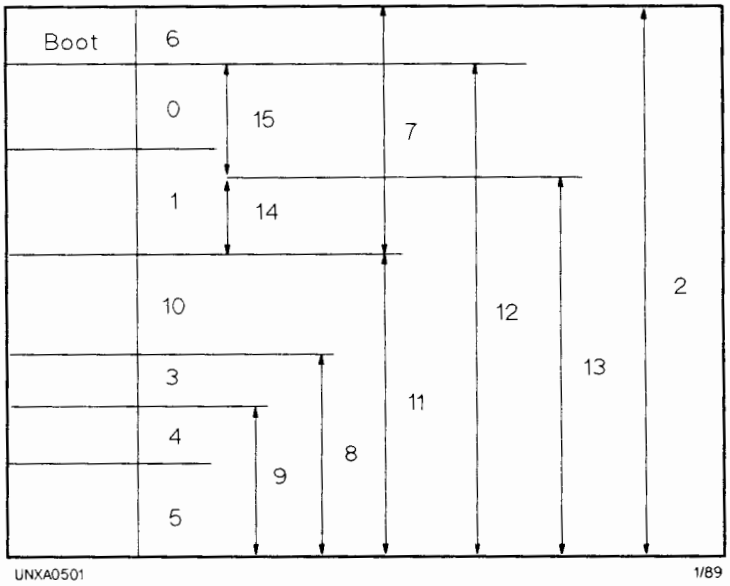


Figure 1-14. Disk Sectioning Scheme

Creating an HP-UX File System on a New Disk

1. Initialize media using *mediainit*:

   # mediainit /dev/diag/dsk/c1d0

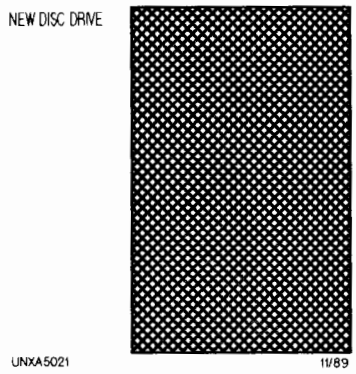


Figure 1-15. Initializing the Media

2. Make a new file system using *newfs*:

   # newfs /dev/rdsk/c1d0s7 hp7937

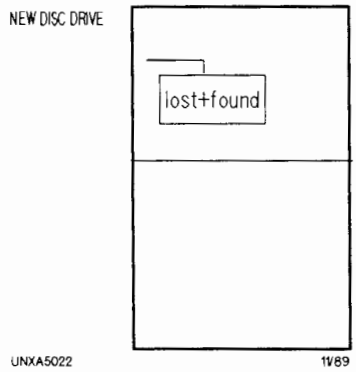


Figure 1-16. Making a New File System

3. Make a mount point directory using *mkdir*:

   # mkdir /newdir

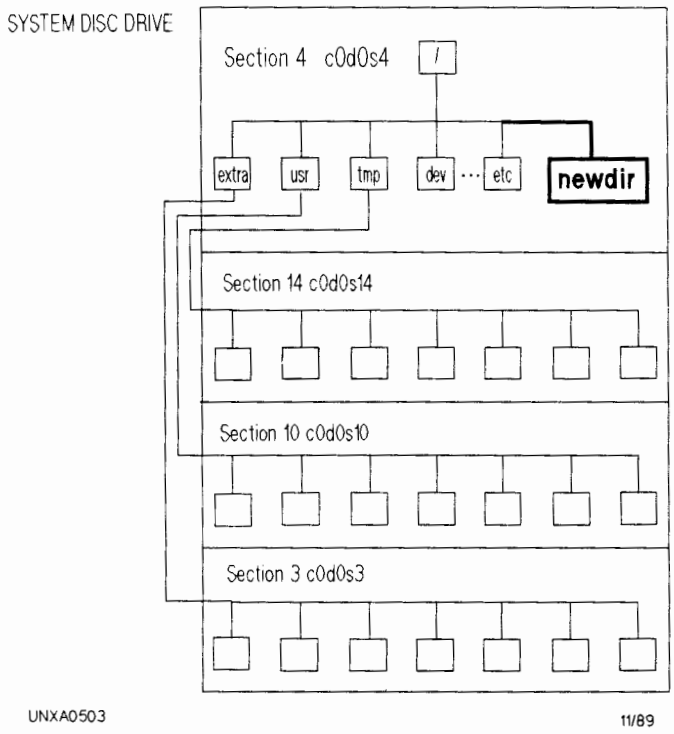


Figure 1-17. Adding a New Directory

4. Mount the new file system using *mount*:

   # mount /dev/dsk/c1d0s7 /newdir

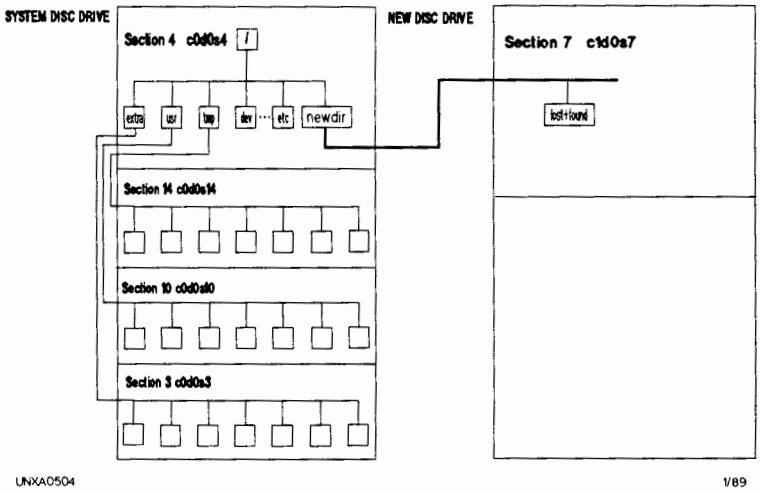


Figure 1-18. Mounting the New File System

The */etc/newfs* Command

- Creates a file system using default values from */etc/disktab*.
- Calls *mkfs* to construct the file system:

  # /etc/newfs [-v] [mkfs-options] devicefile model

  Where:

Key	Operation
-v	Verbose mode.
mkfs-options	Any option available with *mkfs*; the options override the default values.
devicefile	Special device file associated with the device.
model	HP model number of the disk (see */etc/disktab*).

- Example (*newfs* with default values):

  # newfs /dev/rdsk/c1d0s3 hp7935

- Example (*newfs* specifying file system characteristics; overrides */etc/disktab*):

  # newfs -b 4096 -f 2048 -m 15 -i 4096 /dev/rdsk/c1d0s3 hp7935

  Where:

Key	Operation
-b 4096	Specifies block size in bytes.
-f 2048	Specifies fragment size in bytes.
-m 15	Specifies the minfree value in bytes.
-i 4096	Specifies one inode for every 4096 bytes of file space (default: one inode for every 2048 bytes of file space).

The */etc/disktab* File

- *disktab* defines supported disk drive geometries and disk section characteristics.
- Used by */etc/newfs* to create HP-UX file systems.
- Options entered with the *newfs* command override parameters contained in */etc/disktab*.
- For each supported HP model number, *disktab* lists:

ty	Type of disk (removable or Winchester).
ns	Number of sectors per track.
nt	Number of tracks per cylinder.
nc	Total number of cylinders on the disk.
s[0-n]	Section size in sectors; file system size = DEV_BSIZE * the number of sectors (where DEV_BSIZE = 1024 bytes).
b[0-n]	Section block sizes in bytes.
f[0-n]	Section fragment sizes in bytes.
se	Number of bytes per sector.
rm	Number of revolutions per minute.

- Example (a sample entry for an HP7937 disk):

```
hp7937:\
        :ty=winchester:ns#30:nt#13:nc#1396:rm#3600:\
        :s0#24280:b0#8192:f0#1024:\
        :s1#48560:b1#8192:f1#1024:\
        :s2#558051:b2#8192:f2#1024:\
        :s3#29298:b3#8192:f3#1024:\
        :s4#107426:b4#8192:f4#1024:\
        :s5#216664:b5#8192:f5#1024:\
        :s6#1998:b6#8192:f6#1024:\
        :s7#75152:b7#8192:f7#1024:\
        :s8#353778:b8#8192:f8#1024:\
        :s9#324196:b9#8192:f9#1024:\
        :s10#129024:b10#8192:f10#1024:\
        :s11#482898:b11#8192:f11#1024:\
        :s12#556052:b12#8192:f12#1024:\
        :s13#507282:b13#8192:f13#1024:\
        :s14#24280:b14#8192:f14#1024:\
        :s15#48560:b15#8192:f15#1024:\
```

An */etc/checklist* Example

```
# cat /etc/checklist
/dev/dsk/c2000d0s4  /       hfs    rw    0[1]  1[2]  # root
/dev/dsk/c2000d0s3  /extra  hfs    rw    0     2     # extra
/dev/dsk/c2000d0s5  /mnt    hfs    rw    0     3     # /mnt
/dev/dsk/c2000d0s0  /tmp    hfs    rw    0     4     # /tmp
/dev/dsk/c2000d0s10 /usr    hfs    rw    0     5     # /usr
/dev/dsk/c2000d0s1  swap    ignore sw    0     0     # swap
```

1 This column: Backup frequency, not implemented, set to 0.

2 Root should be assigned a pass number value of 1 (*fsck* ignores file systems having a pass number value of 0).

The *mount* Command

- The */etc/mount* command announces to the system that a removable file system is to be attached to the file tree at *directory*.
- Executing *mount* with no parameters shows all file systems currently mounted by printing the table contained in */etc/mnttab*.
- The command and command parameters are shown below:

  # /etc/mount -a
  # /etc/mount [fsname directory [-f] [-o options]]
  # /etc/mount [-p] [-l] [-L] [-s] [-u]

  Where:

Key	Operation
-a	Attempt to mount all file systems listed in */etc/checklist*.
fsname	Full path name of block special device file associated with file system.
directory	Full path of existing directory where the file system is to be mounted.
-f	Force the file system to be mounted.
-o options	Defaults—use options specified, or one or more of the following separated by commas: *rw*—Read/Write (default). *ro*—Read only. *suid*—Set user ID execution allowed (default). *nosuid*—Set user ID execution denied.
-l	Displays local mount information.
-L	Displays local mount information, plus cluster-wide NFS mounts.
-s	7.0 treatment of */etc/mnttab* file; does not add kernel mount information to */etc/mnttab*.
-p	Print the list of mounted file systems in a format suitable for use in */etc/checklist*.

The *umount* Command

- Detaches a file system from the HP-UX tree.
- File system must be quiescent.
- The root file system and the file systems used in conjunction with dynamic swapping cannot be unmounted.
- The command and common parameters are shown below:

  # /etc/umount -a [-v] [-s] [-h host] [-t type]
  # /etc/umount fsname | mount_point_dir

  Where:

Key	Operation
-a	Attempt to unmount all file systems listed in */etc/mnttab*.
fsname	Full path name of special device file associated with the file system, or the full path name of the mount-point-directory associated with the file system to be unmounted.
mount_point_dir	Full path name of the system's mount-point-directory.
-v	Verbose.
-s	7.0 treatment of */etc/mnttab* file (does not add kernel mount information to */etc/mnttab*.
-h host	Unmount only those file systems in */etc/mnttab* that are remote-mounted from the host.
-t type	Unmount only file systems mounted with a given type.

The *bdf* Command

- Prints the amount of free disk space available on the specified file system.
- *bdf* with no options prints information on all mounted file systems.
- The command and parameters are shown below:

  $ */usr/bin/bdf [-b] [-i] [-l|-L] [-t type | [filesystem] | file] ...]*

  Where:

Key	Operation
-b	Report on the file systems; include dynamic swap information.
-i	Report the number of used and free inodes.
-t type	Report on the file systems of a given type (hfs or nfs).
filesystem	Special device file associated with file system (for example */dev/dsk/c2000d0s4*).
file	Print information on the file system that contains *file*.
-l	Display disk-space-available information for a locally mounted file system.
-L	Display information for the file system that can be unmounted from the local cnode (includes file systems mounted on the local node and cluster-wide NFS mounts).

- Example (*bdf -b* prints the following information):

Filesystem	kbytes	used	avail	capacity	Mount
/dev/dsk/c2000d0s4	102512	26665	65596	29%	/
/dev/dsk/c2000s10	123295	42739	68226	39%	/usr
/dev/dsk/c2000d0s0	23168	32	20816	0%	/tmp
/dev/dsk/c2000d0s5	207127	15	186399	0%	/mnt
swapping	4096	2048	2048	50%	/mnt
/dev/dsk/c2000d0s3	27912	26100	1812	102%[1]	/extra

1 File system */extra* is filled beyond MINFREE by 2%.

MINFREE Space vs. User File System Space

- File system performance rapidly decreases when the file system is filled beyond 90% of its total capacity.
- To prevent this performance degradation, HP-UX compares the actual file system fill to the file system's minimum allowed free space (MINFREE) value. When a file system's fill value leaves less than the MINFREE value, only a superuser can write on the remaining free file space.
- The default value of MINFREE is set by HP-UX to 10. MINFREE can be set by */etc/newfs* when the file system is created, or altered using the */etc/tunefs* command. For example:

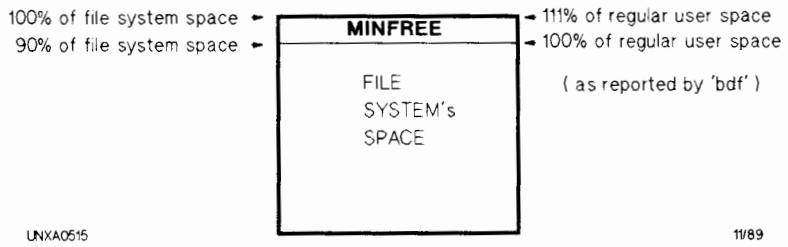


Figure 1-19. MINFREE Space vs. User File System Space

To calculate user writable space in percent:

% user_space = 100 - MINFREE

File System Organization

HP-UX Boot Section Organization

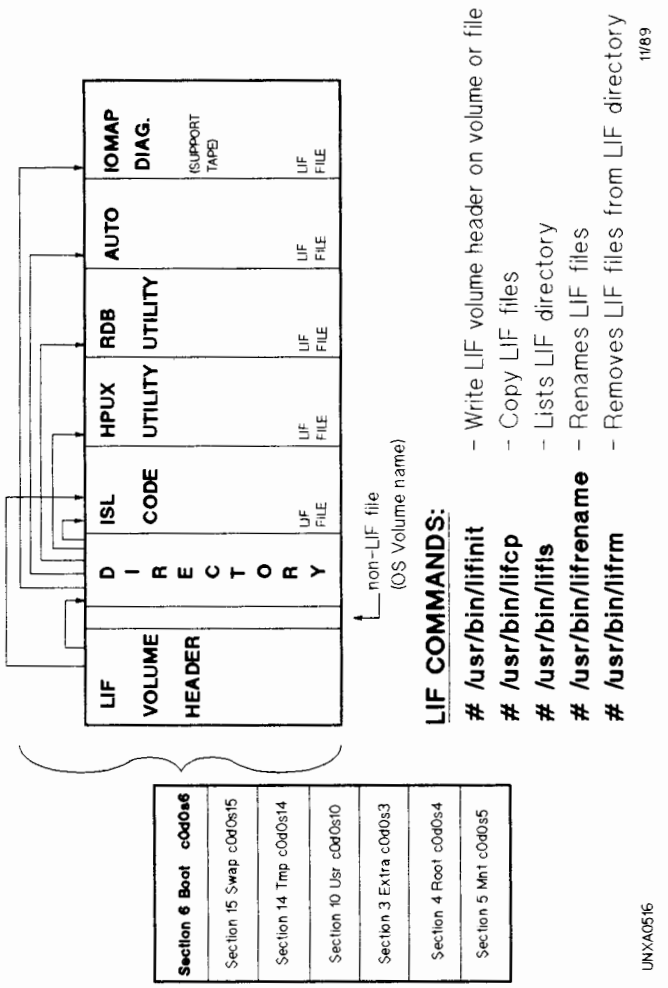


Figure 1-20. HP-UX Boot Section Organization

HP-UX Series 800 Cylinder Groups

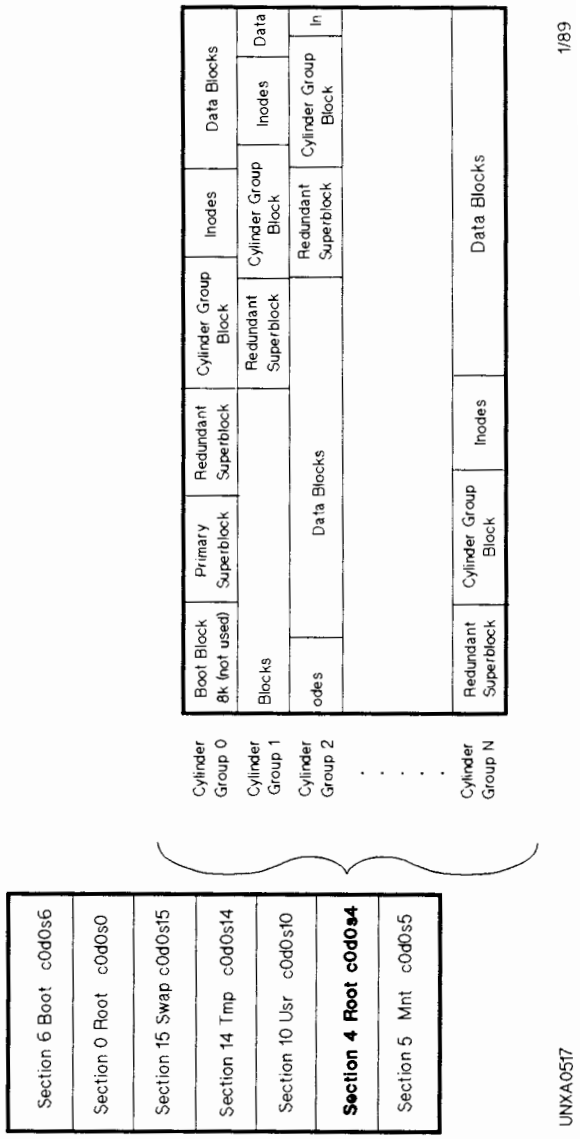


Figure 1-21. HP-UX Series 800 Cylinder Groups

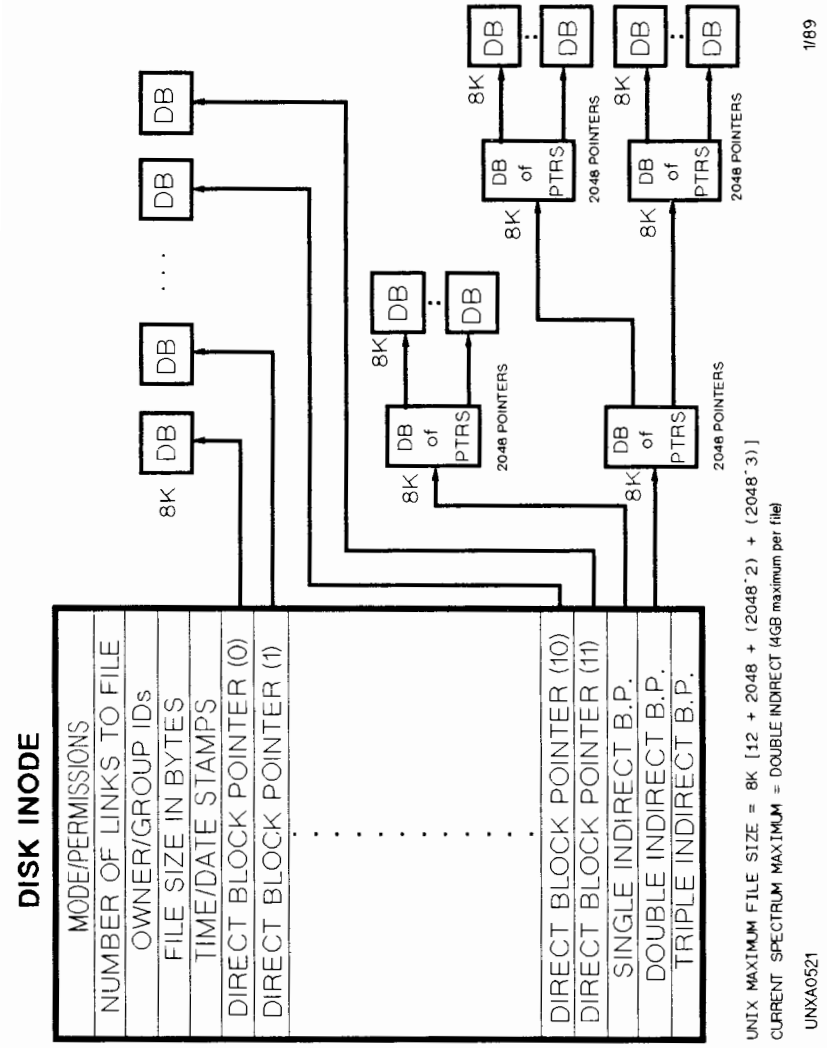


Figure 1-22. Inodes

Causes of File System Corruption

- Improper shutdown procedures.
  - Not using *shutdown* or *reboot* to halt the CPU.
  - Physically write-protecting a mounted file system.
  - Taking a mounted file system off-line.
- Improper startup procedures.
  - Not checking a file system for inconsistencies.
  - Not repairing inconsistencies found.
- Hardware failure.
  - Large variety of types of hardware failures.
  - Can be minimized with preventive maintenance.

File System Checker

/etc/fsck File System Checker

- *fsck* checks for file system corruption by comparing the customer file system to an internal *fsck* standard that defines how a high performance HP-UX file system should be constructed. If corruption is detected, *fsck* will attempt to repair the damage.
- *fsck* has two operating modes:

preen	Automatically corrects inconsistencies that will not result in data loss.
interactive	Prints a brief error message for each inconsistency and prompts the user for the corrective action.

/etc/fsck Syntax

Caution

fsck should not be run on a mounted file system (except root; always mounted).

fsck should be run on character device files (except root; block device file).

- Preen Mode Run String:

  # fsck -p [device_file]

  # fsck -P [device_file]

- Interactive Mode Run String:

  # fsck [-y] [-n] [-b block] [-q] [device_file]

Where:

Key	Operation
-p	Check file system for inconsistencies.
-P	Check file system specified if not cleanly unmounted.
-b block	Use redundant superblock specified in *block* variable to check file system. Use when primary superblock is corrupted.
-y	Assume *yes* response to all *fsck* questions (use with caution).
-n	Assume *no* response to all *fsck* questions (do not write to file system).
-q	Fix counts in superblock and cylinder groups; print brief message.
device_file	Device file of the file system to be checked (for example */dev/[r]dsk/cXd0sY*). If not specified, *fsck* runs on high performance systems in */etc/checklist*.

Five Basic Steps to Repairing File Systems

1. Run *fsck* in preen mode to repair simple file system errors.
2. If file system inconsistencies still exist, run *fsck* in the interactive mode with the *-n* option. Redirect the output to a printer or file.
3. Analyze the error printout or the file created in Step 2 to determine the problem.
4. Mount the file system (for example, # *mount -f /dev/dsk/c0d0s10 /mount_point_dir*) and copy the files removed by *fsck* to a clean file system.
5. Invoke *fsck* interactively and repair the damage.

2

HP-UX Installation/Updating

Installing HP-UX

- Read any *Read Me First* documents and follow the procedures in the manual *Installing and Updating HP-UX*, HP part number 92453-90035.
- HP-UX installation consists of the following general steps:

1. Install the hardware in card locations and verify peripheral addresses. Physically connect any additional peripheral devices.
2. Load the Install Tape.
   - Boot from the Install Tape.
   - From the *ISL>* prompt do the following:
     a. Set *primpath* to the path of the system disk.
     b. Set *altpath* to the path of the tape device.
     c. Set *autoboot* ON.
     d. Type the installation string required for your media from the ISL prompt.
3. Install the *Product* tape(s) using the Update Utility screens.
4. See *Post Installation Guidelines* (later in this section) for general steps to configure the newly installed system.

815 Standard Hardware Configuration

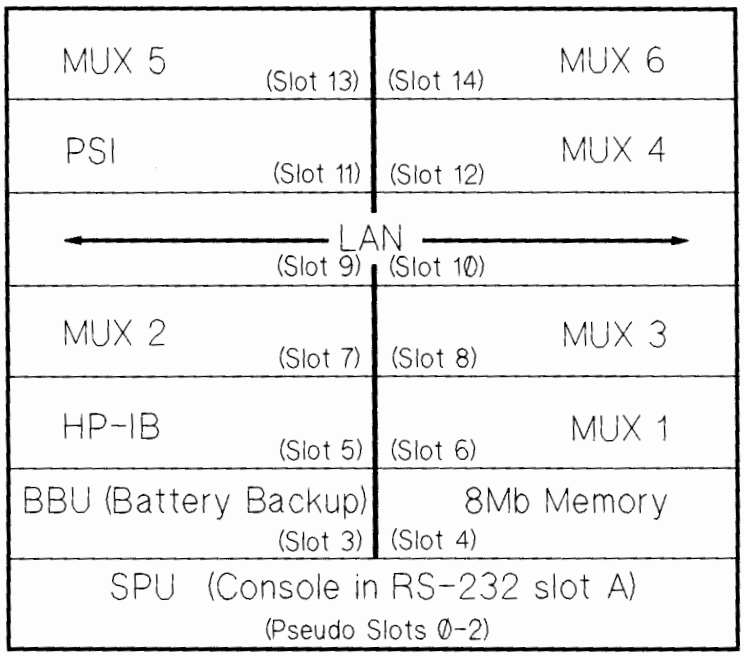


Figure 2-1. 808/815 Standard Hardware Configuration

Note

Slots 9 through 14 in the Model 808 are used to enclose the embedded hard disk.

808/815 Boot Paths and Installation Commands

- Installation of the 808/815 (with Mag Tape Drive)

HP-IB Card (Slot 5, Module No. 20)	Installation Commands and Boot Paths
System Disk: Address 0 Mag Tape Drive: Address 4	Command to Boot from Tape: *hpux -a (20.0) (20.4;0xa0000,1)* Primary Boot Path: 20.0[1] Alternate Boot Path: 20.4[1]

1 Default boot path.

- Installation of the 808/815 (with Cartridge Tape Drive)

HP-IB Card (Slot 5, Module No. 20)	Installation Commands and Boot Paths
System Disk: Address 0 Cartridge Tape Drive: Address 3	Command to Boot from Tape: *hpux -a (20.0) (20.3;0x400000)* or *hpux (20.3;0x400000)* or *hpux install* Primary Boot Path: 20.0[1] Alternate Boot Path: 20.3[1]

1 Default boot path.

Booting HP-UX on 808/815

- From Reset or Transfer of Control

  Boot from primary boot path (Y or N)?> n
  Boot from alternate path (Y or N)?> n
  Enter boot path or ?> 20.0 (the path to System Disk)
  .
  Booting.
  .
  Console IO Dependent Code (IODC) revision 4
  Boot IO Dependent Code (IODC) revision 4
  .
  Interact with IPL (Y or N)?> y
  .
  Hard Booted.
  .
  ISL Revision A.00.08 June 22, 1989
  .
  ISL> hpux (20.0;4)hp-ux

Where:

Key	Operation
20.0	The path to the system disk.
4	Integer section number that contains the kernel file (usually 4 or 13).
hp-ux	The name of the kernel file (usually *hp-ux* or *SYSBCKUP*).

808/815 Addressing

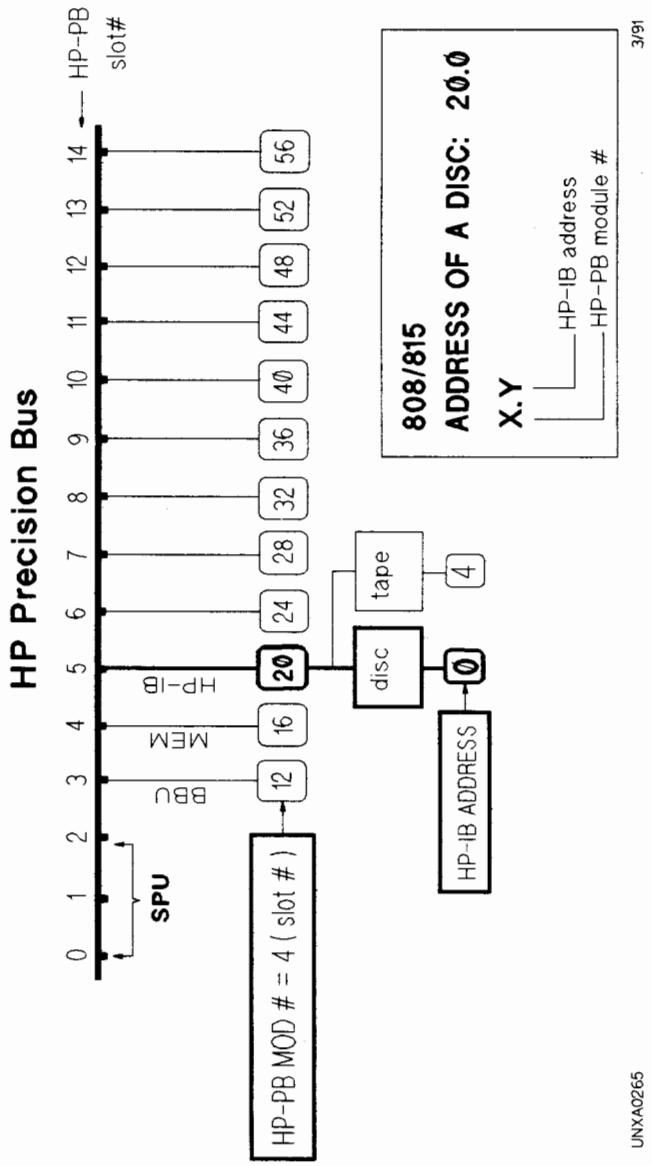


Figure 2-2. 808/815 Addressing

822/832/842/852/642/652 Standard Hardware Configuration

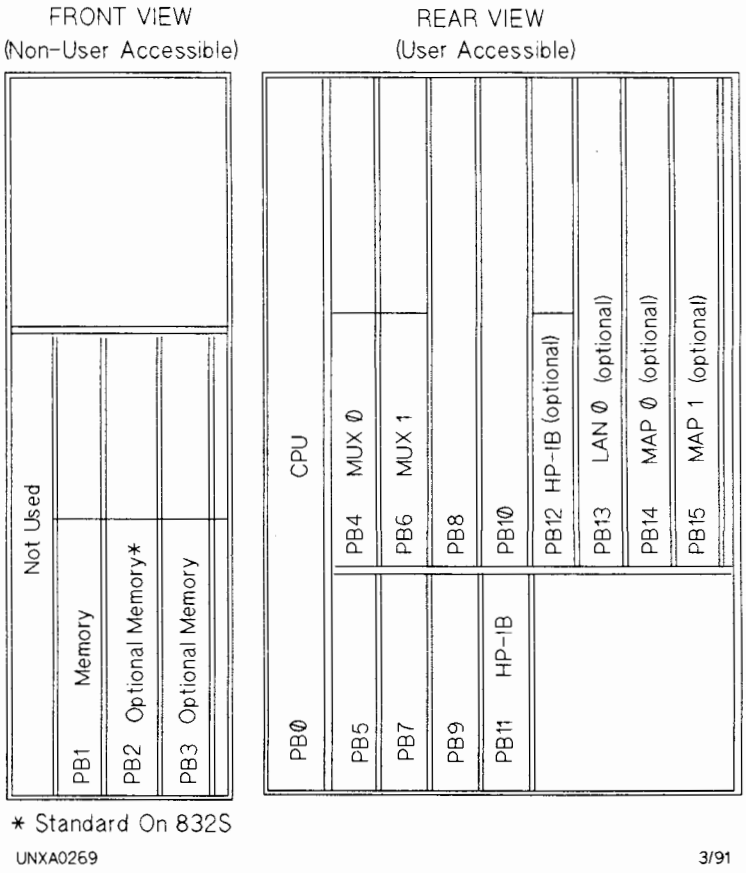


Figure 2-3. 822/832/842/852/642/652 Standard Hardware Configuration

822/832/842/852/642/652 Boot Paths and Installation Commands

- Installation of the 822/832/842/852/642/652 (with DDS)

HP-IB Card (Slot 11, Module No. 44)	Installation Commands and Boot Paths
System Disk: Address 0 DDS Drive: Address 7	Command to Boot from Tape: *hpux -a (44.0) (44.7;0xa0000,1)* or *hpux (44.7;0xa0000,1)* or *hpux install* Primary Boot Path: 44.0[1] Alternate Boot Path: 44.7[1]

1 Default boot path.

- Installation of the 822/832/842/852/642/652 (with Cartridge Tape Drive)

HP-IB Card (Slot 11, Module No. 44)	Installation Commands and Boot Paths
System Disk: Address 0 Cartridge Tape Drive: Address 3	Command to Boot from Tape: *hpux -a (44.0) (44.4;0x400000)* or *hpux (44.4;0x400000)* or *hpux install* Primary Boot Path: 44.0[1] Alternate Boot Path: 44.3[1]

1 Default boot path.

Booting HP-UX on 822/832/842/852/642/652

- From Reset or Transfer of Control

Boot from primary boot path (Y or N)?> n
Boot from alternate path (Y or N)?> n
Enter boot path or ?> 44.0 (the path to System Disk)
.
Booting.
.
Console IO Dependent Code (IODC) revision 4
Boot IO Dependent Code (IODC) revision 4
.
Interact with IPL (Y or N)?> y
.
Hard Booted.
.
ISL Revision A.00.08 June 22, 1989
.
ISL> *hpux (44.0;4)hp-ux*

Where:

Key	Operation
20.0	The path to the system disk.
4	Integer section number that contains the kernel file (usually 4 or 13)
hp-ux	The name of the kernel file (usually *hp-ux* or *SYSBCKUP*).

822/832/842/852/642/652 Addressing

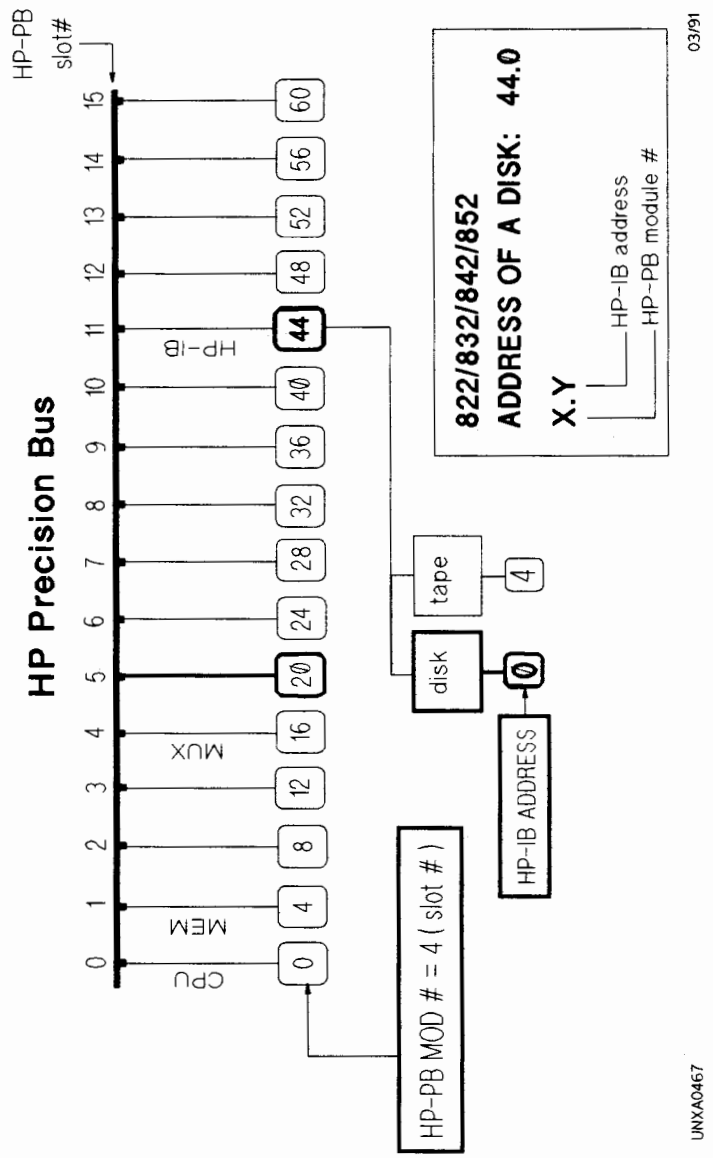


Figure 2-4. 822/832/842/852/642/652 Addressing

825/835 Standard Hardware Configuration

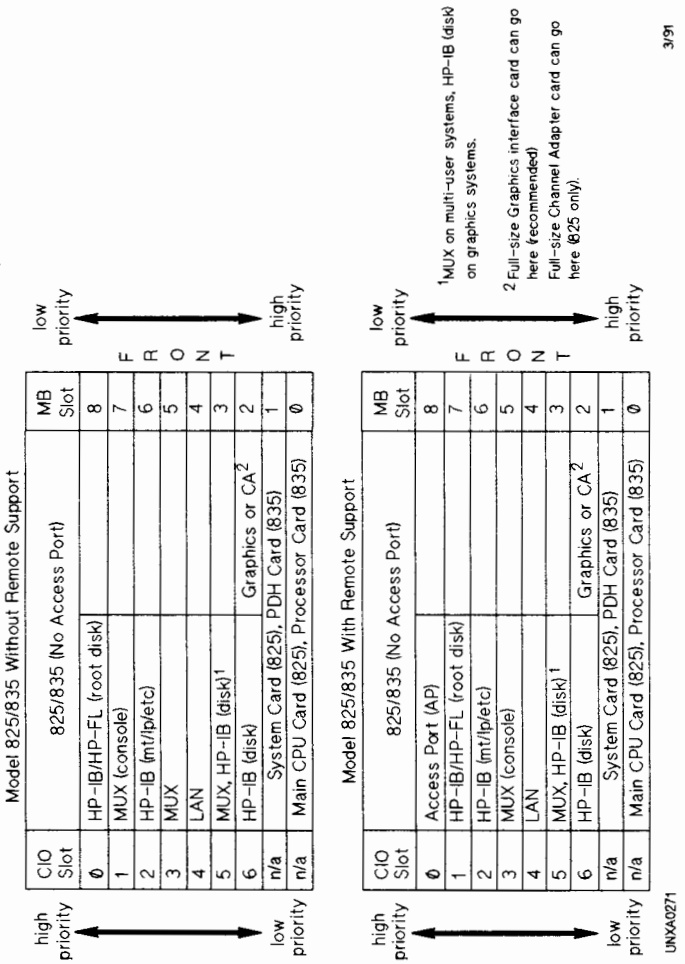


Figure 2-5. 825/835 Standard Hardware Configuration

834 Standard Hardware Configuration

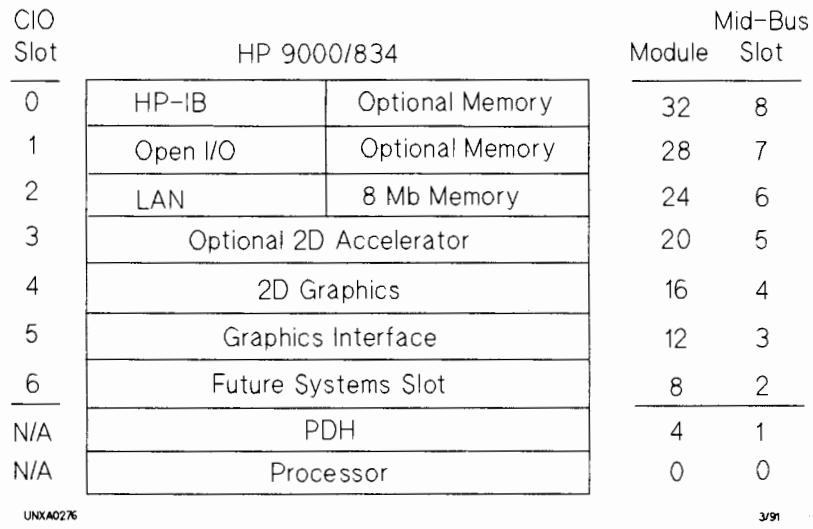


Figure 2-6. 834 Standard Hardware Configuration

635 Standard Hardware Configuration (no Access Port)

CIO Slot			Mid-Bus Slot
Ø	HP-IB/HP-FL (root disk)	16 MB Memory Array	8
1	MUX (console)	8MB Memory Array	7
2	HP-IB	Open for Memory Expansion	6
3		Open for Memory Expansion	5
4	LAN	Open for Memory Expansion	4
5		Open for Memory Expansion	3
6		Open for Memory Expansion	2
n/a	PDH Card (835)		1
n/a	Processor Card (835)		Ø

UNXA0278 3/91

Figure 2-7. 635 Standard Hardware Configuration (no Access Port)

635 Standard Hardware Configuration (Access Port)

CIO Slot			Mid-Bus Slot
0	Access Port (AP)	16 MB Memory Array	8
1	HP-IB/HP-FL (root disk)	8 MB Memory Array	7
2	HP-IB	Open for Memory Expansion	6
3	MUX (Console)	Open for Memory Expansion	5
4	LAN	Open for Memory Expansion	4
5		Open for Memory Expansion	3
6		Open for Memory Expansion	2
n/a	PDH Card (835)		1
n/a	Processor Card (835)		0

UNXA0279 3/91

Figure 2-8. 635 Standard Hardware Configuration (Access Port)

845 Standard Hardware Configuration (no Access Port)

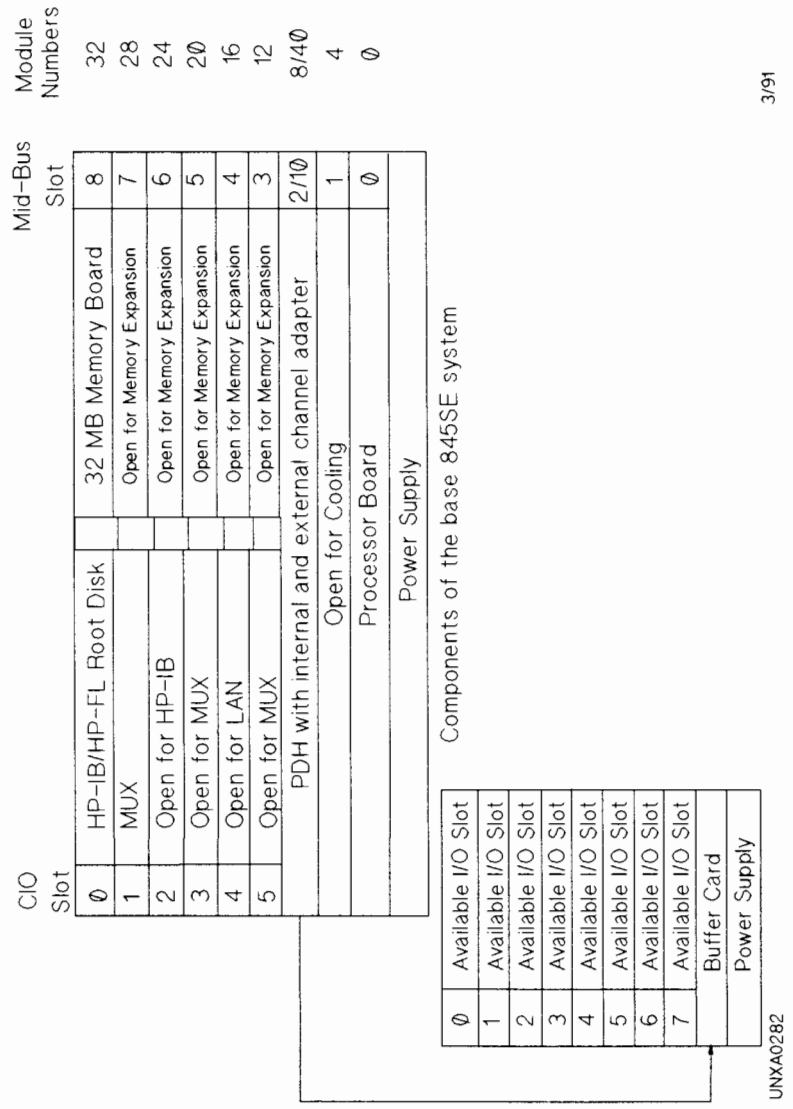


Figure 2-9. 845 Standard Hardware Configuration (no Access Port)

845 Standard Hardware Configuration (Access Port)

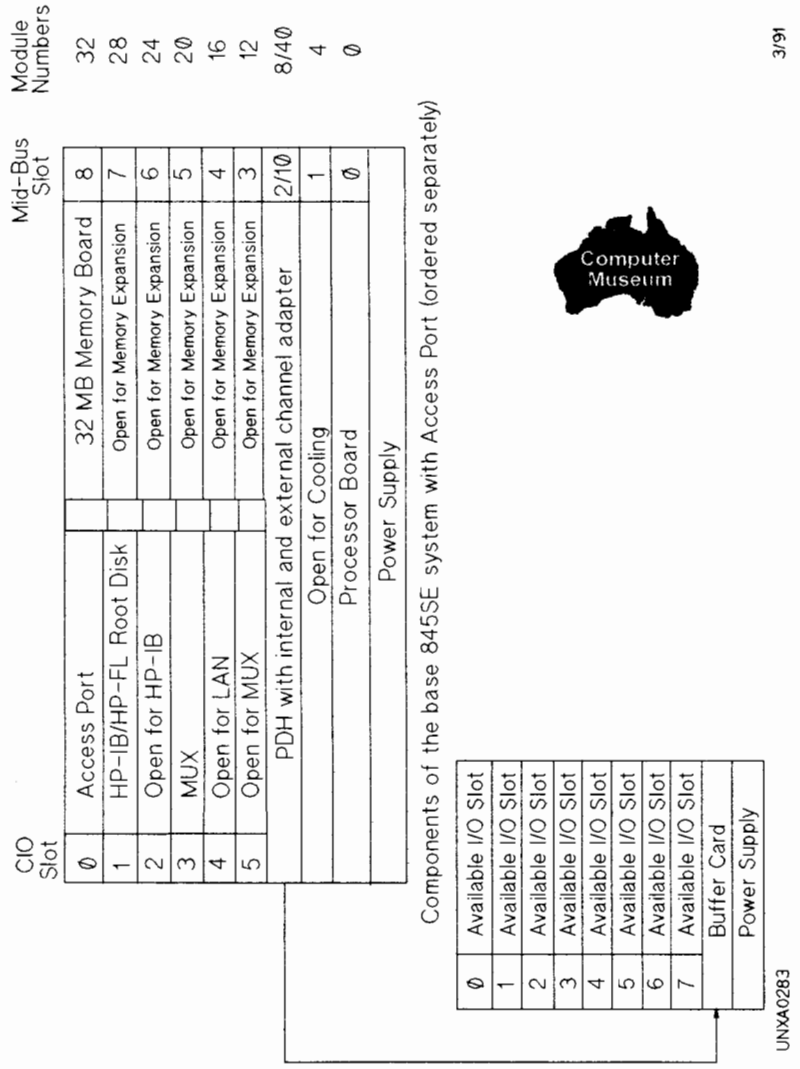


Figure 2-10. 845 Standard Hardware Configuration (Access Port)

645 Standard Hardware Configuration

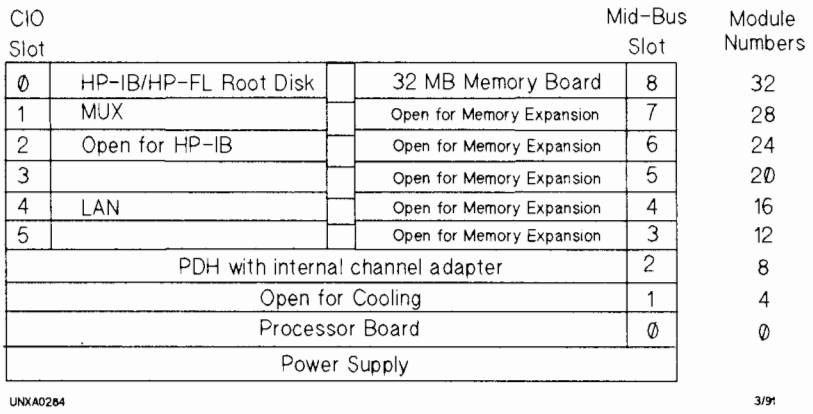


Figure 2-11. 645 Standard Hardware Configuration

825/835 Boot Paths and Installation Commands

• Installation of the 825/835 (with Mag, or DDS Tape Drive, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag, or DDS tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.0.0)(4.2.3;0xa0000,1)* or *hpux (4.2.3;0xa0000,1)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 825/835 (with Mag, or DDS Tape Drive, Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: Access Port (AP) CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag, or DDS tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.1.0)(4.2.3;0xa0000,1)* or *hpux (4.2.3;0xa0000,1)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 825/835 (with CTD, no Access Port, Non-Graphics Console)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 6: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a(4.0.0)(4.6.3;0x400000)* or *hpux (4.6.3;0x400000)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.6.3[1]

1 Default boot path.

• Installation of the 825/835 (with CTD, Access Port, Non-Graphics Console)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: Access Port (AP) CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 6: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a (4.1.0) (4.6.3;0x400000)* or *hpux (4.6.3;0x400000)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.6.3[1]

1 Default boot path.

• Installation of the 825/835 (with CTD, no Access Port, Graphics Console)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 5: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a(4.0.0)(4.5.3;0x400000)* or *hpux (4.5.3;0x400000)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.5.3[1]

1 Default boot path.

• Installation of the 825/834/835/845/635/645 (with CTD, Access Port, Graphics Console)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: Access Port (AP) CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 5: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a (4.1.0) (4.5.3;0x400000)* or *hpux (4.5.3;0x400000)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.5.3[1]

1 Default boot path.

• Installation of the 825/835 (with CTD, no Access Port, A1074A GAI Card)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a(4.0.0)(4.2.3;0x400000)* or *hpux (4.2.3;0x400000)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 825/835 (with CTD, Access Port, A1074A GAI Card)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: Access Port (AP) CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 5: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux -a (4.1.0) (4.5.3;0x400000)* or *hpux (4.5.3;0x400000)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.5.3[1]

1 Default boot path.

834 Boot Paths and Installation Commands

- Installation of the 834 (with CTD, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.0.0)(4.2.3;0x400000)* or *hpux (4.2.3;0x400000)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

635 Boot Paths and Installation Commands

• Installation of the 635 (with Mag, or DDS Tape Drive, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag, or DDS tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.0.0)(8.2.3;0xa0000,1)* or *hpux (4.2.3;0xa0000,1)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 635 (with CTD, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.0.0)(8.2.3;0x400000)* or *hpux (4.2.3;0x400000)* Primary Boot Path: 4.0.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 635 (with Mag Tape Drive, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(4.1.0)(4.2.3;0xa0000,1)* or *hpux (4.2.3;0xa0000,1)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.2.3[1]

1 Default boot path.

• Installation of the 635 (with CTD, Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 1: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a (4.1.0) (4.2.3;0x400000)* or *hpux (4.6.3;0x400000)* Primary Boot Path: 4.1.0[1] Alternate Boot Path: 4.6.3[1]

1 Default boot path.

845/645 Boot Paths and Installation Commands

• Installation of the 845/645 (with Mag, or DDS Tape Drive, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag, or DDS tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(8.0.0)(8.2.3;0xa0000,1)* or *hpux (8.2.3;0xa0000,1)* Primary Boot Path: 8.0.0[1] Alternate Boot Path: 8.2.3[1]

1 Default boot path.

• Installation of the 845/645 (with CTD, no Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with CTD at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(8.0.0)(8.2.3;0x400000)* or *hpux (8.2.3;0x400000)* Primary Boot Path: 8.0.0[1] Alternate Boot Path: 8.2.3[1]

1 Default boot path.

• Installation of the 845/645 (with Mag, or DDS Tape Drive, Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag, or DDS tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(8.1.0)(8.2.3;0xa0000,1)* or *hpux (8.2.3;0xa0000,1)* Primary Boot Path: 8.1.0[1] Alternate Boot Path: 8.2.3[1]

1 Default boot path.

• Installation of the 845/645 (with CTD, Access Port, all Consoles)

CIO Configuration	Installation Commands and Boot Paths
CIO Slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO Slot 2: HP-IB device adapter with mag tape drive at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a (8.1.0) (8.2.3;0x400000)* or *hpux (8.2.3;0x400000)* Primary Boot Path: 8.1.0[1] Alternate Boot Path: 8.2.3[1]

1 Default boot path.

- From Reset or Transfer of Control

Boot from primary boot path (Y or N)?> n
Boot from alternate path (Y or N)?> n
Enter boot path or ?> 4.1.0 (the path to System Disk)

.

Booting.

.

Console IO Dependent Code (IODC) revision 4
Boot IO Dependent Code (IODC) revision 4

.

Interact with IPL (Y or N)?> y

.

Hard Booted.

.

ISL Revision A.00.08 June 22, 1989

.

ISL> *hpux (4.1.0;4)hp-ux*

Where:

Key	Operation
4.1.0	The path to the system disk.
4	Integer section number that contains the kernel file (usually 4 or 13).
hp-ux	The name of the kernel file (usually *hp-ux* or *SYSBCKUP*).

825/835/845 Addressing

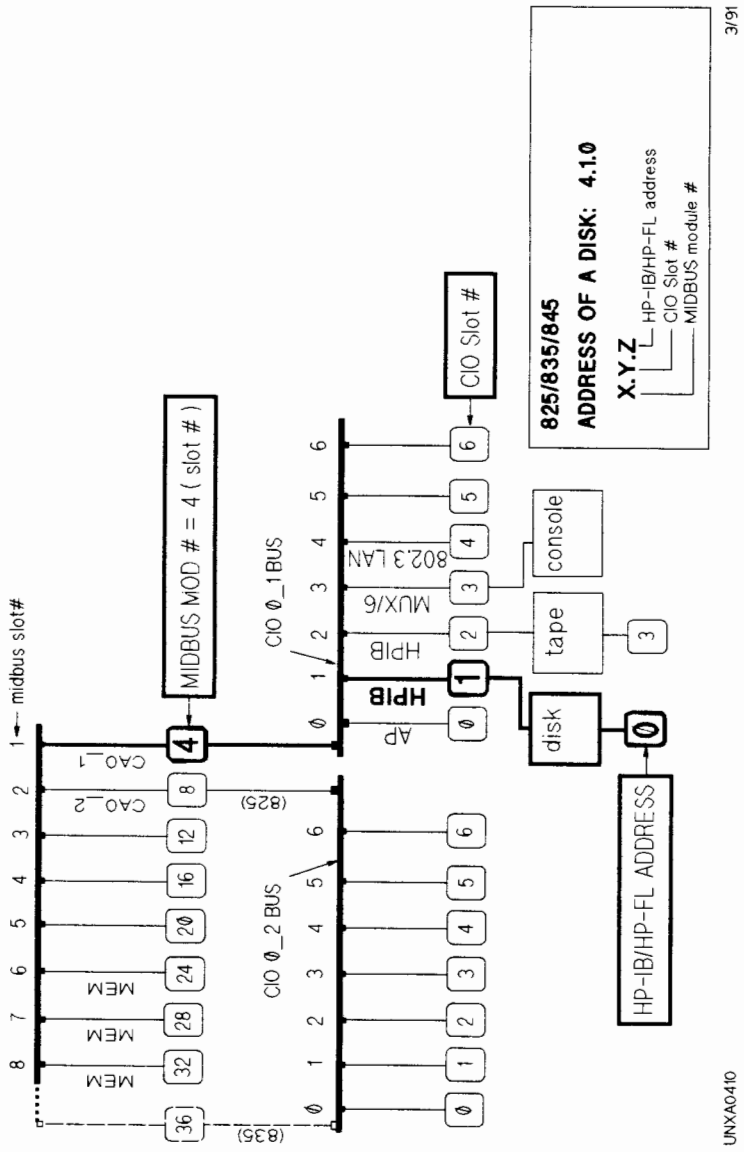


Figure 2-12. 825/835/845 Addressing

850/855/860/865/870 Standard Hardware Configuration

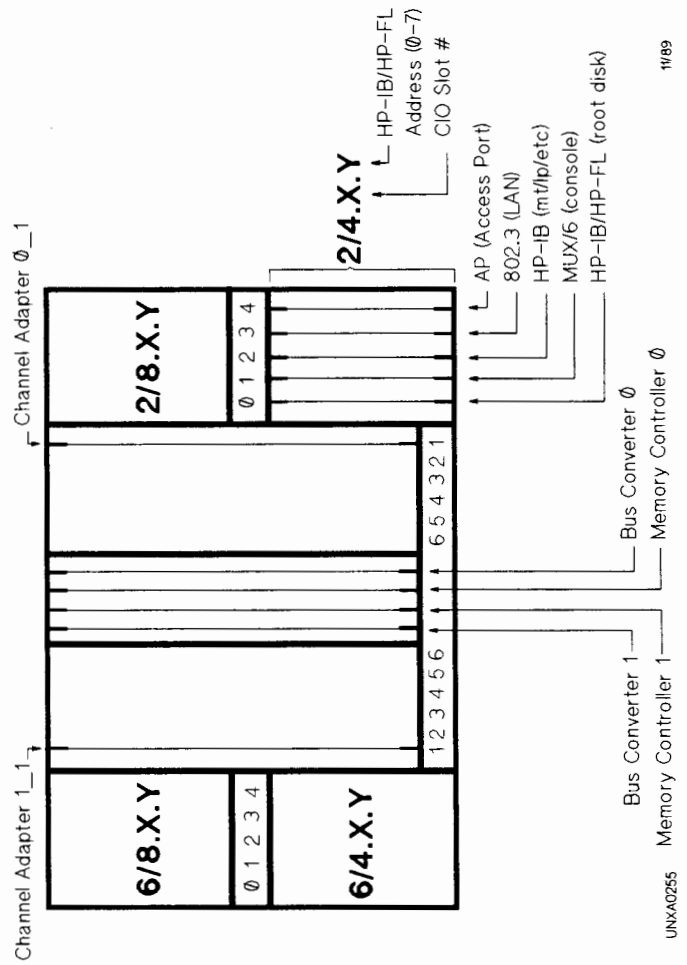


Figure 2-13. 850/855/860/865/870 Standard Hardware Configuration

850/855/860/865/870 Boot Paths and Installation Commands

- Installation of the 850/855/860/865/870 (with Mag Tape Drive)

CIO Configuration	Installation Commands and Boot Paths
CIO cardcage 0_1, slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO cardcage 0_1, slot 2: HP-IB/HP-FL device adapter with system disk at Address 3	Command to Boot Tape: *hpux install* or *hpux -a(2/4.0.0) * *(2/4.2.3;0x0a0000,1)* or *hpux (2/4.2.3;0x0a0000,1)* Primary Boot Path: 2/4.0.0[1] Alternate Boot Path: 2/4.2.3[1]

1 Default boot path.

- Installation of the 850/855/860/865/870 (with CTD)

CIO Configuration	Installation Commands and Boot Paths
CIO cardcage 0_1, slot 0: HP-IB/HP-FL device adapter with system disk at Address 0 CIO cardcage 0_1, slot 2: HP-IB/HP-FL device adapter with CTD at Address 3	Command to Boot from Tape: *hpux install* or *hpux -a(2/4.0.0) * *(2/4.2.3;0x400000)* or *hpux (2/4.2.3;0x400000)* Primary Boot Path: 2/4.0.0[1] Alternate Boot Path: 2/4.2.3[1]

1 Default boot path.

- From Reset or Transfer of Control

Boot from primary boot path (Y or N)?> n
Boot from alternate path (Y or N)?> n
Enter boot path or ?> 2/4.0.0 (the path to System Disk)
.
Booting.
.
Console IO Dependent Code (IODC) revision 4
Boot IO Dependent Code (IODC) revision 4
.
Interact with IPL (Y or N)?> y
.
Hard Booted.
.
ISL Revision A.00.08 June 22, 1989
.
ISL> *hpux (2/4.0.0;4)hp-ux*

Where:

Key	Operation
2/4.0.0	The path to the system disk.
4	Integer section number that contains the kernel file (usually 4 or 13).
hp-ux	The name of the kernel file (usually *hp-ux* or *SYSBCKUP*).

850/855/860/865/870 Addressing

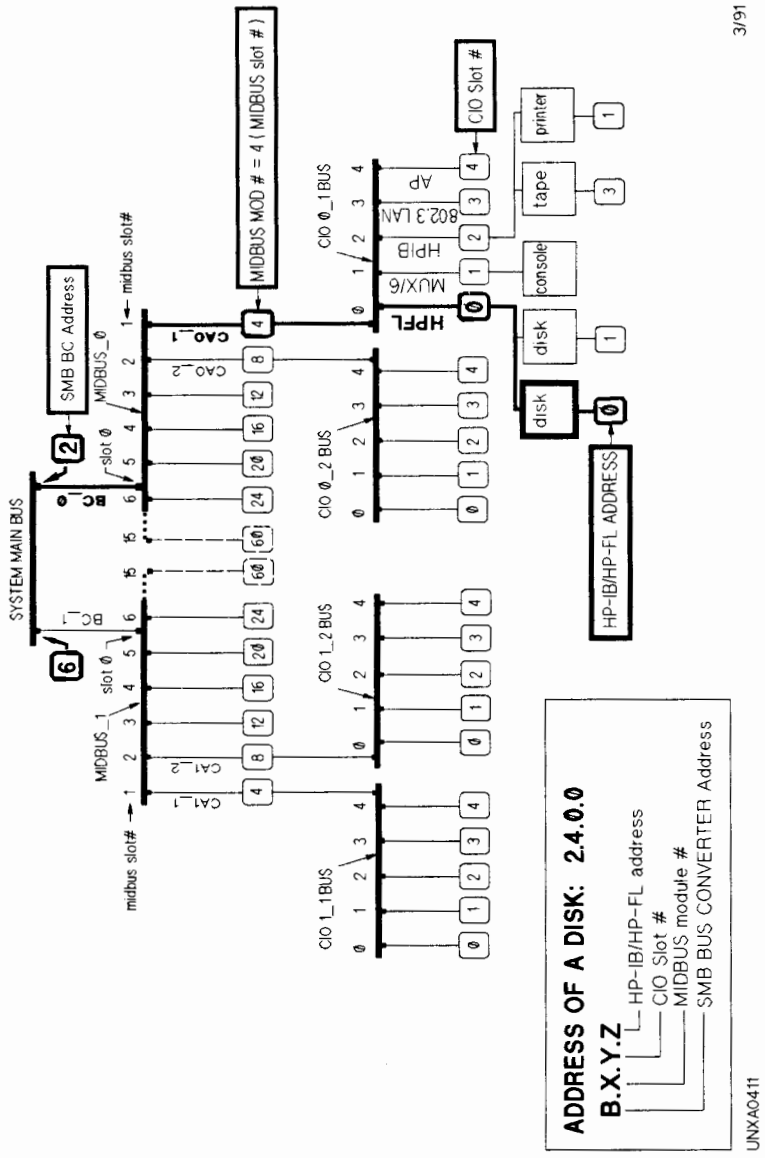


Figure 2-14. 850/855/860/865/870 Addressing

System Startup

HP-UX System Startup

ISL>hpux discX(BC/X.Y.Z;0xS)hp-ux

↓

Loads *hp-ux* into memory and then begins execution.

↓

Kernel invokes */etc/init* command.

↓

init spawns processes in the order that are listed in */etc/inittab*. All lines with action fields related to start-up and the default run-level are spawned.

↓

The system completes the startup process. Users may login.

/etc/inittab Example

```
init:2:initdefault:
ioin::sysinit:/etc/ioinit -i>/dev/console > /dev/console 2>&1
mux::sysinit:/etc/dasetup </dev/console > /dev/console 2>&1
brc1::bootwait:/etc/bcheckrc </dev/console > /dev/console 2>&1
slib::bootwait:/etc/recoversl </dev/console > /dev/console 2>&1
brc2::bootwait:/etc/brc >/dev/console 2>&1
link::wait:/bin/sh -c "/rm -f dev/syscon; ln /dev/systty /dev/syscon"
>/dev/console 2>&1[1]
cwrt::bootwait:cat /etc/copyright >/dev/syscon
rc::/etc/rc </dev/console >dev/console 2>&1
powf::powerwait:/etc/powerfail >dev/console 2>&1
cons::respawn:/etc/getty console console
ttp1:2:off:/etc/getty -h tty0p1 9600
ttp2:2:off:/etc/getty -h tty0p2 9600
ttp3:2:off:/etc/getty -h tty0p3 9600
ttp4:2:off:/etc/getty -h tty0p4 9600
```

1 Prints as a single line on the console; no linewrap.

/etc/inittab Fields

inittab format: *id:rstate:action:process*

Where:

Key	Operation
id	Unique 1 to 4 character identification.
rstate	Defines the run levels where the process is valid. Valid levels are *0* through *6*, *s*, or *S*. Processes can have multiple run levels, for example, *id:234:respawn ...* initiates the process to run in states 2, 3, or 4.
action	The options listed below: *respawn*—if process does not exist, start; if process dies, restart. *wait*—start the process waiting to complete. *once*—start once, do not wait for completion; if it dies, do not restart. *boot*—start once at boot-up; do not wait for completion; do not restart. *bootwait*—start once at boot-up; wait for completion; do not restart. *powerwait*—execute only when *init* receives a power fail signal (SIGPWR). *off*—if process associated with this entry is running, send a 20 second warning signal, then kill the process. *initdefault*—invoke first time *init* is run. Sets default run level. *sysinit*—execute before *init* tries to access console. Used to initialize devices that *init* could receive run-level information from.
process	This is a shell command to be executed.

/etc/inittab Start-up Process Flow

- Sets the system run-level as indicated by *initdefault*.

  init:2:initdefault:

- Runs */etc/loinit* command. Assigns output and error messages to the console. *loinit* initializes Kernel I/O System data structures using information from the */etc/ioconfig* file. The *-i* option causes *loinit* to run */etc/insf* in order to assign logical unit numbers (lu) and create special device files for all the new devices on the system.

  ioin::sysinit:/etc/ioinit -i >/dev/console 2>&1

- Turns on all multiplexer cards. Assigns input from console, output to console, and directs errors to console.

  muxi::sysinit:/etc/dasetup < /dev/console >/dev/console 2>&1

- Run */etc/bcheckrc* shell program. Assign input, output, and error messages to the console. *bcheckrc* exits if running on a diskless client, starts mirror disks if configured, and invokes *fsck* on dirty file systems.

  brc1::bootwait:/etc/bcheckrc </dev/console >/dev/console 2>&1

- Run */etc/recoversl* shell program. Assign input, output, and error to the console). *recoversl* checks for the existence of shared libraries that are critical to the system. If any critical shared library is missing or damaged, *recoversl* assists the system administrator in recovering the shared library from update media.

  slib::bootwait:/etc/recoversl >/dev/console 2>&1

- Run */etc/brc* shell program. Assigns output and error messages to */dev/syscon*. */dev/syscon* is used by HP-UX as a virtual system console. *brc* removes the file */etc/mnttab* that contains old file system mount information. If not running on a diskless client, *brc* removes */etc/rcflag*.

  brc2::bootwait:/etc/brc >/dev/console 2>&1

- Remove old */dev/syscon* device file. Create new */dev/syscon* file and link it to */dev/systty* (the physical console). Direct output and errors to the console.

  *link::wait:/bin/sh -c "/bin/rm -f /dev/syscon; *
  ln /dev/systty /dev/syscon" >/dev/console 2>&1

- Display a copyright message on the console for legal purposes.

  cwrt::bootwait:cat /etc/copyright >/dev/syscon

- Run */etc/rc* shell program. Direct output and errors to the console. *rc* contains run commands that set date and time, mount file systems, and perform other housekeeping chores.

  rc::wait:/etc/rc </dev/console >/dev/console 2>&1

- Run */etc/powerfail* shell program. Assign output and error messages to the console.

  *powf::powerwait:/etc/powerfail >/dev/console 2>&1 *
  #power fail routine

- Create a *getty* process for each terminal to be enabled in the specified run-state. Set up communication protocol and issue the first login prompt on the terminal.

  cons::respawn:/etc/getty console
  ttp1:2:off:/etc/getty -h tty0p1 9600
  ttp2:2:off:/etc/getty -h tty0p2 9600
  ttp3:2:off:/etc/getty -h tty0p3 9600
  ttp4:2:off:/etc/getty -h tty0p4 9600

Changing Run Levels with *init*

- The */etc/init* command can be used to change the system's run-level.
- *init* reads */etc/inittab* only when the run-level changes, or when forced to by a *Q* or *q* option.
- */etc/init* command and parameters, for example:

  # init [0123456SsQq]

Where:

Key	Operation
S | *s*	Single user run-level. (Only the virtual console, */dev/syscon*, is enabled.).
2	By convention, used as a multi-user run-level. Normally used to enable user terminals and other serial devices.
013456	Assigned by system administrator to create other run-levels.
Q | *q*	Forces re-examination of */etc/inittab* even if setting same run-level.

Note

The default run-level, double colons (::), matches run-levels 0-6.
Example: *co::respawn:/etc/getty console*
(console will remain ON in run-levels 0-6).

The */etc/bcheckrc* Script

- The *bcheckrc* script performs the following tasks:
  - *bcheckrc* determines the type of system invoking this script. If the calling system is a diskless cluster, the script is exited.
  - If applicable, mirror disks are configured and *fsck* is run on them.
  - Check if the mountable file systems listed in */etc/checklist* were cleanly unmounted on last shutdown. If a file system was not cleanly unmounted, *fsck* is run in *preen* mode to check for corruption.
  - If corruption is detected by *fsck* and can be repaired without data loss, the file system is automatically corrected. If a correction could result in data loss, the operator is prompted to run *fsck* interactively to repair the damage; then, to reboot the system using the */etc/reboot -n* command.

The */etc/brc* Script

- The *brc* script performs the following tasks:
  - The */etc/rcflag* flag file is removed if present. This flag is used by the */etc/rc* script to test if system start-up is occurring. If this flag file is absent */etc/rc* assumes that the system is not in the start-up process.
  - *brc* removes the */etc/mnttab* file unless the system being started is a diskless client. The */etc/mnttab* file contains the file system mounting information; */etc/mnttab* is updated whenever the */etc/rc* script is run at system start-up.

The */etc/rc* Script

- The *rc* script is divided into two sections: Functions and Function Calls.
  - Functions—an example:

```
initialize ( )
{
   RBOOTD_DEVICES="" # device file used by /etc/rbootd
   if [ "$SYSTEM_NAME"= "" ] # system's network name
   then
      SYSTEM_NAME=unknown
      export SYSTEM_NAME
   fi
   TIMEOUT=20 # timeout length for date setting
   vtgateway="" # name of system acting as the gateway
   vtgopts="" # vdtaemon options
   vtginterfaces="" # gateway devices
}
localrc ( )
{
   # This function is intended for adding local initialization
   functions to rc.
   : # do nothing instruction (a function must contain some
   command)
}
```

  - Function Call—an example:

```
initialize
:
localrc
```

/etc/rc Function Calls by System Type

/etc/rc **Function Calls by System Type**

Function Call	System Type			Basic Tasks Performed
	SA[1]	DS[2]	DC[3]	
initialize	√	√	√	Set time zone, system name, etc.
set_state	√	√	√	Determine if standalone, server, or diskless client
set_date	√	√		Set system date, time, and year
set_privgrp	√	√	√	Associate a kernel capability with a group id
setparms	√	√	√	Set system configuration values
hfsmount	√	√		Mounts high performance file systems
save_core	√	√	√	Saves memory core dump to file system files
swap_start	√	√	√	Turn ON paging and swapping
syncer_start	√	√		Start Synchronizer; flush file system memory to disk every 30 seconds
lp_start	√	√		Start lp scheduler if configured
clean_ex	√	√		Save editor files open during power failure
clean_uucp	√	√		Scan spool directories; delete old *uucp* files
switch_over	√	√	√	Set variables for SwitchOver/UX
net_start	√	√	√	Start networking if */etc/netlinkrc* is executable
csp_start		√	√	Start the cluster server
rbootd_start		√		Start remote boot daemon for diskless cluster

1 SA = Standalone System.

2 DS = Diskless Server.

3 DC = Diskless Client.

/etc/rc **Function Calls by System Type, cont.**

Function Call	System Type			Basic Tasks Performed
	SA[1]	DS[2]	DC[3]	
cron_start	√	√	√	Start cron and make new *cronlog*
pty_start	√	√	√	Start psuedo-terminal daemon
vt_start	√	√	√	Start vtdaemon
list_tmps	√	√	√	Display files in */tmp*, */usr/tmp*, and *lost+found*
clean_adm	√	√	√	Save oldlogs; make *sulog*, *diaglog*, and *messages*
diag_start	√	√	√	Start diagnostic event logger
syslogd_start	√	√	√	Start system error message logger; make *syslog*
audit_start	√	√		Start audit subsystem
localrc	√	√	√	Run Sys. Admin. created initialization commands

1 SA = Standalone System.

2 DS = Diskless Server.

3 DC = Diskless Client.

The */etc/powerfail* Script

- The *powerfail* script performs the following tasks:
  - Runs */etc/src.sh* shell program which sets system configuration variables such as timezone (TZ) and the system's network name (*SYSTEM_NAME*).
  - Starts multiplexer cards using */etc/dasetup*.
  - Logs the fact that a power failure occurred on system console and user terminals.
  - If required, the system administrator can add commands to reload any programmable I/O card or device needing post failure attention.

System Shutdown

The *shutdown* and *reboot* Commands

- *shutdown* is the recommended command for halting and rebooting the system. The */etc/shutdown* script performs the following:
  - Changes to the root directory (/).
  - Warns users of impending shutdown and waits a specified delay time (default wait is 60 seconds).
  - Stops non-essential system and user processes.
  - Changes the run-level to single-user (30 second delay).
  - Unmounts file systems other than *root*.
  - Executes *sync* to flush the system cache buffers to disk.
  - If *-r* or *-h* was used, reboots or halts the system.

shutdown Syntax

 # /etc/shutdown [-r | -h] [grace] Where:

Key	Operation
-r	Automatic reboot following shutdown.
-h	Halts the system following shutdown.
grace	Optional number of seconds to wait before killing processes.

reboot Syntax

 # /etc/reboot [-h | -r] [-n] [-s] Where:

Key	Operation
-h	Halts the system.
-r	Reboots the system automatically (default).
-n	No *sync* before halt or reboot.
-s	*sync* before halt or reboot (default).

Special Device Files

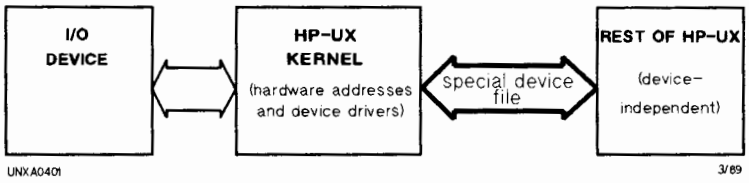


Figure 2-15. Special Device Files

- Special device files link the kernel to the rest of HP-UX.
- Special device files pass device dependent parameters (for example: driver name, tape density, modern configuration, etc.) to the kernel.
- Transfer data by character (raw), or in blocks (cooked).
- Must reside in the */dev* directory.
- Created by *insf*, *mksf*, or *mknod* commands after system generation.

Block and Character Devices

Block Devices

- I/O operations done in block or fragment units.
- Mass storage devices holding mountable file systems.

Character Devices

- I/O operations done in character data streams.
- All devices that do not contain mountable file systems, such as: terminals, printers, and tape drives.
- Mass storage disks can also be accessed through character devices.

/dev Directory: Peripheral Special Device Files

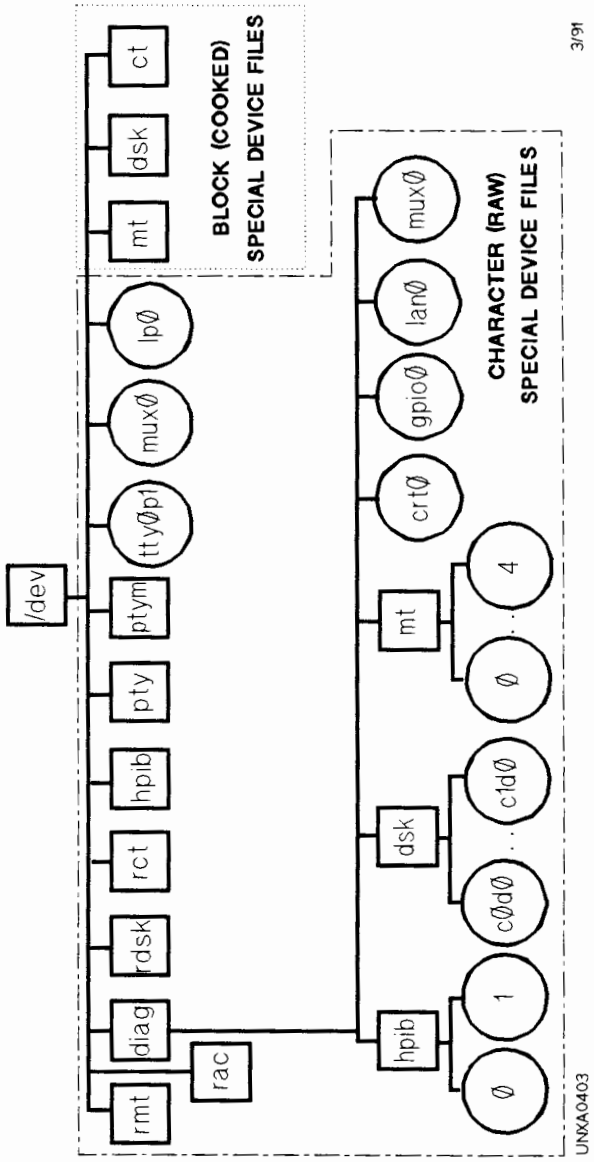


Figure 2-16. /dev Directory: Peripheral Special Device Files

Device File Naming Conventions

Terminal Device Files

o Terminal Device File Names

/dev/tty0p0 Where:

Key	Operation
tty0	0 is a logical unit number (lu) assigned by *insf*.
p0	0 is the multiplexer port number (0-5).

o Modem Device File Names

/dev/ttyd2p3 Where:

Key	Operation
d	Designates a dial-in modem.
2	A logical unit number (lu) assigned by *insf*.
3	The multiplexer port number (0-5).

o UUCP Modem for Automatic Dial-Out

/dev/cua2p3 Where:

Key	Operation
2	A logical unit number (lu) assigned by *insf*.
3	The multiplexer port number (0-5).

o UUCP Modem for Manual Dial-Out

/dev/cul2p3 Where:

Key	Operation
2	A logical unit number (lu) assigned by *insf*.
3	The multiplexer port number (0-5).

1/2-inch Magnetic Tape Device Files

/dev/[r]mt/udn Where:

Key	Operation
[r]	When present, indicates that file can be found on the character (raw) directory for this device.
u	The logical unit (lu) assigned by *insf*.
d	Identifies tape density: *h* (high density, 6250 bpi), *m* (medium density, 1600 bpi), or *l* (low density, 800 bpi).
n	When present, indicates no rewind after write.

Examples:

/dev/rmt/0m	Logical unit 0, medium density, character device file.
/dev/mt/1hn	Logical unit 1, high density, block device file, no rewind after write.

Disk Device Files

/dev/[r]dsk/cXd0sZ Where:

Key	Operation
r	When present, indicates that file can be found on the character (raw) directory for this device.
X	Logical unit number (lu) *X* assigned by *insf* (for HP-UX versions prior to 8.0: when addressing an HP-IB device *X* becomes *1000 + lu number*; for an HP-FL device *X* becomes *2000 + lu number*).
Z	Section number *Z* addressed by this device file.

Examples:

/dev/rdsk/c0d0s4	Logical unit 0, section 4, character device file.
/dev/dsk/c1d0s2	Logical unit 0, section 4, block device file.

Printer and Cartridge Tape Device Files

o Line Printer Device File Names

/dev/lpX

Where:

Key	Operation
X	Logical unit number (lu) *X* assigned by *insf*.

o Cartridge Tape Device File Names

/dev/[r]ct/cXdYsZ Where:

Key	Operation
r	When present, indicates that file can be found on the character (raw) directory for this device.
X	Logical unit number (lu) *X* assigned by *insf*.
Y	Unit number *Y* (0 = does not share same controller as disk; 1 = shares same controller as disk drive, for example: 7914CT).
Z	Section number *Z* addressed by this device file (typically *2*; section 2 accesses all sections of tape).

Special Files Needed by HP-UX

Filename	Use	Recreated by:
syscon	Access system console	}
systty	Access system console	} *insf -d cn*
console	Access system console	}
diag0/	HP-UX diagnostics	*insf -d diag0*
dmem	HP-UX diagnostics	*insf -d dmem*
ktest	HP-UX diagnostics	*insf -d ktest*
kmem	Virtual memory	}
mem	Physical memory	} *insf -d mm*
null	Bit bucket	}
config	Access I/O configuration	*insf -d devconfig*
root rroot	Access root device during system start-up	*insf -d root*
tty	Access user terminal	*insf -d sy*

Note

Remember to change directories to */dev* before executing the *insf* command.

The */etc/lssf* Command

- Lists characteristics of special files:
  - Driver name
  - lu number
  - Driver options
  - HP-UX software address
  - Device file path
- Uses the special file name *etc/devices*, and the kernel (hp-ux) to obtain information.

Examples:

# *lssf /dev/dsk/c7d0s3*	disk2 lu 7 unit 0 section 3 address 4.0.0 /dev/dsk/c7d0s3.
# *lssf /dev/tty1p5*	mux0 lu 1 port 5 hardwired address 4.5 tty1p5.

MKNOD Example

This example makes a dial-in modem special device file for mux lu 2, port 0.

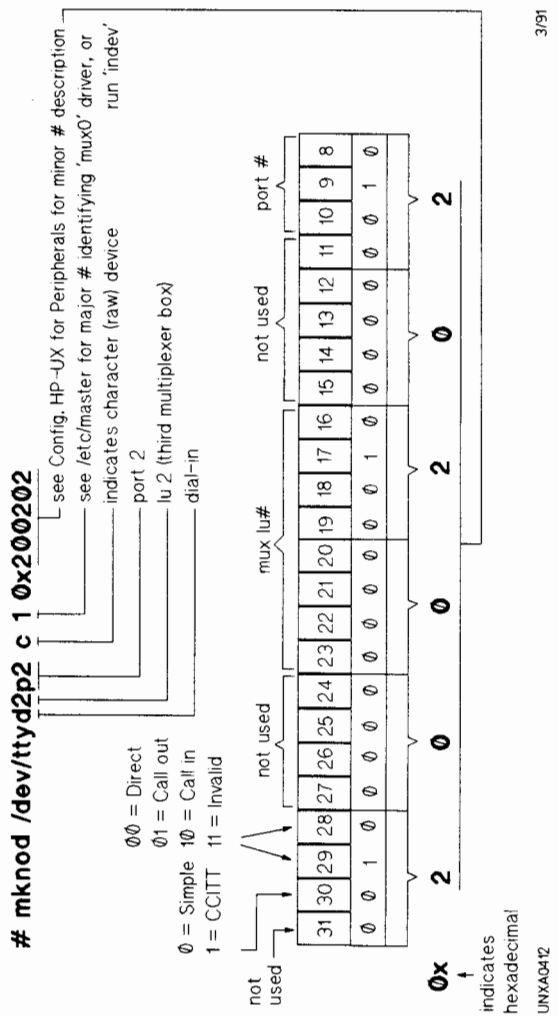


Figure 2-17. MKNOD Example

The *mksf* Command

- Creates one or more special device files for the specified driver.
- Extracts the major number from the kernel (hp-ux).
- Command syntax varies depending on the driver type (mux0, disc0, etc.).

Syntax example for a mux0 driver:

 # mksf -d mux0 [-l lu] [-p port] [-h | -i | -o] [-c] [path]

Key	Operation
-d mux0	Specifies driver to use for special device file(s) created.
-l lu	Logical unit number (lu) of a device as assigned by *insf*.
path	Default path name is *tty*<lu>*p*<port>.
-c	CCITT (European Standard).
-h	Hardwired (direct connect).
-i	Dial-in modem.
-o	Dial-out modem.
-p	Multiplexer port number (0-5).

- This example makes a dial-in modem special device file for mux lu 2, port 2.

```
# cd /dev
# mksf -d mux0 -l 2 -p 2 -i ttyd2p2
```

The *insf* Command

Caution The *insf* command should only be run in single user mode.

- Reads information about devices directly from the kernel (hp-ux).
- Assigns a logical unit number to each *new* device.
- Creates all default special files for each device.
- Sets appropriate file permissions.
- If needed, set appropriate file ownership.
- Creates diagnostics special files.
- Uses standard path names.

Syntax

 # /etc/insf [-d driver | -C class] [-H hdw_path] [-l lu] [-f] [-k] [-e]

- No options: Assigns logical unit (lu) numbers and creates default device files for all *new* devices in the kernel (hp-ux).
- Options:

Key	Operation
-d	Select device associated with an I/O driver (*disc0*, etc.).
-C	Select devices in a device class (disk, printer, etc.).
-H	Select device at a hardware address (8.0.0, etc.).
-l	Select device with a particular lu or assign a specific lu.
-f	Force a specific lu to map to a device.
-k	Assign an lu to the device without creating device files (cannot be used with the *-e* option).
-e	Create device files for devices having lu numbers (cannot be used with the *-k* option).

- Examples:

  # *insf -e* (re-create files for existing devices)
  # *insf -f disc1 -l lu* (assign lu and device file for new disk)
  # *insf -e -C printer* (re-create printer device file)

The *rmsf* Command

- Removes device files and logical unit (lu) number(s) assigned to hardware path(s) in the kernel.
- Syntax:

  # *rmsf [-a | -k] devfile*
  # *rmsf [-k] [-d driver] |-C class] -H hdw_path*

- Options:

Key	Operation
-a	Removes device information and device files.
-k	Removes device information only.
-d	Selects devices controlled by an I/O driver.
-C	Selects devices in a device class.
-H	Selects device at a hardware address.

- Example:

  # *rmsf tty2p0* (removes specified device file)
  # *rmsf -a dsk/c1d0s0* (removes device and device file)
  # *rmsf -H 4.0* (re-moves device at 4.0 and device files)

Line Printer Spooler System

Users

- Queue files to printers.
- Obtain status of lp system.
- Cancel any print job.
- Mark printers in and out of service.

LP Administrator

- Change configuration of system.
- Mark printers in and out of service.
- Start and stop the system.

Spooling System Directory Overview

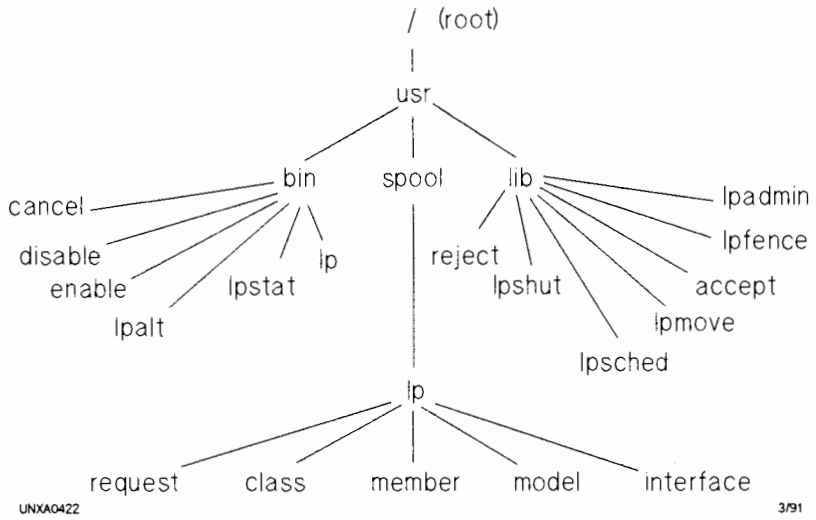


Figure 2-18. Spooling System Directory Overview

Spooler System Terminology

Term	Meaning
Class	- A grouping of printers. - Must have at least one printer. - Usually contains more than one printer. - Printers may be assigned to more than one class.
Device	- Port on system where printer is connected. - Accessed through the special file */dev/lp*(n), or other special */dev* devices.
Printer	- Logical name of a physical device. - Name used for actual printer.
Destination	- Place where the files will be queued. - Destination can be a queue for a particular printer, or class of printers.
Scheduler	- Runs when system is multi-user. - Routes requests on a FIFO basis. - Enables files to be printed on a specific printer or printer class.
Log	- Log file located in */usr/spool/lp/log*. - Maintains a record of each lp spooler system request, including: request ID, user name, printer name, time, error messages, and reprints due to failure.

User Commands

Common LP Spooler User Commands

Command	Example
lp	$ *lp /etc/passwd*
	$ *lp -dprinter_name file1* (select printer by name)
	$ *lp -p4 /etc/passwd* (set priority to 4)
lpstat	$ *lpstat -t*
cancel	$ *cancel printer_name-117* (cancel job in queue)
	$ *cancel printer_name* (cancel job now printing)
enable	$ *enable printer_name*
disable	$ *disable -r* "Changing Ribbons" *printer_name*

The */usr/bin/lp* Command

- The *lp* command arranges for the named files and associated information (collectively called a request) to be printed by a line printer or plotter.
- The *lp* command and common options are shown below:

  $ *lp [-ddest] [-m] [-nnumber] [-ppriority] [-s] [-ttitle] [-w] [files]*

Key	Operation
-ddest	Files will be printed on *dest* (the name of a printer or printer class). If this key is omitted, file(s) will be printed on the default system printer.
-m	Send mail after the file(s) have been printed.
nnumber	Print *number* of copies of the specified file(s).
ppriority	Give *priority* to the print request (specified as a integer from 0 through 7 for the lowest through the highest priority). The file(s) will be printed if equal to or greater than the printer fence value; if below the fence, the printout will be deferred.
-s	Suppress messages from *lp* such as *request ID is* . . . .
-ttitle	Print *title* on the banner page of the output.
-w	Write a message on the user's terminal after *files* have been printed.
files	File(s) to be printed or plotted (default file is STDIN).

The */usr/bin/lpstat* Command

- The *lpstat* command prints information about the status of the LP spooling system. It reports the status of the scheduler, printers, printer classes, and the default system printer.
- If *lpstat* is used with no arguments, it reports the status of any requests made by the user.
- The *lpstat* command and common options are shown below:

  $ *lpstat [-c[list]] [-d] [-p[list]] [-r] [-t] [-v[list]]*

Key	Operation
-c[list]	Print class names and their member, where *list* is a listing of intermixed printer names and class names.
-d	Print the system default printer destination.
-p[list]	Print the status of printers, where *list* is a listing of printer names.
-r	Print the status of the scheduler.
-t	Print all status information.
-v[list]	Print the names of printers and the path names of the devices associated with them, where *list* is a listing of printer names.

The */usr/bin/cancel* Command

- The *cancel* command cancels printing of the file currently being printed, or spooled files when request ID numbers are specified.
- The *cancel* command and common options are shown below:

  $ *cancel [ids] [printers] [-a] [-e] [-i] [-uuser]*

Key	Operation
ids	Specify the request IDs to be canceled in *ids*.
printers	Specify the name(s) of printer(s) or printer classes where the *cancel* request is be performed.
-a	Remove all requests a user owns as specified in the *printers* queue.
-e	Empty the spool queue of all requests for the *printers* specified. Only the superuser can use the *-e* option.
-i	Cancel only local requests.
-uuser	Remove any requests queued belonging to *user*. Multiple *-u* options are allowed; only the superuser can use this option.

The */usr/bin/enable* Command

- The *enable* command activates the named printer(s), enabling them to print requests taken by */usr/bin/lp*. This changes the status to allow the scheduler to send requests to the printer.
- The *enable* command is shown below:

  $ *enable printers*

Key	Operation
printers	Specify the name(s) of printer(s), or printer class or classes to be enabled.

The */usr/bin/disable* Command

- The *disable* command deactivates the named printer(s), disabling them from printing requests taken by */usr/bin/lp*. By default, any requests that were being printed on the designated printers are reprinted in entirety on the same printer, or on another printer in the same class.
- The *disable* command and options are shown below:

  $ *disable [-c] [-r[reason]] printers*

Key	Operation
-c	Cancel any requests that are currently printing on any of the designated *printers*.
-r[reason]	Associates *reason* with the deactivation of *printers*. The specified *reason* will be printed when status is requested via the */usr/bin/lpstat* command. *reason* must be enclosed in double quotes if the *reason* string contains white space.
printers	Name of printer(s) being deactivated.

Administrator Commands

The */usr/lib/lpshut* Command

- The *lpshut* command shuts down the printer scheduler.
- The printers that are printing when *lpshut* is invoked will stop printing. Any files that are interrupted will reprint in entirety after the scheduler is started again by the */usr/lib/lpsched* command.
- All LP commands perform their functions even when the scheduler is not running. Jobs can still be submitted to queues.
- The *lpshut* command has no arguments and is shown below:

  # *lpshut*

The *lpadmin* Command

Configuration changes can be done with *lpadmin*:

- Add and remove printers.
- Change class members.
- Change the device associated with the printer.
- Assign an interface for a printer.
- Assign a system default destination.

Options to lpadmin		Examples
-d(dest)	Assign dest as the system default destination.	-dlaser
-x(dest)	Remove destination dest from the spooler.	-xlaser
-p(printer)	Selects a printer to which other options refer.	-plaser
-acluster_client	Specify a non-rootserver cnode printer.	
To be used when the -p(printer) option is selected:		
-g(priority)	Sets the default priority (0 - 7) for incoming print requests for printer; default is 0.	-g4
-c(class)	Insert printer as a member of a class.	-clp3
-v(device)	Associate device with printer.	-v/dev/lp0
-r(class)	Remove printer from a class.	-rlp3
Declaring an Interface Program		
-e(printer)	Use existing printer interface.	-elp
-i(interface)	Use a new script as interface.	-i(path/mk)
-m(model)	See */usr/spool/lp/model*.	-mhp2563a

The */usr/lib/accept* Command

- The *accept* command allows */usr/bin/lp* to accept request for the named printer or class of printers.
- The *accept* command is shown below:

  $ *accept destinations*

Key	Operation
destinations	Name of a spooled printer(s), printer class or classes that */usr/bin/lp* is to accept requests from.

The */usr/lib/lpsched* Command

- The *lpsched* command schedules request from */usr/bin/lp* for printing on line printers. *lpsched* is typically invoked in the */etc/rc* script at system start-up.
- The *lpsched* command and options are shown below:

  # lpsched [-v] [-a]

Key	Operation
-v	Write a verbose record of the *lpsched* process on */usr/spool/lp/log*.
-a	Write *lpana* (see *lpana*(1M)) logging data on */usr/spool/lp/lpana.log*.

The *lpmove* Command

- *lpmove* moves requests from one printer to another. For example:
  - Move a specific request to another destination.

```
# /usr/lib/lpshut
# lpmove dp-115 printer_name
# /usr/lib/lpsched
```

  - Move all destination requests to another destination.

```
# /usr/lib/lpshut
# /usr/lib/reject -r "Down for Repair" printer_name
# /usr/lib/lpmove from_printer_name to_printer_name
# /usr/lib/lpsched
```

The */usr/lib/lpmove* Command

- The *lpmove* command moves requests that were queued by */usr/bin/lp* between printer destinations.
- This command may be used only when the scheduler is not running, so */usr/lib/lpshut* must be invoked prior to using the *lpmove* command.
- *lpmove* can move a single request to another printer or class, or all requests from one printer or class to another printer or class.
- The *lpmove* command and arguments are shown below:

 # lpmove dest1 dest2

Key	Operation
dest1	Request ID(s) to move to *dest2*. If a printer name is specified, all requests queued for that printer are moved to *dest2*. Following this, all subsequent requests to *dest1* will be rejected.
dest2	Name of printer or class of printers where requests are to be moved.

The */usr/lib/reject* Command

- The *reject* command prevents */usr/bin/lp* from accepting requests for the named printer or class of printers.
- The *reject* command and options are shown below:

  $ *reject [-r[reason]] destinations*

Key	Operation
-rreason	Associates *reason* with preventing */usr/bin/lp* from accepting requests. If the stated reason contains white space it must be enclosed in double quotes (for example: "Changing Ribbons"). Maximum length of a reason message is 80 characters; default is "Reason Unknown."
destinations	Name of printer or class of printers from where requests are rejected.

The */usr/lib/lpfence* Command

- The *lpfence* defines the minimum priority for which a spooled file needs to be printed.
  - Fence values must be between 0 (lowest fence) and 7 (highest fence). Spooled files with a priority equal to or higher than the fence will be printed; files with priorities lower than the fence will be deferred.
  - Each printer has its own fence setting and is initialized to 0 (lowest fence) when configured into the spooling system by the */usr/lib/lpadmin* command.
  - The *lpfence* command may be used only when the scheduler is deactivated (using the */usr/lib/lpshut* command).
- The *lpfence* command syntax is shown below:

  # /usr/lib/lpfence printer fence

Key	Operation
printer	The individual printer or class name where fence is set.
fence	Fence priority value (0, lowest priority through 7, highest priority).

The */usr/bin/lpalt* Command

- The *lpalt* command alters a line printer request that was made by the *lp* command. New unique ID is returned to standard output.
- The *lpalt* command and common options are shown below:

  $ *lpalt id [-ddest] [-m] [-nnumber] [-ppriority] [-s] [-ttitle] [-w]*

Key	Operation
id	Request ID returned by *lp*. This request will be altered if not printed.
-ddest	File(s) will be printed on *dest* (the name of a printer or printer class). If this key is omitted, file(s) will be printed on the default system printer.
-m	Send mail after the file(s) have been printed.
-nnumber	Print *number* of copies of the specified file(s).
-ppriority	Give *priority* to the print request. *priority* must be an integer between 0 (lowest priority) and 7 (highest priority) inclusive. The file(s) will be printed if equal to or greater than the printer fence value; if below the fence, the printout will be deferred.
-s	Suppress messages from *lp* such as *request ID is ...* .
-ttitle	Print *title* on the banner page of the output.
-w	Write a message on the user's terminal after file(s) have been printed.

Root Disk Partitioning

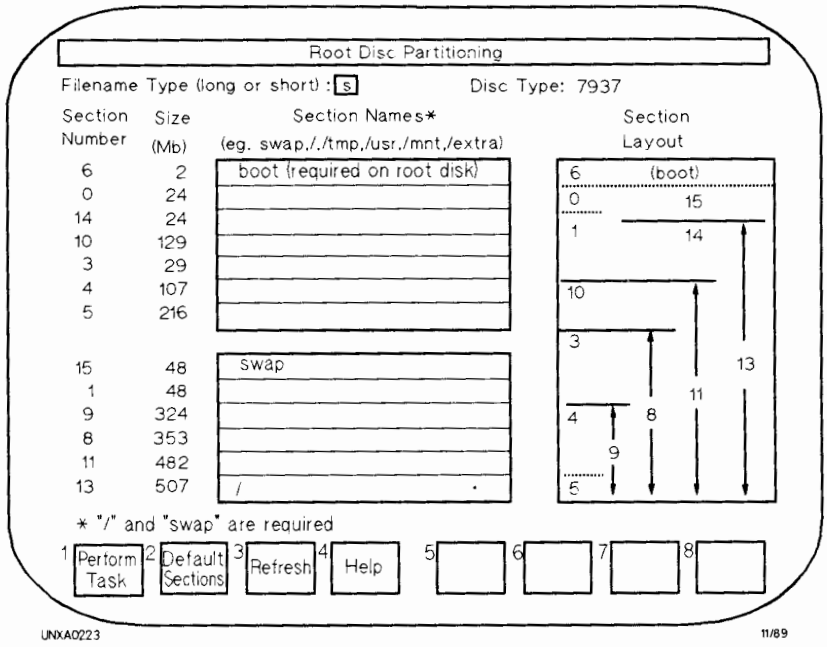


Figure 2-19. Root Disk Partitioning Example 1

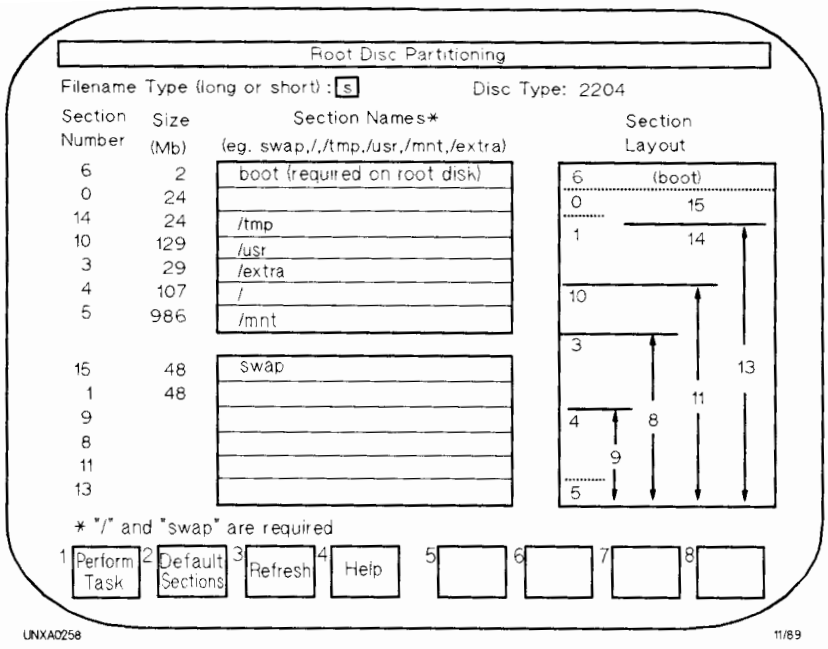


Figure 2-20. Root Disk Partitioning Example 2

HP-UX Installation Menu

Main Menu

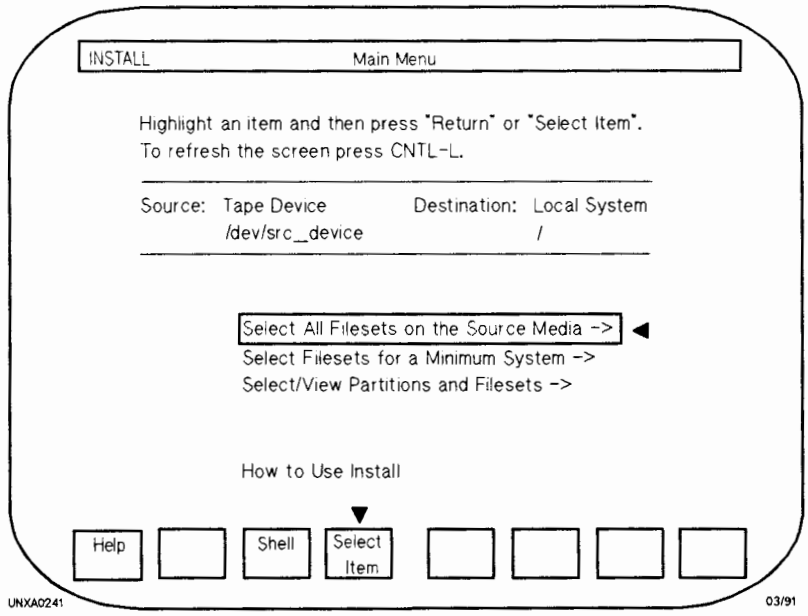


Figure 2-21. Install: *Main Menu*

Menu Selection: *Select Filesets on Source Media*

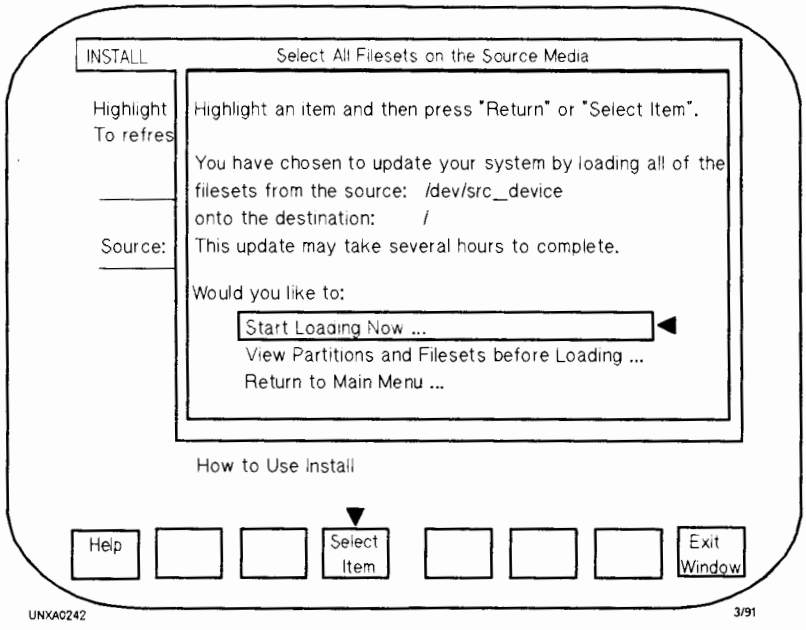


Figure 2-22. Install Menu Selection: *Select Filesets on Source Media*

Menu Selection: *Select Filesets on Source Media* **Cont.**

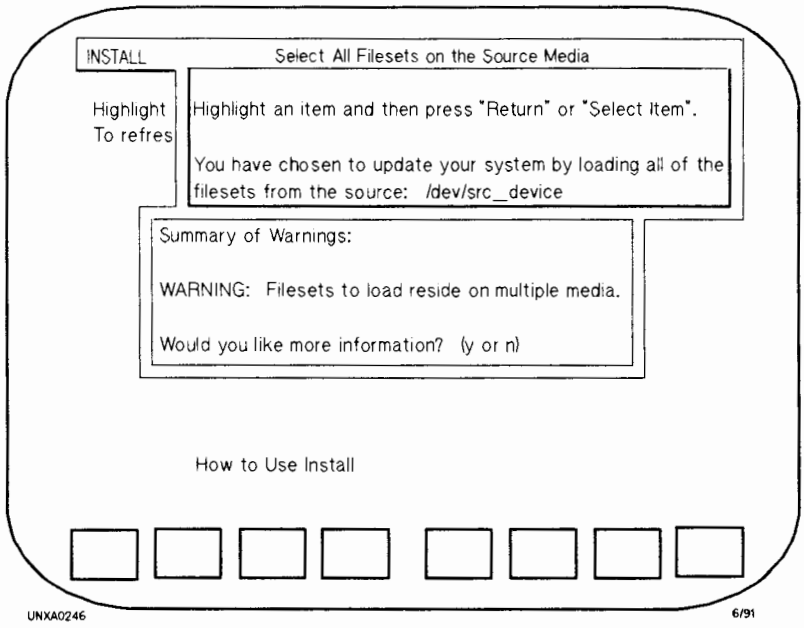


Figure 2-23. Install Menu Selection: *Select Filesets on Source Media* **Cont.**

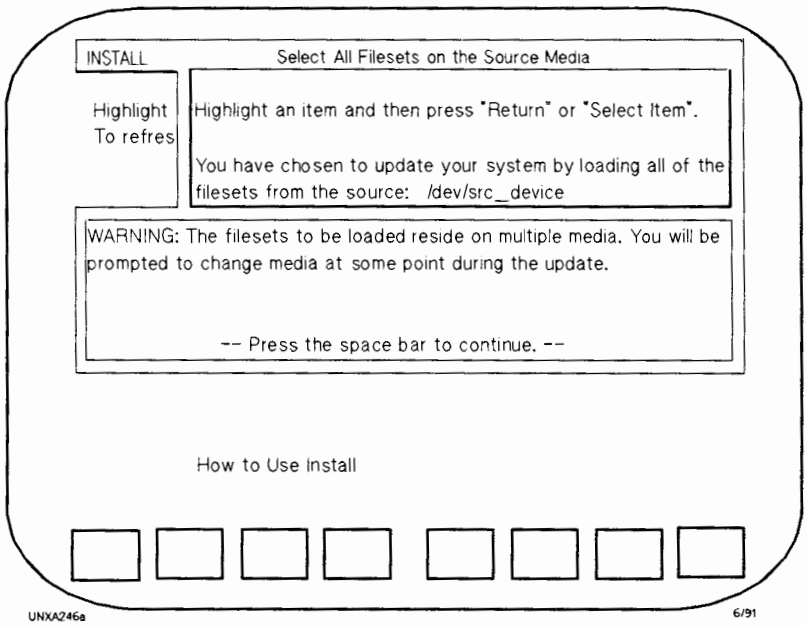


Figure 2-24. Install Menu Selection: *Select Filesets on Source Media* **Cont.**

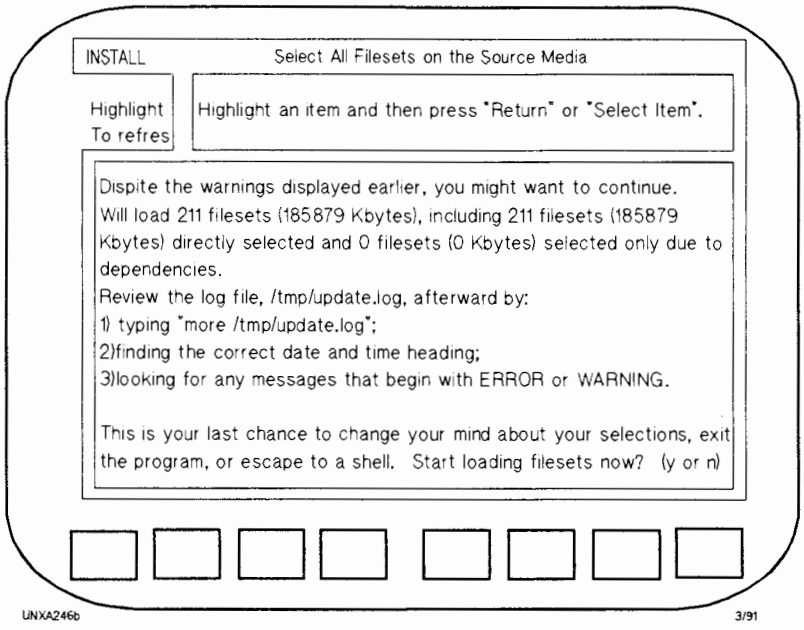


Figure 2-25. Install Menu Selection: *Select Filesets on Source Media* **Cont.**

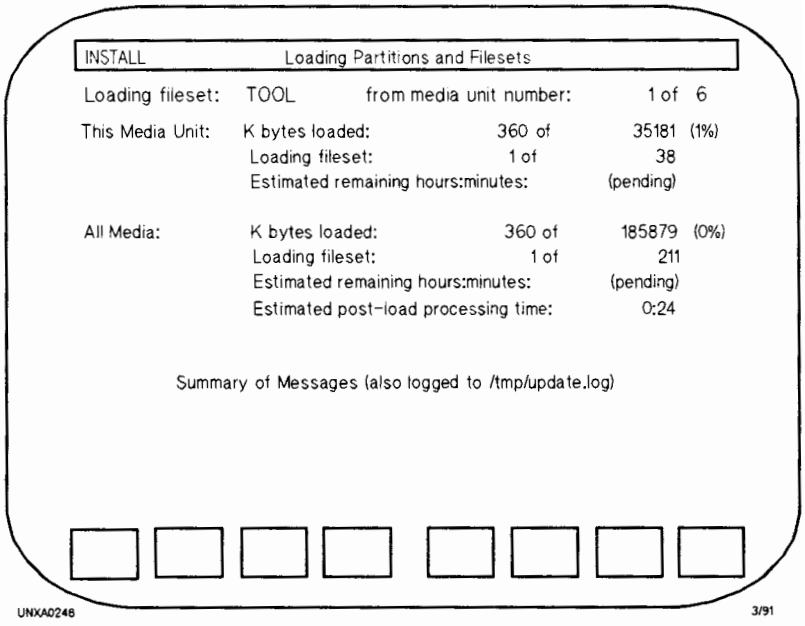


Figure 2-26. Install Menu Selection: *Loading Partitions and Filesets*

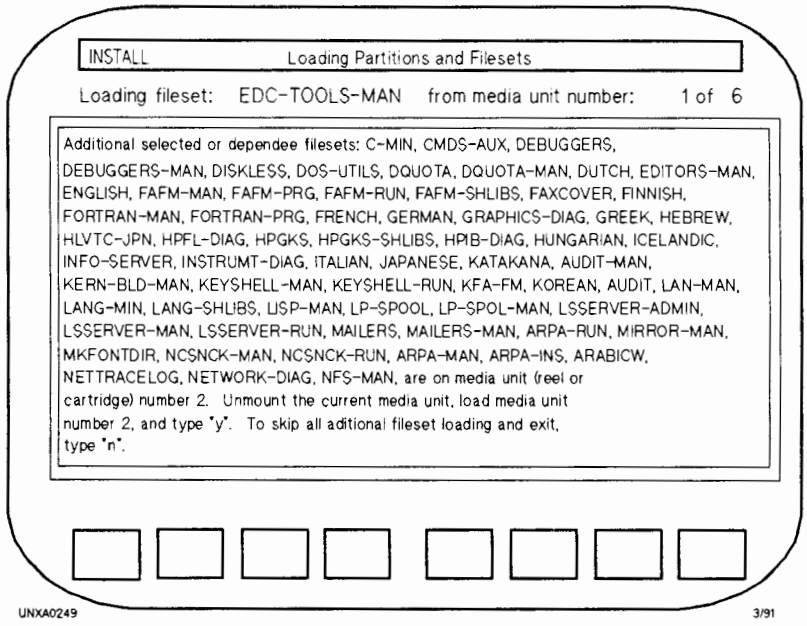
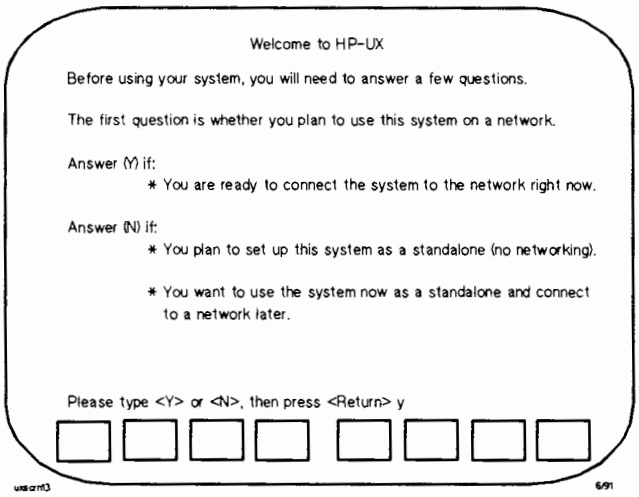
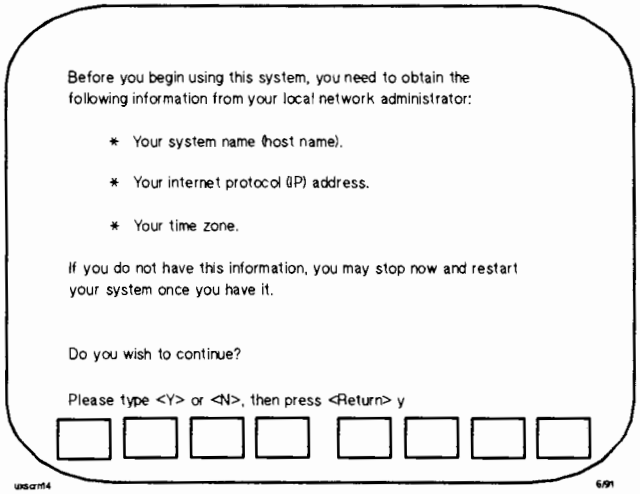


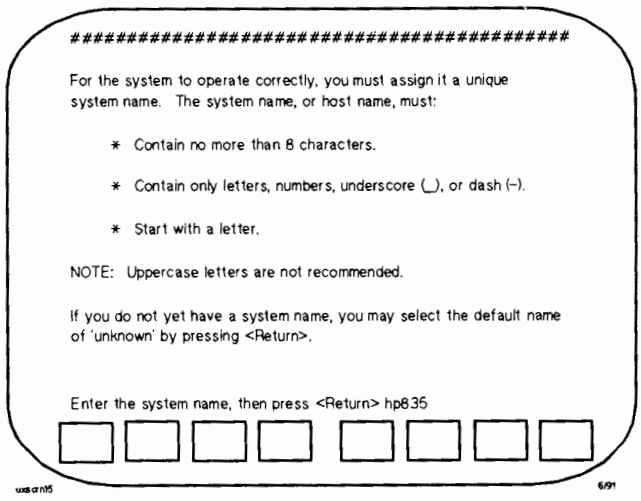
Figure 2-27. Install Menu Selection: *Loading Partitions and Filesets* **Cont.**



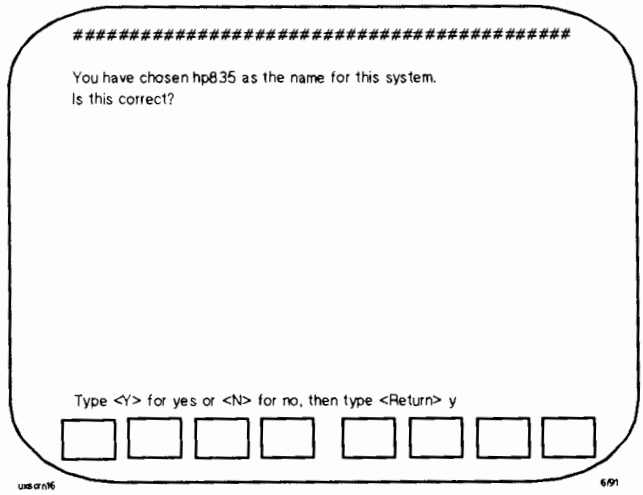
HP-UX Configuration, Slide 1 of 10



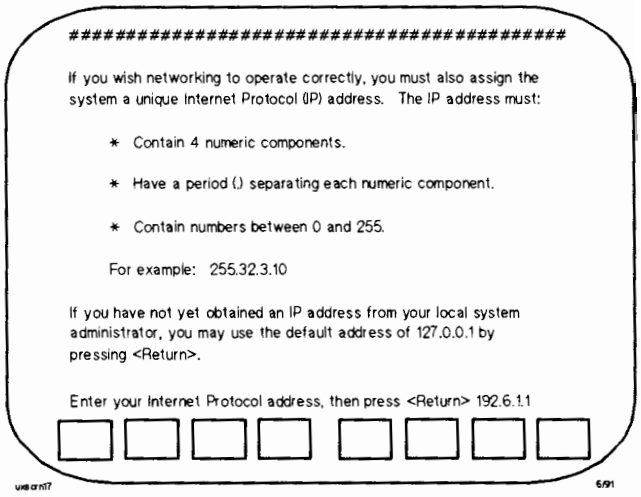
HP-UX Configuration, Slide 2 of 10



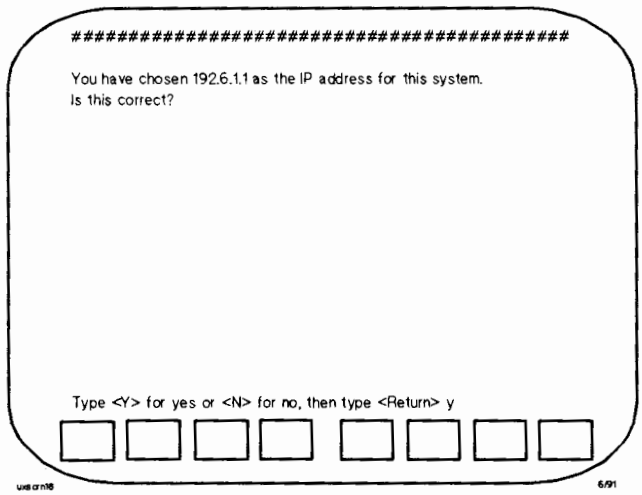
HP-UX Configuration, Slide 3 of 10



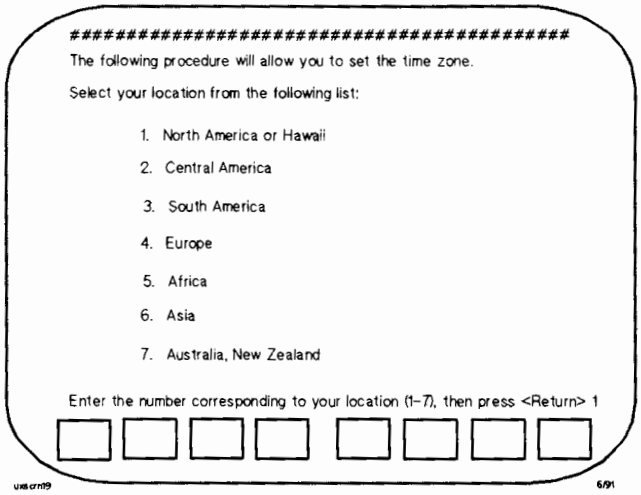
HP-UX Configuration, Slide 4 of 10



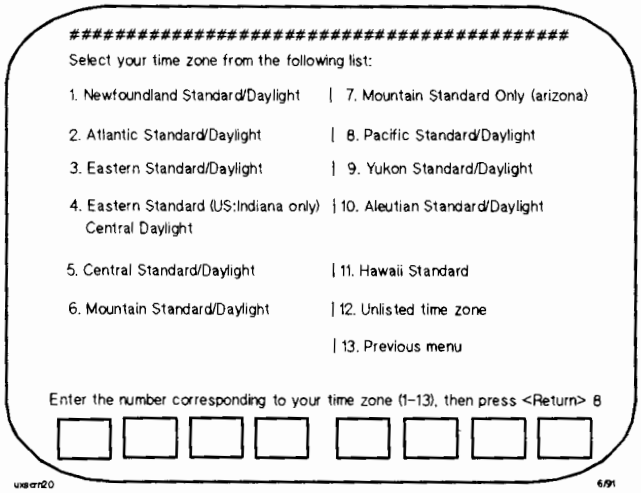
HP-UX Configuration, Slide 5 of 10



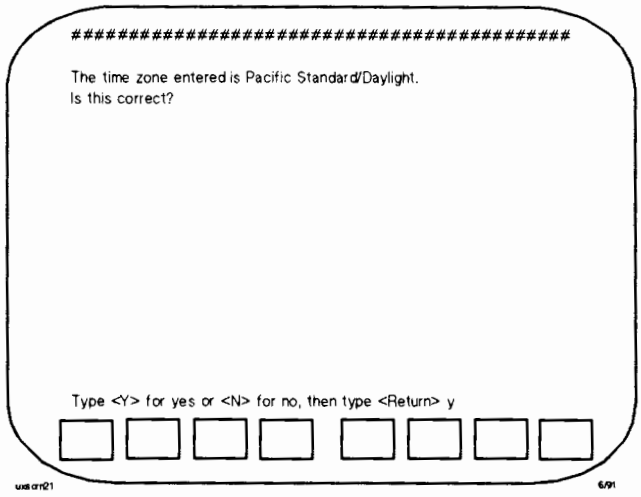
HP-UX Configuration, Slide 6 of 10



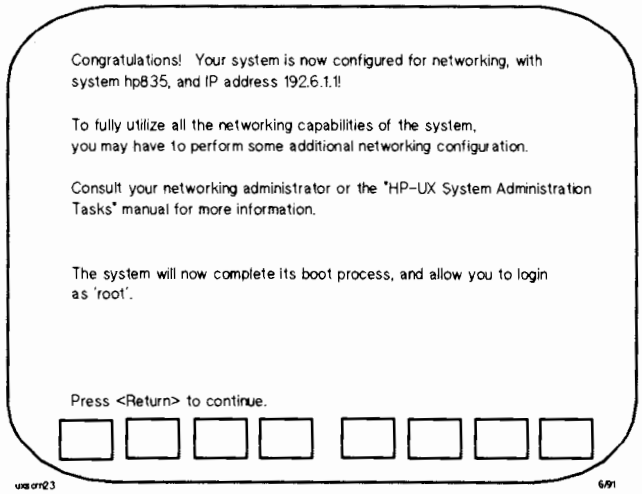
HP-UX Configuration, Slide 7 of 10



HP-UX Configuration, Slide 8 of 10



HP-UX Configuration, Slide 9 of 10



HP-UX Configuration, Slide 10 of 10

Post Installation Guidelines

Essential tasks are:

- Setup system security (root password, trusted system, etc.).
- Check status of peripherals with SAM.
- Check time zone (TZ) variables in the following files:

  /.profile

  /etc/rc

  /etc/profile

  /etc/csh.login

  /etc/powerfail
- Set the system clock with *date* command.
- Mount file systems.
- Setup the LP spooler.
- Print */etc/super_blocks* (*# lp /etc/super_blocks*).
- Customize shell start-up script(s).
- Check/configure software subsystems (NFS, ARPA, uucp, etc.).
- Back-up the configured system (*fbackup*).

Note

For further information, refer to the section *After Installing HP-UX* in the manual *Installing and Updating HP-UX*, HP part number, 92453-90035.

Updating HP-UX

HP-UX Update Menu

Main Menu

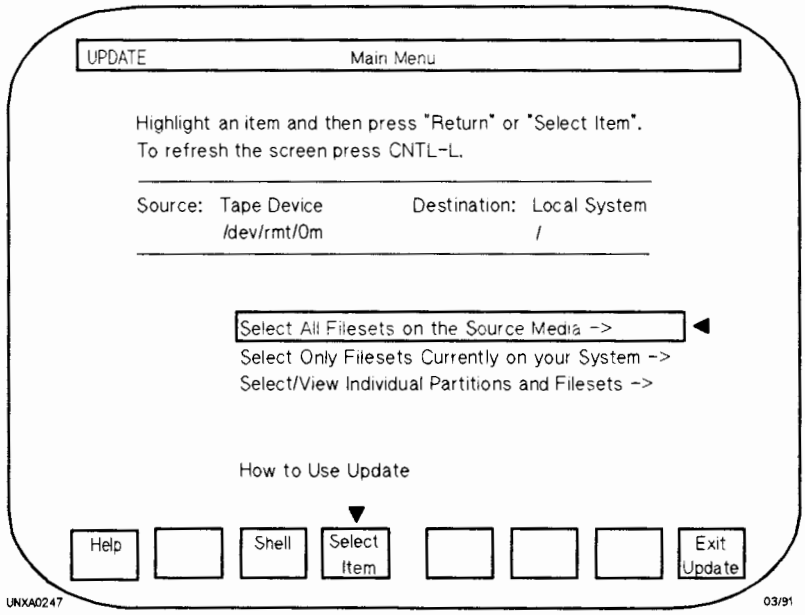


Figure 2-28. Update: *Main Menu*

Menu Selection: *Load All Filesets on the Source Media*

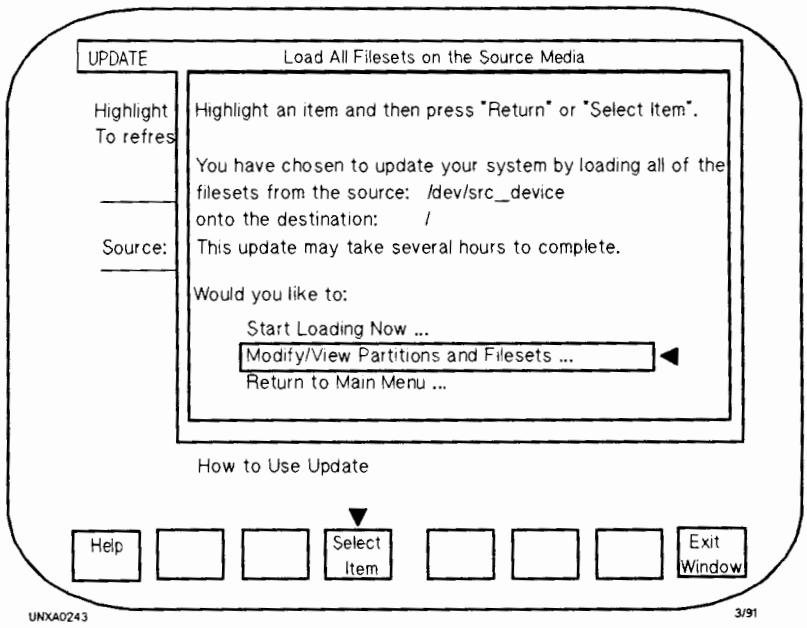


Figure 2-29. Update Menu Selection: *Load All Filesets on the Source Media*

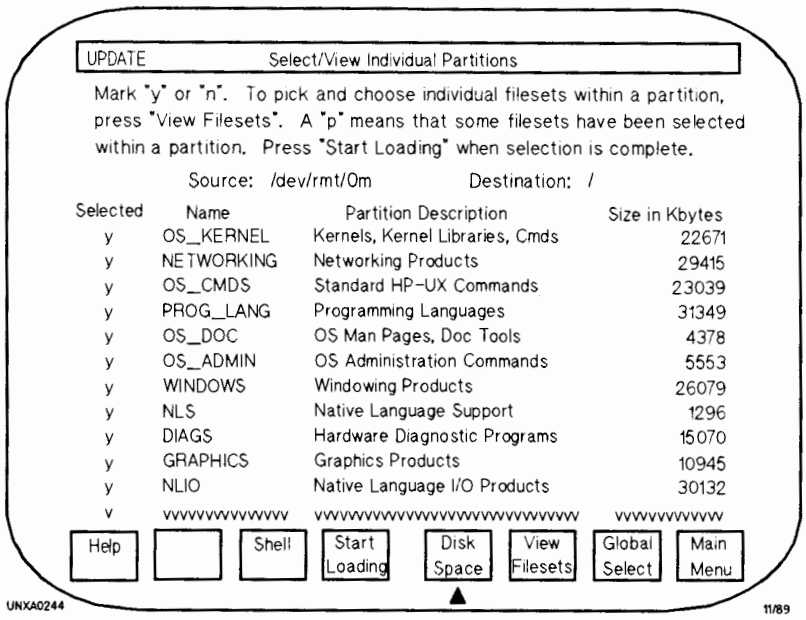


Figure 2-30. Update Menu Selection: *Select/View Individual Partitions*

Menu Selection: *Disk Space Analysis*

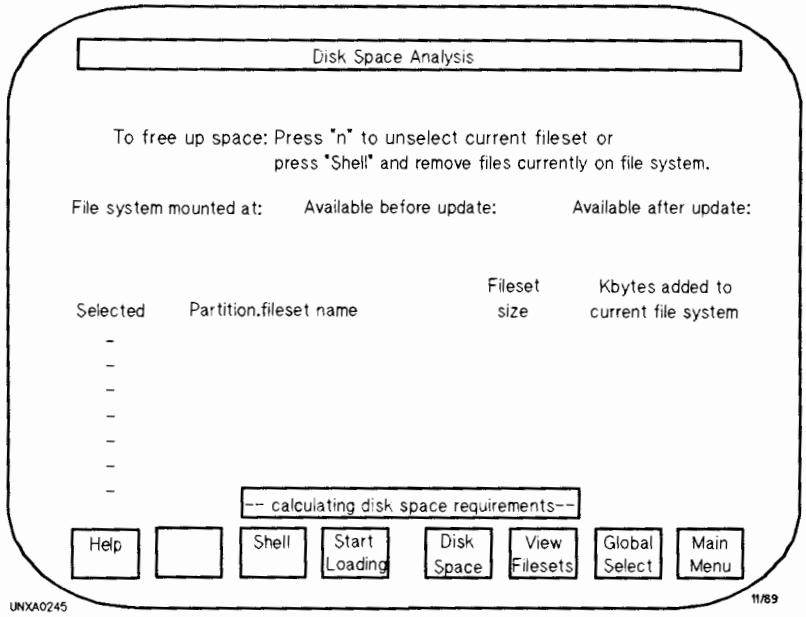


Figure 2-31. Update Menu Selection: *Disk Space Analysis*

Menu Selection: *Disk Space Analysis - Select File System*

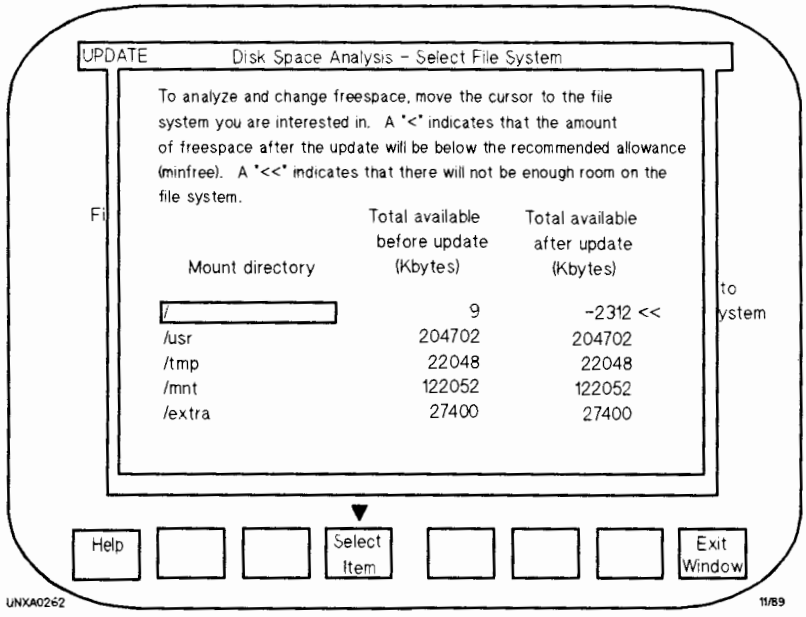


Figure 2-32.
Update Menu Selection: *Disk Space Analysis - Select File System*

Menu Selection: *Disk Space Analysis*

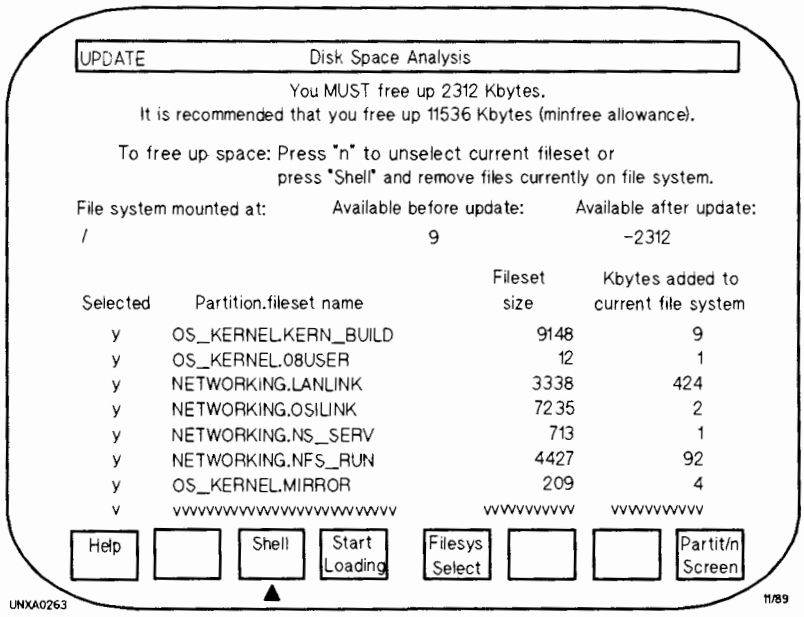


Figure 2-33. Update Menu Selection: *Disk Space Analysis*

Fixing Overflow with Symbolic Links

- A symbolic link transparently links a file or directory to another file or directory. This is often used when a file system overflows. On overflow, all the files in a selected directory are moved to a new directory on a new file system. The original directory is then symbolicly linked to the new directory where the data then resides. The user can access the data using the original path name (using the symbolic link) or directly using the new path name.
- Symbolic links cannot cross physical disk drives.
- The */etc/ln* command and parameters required to link one directory to another are shown below:

  # ln -s new_directory old_directory

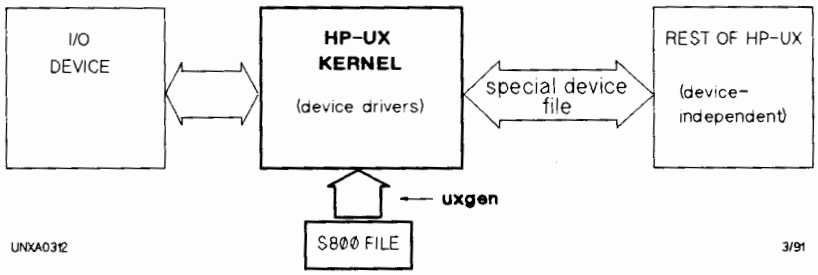
Key	Operation
-s	Causes *ln* to create a symbolic link.
new_directory	Full path name of new directory where the moved files reside.
old_directory	Full path name of original directory where files resided previously.

- Example:

  # mkdir /mnt/users
  # cp -r /users/ /mnt/users && rm -rf /users/**
  # ln -s /mnt/users /users

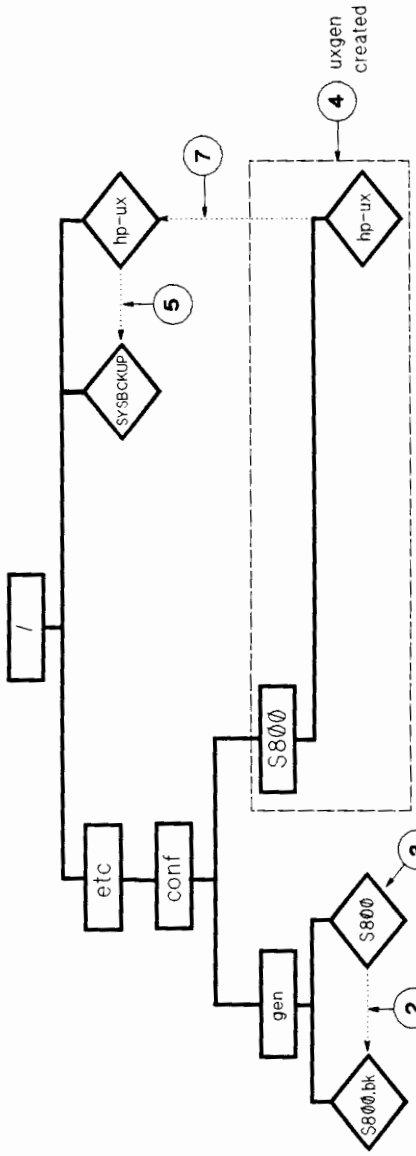
UXGEN

Adding Kernel Drivers



- A new kernel (hp-ux) must be generated using *uxgen* only when adding a device whose associated driver was not previously included in the existing Kernel with uxgen(1m).

UXGEN Process



The following steps assume that the gen file is named S800:

1. # cd /etc/conf/gen
2. # cp S800 S800.bk
3. # vi S800
4. # /etc/uxgen S800
5. # cp /hp-ux /SYSBCKUP
6. # cd /etc/conf/S800
7. # mv hp-ux /hp-ux
8. # shutdown -h 0
9. Turn the system off. Install hardware.
10. Turn the power on. Reboot the system.
11. # cp /hp-ux /SYSBCKUP
12. If boot string changed, modify LIF's 'AUTO' file

UNXA0313 03/91

S800 - UXGEN Input File

The S800 file consists of the following sections:

- # include */etc/master*.
  - Contains connectivity rules for I/O configuration.
  - List of tunable parameters and defaults.
  - Major numbers for all devices.
- Include statements.
  - Used to include I/O drivers and optional subsystems in the Kernel (hp-ux).
- Kernel devices.
  - Specifies locations of console, root, swap, and dump devices.
- Tunable parameters.
  - Overrides default values.
- I/O statement.
  - Used to configure devices whose drivers do not support autoconfiguration (for example: *instr0*, *gpio0/gpio1*, *psi0*, *pdn0*, *rti0/rti1*).

I/O Statement Syntax

- Curly braces pairs must enclose multi-line I/O statements.
- Semicolons must be used to end single-line I/O statements.
- Comments begin with /* and end with */.

Kernel Device—Console

Syntax:

console on <driver_path> at <hdw_address>;

or

console on default;

Examples:

console on default;

/ Console used when booting */*

console on cio_ca0.mux0 at 8.0;

/ 825, 835/625, 845/645 */*

console on mux1 at 16;

/ 808, 815, 822, 832, 842, 852 */*

console on bus_converter.cio_ca0.mux0 at 2/8.0;

/ 850, 855, 860, 865, 870 */*

Kernel Device—Root

Syntax:

root on default [section <integer>];

or

root on <driver_path> at <hdw_address> [section <integer>];

Examples:

root on default;

/ Boot device and section */*

root on hpib1.disc1 at 16.0 section 13;

/ 808, 815, 822, 832, 842, 852 */*

root on cio_ca0.hpib1.disc1 at 8.0.0 section 0;

/ 825, 835/635, 845/645 */*

root on bus_converter.cio_ca0.hpib1.disc1 at 2/8.0.0 section 13;

/ 850, 855, 860, 865, 870 */*

Kernel Device—Dump

Syntax:

dumps on default [section <integer>];

or

dumps on <driver_path> at <hdw_address> [section <integer>];

⋮

<driver_path> at <hdw_address> [section <integer>];

Examples:

dumps on default;

*/** Swap device, section 15 **/*

dumps on hpib1.disc1 at 16.2 section 15;

*/** 808, 815, 822, 832, 842, 852 **/*

dumps on cio_ca0.hpib0.disc1 at 8.0.2 section 0;

*/** 825, 835/635, 845/645 **/*

dumps on bus_converter.cio_ca0.hpib0.disc1 at 2/8.0.1 section 15;

*/** 850, 855, 860, 865, 870 **/*

Kernel Device—Swap

Syntax:

swap on default [section <integer>];

or

swap on <driver_path> at <hdw_address> [section <integer>];

⋮

<driver_path> at <hdw_address> [section <integer>];

Examples:

swap on default;

*/** Boot device, section 15 **/*

swap on default section 1;

*/** Boot device, section 1 **/*

swap on hpib1.disc1 at 16.0 section 15;

*/** 808, 815, 822, 832, 842, 852 **/*

swap on cio_ca0.hpib0.disc1 at 8.0.0 section 0;

*/** 825, 835/635, 845/645 **/*

swap on bus_converter.cio_ca0.hpib0.disc1 at 2/8.0.0 section 15;

*/** 850, 855, 860, 865, 870 **/*

Non-Automatically Configurable Devices

Device controlled by drivers that do not automatically configure (for example: *instr0*, *gpio0/gpio1*, *psi0*, *pdn0*, *rti0/rti1*) must be specified in the I/O statement.

Some examples:

```
io {    /* HP-IB instrument on a CIO system */
   cio_cao address 4 {
      hpib0 address 2 {
         instr0 address 7;
      }
   }
}
or—
io {    /* HP-PB General Purpose I/O card */
   gpio1 address 48;
}
or—
io {    /* X.25 on either HP-PB or CIO systems */
   pdn0 address 12;
}
```

CIO (Mid-bus) Architecture Drivers

- System Main Bus Driver

Name	Supported Devices
bus_converter	Bus Converter Interface (required on 850/855/860/865/870 only)

- Mid-Bus Driver

Name	Supported Devices
cio_ca0	CIO Channel Adapter Interface
graph0	Graphics controller and its HIL modules (98720 card)
graph2	Graphics controller and its HIL modules (98730, 98550 card)
psi0	Mid bus Programmable Serial Interface for SNA Link product

- CIO Cardcage Bus Master Device Drivers

Name	Supported Devices
hpib0	HP-IB Interface (27110 card). Supports up to 8 HP-IB peripherals
hpfl0	HP-IB Interface (27111 card). Supports up to 8 HP-FL peripherals
scsi2	CIO SCSI card (HP27147A)

- CIO Cardcage Device Adapter Drivers

Name	Supported Devices
disc1	CS/80 and SS/80 devices (disks and cartridge tapes) connected via HP-IB interface (27110 card)
disc2	CS/80 devices (disks) connected via HP-FL interface (27111 card)
disc3	Disk devices connected via SCSI interface
tape1	1/2 inch magnetic tape devices
tape2	1.3 Gbyte DAT device
lpr0	256X line printers (using CIPER protocol)
lpr1	2932/2934 and 2235 line printers (using Amigo protocol)
mux0	RS-232 (serial) peripherals (27140 card); includes terminals, printers, and plotters (8 ports available)
mux0_16	Same as above with 16 ports
instr0	All other HP-IB peripherals (plotters, other printers, general HP-IB instruments)
lan0	Networking (27125 card)
gpio0	General-purpose parallel I/O interface (27114 card)
display0	Spectrograph (A1017A) interface or Nimbus (A1047A, A1048A) interface connected via graphics interface (98720, 98750, or 98730 card)

- CIO Cardcage Device Adapter Drivers, Cont.

Name	Supported Devices
osi0	OSI Express Card interface (32124A or 32125A cards) connected via HP A1126 bus converter supporting HP MAP 3.0 networking
autox0	650 Mbyte magneto (rewritable) optical disk

HP-PB Architecture Drivers

- HP-PB Bus-Master Drivers

Name	Supported Devices
hpib1	HP-IB interface (28650 card). Supports up to 8 HP-IB peripherals
scsi1	SCSI interface card

- HP-PB Device Adapter Drivers

Name	Supported Devices
disc1	CS/80 and SS/80 devices (disks and cartridge tapes) connected via HP-IB interface (28650 card)
disc3	Disk devices connected via SCSI interface
scc1	RS-232C for Serial Communications Controller (SCC) on motherboard or CPU
tape1	1/2 inch magnetic tape drives
tape2	1.3 Gbyte DAT device
lpr0	256X line printers (using CIPER protocol)
lpr1	2932/2934 and 2235 line printers (using Amigo protocol)
lpr2	Centronics line printers
mux2	RS-232C (serial) peripherals (40299 card); includes terminals, printers, and plotters
instr0	All other HP-IB peripherals (plotters, other printers, general HP-IB instruments)
lan1	Networking designed for HP 28562-60001 LANLINK card
gpio1	General-purpose parallel I/O interface (28651 card)
osi0	OSI Express Card interface (32122 or 32123 cards) supporting HP MAP 3.0 networking
autox0	650 Mbyte magneto (rewritable) optical disk

The *lsdev* Command

- Lists I/O drivers contained in the kernel (hp-ux). For each I/O driver, the character and block major numbers, and the device class are displayed.
- Example output:

Character	Block	Driver	Class
-1	-1	processor	processor
-1	-1	memory	memory
50	-1	lan0	lan
5	5	tape1	tape_drive
1	-1	mux0	tty
7	8	disc1	disk
-1	-1	cio_ca0	cio
-1	-1	hpib0	hpib
60	-1	nm	pseudo
56	-1	ni	pseudo
.			
.			
.			
0	-1	cn	pseudo

The *ioscan* Command—Syntax

- Probes and displays the I/O configuration of a running system.
- Syntax:

  ioscan [-k|-u] [-d dvr | -C class] [-l lu] [-H hdw_path] [-f [-n]] [devfile]

  or—

  ioscan [-M . . .] [-H hdw_path]

- Options:

Key	Operation
-k	Displays kernel data structures; does not scan devices.
-u	Displays usable devices; does not scan devices.
-d	Selects devices associated with an I/O driver.
-C	Selects devices in a device class.
-l	Selects devices with a given logical unit number.
-H	Selects devices at a given hardware path.
-f	Full listing; includes software paths, status, etc.
-n	Lists device files associated with each device.
-M	Driver, or string of drivers separated by periods, that specify hardware device(s).
hwd_path	Physical address of device (for example *BC/X.Y.Z*).
none	Probes the devices and displays information for all the devices in the system.

The *ioscan* Command—Default Behavior

 # ioscan

Hardware Path	Description	Status
0	processor	ok
4	cio	ok
4.0	hpfl	ok
4.0.0	disk	ok
4.1	tty	ok
4.2	hpib	ok
4.2.0	disk	ok
4.2.4	tape_drive	ok
4.4	lan	ok
4.6	hpib	ok
8	memory	ok
12	memory	ok

The *ioscan* Command—Listing Device Files

 # ioscan -fn -C tape_drive

Class	LU	H/W Path	Driver	H/W Status	S/W Status
tape_drive	1	4.2.4	cio_ca0.hpib0.tape1	ok(0x178)	ok
			/dev/diag/mt/1	/dev/mt/1m	/dev/rmt/1l
			/dev/mt/1h	/dev/mt/1mn	/dev/rmt/1ln
			/dev/mt/1hn	/dev/rmt/1h	/dev/rmt/1lm
			/dev/mt/1l	/dev/rmt/1hc	/dev/rmt/1mn
			/dev/mt/1ln	/dev/rmt/1hn	

 # ioscan -fn -H 4.1

Class	LU	H/W Path	Driver	H/W Status	S/W Status
tty	0	4.1	cio_ca0.mux0	ok(0x7)	ok
			/dev/diag/mux0	/dev/tty0p1	/dev/tty0p4
			/dev/mux0	/dev/tty0p2	/dev/tty0p5
			/dev/tty0p0	/dev/tty0p3	

The *ioscan* Command—Full Listing

 # ioscan -f

Class	LU	H/W Path	Driver	H/W Status	S/W Status
processor	-	0	processor	ok(0x0)	ok
cio	-	4	cio_ca0	ok(0x1000)	ok
hpfl	-	4.0	cio_ca0.hpfl0	ok(0x8)	ok
disk	0	4.0.0	cio_ca0.hpfl0.disc2	ok(0x2)	ok
tty	0	4.1	cio_ca0.mux0	ok(0x7)	ok
hpib	-	4.2	cio_ca0.hpib0	ok(0x2)	ok
disk	0	4.2.0	cio_ca0.hpib0.disc1	ok(0x22b)	ok
tape_drive	1	4.2.4	cio_ca0.hpib0.tape1	ok(0x178)	ok
lan	0	4.4	cio_ca0.lan0	ok(0x6)	ok
memory	-	8	memory	ok(0x800)	ok

 # ioscan -fu

Class	LU	H/W Path	Driver	H/W Status	S/W Status
disk	0	4.0.0	cio_ca0.hpfl0.disc2	ok(0x2)	ok
tty	0	4.1	cio_ca0.mux0	ok(0x7)	ok
tape_drive	0	4.2.3	cio_ca0.hpib0.tape1	ok(0x178)	ok
tape_drive	1	4.2.4	cio_ca0.hpib0.tape1	ok(0x178)	ok
lan	0	4.4	cio_ca0.lan0	ok(0x6)	ok

SPU Configuration Files

Note

Additional information regarding specific SPU addressing can be found earlier in this section.

815 Configuration Files

- Configuration template files are located on:

  /etc/conf/gen/templates/815/genfiles

- Three templates are available (HP-UX 8.0):

File Name	Configuration	Root Disk
1	Basic	HP-IB
2	Networking	HP-IB
dskless	Diskless	N/A

832 Configuration File

- Configuration template files are located on:

  /etc/conf/gen/templates/832/genfiles

File Name	Configuration	Root Disk
1	RS-232-C	HP-IB

825/835 Configuration Files

- Configuration template files are located on:
  /etc/conf/gen/templates/825/genfiles
  /etc/conf/gen/templates/835/genfiles
- Sixteen templates are available (HP-UX 8.0):

File Name	Console	Root Disk	AP	CIO Expander
1	RS-232-C	HP-IB	No AP	No CIO Exp
2	Graphics	HP-IB	No AP	No CIO Exp
3	RS-232-C	HP-IB	AP	No CIO Exp
4	Graphics	HP-IB	AP	No CIO Exp
5	RS-232-C	HP-FL	No AP	No CIO Exp
6	Graphics	HP-FL	No AP	No CIO Exp
7	RS-232-C	HP-FL	AP	No CIO Exp
8	Graphics	HP-FL	AP	No CIO Exp
9	RS-232-C	HP-IB	No AP	CIO Exp
10	Graphics	HP-IB	No AP	CIO Exp
11	RS-232-C	HP-IB	AP	CIO Exp
12	Graphics	HP-IB	AP	CIO Exp
13	RS-232-C	HP-FL	No AP	CIO Exp
14	Graphics	HP-FL	No AP	CIO Exp
15	RS-232-C	HP-FL	AP	CIO Exp
16	Graphics	HP-FL	AP	CIO Exp

850 Configuration Files

- Configuration template files are located on:
  /etc/conf/gen/templates/850/genfiles
- Four templates are available (HP-UX 8.0):

File Name	Console	Root Disk
1	RS-232-C	HP-IB
2	Graphics	HP-IB
3	RS-232-C	HP-FL
4	Graphics	HP-FL

3

Diagnostics and Support Tape

HP-UX On-line Diagnostics

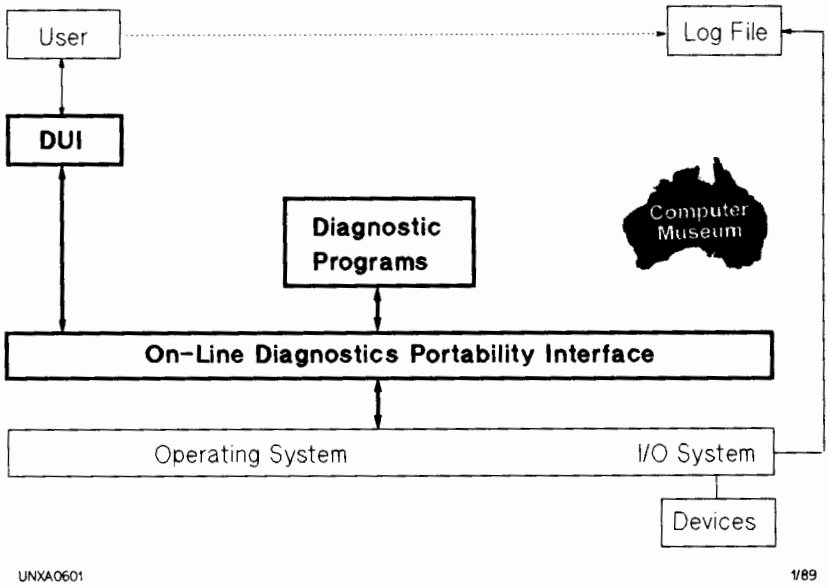


Figure 3-1. HP-UX On-line Diagnostics

DUI User Capabilities

- Four capabilities are available:

Level 0	Highest capability level. User may install, remove, or update programs and may do all of Level 1.
Level 1	User may perform destructive tests, may enter Single-User (SUM) or Multi-User (MUM) mode, and may do all of Level 2.
Level 2	User may perform disruptive tests, but may not modify user data, and may do all of Level 3.
Level 3	User may run non-disruptive tests only.

- To see your logon capabilities, *cat* the file */usr/diag/security*.

  For example:

  # cat /usr/diag/security

  root:0

Running DUI

- DUI can be invoked by running *dui* or *sysdiag* on the */usr/diag/bin* directory (HP-UX 7.0). For example:

```
# /usr/diag/bin/sysdiag
**********************************************
*****          ONLINE DIAGNOSTIC SUBSYSTEM          *****
*****                                               *****
*****          (C) Hewlett Packard Co. 1987         *****
*****                                               *****
*****          DUI Version A.01.07                  *****
*****                                               *****
**********************************************
DUI  1> mode  SUM
DUI  2> run  muxdiag  pdev=6/4.1
```

UNXA0604 11/89

- DUI can be invoked by running *sysdiag* from any directory (*script* file in */bin*) beginning with HP-UX 8.0.

Useful Commands

HELP	Gives help on commands, syntax, and diagnostic descriptions.
LIST	Lists diagnostic related information, such as program name, version, type, level, and mode.
RUN	Runs specified diagnostics.
REDO	Allows execution of a previous command, or editing and execution of a previous command.

HELP

DUI 1> HELP

The following commands are available in the *DUI*. Information about a particular command can be obtained by typing *HELP* followed by the command name.

Command	Description
ABORT	Abort a diagnostic system program.
CI	Invoke the system command interpreter.
CODETEST	Test facility for program developers.
DEFAULT	Display/set default modifier values.
DIAGSYSTEM	Manipulate internal diagnostic system processes.
DO	Re-execute a command.
EXIT	Exit the DUI.
FOREGROUND	Bring a background process into the foreground.
HARDCOPY	Echo input/output data to a hardcopy device.
HELP	Help facility.
INSTALL	Add a program to the diagnostic system.
LIST	Display information on installed programs.
LISTREDO	Display the command history stack.
MODE	Display/set system mode.
MODIFY	Modify a diagnostic system program.
OUTFILE	Echo input/output to a file.
PURGE	Purge a diagnostic system program.
REDO	Edit and re-execute a command.
REDOLOAD	Load a command history stack.
REDOSAVE	Save a command history stack.
REDOSIZE	Set the size of the command history stack.

- HELP, cont.

Command	Description
REPLY	Reply to a background process.
RESUME	Resume a suspended process.
RUN	Run a diagnostic system program.
SET	Set modifier values.
SHOWACTIVE	Display all active diagnostic system programs.
SHOWDEFAULT	Display system default modifier values.
SHOWPARMS	Display current modifier values.
SHOWSTATE	Display the state of the system.
SUSPEND	Suspend the processing of a diagnostic system program.
UNLOCK	Unlock a malfunctioning locked device.
USEFILE	Begin reading DUI input from a file.
WAIT	Wait until all background processes have completed.

LIST

DUI 29> LIST LONG

Program Name	Program Version	Prog Type	Le-vel	SUM PRG	Diagnosable Products
afidad	A.00	diag	0	NO	HP27114
ciperlpd	A.01.02	diag	1	NO	HP2564B HP2565A HP2566A HP2563A HP2563B HP2566B HP2567B
cs80diag	A.02.00	diag	3	NO	HP7907 HP7911 HP7912 HP7914 HP7933H HP7935
reeldiag	A.01.18	diag	1	NO	HP7979 HP7979A
muxdiag	A.01.00	diag	1	YES	HP27140

UNXA0607 11/89

LIST [<diagnostic name>] [LONG]

DUI 30> list cs80diag

LIST [prod=<prod name>] [type=diag | exerciser | verifier | utility]

DUI 31 > list product=HP7937FL

RUN

RUN <diagnostic name>

[PDEV = physical path to device] (see example below)
[SECTIONS =Section range list]
[STEPS = Steps range list]
[ERRCOUNT = number]
[LOOPCOUNT = number]
[BACKGROUND]
[ERRONLY]
[ERRPAUSE]

RUN Example

DUI 9>run cs80diag errcount=10 pdev=4.0.0 loop=2 sections=10

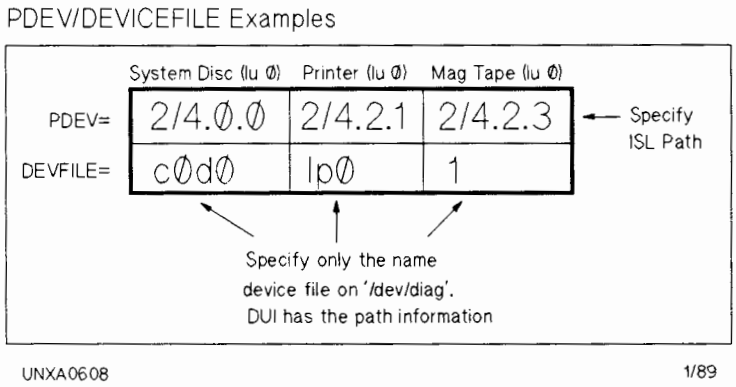


Figure 3-2. PDEV/DEVICEFILE Examples

REDO

REDO [? or *<command number> <string>]*

Use *R*, *I* and *D* as in MPE REDO.

Other Useful Commands

- MODE [SUM | MUM]

  Displays/changes user mode.

- HARDCOPY [ON | OFF]

  Copies output from screen to LP.

- HARDCOPY FILE=filename

  Copies output from screen to disk file.

- SHOWACTIVE

  Shows currently running/suspended processes.

- SUSPEND

  Suspends diagnostic.

- ABORT

  Aborts diagnostic (PID required).

- CI

  Suspends DUI; returns to HP-UX shell. *exit* returns to DUI.

Getting Sectioning Information

- DUI 10> help cs80diag sections

The following sections are available: DEFAULT

Section 10	Diagnostic Trouble Tree—This section will execute the fault isolating diagnostic trouble tree.
Section 17	External Exerciser—This section provides the user with interactive access to the disk drive's internal diagnostics and utilities.
DUI>	Type *HELP CES0DIAG [:command]* to obtain a list and brief description of each available command.

logtool

DUI> logtool

logtool (System and Memory Log Analysis Tool) provides the following functions:

- System log files for both hardware and software.
- Memory log files for logging priority errors.
- Log file maintenance—Clear, Delete, and Switch.
- Log file decoding—Display.
- Useful for troubleshooting intermittent problems.

logtool Miscellaneous Commands

- DISPLAYLOG

  Display I/O entries as information is logged.

- EXIT

  Exit *logtool*, and return to *DUI*.

- HELP

  Help about running *logtool*.

- REDO

  Edit the last line of text entered.

- SUSPEND

  Return control to the *DUI*, and suspend *logtool*.

logtool System Logfile Commands

- LAYOUT

  Read in layout file.

- LIST

  List the contents of the system error log.

- PURGESYSLOG

  Delete the specified system error logs.

- PURGEWORK

  Delete specified *work* files from the disk.

- SELECT

  Select specified records from system log files.

- STATUS

  Report on status of all system log files.

- SWITCHLOG

  Cause the system to start a new system log file.

- TYPES

  Description of system log file *types*.

sysmap

DUI> sysmap

sysmap provides on-line system configuration information in the following output maps:

- *cpumap*

  Data includes information about CPUs, coprocessors, and caches.

- *memmap*

  Data includes information about controller and array sizes, interleaved status, and enabled status.

- *modulemap*

  Data includes information about CPUs, memories, graphic cards, and other modules that reside on the system bus.

- *iomap*

  A map of all I/O devices configured into the system having CONFIRM mode On; shows devices actually connected.

Running Off-line Diagnostics from Support Tape

- From Reset or Transfer of Control

Boot from primary boot path (Y or N)?> n
Boot from alternate path (Y or N)?> n
Enter boot path or ?> 2/4.2.3 (ISL address of Support Tape boot device)

.

Booting

.

Console IO Dependent Code (IODC) revision 4
Boot IO Dependent Code (IODC) revision 4

.

Interact with IPL (Y or N)?> y

.

Hard Booted

.

ISL Revision A.00.02 June 22, 1989
ISL> *IOMAP* (see complete list of off-line diagnostics following)
IOMAP Revision A.01.03 October 5, 1989

Available Off-line Diagnostics

- Diagnostics and utilities available from Support Tape ISL prompt

Name	HP Mode Number	Description
A1002AP	825/832/834/835/845/635/645	A1002A SPU Proc. Diag.
A1100AP	850/855/860	A1100A SPU Proc. Diag.
A1002AM	825/834/835/845/635/645	A1002A SPU Memory Diag.
A1100AM	850/855/860/870	A1100A SPU Memory Diag.
A1002AI	825/832/834/835/842/845/852/635/645	A1002A SPU I/O Diag.
A1100AI	850/855/860/870	A1100A SPU I/O Diag.
IOMAP	All HPPA systems	Input/Output Map Utility
CAEXR	All HPPA systems	Channel Exerciser Utility
CLKUTIL	All HPPA SPUs	Clock Utility
SS_CONFIG	All HPPA SPUs	Stable Store Config. Utility
BCDIAG	All CIO SPUs	A1126A Bus Converter Diag.
MPROC	870	Multiprocessor Diag.
UNIPROC	842/852/870	Single Processor Diag.

Booting the HP-UX Support Tape

Processor Dependent Code (PDC) Revision 3.2

.

Console path = 4.3.0.0.0.0
Primary boot path = 4.1.0.0.0.0
Alternate boot path = 4.2.3.0.0.0

.

Enter boot path, command, or ?> 4.2.3

.

Booting

.

Console IO Dependent Code (IODC) revision 4
Boot IO Dependent Code (IODC) revision 4

.

Interact with IPL (Y or N)?> y

.

Hard Booted

.

ISL Revision A.00.12 February 11, 1991

.

ISL> support

Support Tape Main Menu

- To get the Support Tape Main Menu from the HP-UX shell type:

  # *menu*

- Main Menu Screen:

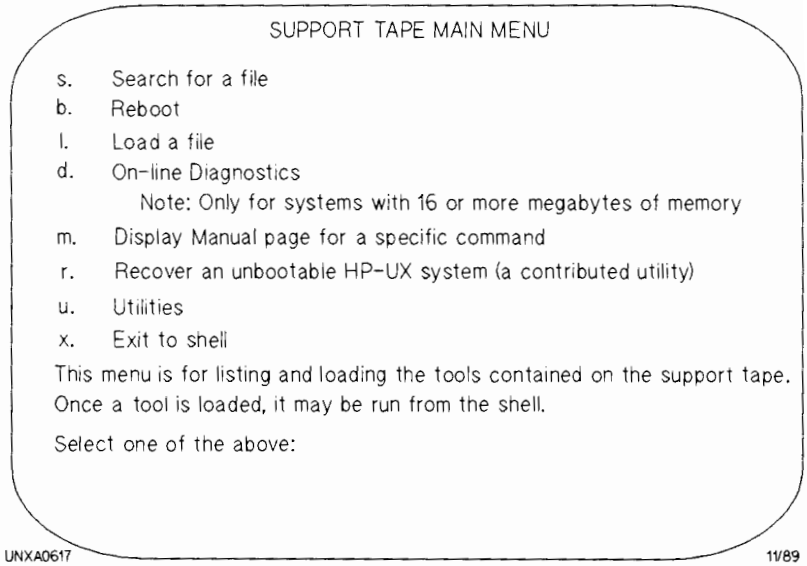


Figure 3-3. Support Tape Main Menu

Loading a File from Support Tape

- To load a file from the Support Tape Main Menu use the *l* option, as shown below:

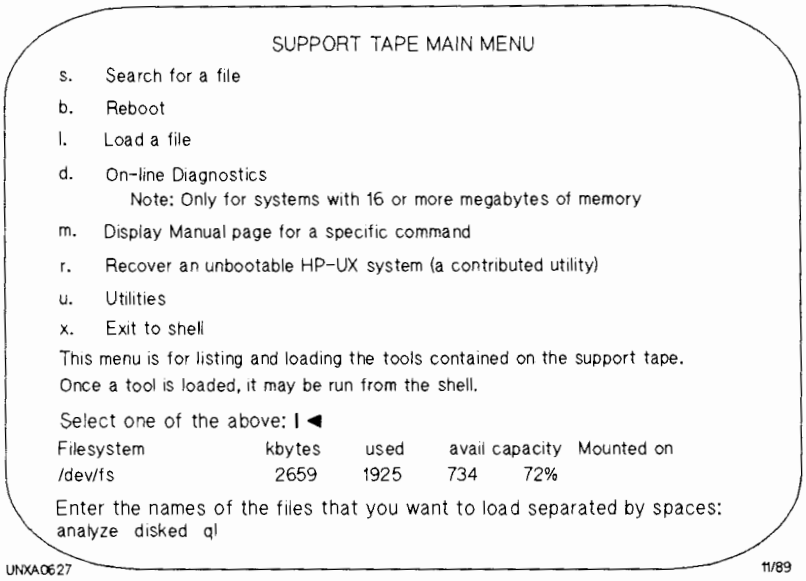


Figure 3-4. Support Tape Main Menu, Cont.

Support Tape Utilities Menu

- The Support Tape Utilities Menu is shown below:

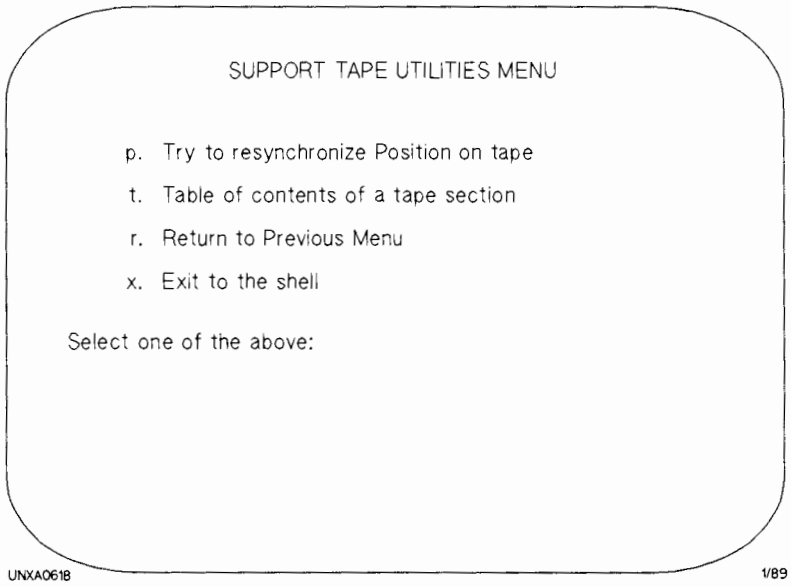


Figure 3-5. Support Tape Utilities Menu

Support Tape On-line Diagnostics Menu

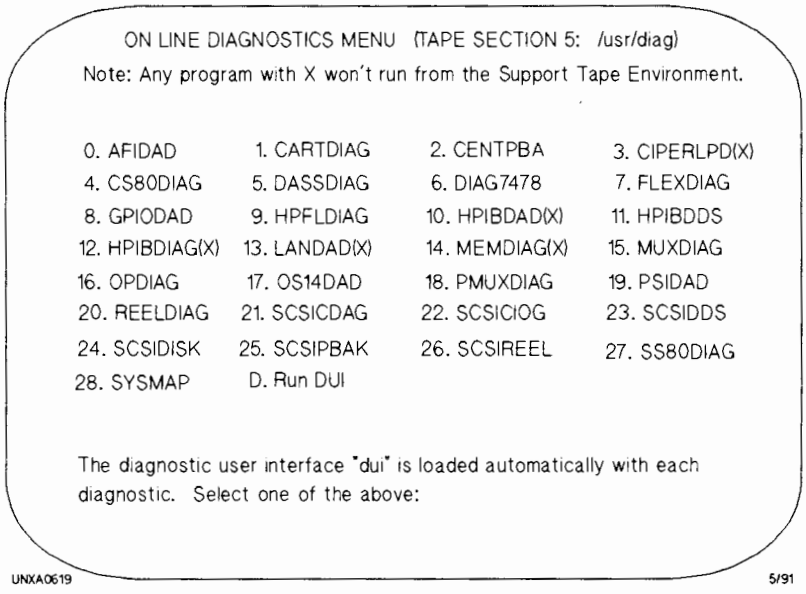


Figure 3-6. Support Tape On-line Diagnostics Menu

System Verifier—*verify*

verify is not a diagnostic, but it is useful in confirming the correct configuration of peripherals on HP-UX systems. Physical I/O configuration is compared to the configuration of the kernel and device files; discrepancies are reported and logged. Currently *verify* is supported on HP-UX 8.0 only, and only works with HPIB and SCSI devices.

verify Example

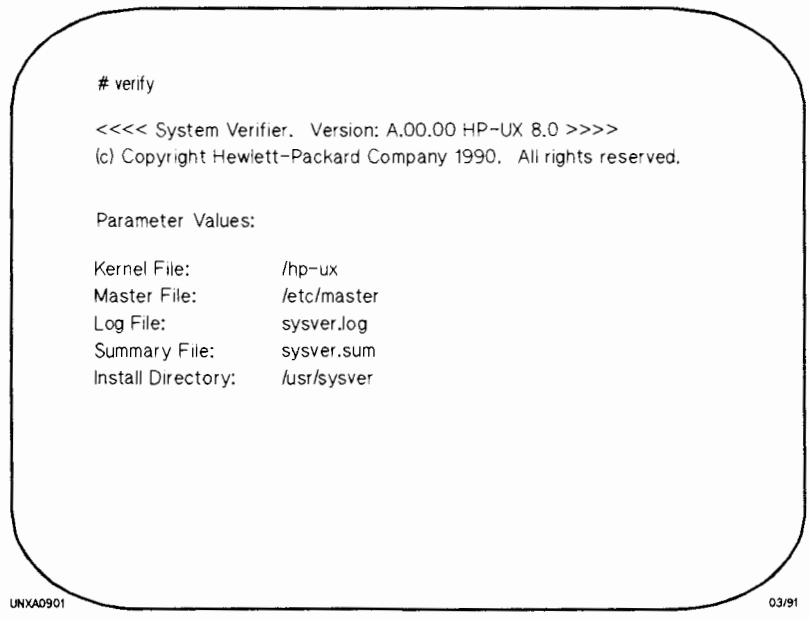


Figure 3-7. ***verify*** **Example**

System Verifier Main Menu

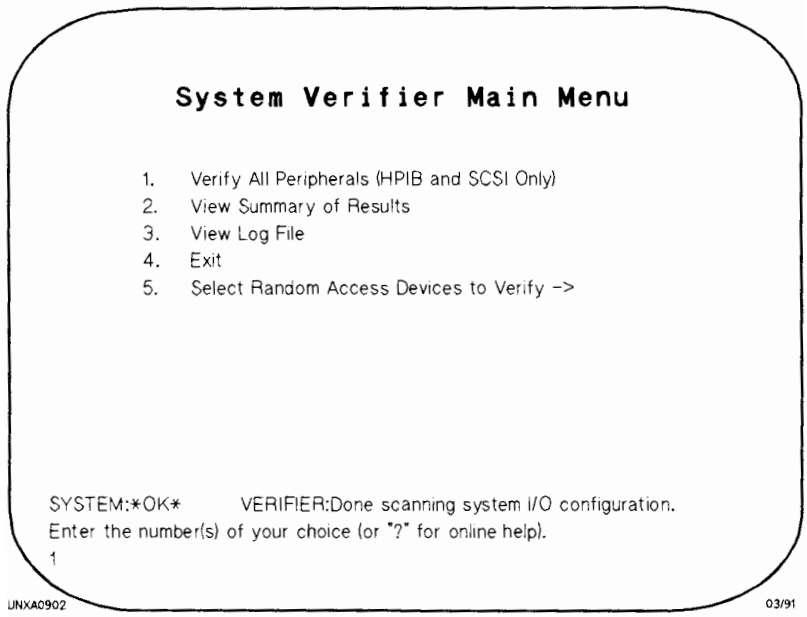


Figure 3-8. System Verifier Main Menu

View Summary Logs

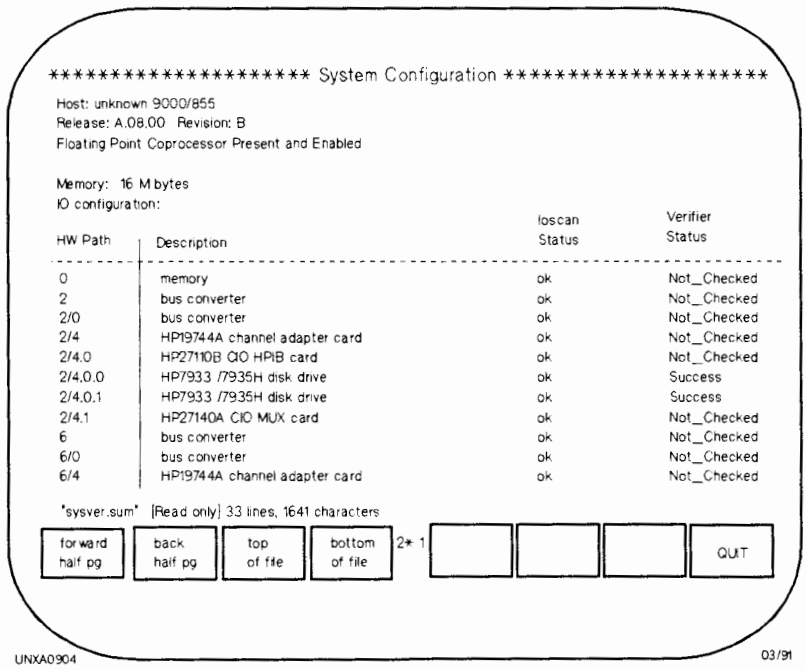


Figure 3-9. Summary Logs Display

4

Memory Dumps

Memory Core Dumps

- If HP-UX gets a High Priority Machine Check (HPMC) or panics, the kernel will automatically write an image of the entire physical memory onto the primary swap device.
- After the HPMC or panic and the memory write to swap, the kernel halts present processes and attempts to reboot. On reboot */etc/rc* will invoke */etc/savecore*. *savecore* recognizes the attempt to save the memory image on the primary swap device into two files on the *tmp* file system. Normally the destination of the files, *hp-ux.X* and *hp-core.X*, is the */tmp/syscore* directory.
- The size of *tmp* should be larger than physical memory to enable it to hold a full memory dump. If the size of *tmp* is smaller than physical memory, *savecore* will store only a portion of the dump on *tmp*; the rest will be lost. To clear a dump without saving it, at the shell prompt type: */etc/savecore -c /tmp*
- */etc/savecore* will clear special bits on the primary swap device when the entire dump has been saved to files on the file system. On subsequent reboots, */etc/savecore* will not recognize that a dump resides on the primary swap device.

Modifying */etc/rc* to Save Memory Dumps

1. Execute the *bdf* command. Select a file system which contains more free space than the size of physical memory. Note the associated mount_point_directory:

   # /usr/bin/bdf (see *bdf* command described earlier)

2. Make a *syscore* directory on the mount_point_directory selected in Step 1 above:

   # /bin/mkdir /mount_point_directory/syscore

3. Using vi or ed, make the following changes to the *save_core* function in the */etc/rc* file:

   From—

   ```
   if [ -x /etc/savecore ] && [ -d /tmp/syscore ]
   then
   /etc/savecore/tmp/syscore
   ```

   To read—

   ```
   if [ -x /etc/savecore ] && [ -d /mount_point_directory/syscore ]
   then
   /etc/savecore /mount_point_directory/syscore ]
   ```

4. After a memory dump and subsequent reboot, two files will be saved on the directory created in Step 2. These are:

   /mount_point_directory/syscore/hp-ux.X

   and

   /mount_point_directory/syscore/hp-core.X

   Where: The trailing *X* in the file name is an integer number; the first dump saved is zero (0), the next 1, etc.

5

Diskless Clusters

Creating a Diskless Cluster

To create a cluster server and add clients, perform the following:

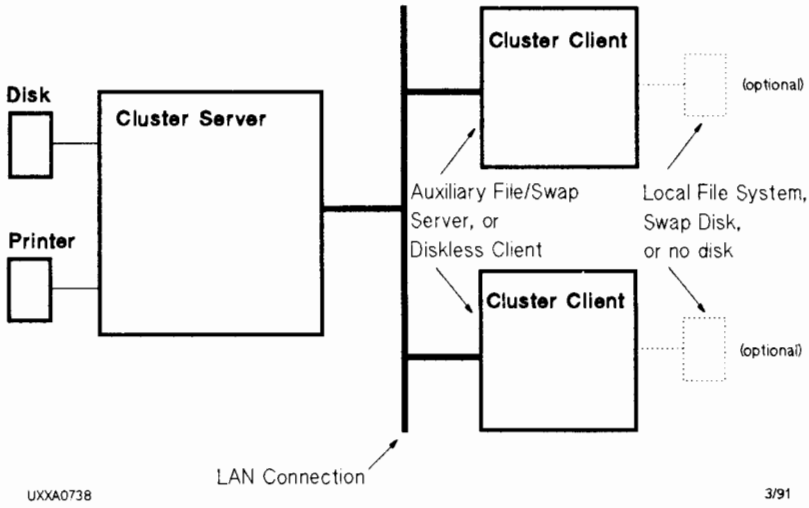
1. Use the System Administration Manager program "Create an HP-UX Cluster." This will "clusterize" a standalone system making it a cluster server.

Note

During this step, you may add clients that are of the same type (S300 or S800) as your server.

2. Where a Series 800 machine is to act as a server for Series 3XX clients, run */etc/update* to update the server, and load Series 3XX software.
3. Use the System Administration Manager program "Add Cluster Clients."

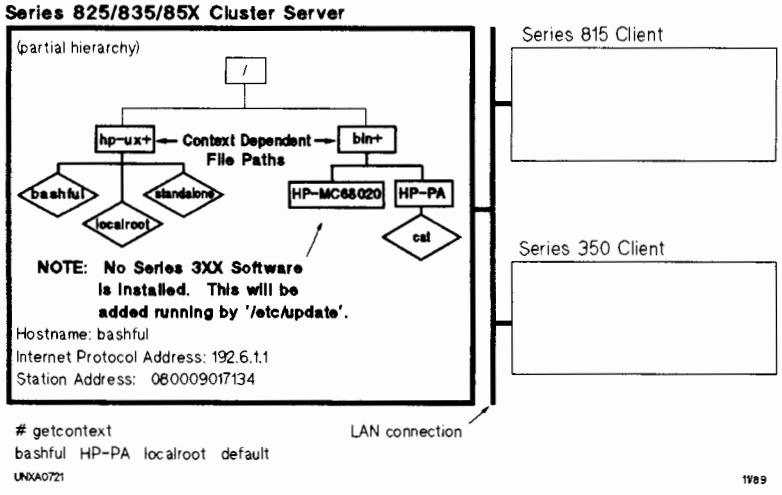
Diskless Basics



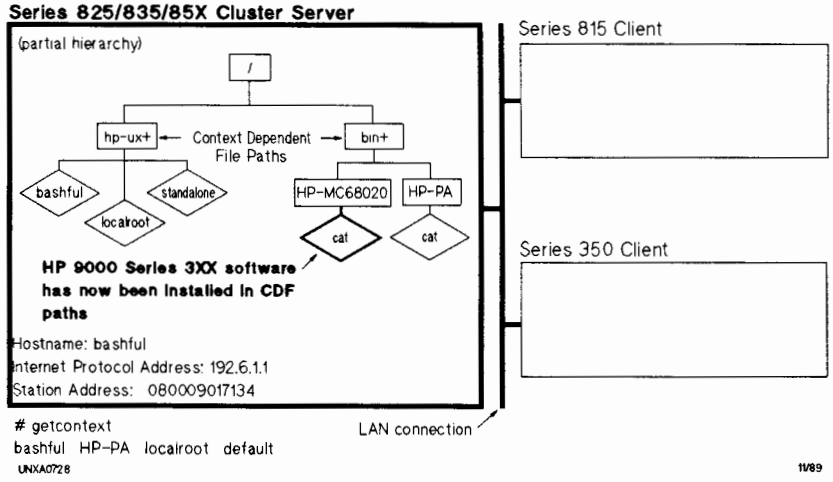
Servers: Series 600 and 800 (except Models 808 and 815) can serve all types of clients. Series 3XX and 4XX can only serve 3/4XX machines.

Clients: Series 800 Models 815, 822, 832, 842, 852, Series 3XX, and 4XX. No Series 800 machine may be served by a Series 3XX or 4XX machine.

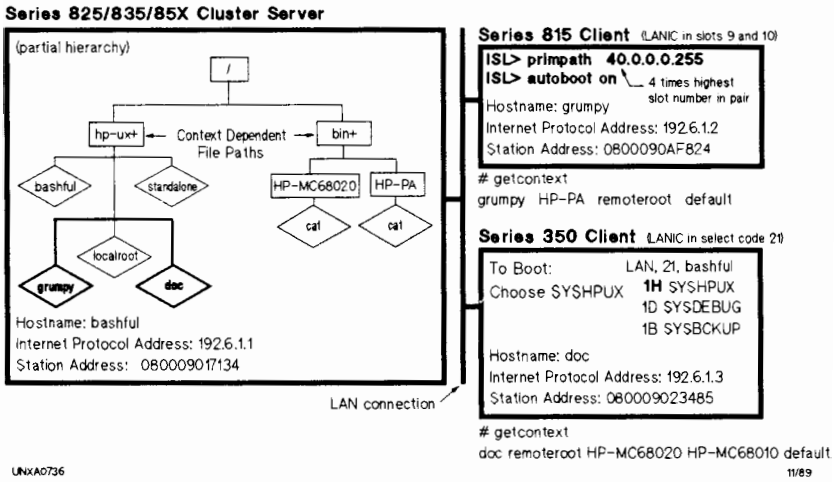
Newly Clusterized Server



After Updating HP-UX Series 3XX Software



New Cluster Clients Added



SAM—Create a Cluster

Cluster Configuration

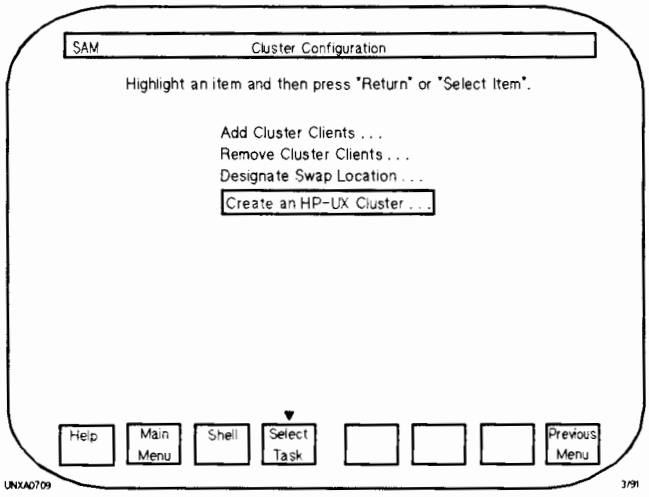
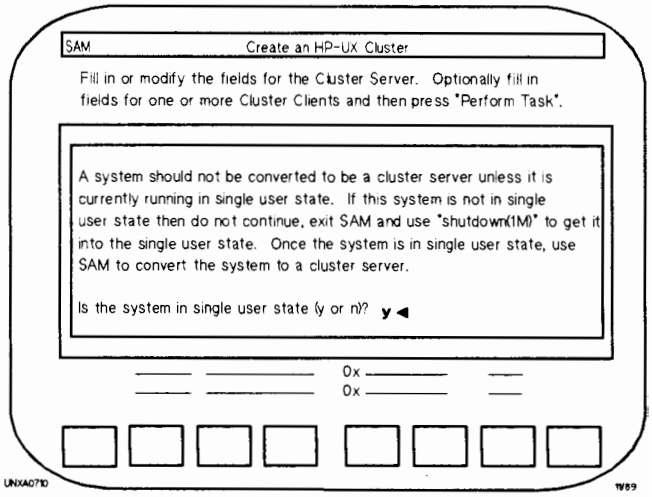
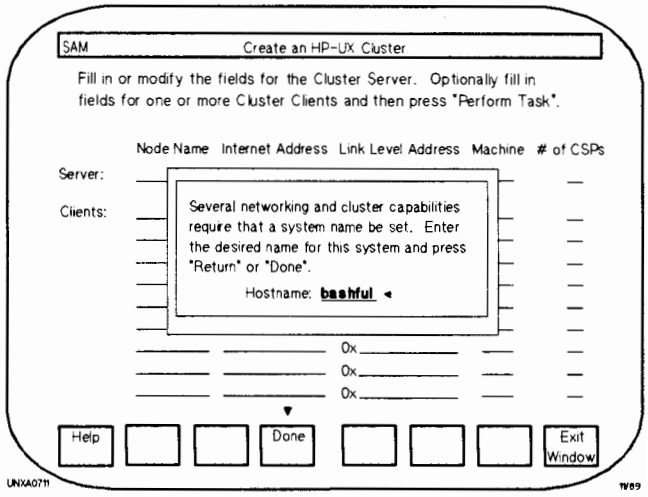


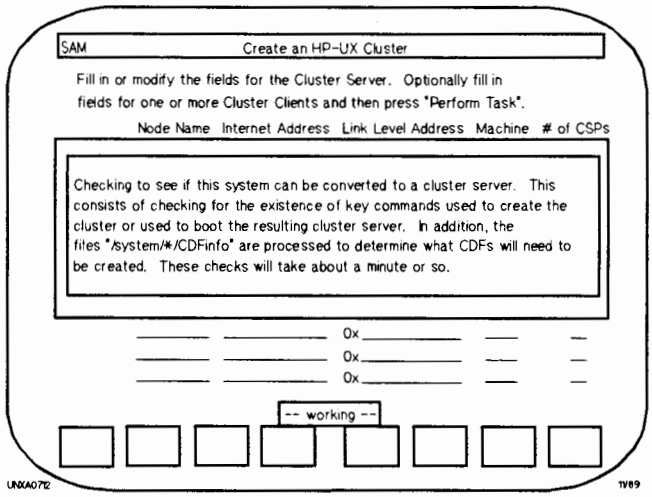
Figure 5-1. SAM: *Cluster Configuration*



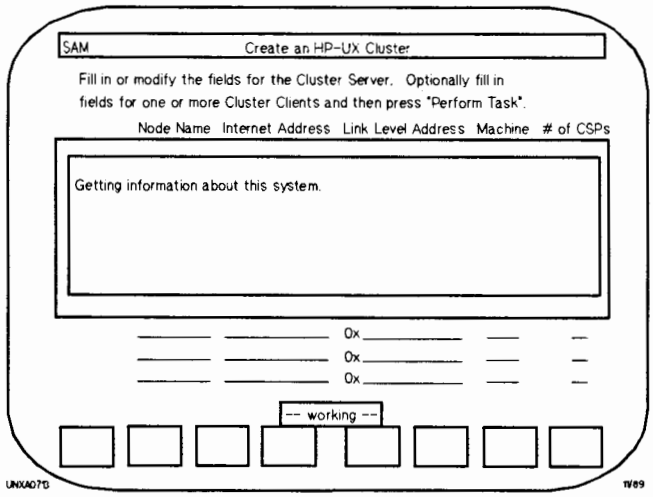
SAM: *Create an HP-UX Cluster*, **Slide 1 of 11**



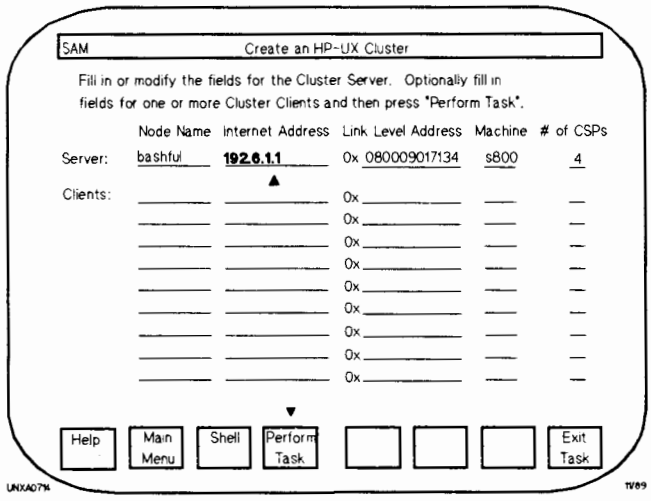
SAM: *Create an HP-UX Cluster*, **Slide 2 of 11**



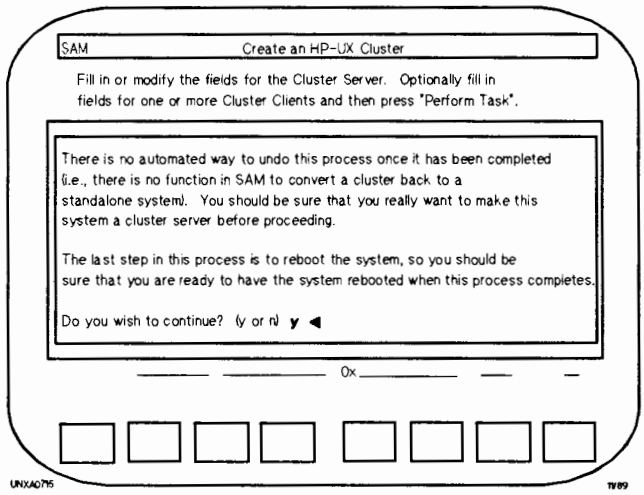
SAM: *Create an HP-UX Cluster*, **Slide 3 of 11**



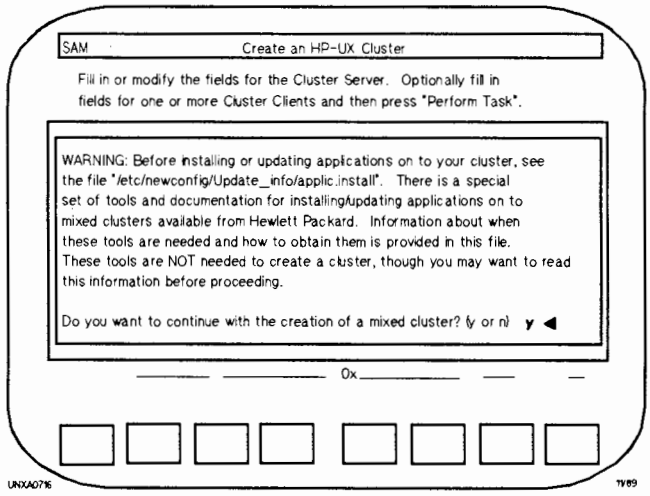
SAM: *Create an HP-UX Cluster*, **Slide 4 of 11**



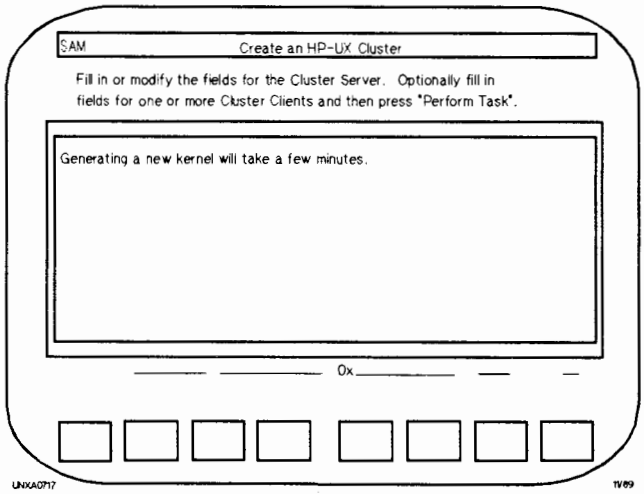
SAM: *Create an HP-UX Cluster*, **Slide 5 of 11**



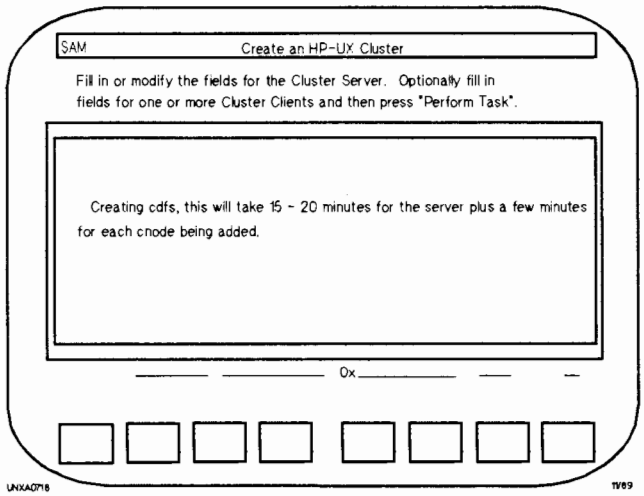
SAM: *Create an HP-UX Cluster*, **Slide 6 of 11**



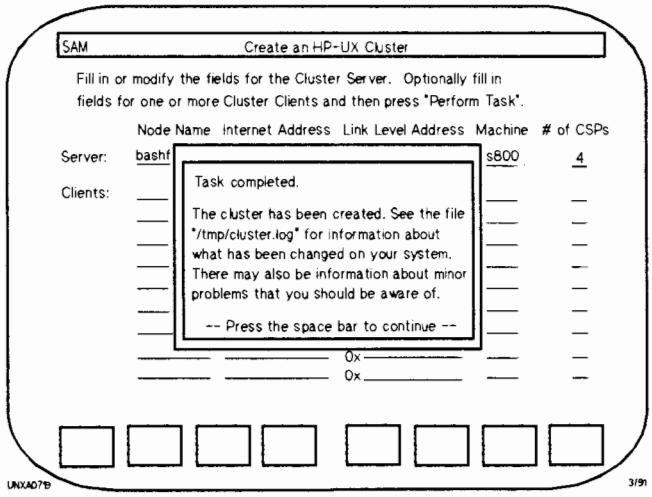
SAM: *Create an HP-UX Cluster*, **Slide 7 of 11**



SAM: *Create an HP-UX Cluster*, **Slide 8 of 11**

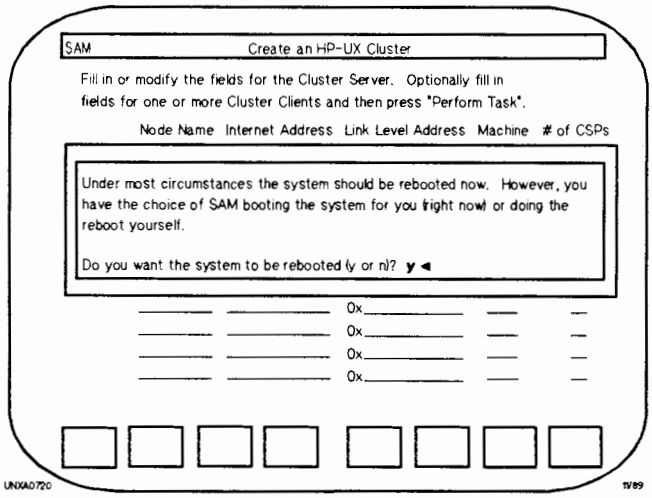


SAM: *Create an HP-UX Cluster*, **Slide 9 of 11**



SAM: *Create an HP-UX Cluster*, **Slide 10 of 11**

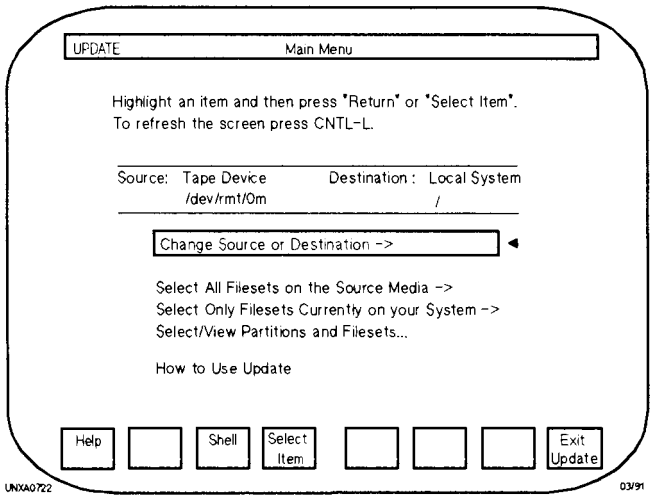
Create an HP-UX Cluster, Cont.



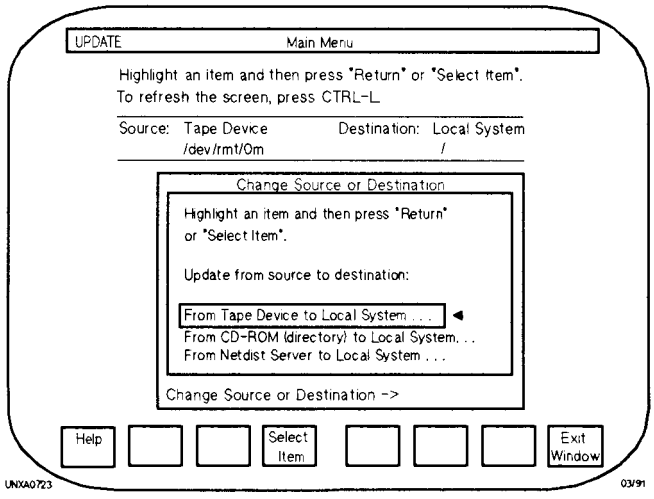
SAM: *Create an HP-UX Cluster*, **Slide 11 of 11**

Update

Main Menu

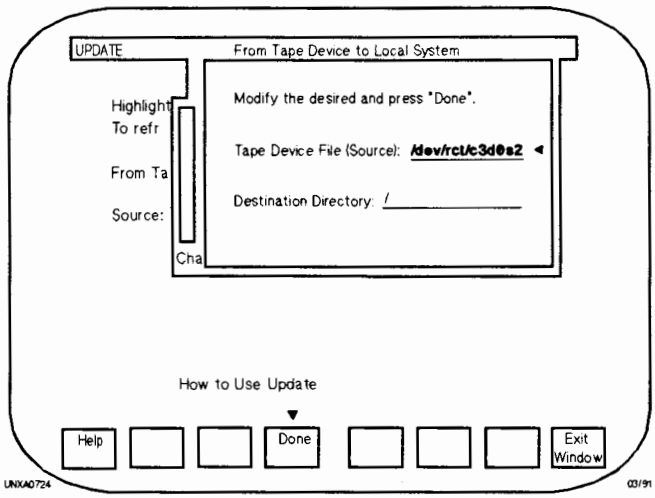


SAM: *Update*, Slide 1 of 5



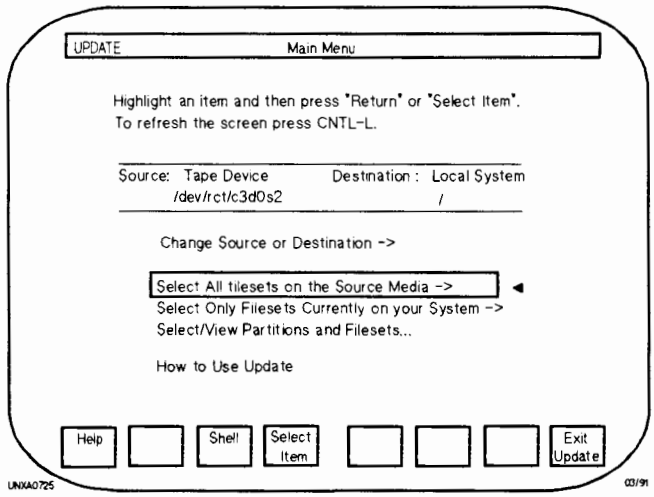
SAM: *Update*, Slide 2 of 5

From Tape Device to Local System



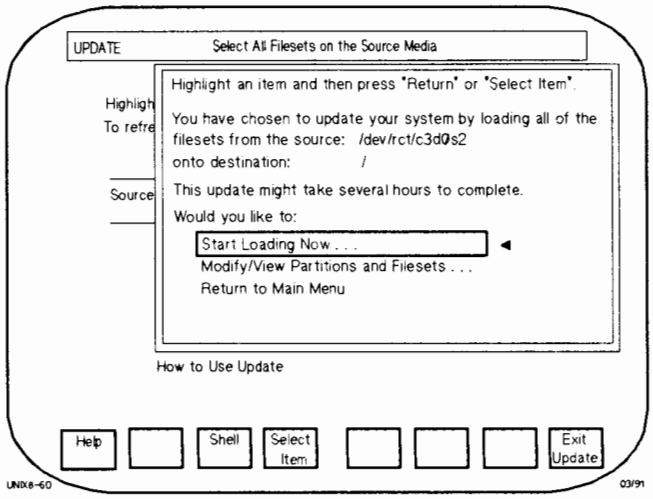
SAM: *Update*, **Slide 3 of 5**

Main Menu



SAM: *Update*, **Slide 4 of 5**

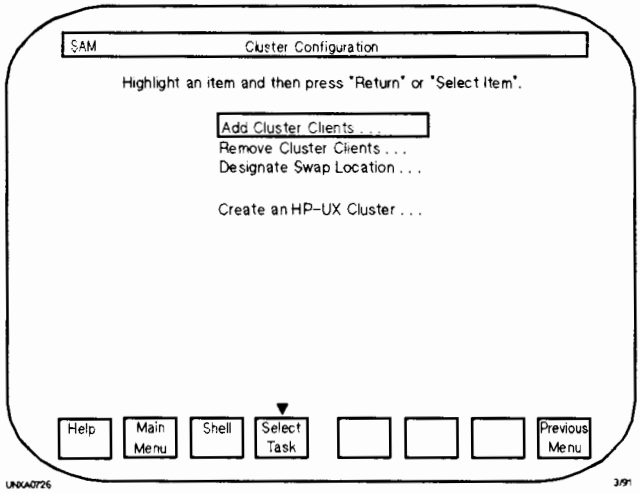
Select all Filesets on the Source Media



SAM: *Update*, **Slide 5 of 5**

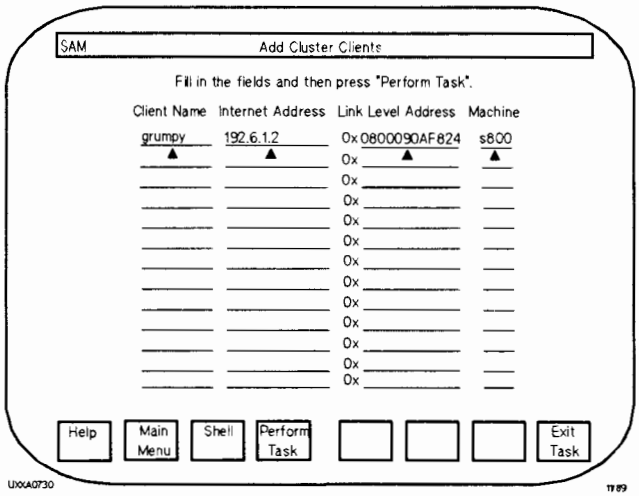
SAM—Cluster Clients

Cluster Configuration

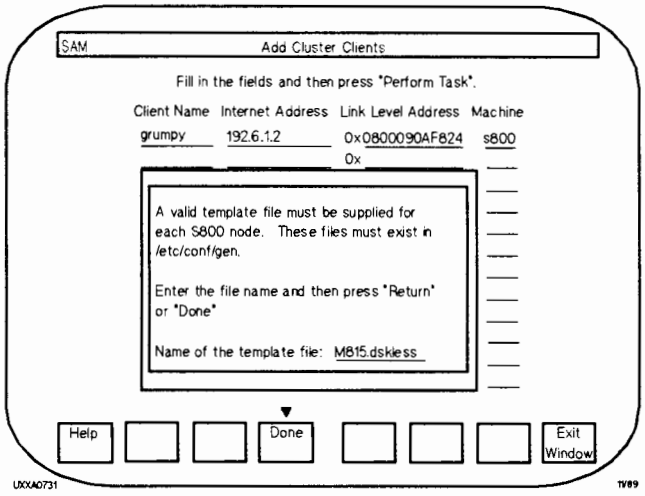


SAM: *Cluster Configuration*

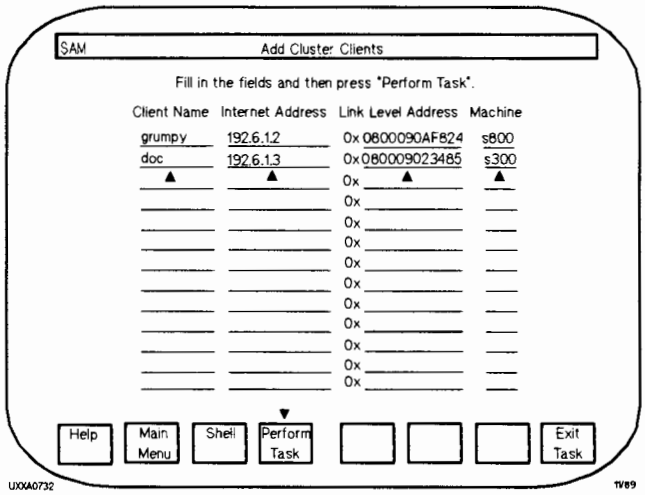
Add Cluster Clients



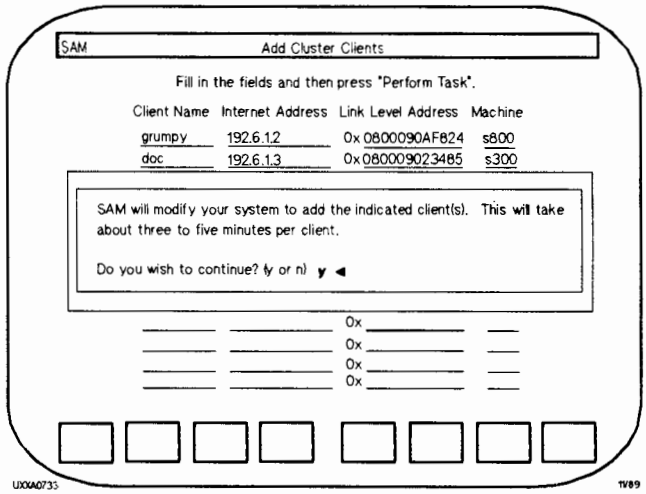
SAM: *Add Cluster Clients*, **Slide 1 of 7**



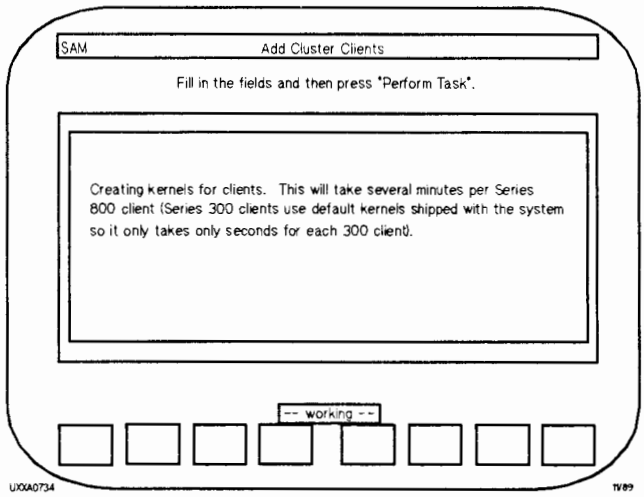
SAM: *Add Cluster Clients*, **Slide 2 of 7**



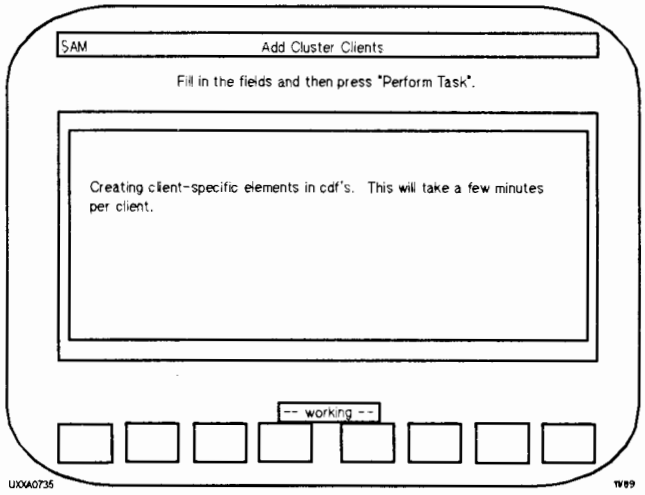
SAM: *Add Cluster Clients*, **Slide 3 of 7**



SAM: *Add Cluster Clients*, **Slide 4 of 7**

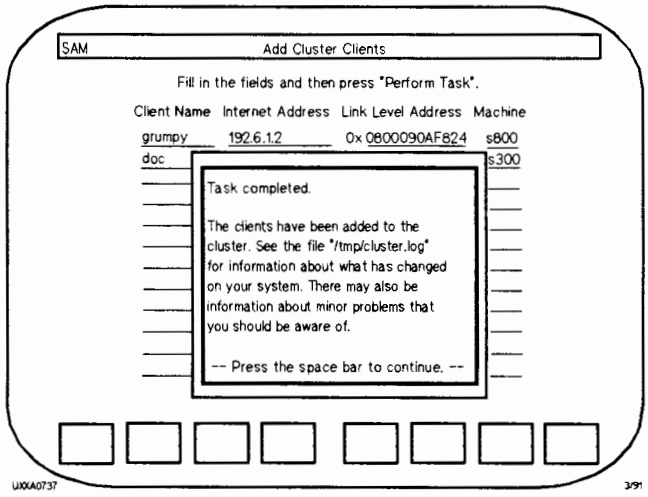


SAM: *Add Cluster Clients*, **Slide 5 of 7**



SAM: *Add Cluster Clients*, **Slide 6 of 7**

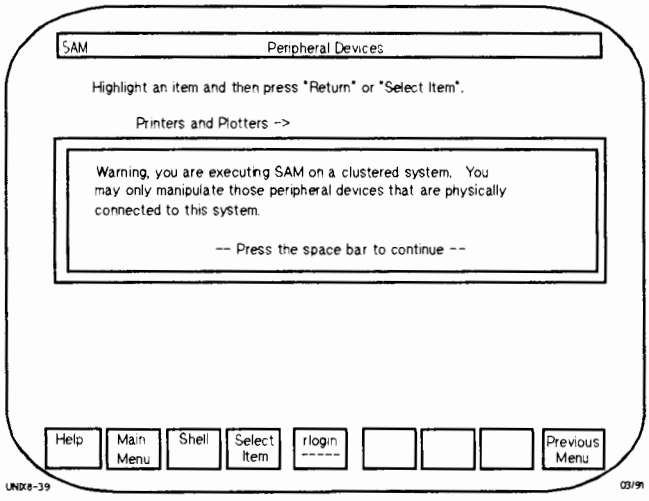
Add Cluster Clients, Cont.



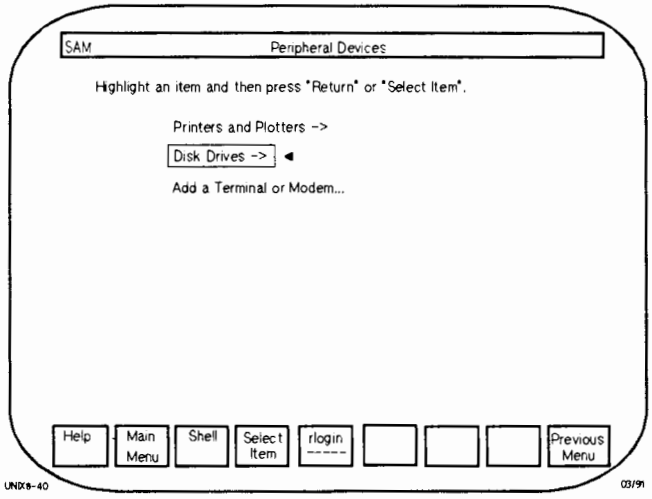
SAM: *Add Cluster Clients*, **Slide 7 of 7**

SAM—Auxiliary File and Swap Server Configuration

Peripherals Devices

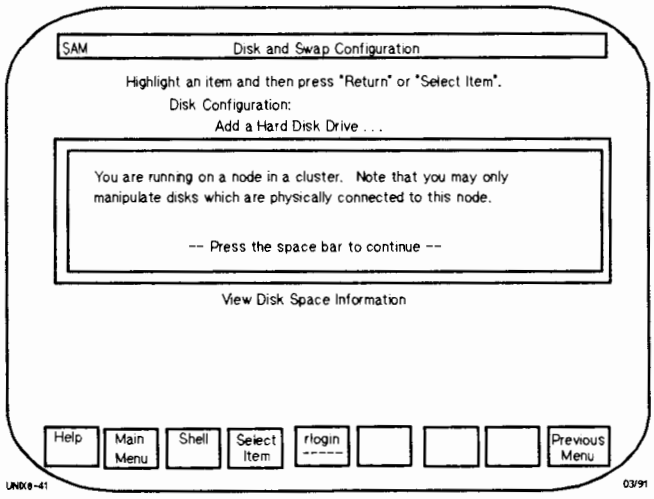


SAM: *Peripheral Devices*, **Slide 1 of 12**

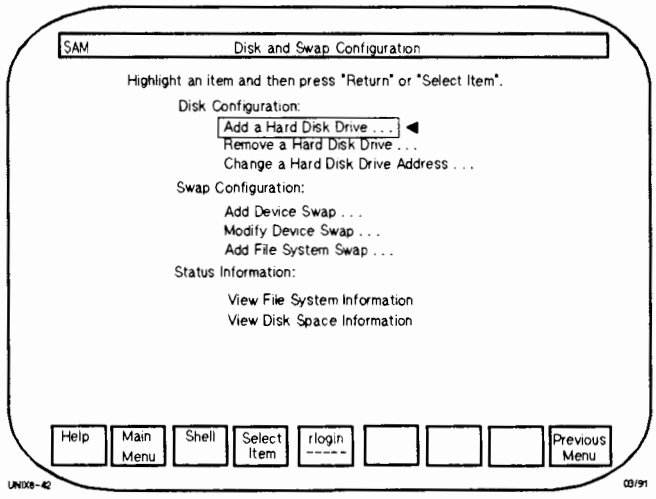


SAM: *Peripheral Devices*, **Slide 2 of 12**

Disk and Swap Configuration

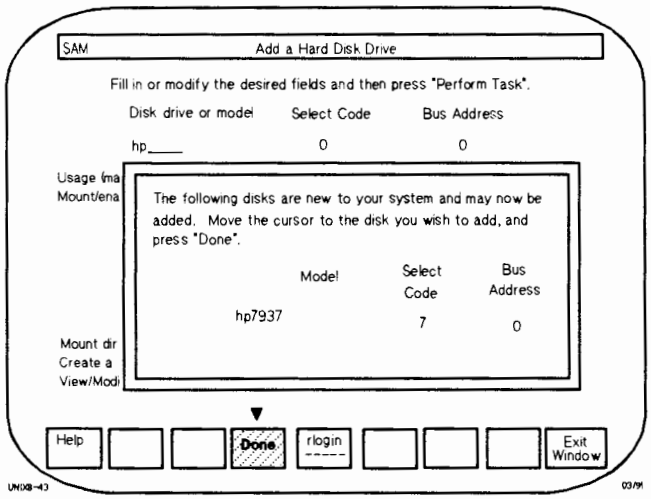


SAM: *Peripheral Devices*, **Slide 3 of 12**

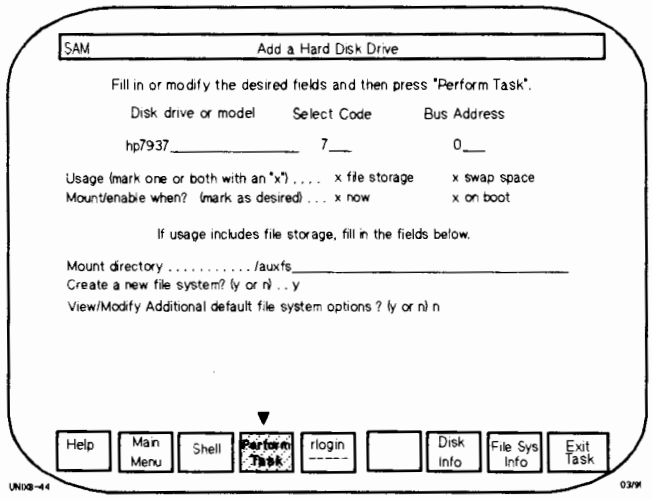


SAM: *Peripheral Devices*, **Slide 4 of 12**

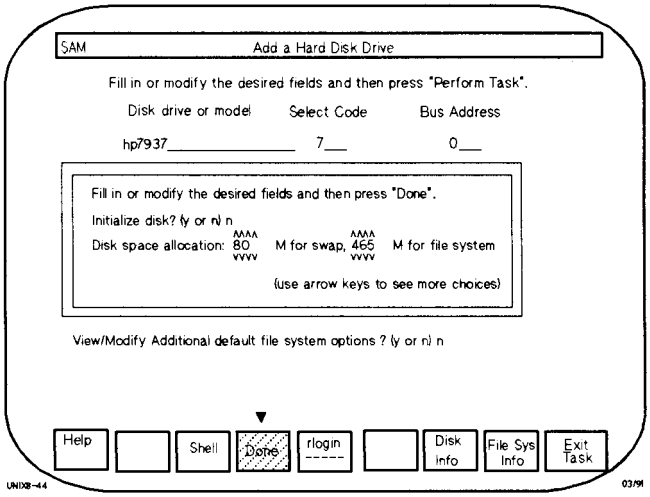
Add a Hard Disk Drive



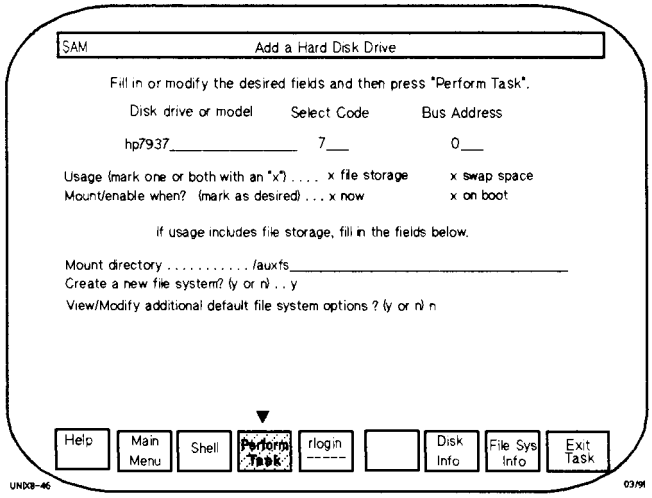
SAM: *Peripheral Devices*, **Slide 5 of 12**



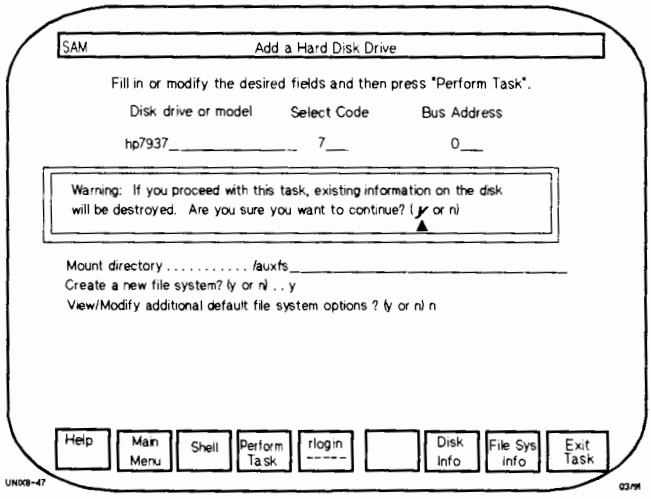
SAM: *Peripheral Devices*, **Slide 6 of 12**



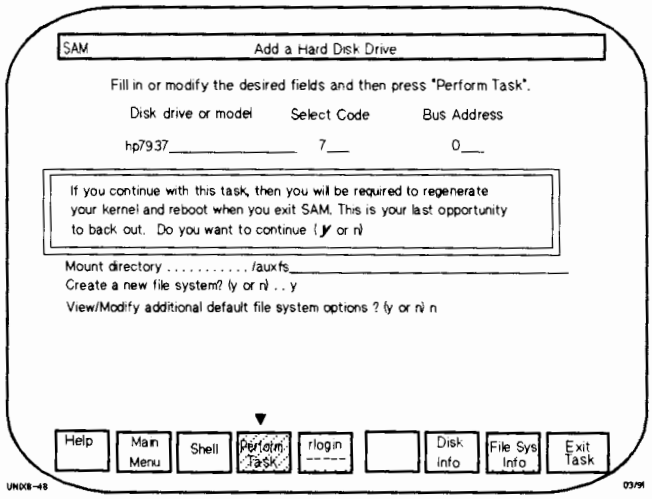
SAM: *Peripheral Devices*, **Slide 7 of 12**



SAM: *Peripheral Devices*, **Slide 8 of 12**

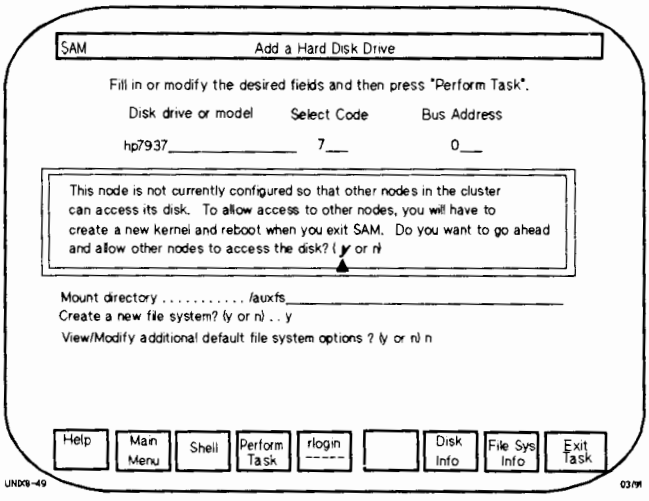


SAM: *Peripheral Devices*, **Slide 9 of 12**

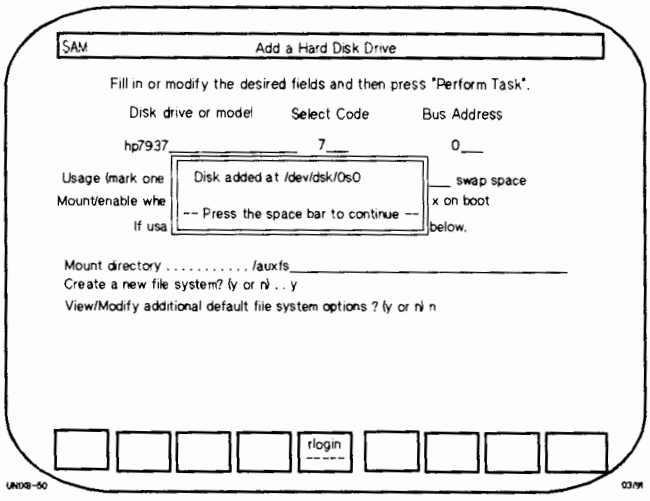


SAM: *Peripheral Devices*, **Slide 10 of 12**

Add a Hard Disk Drive, Cont.

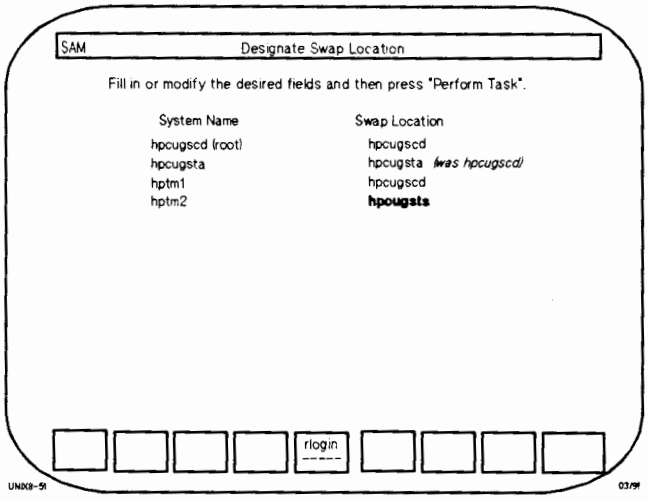


SAM: *Peripheral Devices*, **Slide 11 of 12**

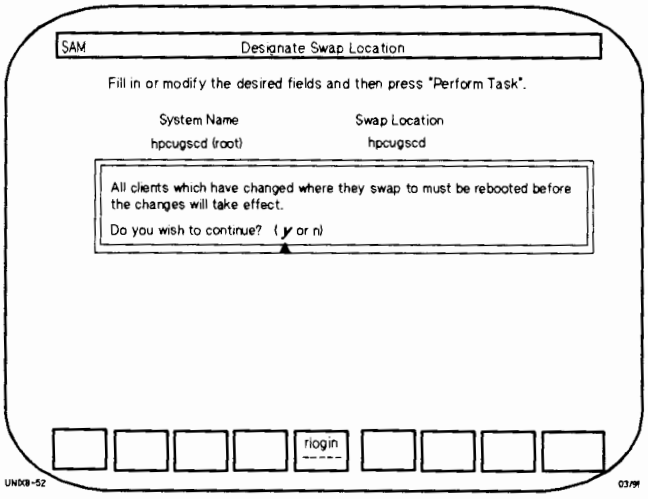


SAM: *Peripheral Devices*, **Slide 12 of 12**

Designate Swap Location

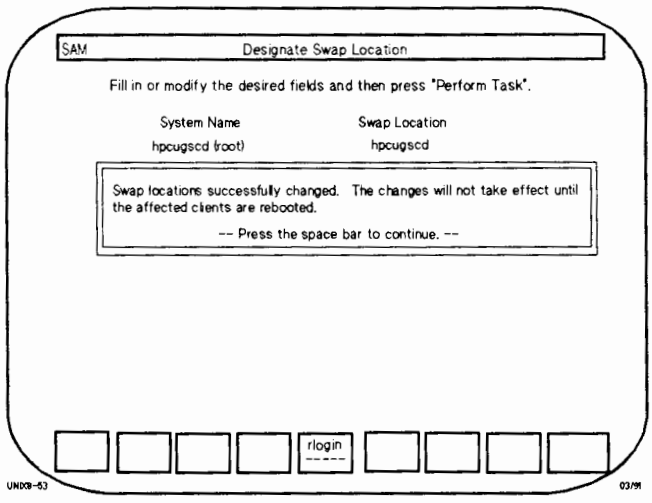


SAM: *Designate Swap Location*, **Slide 1 of 4**



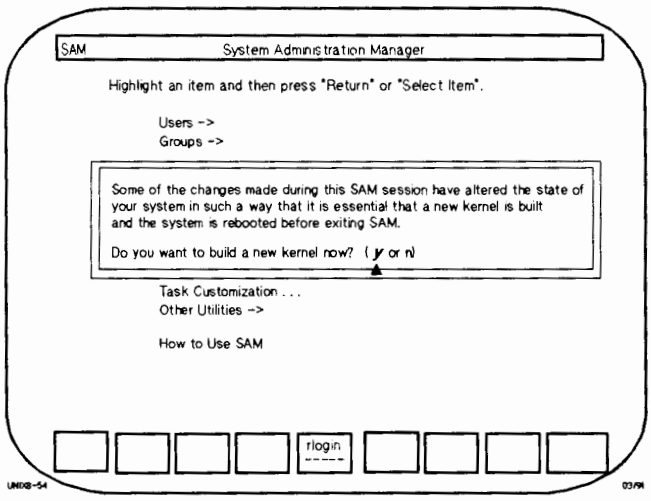
SAM: *Designate Swap Location*, **Slide 2 of 4**

Designate Swap Location, Cont.



SAM: *Designate Swap Location*, **Slide 3 of 4**

System Administration Manager



SAM: *Designate Swap Location*, **Slide 4 of 4**

6

Mirror Disk

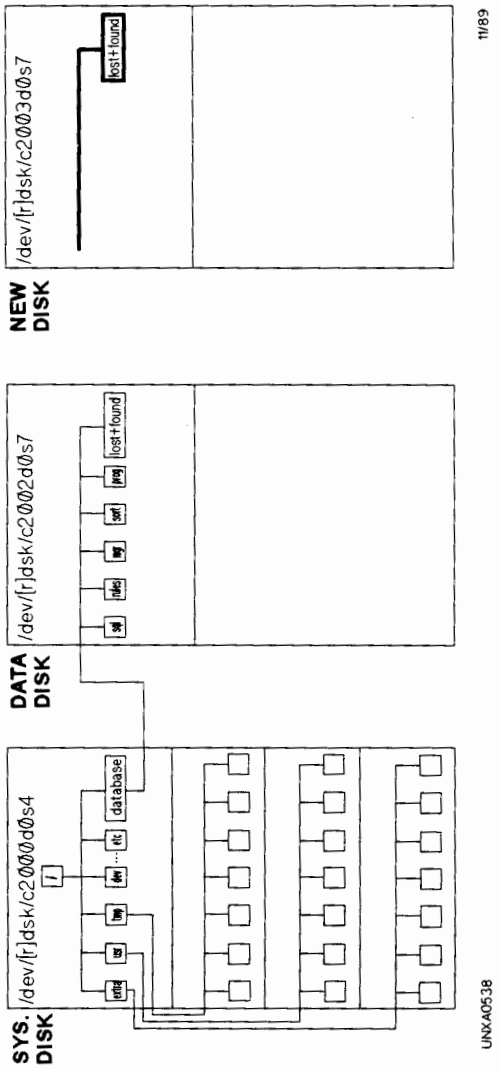
Mirror Disk Basics

- A mirrored disk is a pair of disk sections that are copies of each other. To the user they look and act like a single section.
- The pair is managed by kernel code called the *mirror driver*. A physical write is split into two write calls, one for each section of the pair. A physical read is routed to the least busy drive.
- Mirror disks are supported only on HP-FL drives on HP 9000 Series 8XX machines (except 808 and 815).
- Section pairs must be on identical disk model numbers, and must have identical section numbers. Pair section internal structures (block size, fragment size, etc.) must be identical.
- The mirror driver allows a single HP 9000 Series 800 CPU to create and share up to 16 mirror disk pairs (32 drives).
- It is recommended (but not required) that each member of a pair be installed on separate HP-FL interfaces to prevent a single point interface failure from affecting both members of a pair.

Creating a Mirror Disk

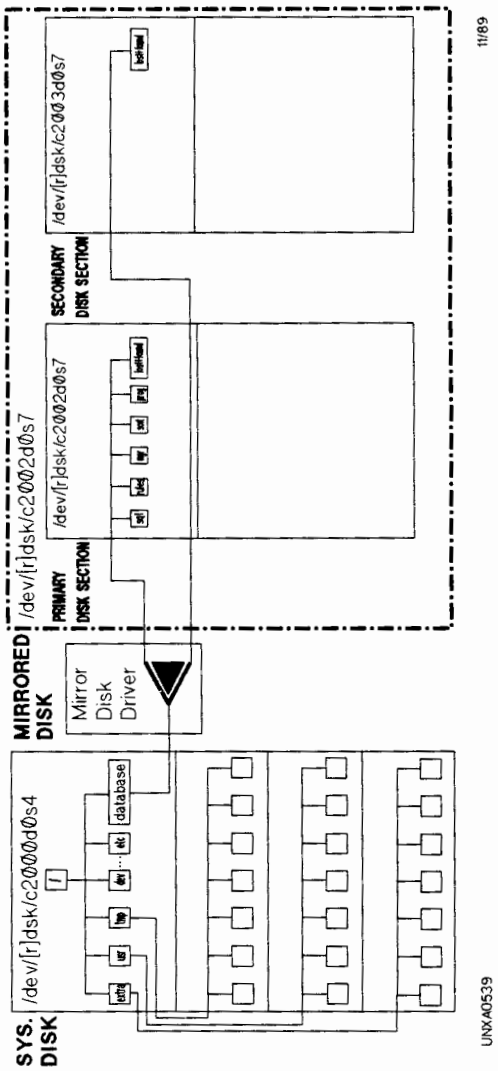
1. Create a new file system using the *newfs* command. For example:

   # newfs /dev/rdsk/c2003d0s7 hp7937



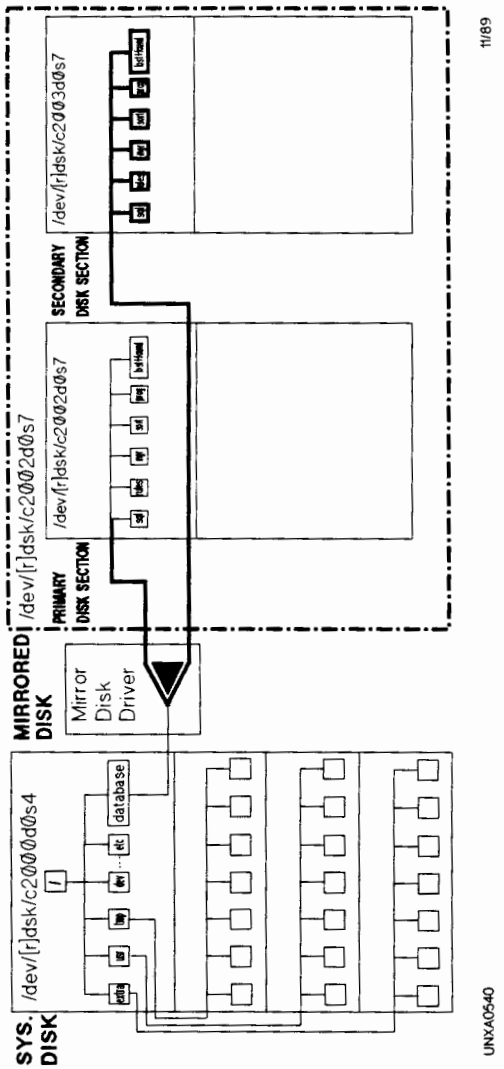
2. Mirror the primary and secondary disk sections. For example:

 # mirror -c /dev/rdsk/c2002d0s7 online /dev/rdsk/c2003d0s7 offline



3. Update the secondary disk section with an exact image of the primary disk section using the *mirror* command. For example:

   # mirror -r /dev/dsk/c2002d0s7



The */etc/mirror* Command

- The *mirror* command is used to configure, unconfigure, and control mirrored disks. The *mirror* command and options are shown below:

  # mirror -c [-f] primarydev pstate secondarydev sstate

  # mirror -u mirrordev ...

  # mirror -o [-f] -p|-s mirrordev [[-p|-s] mirrordev ...]

  # mirror -r [-t] mirrordev

  # mirror -l [device]

Where:

Key	Operation
-c	Configure a mirror disk (does not work for *root* and *swap*; uxgen required).
-f	Manually set fail flag for the OFFLINE section (when set, indicates hardware failure).
primarydev	Block or character special file path of the primary disk section of the mirror.
pstate	State of primary disk section. Set *pstate* to *online* or *offline* (typically set to *online*).
secondarydev	Block or character special file path of the secondary disk section of the mirror.
sstate	State of secondary disk section. Set *sstate* to *online* or *offline* (typically set to *online*).
-u	Unconfigure the named mirror(s); revert mirrored section(s) to unmirrored.
mirrordev	Block or character special file path of primary disk section in mirror.
-p|-s	*-p* requests primary disk section go offline; *-s* requests secondary disk go offline.
-r	Reimage the named mirror (assures identical data on both sections of mirror).
-t	Requests that a table-driven reimage (update only changed files since going offline).
-l	List mirrors (uses */etc/mirrorlog* daemon and */etc/mirrortab*).
device	Special file path of desired mirror disk.

Listing Mirror Disk Status

- To list mirror status, type:

  # /etc/mirror -l

- *mirror -l* displays one line per mirror in the following format:

  primarydev pstate secondarydev sstate fail

  Where:

Key	Operation
primarydev	Block special file path of primary disk section.
pstate	*ONLINE*—Disk section is available for reads and writes. *OFFLINE*—Disk section is not available for reads and writes. *REIMAGE*—Disk section is being re-imaged.
secondarydev	Block special file path of secondary disk section.
sstate	Same as *pstate* above except indicates secondary disk section state.
fail	*FAIL*—Hardware fail flag; set automatically on failure or by *mirror -cf* command. *GOOD*—Hardware status flag displayed if *FAIL* flag not set.

- Example:

  # /etc/mirror -l

  ```
  /dev/dsk/c0d0s4 ONLINE /dev/dsk/c1d0s4 OFFLINE GOOD
  /dev/dsk/c0d0s10 ONLINE /dev/dsk/c1d0s10 REIMAGE GOOD
  ```

Setting Mirror Disk Sections Offline

- Only one section of a mirror disk may be taken offline at a time; the other must remain online.
- Use the *mirror -o* command to take a section offline (see */etc/mirror* command earlier in this section).
- Example:

```
# /etc/mirror -l

  /dev/dsk/c0d0s10 ONLINE /dev/dsk/c1d0s10 ONLINE GOOD


# /etc/mirror -os /dev/dsk/c0d0s10 (set secondary OFFLINE)
# /etc/mirror -l

  /dev/dsk/c0d0s10 ONLINE /dev/dsk/c1d0s10 OFFLINE GOOD


# /etc/mirror -r /dev/dsk/c0d0s10 (reimage, set ONLINE)
# /etc/mirror -l

  /dev/dsk/c0d0s10 ONLINE /dev/dsk/c1d0s10 ONLINE GOOD


# /etc/mirror -op /dev/dsk/c0d0s10 (set primary OFFLINE)
# /etc/mirror -l

  /dev/dsk/c0d0s10 OFFLINE /dev/dsk/c1d0s10 ONLINE GOOD
```

7

Cookbook Procedures

Spool-A-Printer Cookbook

This procedure valid for HP-UX 7.0 only.

1. Find the printer model number:

   # *ll /usr/spool/lp/model*

2. Identify the printer special device file:

   # *lssf /dev/lp** (for HPIB printer)

   # *lssf /dev/tty?p?* (for serial printer)

3. Verify device file owner is *'lp'* and group is *'bin'*.

4. Configure the spooler process:

   # *cd /usr/lib*

   # *lpshut*

   # *lpadmin* -*p*printer_name (user's choice) -*v*/dev/devicefile (from Step 2 above) -*m*hpMODEL (from Step 1 above)

   # *accept* printer_name

   # *../bin/enable* printer_name

   # *lpadmin* -*d*printer_name (execute this line if the spooled printer is the default printer)

   # *lpsched*

5. Test the spooler and check spooler status:

   # *lp* -*d*printer_name */etc/passwd*

   # *lpstat -t*

Adding a LaserJet or Serial Printer

This procedure valid for HP-UX 7.0 only.

1. Connect the printer to an available port on one of the muxes (do not use the Access Port).
2. Verify that a special device file exists for the new printer:

   # lssf /dev/ttyXpY

   Where:
   X = logical unit (lu) number of the mux assigned by *insf*.
   Y = port number the printer is attached to (0 - 5).

   mux0 lu X port Y hardwired address mod.slot */dev/ttyXpY*.

   If *lssf* fails to find the desired special device file, check to see that the insf process has been correctly followed. If the kernel (hp-ux) has been configured correctly, *mksf* can create a new special device file for the printer.

   # cd /dev

   # /etc/mksf -d mux0 -l X -p Y -h /dev/ttyXpY

   Where:
   X and *Y* have the same meaning as above.
3. Modify */etc/inittab* using vi or ed. Delete any existing lines which refer to the special device file that will be used by the new printer.
4. Add the following line to */etc/inittab*:

   xx:2:off:/etc/getty -h ttyXpY 9600

   Where:

Key	Operation
xx	Unique one or two character identification.
2	Run level (typically *2* for multiuser printer operation).
X	Multiplexer's logical unit (lu) number assigned by *insf*.
Y	Port number printer is attached to (0 - 5).
9600	Printer baud rate.

5. Configure the printer into the LP spooler.

Printer/Spooler Troubleshooting

1. Check spooler status:
   - Status OK

     $ *lpstat -t*

     scheduler is running

     system default destination: laser (default printer name)

     device for lp: /dev/lpX (printer special device file)

     laser accepting request since Jan 16 16:29

     printer laser is idle. enabled since Jan 16 16:30

   - Printer DOWN

     $ *lpstat -t*

     scheduler is running

     system default destination: laser

     device for lp: /dev/lpX

     laser accepting request since Jan 16 16:29

     printer laser disabled since Feb 04 11:16 - reason unknown

2. Check the state of the files in the spooler queue:

   $ *ll /usr/spool/lp/request/* laser (default printer name)

3. Bypass the lp spooler by using the printer's special device file:

   $ *cat /etc/passwd > /dev/lpX* (HPIB printer)

   $ *cat /etc/passwd > /dev/ttyXpY* (serial printer)

Spool-A-Remote-Printer Cookbook

This procedure valid for HP-UX 7.0 only.

1. Configure the local spooler for the remote line printer:

   # *cd /usr/lib*

   # *lpshut*

   # *lpadmin -p*printer_name (user's choice) *-mrmodel* \
   -v/dev/null -ocmrcmodel > -osmrsmodel \
   *-orm*remote_system_name (remote printer host system name) \
   *-orp*remote_printer_name (remote printer name; must \
   already be configured on spooling system of remote host)

   # *accept* printer_name

   # *../bin/enable* printer_name

   # *lpadmin -d*printer_name (execute this line, if remote printer will be system default printer)

   # *lpsched*

2. Edit the */etc/inetd.conf* file on the remote printer host system. Using vi or ed, remove the pound sign on the line matching the following:

   #printer stream tcp nowait root /usr/lib/rlpdaemon -i

3. Execute the following command on the remote printer host system:

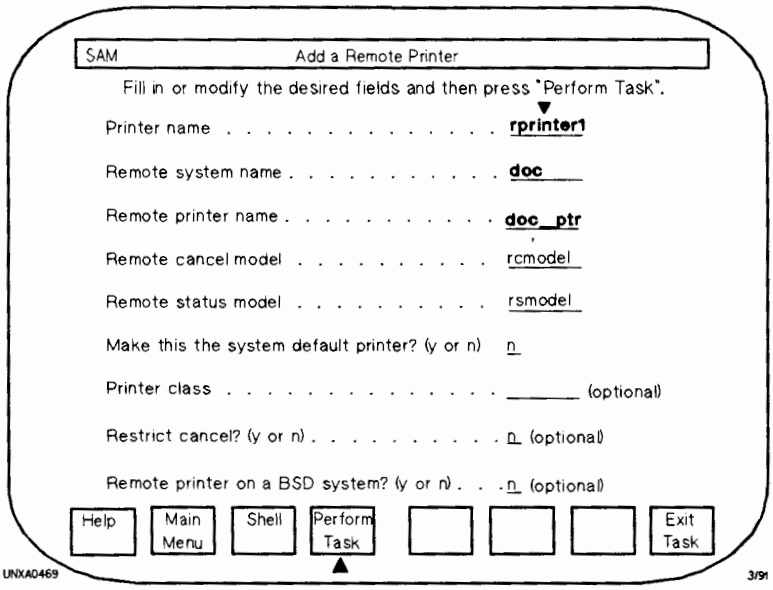
   # */etc/inetd -c*

4. Test the spooler and check spooler status:

   # *lp -d*printer-name */etc/passwd*

   # *lpstat -t*

SAM—Add a Remote Printer



Add-A-File-System Cookbook

1. Initialize the disk, if it has not been initialized:

Caution Initialization destroys all data on the disk.

 # /usr/bin/mediainit /dev/diag/dsk/cXd0 Where:

X = the logical unit (lu) number of the disk assigned by *insf* (for HP-UX versions prior to 8.0: when addressing an HP-PB device *X* becomes 1000 + lu number; when addressing an HP-FL device *X* becomes 2000 + lu number).

2. Create an HP-UX file system with *newfs*:

 # /etc/newfs /dev/rdsk/cXd0sY hpZZZZ

Where:

Key	Operation
X	Logical unit number (lu) *X* assigned by *insf* (for HP-UX versions prior to 8.0: when addressing an HP-IB device *X* becomes *1000 + lu number*; for an HP-FL device *X* becomes *2000 + lu number*).
Y	Section number of the new file system (see */etc/disktab*).
ZZZZ	HP disk model number (see */etc/disktab* for supported models).

3. Make a mount point directory for the new file system:

 # /bin/mkdir /newdir

Where:

newdir = full path name of directory the new file system is to be mounted under.

4. Add a new line to */etc/checklist* for the new file system:

   /dev/dsk/cXd0sY /newdir hfs rw 0 P # /newdir

   Where:

Key	Operation
/dev/./.0sY	Full path name of block special device file for the file system to be mounted.
/newdir	Full path name of directory the new file system is to be mounted under.
hfs	Type (options): *hfs* - high performance file system, *nfs* - remote NFS file system, *swap* - swap file system, *swapfs* - dynamic swap file system, *ignore* - entry is ignored by *mount* and *fsck*.
rw	Options (use default options, or comma separated list of options): *ro* - read only, *rw* - read write (default), *suid* - Set-user-ID execution allowed (default), *nosuid* - Set-user-ID not allowed.
0	Back frequency (set to 0).
P	Integer pass number *P* determines order *fsck* checks file systems.
#	*#* begins comment field.

5. Mount new file system:

   # /etc/mount -a

   Where:

   a = Attempt to mount all file systems in */etc/checklist*.

Add-A-Terminal Cookbook

This procedure valid for HP-UX 7.0 only.

1. Connect the terminal to an available port on one of the muxes (do not use the Access Port for this purpose).
2. Verify that a special device file exists for the new terminal:

   # lssf /dev/ttyXpY

   Where:

   X = logical unit (lu) number of the mux assigned by *insf*.
   Y = port number the terminal is attached to (0 - 5).

   mux0 lu X port Y hardwired address mod.slot */dev/ttyXpY*.

   If *insf* fails to find the desired special device file, run *ioscan* to see if the MUX card has been configured correctly. If it has, *mksf* can create a new special device file for the terminal:

   # cd /dev

   # /etc/mksf -d mux0 -l X -p Y

   Where:

   X and *Y* have the same meaning as above.
3. Modify */etc/inittab* using vi or ed. Delete any existing lines which refer to the special device file that will be used by the new terminal.

4. Add the following line to */etc/inittab*:

   xx:2:respawn:/etc/getty -h ttyXpY 9600

   Where:

Key	Operation
xx	Unique one or two character identification.
2	Run level (typically *2* for multiuser terminal operation).
X	Multiplexer's logical unit (lu) number assigned by *insf*.
Y	Port number terminal is attached to (0 - 5).
9600	Terminal baud rate.

5. Force *init* to read the */etc/inittab* file:

   # *telinit q*

   If communication with the terminal fails, verify the hardware, terminal configuration, and */etc/inittab* file making any necessary changes. After making any necessary changes invoke the following commands:

   # *ps -ef* (to locate getty processes running against new terminal).

   # *kill -9 PID#* (kill process ID associated with *ttyXpY*).

   # *telinit q* (force *init* to read */etc/inittab*; start new getty).

6. Test the new terminal by attempting to login.

Add-A-Dial-In Modem Cookbook

This procedure valid for HP-UX 7.0 only.

1. Connect the MODEM to an available port on one of the muxes (do not use the Access Port or ports 3 - 5 on the synapse panel).

2. Create a special device file for the new dial-in modem:

   # mksf [-d mux0 [-l lu] [-p port] [-h | -i | -o] [-c] [path]

   Where:

Key	Operation
-d mux0	Specifies driver to use for special device file(s) created.
-l	Logical unit number (lu) of the device assigned by *insf*.
path	Default path name is tty<lu>p<port>.
-c	CCITT (European Standard).
-h	Hardwired (direct connect).
-i	Callin MODEM.
-o	Callout MODEM.
-p	Multiplexer port number (0 - 5).

   For example: to make a dial-in MODEM special device file for mux lu 2, port 2:

   # cd /dev

   # mksf -d mux0 -l 2 -p 2 -i ttyd2p2

   Where:

   -i specifies *callin* MODEM.
   ttyd2p2 is the special device file name.

3. Modify */etc/inittab* using vi or ed. Delete any existing lines which refer to the mux and port used by the new MODEM.

4. Add the following line to */etc/inittab*:

   xx:2:respawn:/etc/getty -h -tZZZ ttydXpY 1200 #phone number

   Where:

Key	Operation
xx	Unique one or two character identification.
2	Run level (typically *2* for multiuser MODEM operation).
ZZZ	Integer timeout value in seconds.
X	Multiplexer's logical unit (lu) number assigned by *insf*.
Y	Port number MODEM is attached to (0 - 5).
1200	MODEM baud rate.

5. Force *init* to read the */etc/inittab* file:

   # *telinit q*

   If communication with the MODEM fails, verify the hardware, MODEM configuration, and */etc/inittab* file making any necessary changes. After making any necessary changes invoke the following commands:

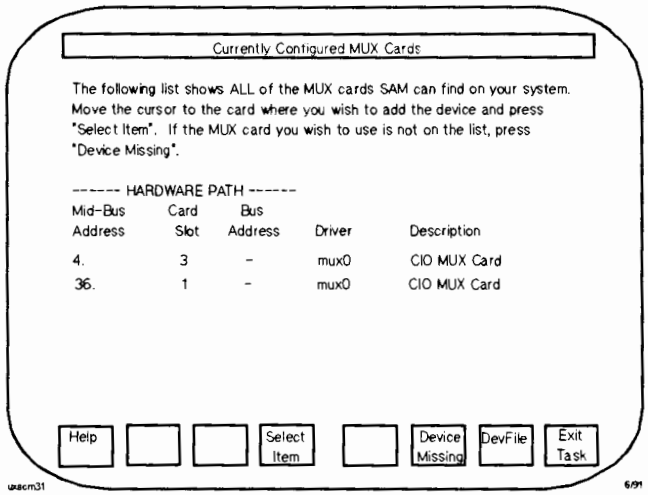
   # *ps -ef* (locate getty processes running against new MODEM).

   # *kill -9 PID#* (kill process ID associated with *ttydXpY*).

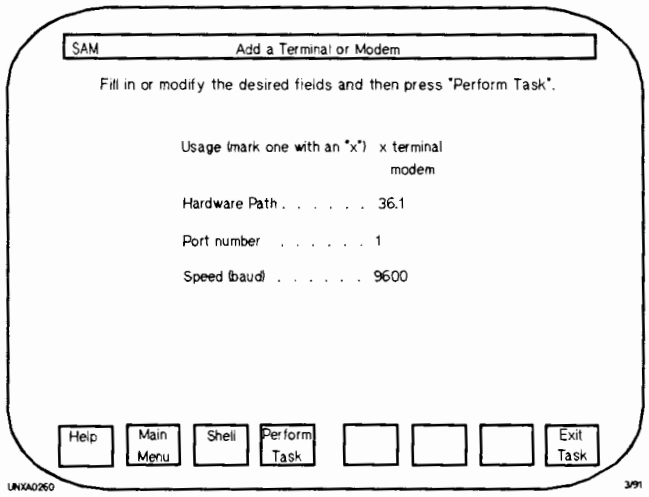
   # *telinit q* (force *init* to read */etc/inittab*; start new getty).

6. Test the new dial-in modem by attempting to login from a remote location.

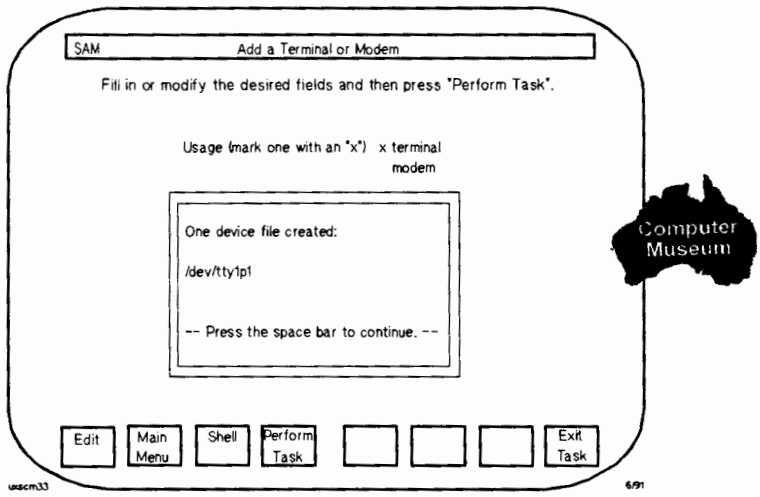
SAM—Add a Terminal or Modem



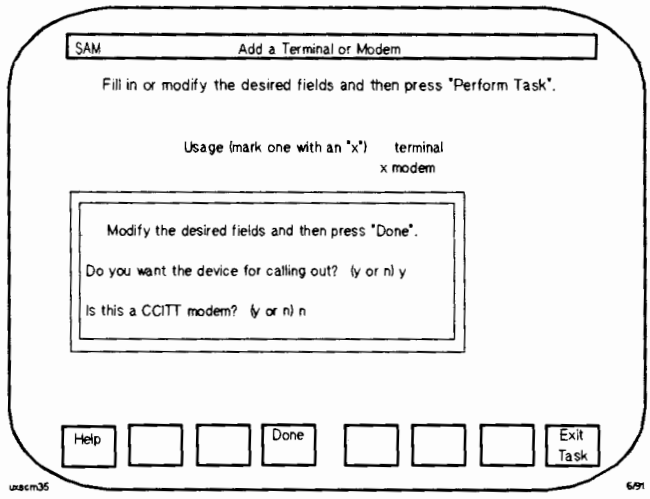
SAM: *Currently Configured MUX Cards*, **Slide 1 of 6**



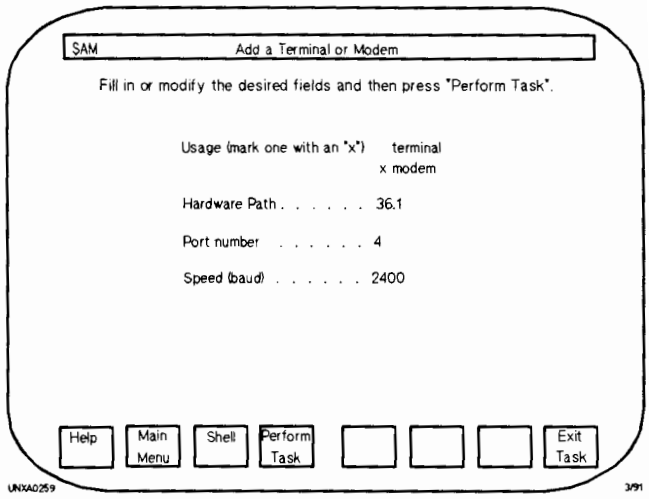
SAM: *Add a Terminal or Modem*, **Slide 2 of 6**



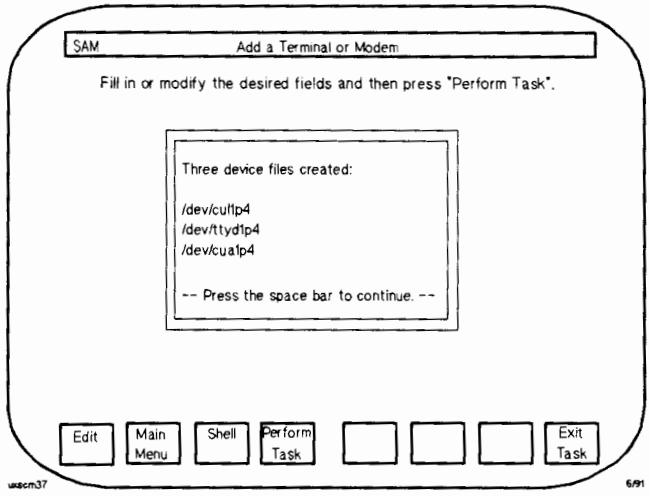
SAM: *Add a Terminal or Modem*, **Slide 3 of 6**



SAM: *Add a Terminal or Modem*, **Slide 4 of 6**



SAM: *Add a Terminal or Modem*, **Slide 5 of 6**



SAM: *Add a Terminal or Modem*, **Slide 6 of 6**

HPMC/Panic Memory Dump Cookbook

If the memory dump resides on the primary swap device, perform the following steps to save the dump file to tape:

1. Boot the system into single user mode:

   ISL>hpux -is driver(BC/X.Y.Z;0xS)hp-ux (see *ISL hpux Utility*)

2. Run *fsck* to fix any damaged file systems:

   # */etc/fsck* (see */etc/fsck* Syntax)

3. Mount the file systems listed in */etc/checklist*:

   # */etc/mount -a*

4. Run *bdf*. Select a file system that contains more free disk space than the size of physical memory. Note the associated mount point directory:

   # */usr/bin/bdf* (see The *bdf* Command)

5. Run the */etc/savecore* command to save the memory dump into the mount point directory of the file system selected in the previous Step:

   # */etc/savecore /mount_point_directory_of_selected_file_system*

6. To save the dump file to 1/2 inch magnetic tape:

   # *cd /mount_point_directory_of_selected_file_system*

   # */usr/bin/tar cv hp-**

1. Install networking software by running */etc/update*. Load all software in the NETWORKING partition.
2. Edit */etc/rc* making the following change to the *initialize0* function:

   From—

   SYSTEM_NAME=unknown

   To read—

   SYSTEM_NAME=bashful

   Where: *bashful* is the user chosen system host name (must be a unique name among all machines connected to this node).
3. *etc/src.sh* sets the system name as does */etc/rc*. Make sure the name is set correctly in both places.
4. Edit */etc/hosts*. Add a line for each host in the network that includes the internet address and the corresponding hostname. Internet addresses must begin in column 1 of the line.

   For example:

   192.6.1.1 *bashful*
   192.6.1.2 *grumpy*
   192.6.1.3 *doc*
   192.6.1.4 *sleepy*

   Where, in line 1 above:

First digit	The internet protocol address must begin in the first column of the */etc/hosts* script.
Last digit	Must not be 0 or 255.
192.6.1.1	A unique protocol (I.P.) address used by *hostname*. Do not use leading zeros; *002* should be *2*.
bashful	The *hostname* of all nodes customer will communicate with.

5. Edit */etc/netlinkrc* making the following changes:

   From—

   ```
   ROOTSERVER='/bin/cnodes -r'
   NODENAME='/bin/cnodes -m'
   DOMAIN='/bin/cnodes -r'
   ORGANIZATION=diskless
   ```

   To read—

   ```
   ROOTSERVER='hostname'
   NODENAME=$ROOTSERVER
   DOMAIN=ces
   ORGANIZATION=ceo
   ```

   Where:

Key	Operation
ces	Domainname—name of domain.
ceo	Orgname—name of organization.

6. Shutdown and reboot the system:

   ```
   # cd /
   # shutdown -r 300
   ```

7. Verify the hardware connection by running the *landad* diagnostic:

   a. Run *landad* using the default sections to obtain the LAN card's hex station address:

      # /usr/diag/bin/sysdiag

      DUI 1> run landad pdev=2/4.3 (2/4.3 = the LAN address)

   b. Run *landad* again specifying section 9. This will test the MAU. Use the hex station address obtained in the previous Step:

      # /usr/diag/bin/sysdiag

      DUI 1> run landad pdev=2/4.3 section=9

8. Check the network packet passing capability by *pinging* each host in the network (include your *hostname*):

   # ping bashful

   # ping grumpy (Note: Use *Ctrl-c* to stop *ping*)

   # ping doc

   # ping sleepy

9. Verify the Network File Transfer (NFT) feature of NS:

   a. Interactively enter *dscopy*:

      # dscopy -i

   b. Copy a file from a remote host in the network to your system:

      # dscopy> grumpy#root:password#/etc/issue /mnt/users/stu01

      Where:

Key	**Operation**
/grumpy	Remote's nodename.
root	Remote login.
password	Remote login's password.
/etc/issue	Full path name of remote file.
/mnt/../stu01	*to* file on local host.

   c. Exit *dscopy* by typing *Ctrl-d*.

10. Verify the Telnet feature of ARPA:

    # telnet grumpy

    login: root

    password:

    (allows session from terminal with no screen mode capability)

    Ctrl-d (exits Telnet)

Add-A-User Cookbook

1. Add a login line to */etc/passwd* using vi or ed:

   caitlin::215:200:caitlin x8174:/mnt/users/caitlin:/bin/sh

   /etc/passwd format:

   user_name:password:user_id:group_id:comment_field:\
   login_directory:command

2. Add or modify a line in */etc/group* using vi or ed (optional):

   ces::200: (May exist if others in new user's group)

   lab::300:caitlin (Add to access other group privileges)

   /etc/group format:

   group_name:password:group_id:member1,member2

3. Make the user's login (or home) directory:

   # mkdir /mnt/users/caitlin

4. Change the owner of */mnt/users/caitlin* from *root* to *caitlin*:

   # chown caitlin /mnt/users/caitlin

   chown syntax:

   # chown owner file

5. Change the group ownership of */mnt/users/caitlin* from *other* to *ces* (or 200):

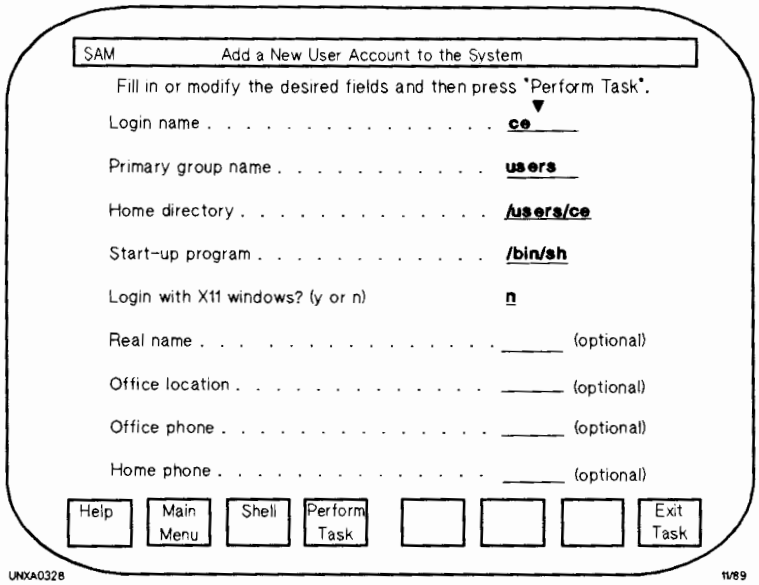
   # chgrp ces /mnt/users/caitlin

   chgrp syntax:

   # chgrp group file

6. Login to the new account. Create a shell customization script (for example *.profile*).

SAM—Add a New User Account to the System



Add Dynamic Swap Cookbook

To add dynamic swap space on a high performance file system (HFS), perform the following steps:

1. Find a file system with sufficient free space to add dynamic swap space, without filling the file system and preventing users from storing files:

   # /usr/bin/bdf -b

2. Use *swapon* to create the desired dynamic swap space on the file system selected in the previous Step:

   # /etc/swapon mount_point_dir min_blocks max_blocks \
   fs_reserve_blocks priority

   Where:

Key	Operation
mount_point_dir	Full path name of mount_point_directory where the file system dynamic swap is to reside.
min_blocks	Minimum number of file system blocks to be allocated for dynamic swap (0 = do not take any blocks at *swapon*).
max_blocks	Maximum size in blocks dynamic swap is allowed to take from the file system (0 = take as many blocks as necessary).
fs_reserve_blocks	Number of file system blocks that are saved for file system use only (0 = no blocks reserved for the file system).
priority	Indicate the order space is taken from the file system for use as swap (priority zero file systems are taken first).

   min, *max*, and *fs_reserve_blocks* size must be specified as an integer number of file system blocks. The size of the file system blocks can be found in */etc/disktab* for the model and section number of the disk that attaches to the mount_point_directory.

Note

Once swap is enabled by *swapon*, *min_blocks* and *fs_reserve_blocks* cannot be changed, but *max_blocks* can be increased in size.

3. If dynamic swapping is to be made permanent (enabled on system start-up) add a line to */etc/checklist* in the following format using vi or ed:

   /dev/dsk/cXd0sY mount_point_dir swapfs min=A, lim=B, \ res=C, pri=P 0 0

   Where:

Key	Operation
/dev/dsk/cXd0sY	Full path name of block special file where dynamic swap is to reside.
mount_point_dir	Full path name of mount_point_directory where the file system dynamic swap is to reside.
A	Integer minimum number of blocks taken by swap (0 = do not take any blocks at *swapon*).
B	Integer maximum number of blocks swap can take from file system (0 = take as many blocks as necessary).
C	Integer number of blocks reserved for file system use (0 = no reserved blocks).
P	Integer priority (0 = use dynamic swap space first).

4. Verify that dynamic swapping has been enabled:

   # /usr/bin/bdf -b

Note

Once dynamic swapping has been enabled, it cannot be deactivated until *swapfs* lines are removed from */etc/checklist* for the section you wish to deactivate; then reboot the system. If dynamic swapping on a file section was not made *permanent*, simply reboot, and all temporary swapping sections will be deactivated.

Dynamic Swapping Features

- Dynamic swap allows paging and swapping on ordinary high performance file systems on an overflow basis. When dedicated swap section space is exhausted, dynamic swapping on enabled file systems begins according to a predetermined priority scheme.
- Dynamic swap space can be added while HP-UX is running using the *swapon* command. *swapon* allows the user to set sizes and limits to prevent dynamic swap pace from growing so large that user file space is critically reduced or eliminated. *swapon* will allocate no less than the minimum amount of blocks specified, but may allocate more for efficient use of swap space. It will not allocate blocks that are reserved for the file system users.
- Swapping performance is reduced when swapping to file systems. Swapping is done in file system sized blocks (typically 8K or 4K blocks), instead of 64K blocks used on dedicated swap sections. Data is scattered across the file system instead of contiguous as on dedicated swap sections.
- Once dynamic swapping is enabled on a section, it cannot be disabled without rebooting HP-UX. File systems with swapping enabled cannot be unmounted.
- Only one directory per file system can be specified for dynamic swapping.

The */etc/swapon* Command

The *swapon* command enables additional devices (dedicated swap sections) or file systems for paging and swapping. The *swapon* command and options are shown below:

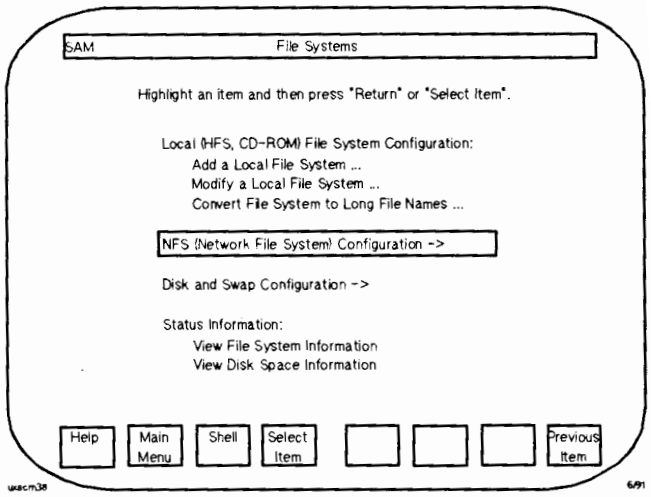
 # /etc/swapon -a

 # /etc/swapon name | [directory min limit reserve priority]

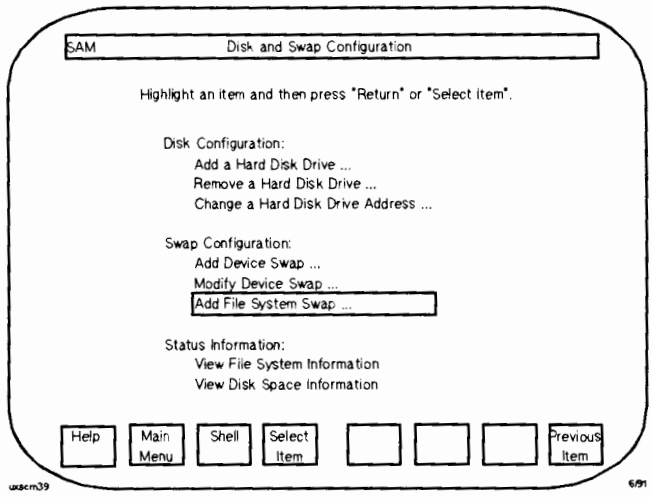
Where:

Key	Operation
-a	All dedicated swap devices (swap sections) marked as *swap*, and all dynamic swapping file systems marked as *swapfs* in */etc/checklist* are made available for swapping.
name	Full path name of block special file of dedicated swap section of disk. This section must be *uxgen*ed into the system.
directory	Full path name of mount_point_directory of the file system to be enabled for dynamic swapping.
min	Integer number of file system blocks to take from the file system (default = 0). Only valid with *directory* option.
limit	Integer maximum number of blocks swap can take from the file system (default = 0). Only valid with *directory* option.
reserve	Integer number of file system blocks that are reserved for file system only (default = 0). Only valid with *directory* option.
priority	Integer indicates order that space is taken from the file systems for use as swap. Lowest priority taken first (default = 0).

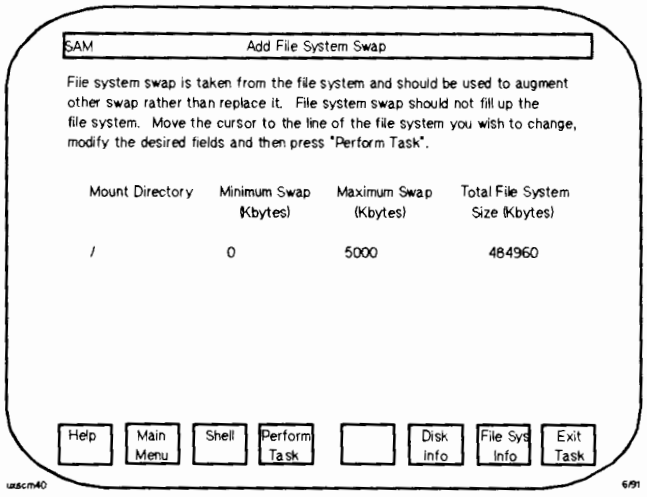
SAM—Add Dynamic Swap



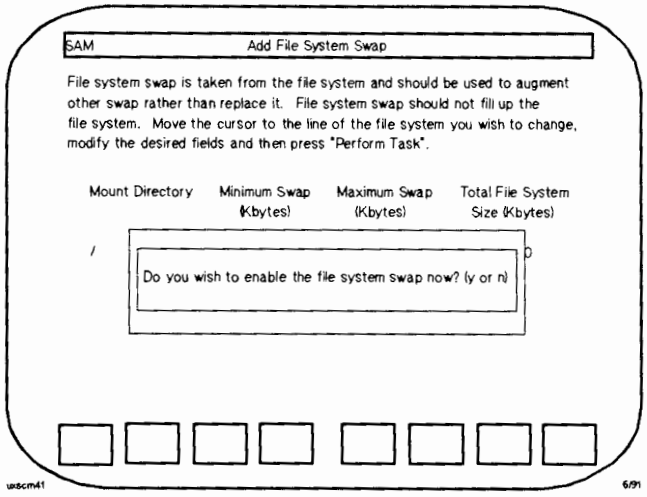
SAM: *File Systems*, **Slide 1 of 6**



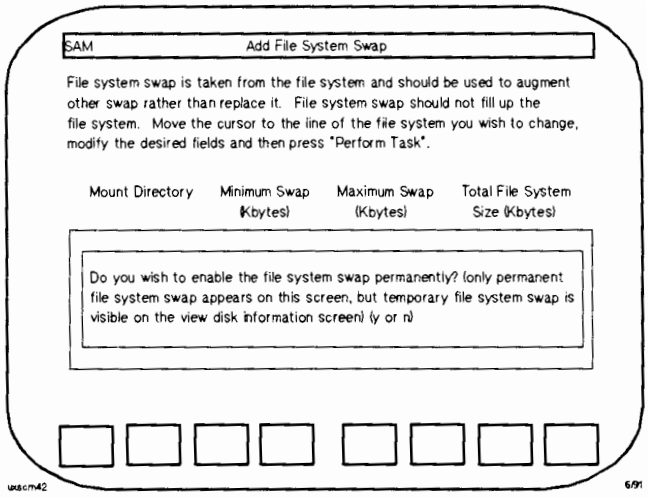
SAM: *Disk and Swap Configuration*, **Slide 2 of 6**



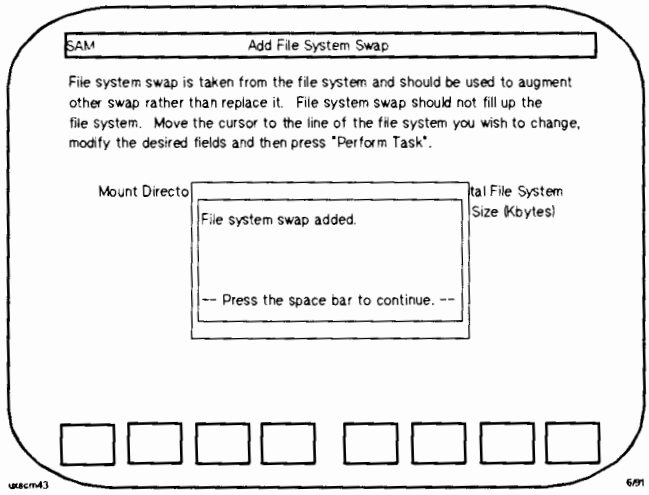
SAM: *Add File System Swap*, **Slide 3 of 6**



SAM: *Add File Syatem Swap*, **Slide 4 of 6**



SAM: *Add File System Swap*, **Slide 5 of 6**



SAM: *Add File System Swap*, **Slide 6 of 6**

Add-A-Mirror-Disk Cookbook

To create a mirror disk on a file system except *root* and *swap* perform the following steps:

1. If the disk drive(s) have never been initialized, initialize the media:

Caution Initialization will destroy any data on the disk drive.

 # /usr/bin/mediainit /dev/diag/dsk/cXd0 Where: *X* = the logical unit (lu) number of the disk assigned by *insf* (for HP-UX versions prior to 8.0, when addressing an HP-FL device *X* becomes 2000 + the lu number).

2. Create an HP-UX file system on the mirrored primary and secondary disk sections, only if valid file system(s) do not already exist:

   # /etc/newfs /dev/rdsk/cXd0sY hpZZZZ

   Where:

Key	Operation
X	The logical unit (lu) number of the disk assigned by *insf* (for HP-UX versions prior to 8.0, when addressing an HP-FL device *X* becomes 2000 + the lu number).
Y	Section number of the file system to be created (see */etc/disktab*).
ZZZZ	Model number of HP disk (see */etc/disktab* for supported models).

3. If a mount_point_directory does not already exist for the primary disk section of the mirrored disk, make one using the following command:

   # /bin/mkdir /newdir

   Where: *newdir* is the full path name of directory the new file system is to be mounted under.

4. Using vi or ed, delete any existing lines in */etc/checklist* that refer to the secondary disk section of the mirror disk pair. If a line does not exist for the mirrored disk primary disk section, add it according to the following format:

   /dev/dsk/cXd0sY /newdir hfs rw 0 P # /newdir

   Where:

Key	Operation
/dev../.0sY	Full path name of block special device file for the mirror disk primary disk section.
newdir	The full path name of directory the new file system is to be mounted under.
hfs	Section is a high performance file system.
rw	May be read or write to (default).
0	Backup frequency (set to 0).
P	Integer pass number determines order that *fsck* checks file systems.
#	Begin comment field.

5. If not already mounted, mount the mirrored disk primary disk section:

   # /etc/mount -a

   Where:

   -a attempts to mount all file systems in */etc/checklist*.

6. Mirror the primary and secondary disk sections:

   # /etc/mirror -c /dev/rdsk/cXd0sY online /dev/rdsk/cZd0sY \ offline

   Where:

Key	Operation
/cXd0sY	*X* = the primary disk logical unit number (see */etc/conf/gen/S800* for lu information). *Y* = section number of the primary disk.
/cZd0sY	*Z* = the secondary disk logical unit number (see */etc/conf/gen/S800* for lu information). *Y* = section number of the secondary disk (must be same as primary).

7. Update the secondary disk section with an exact image of the primary disk section using the *reimage* option (this will also bring the secondary disk online):

   # /etc/mirror -r /dev/dsk/cXd0sY

   Where:

Key	Operation
X	The primary disk logical unit number plus 2000 (see */etc/conf/gen/S800* for lu information).
Y	Section number of the primary disk.

8. After the reimage has completed, verify that both sections of the mirror disk are now ONLINE and GOOD:

   # /etc/mirror -l

Mirror *root*-and-*swap* Cookbook

To create a mirror of the *root* or *swap* sections, perform the following steps:

1. If the disk drive(s) to be used as secondary disk section(s) for *root* or *swap* have never been initialized, initialize the media.

Caution Initialization will destroy any data on the disk drive.

 # /usr/bin/mediainit /dev/diag/dsk/cXd0

Where: *X* = the logical unit (lu) number of the disk assigned by *insf* (for HP-UX versions prior to 8.0, when addressing an HP-FL device *X* becomes 2000 + the lu number).

2. Create an HP-UX file system(s) for *root* and/or *swap* mirrored secondary disk section(s):

 # /etc/newfs /dev/rdsk/cXd0sY hpZZZZ

Where:

Key	Operation
X	The logical unit (lu) number of the disk assigned by *insf* (for HP-UX versions prior to 8.0: when addressing an HP-FL device *X* becomes 2000 + the lu number).
Y	Section number of *root* or *swap* file system (see */etc/conf/gen/S800* for section).
ZZZZ	Model number of HP disk (see */etc/disktab* for supported models).

3. Using vi or ed, edit the *include* section of */etc/conf/gen/S800*. Uncomment the following line:
   From—

   */*include mirror;*/*

   To read—

   include mirror;

4. Using vi or ed, edit the *kernel devices* section of */etc/conf/gen/S800* file to mirror the *root* section, *swap* section, or both:

   From—

   root on disc2 lu X section Y;

   swap on disc2 lu X section Z;

   To read—

   root on disc2 lu X section Y mirrored on disc2 lu W section Y;

   root on disc2 lu X section Z mirrored on disc2 lu V section Z;

   Where:

Key	**Operation**
W	*root* secondary disk lu number.
Y	Section number of *root* file system.
V	*swap* secondary disk lu number.
ZY	Section number of *swap* file system.

5. Type the following commands to make a special file for mirror disk and change mode, ownership, and group for the special file:

   # /etc/mknod /dev/rdsk/mirconfig c 12 0x7f0000

   # chmod 666 /dev/rdsk/mirconfig

   # chown bin /dev/rdsk/mirconfig

   # chgrp bin /dev/rdsk/mirconfig

6. Follow the *UXGEN Process* to generate a new kernel (hp-ux). After a new kernel is booted, the system will mirror the *root* and/or *swap* file system and automatically re-image the mirrored file system(s) on system boot-up.

Modifying the LIF *auto* File Cookbook

1. At the ISL prompt, execute the *lsautofl* command. This command displays the content of the *autoexecute* file.
2. Execute the *set autofile* utility and make the desired changes.

   For example:

   ISL>hpux set autofile (;6) hpux (2/4.0.0;13)/hp-ux

3. Check the display message to ensure the change was correct.
4. From the *ISL>* prompt, set *Autoboot* ON. Check *Primpath* for proper disk path address.
5. Reset the system. The system should automatically boot up without operator intervention.

A

New Features for HP-UX 8.0

This appendix provides a list of the major new features available with HP-UX 8.0. While it is not a comprehensive list, it is offered here as a way to help transition those readers who are knowledgeable of HP-UX version 7.0, to the June 1991 8.0 release.

For a full explanation of HP-UX, readers are encouraged to consult other sources, such as those listed in Appendix B, *Other HP-UX Information Sources*.

Feature	What Changed	Page Reference
tar	- Revised default.	1-43
command	- Added: *h* option.	1-44
/etc/fbackup command	Handling warning for network files and NFS file systems.	1-51
/etc/frecover command	Added: *I*, *V*, *R*, and *c* options. Handling warning for network files.	1-56
/etc/inittab	New *inittab* startup routine.	2-32
/etc/rc script & function calls	Revised script. New function calls added: *set_privgrp*, *setparms*, *switch_over*, etc.	2-39/40
/etc/ powerfail	Added: runs */etc/src.sh* shell program.	2-41
shutdown and *reboot*	Added: changes to root directory (/).	2-42

Feature	What Changed	Page Reference
/dev directory	Added: */rac* subdirectory.	2-44
Device file naming	Changed: lu assigned by *insf* (formerly *uxgen*.	2-45
HP-UX special files	Remove: *swap*. Add: *config*, *root*, *rroot*.	2-48
mksf	Extracts major number from kernel (formerly */etc/devices*).	2-51
insf	Syntax change.	2-52
lpadmin	- Added: *-acluster_client*.	2-63
UXGEN process	Revised process diagram.	2-88
S800 file	Added: Include statements.	2-89
Kernel devices	Added: console, dump, root, swap.	2-90
Non-auto configurable devices	Added: I/O statement example.	2-94
Architecture drivers	Added: *scsi1*, *scsi2*, *disc3*, *tape2*, *mux0_16*, *autox0*, *lpr2*, etc.	2-95
lsdev	New 8.0 feature.	2-99
ioscan	New 8.0 feature.	2-100
DUI	- Revised *sysdiag* functionality.	3-3
	- Expanded *help* menu.	3-4

Feature	What Changed	Page Reference
logtool	New 8.0 feature.	3-10
Off-line diagnostics	Added *MPROC* and *UNIPROC*.	3-14
Support tape main menu	Revised.	3-16
verify	New 8.0 feature.	3-20
Diskless basics	Updated to include new client/server products.	5-2
Cluster config. w/SAM	Added: Designate Swap Location.	5-5
Add Terminal or Modem w/SAM	Menu update: Hardware Path (formerly Logical Unit Number.	7-12
Network install	Revised cookbook procedure.	7-16

B

Other HP-UX Information Sources

Reference Publications

Title	HP Part Number
HP-UX Reference (3-volume set)	09000-90013
HP-UX Users Guide	92453-90001
Advanced UNIX Programming (Prentice-Hall, 1985)	92453-90007
Troubleshooting HP-UX Systems, Error Diagnosis and Recovery	92453-90026
Configuring HP-UX for Peripherals, HP 9000 Series 800	92453-90032
Installing and Updating HP-UX	92453-90035
HP-UX System Administration Tasks Manual, HP 9000 Series 800	92453-90038
HP-UX Master Index, HP 9000 Series 800	92453-90041
Finding HP-UX Information, HP 9000 Series 800	92453-90042
HP-UX System Administration Concepts Manual	98594-90062
HP-UX VI Reference Card	98597-90000

GSY Information Database System

The GSY Server Mail Information Database System (GSYINFO) is available to the on-line community, and provides a way to obtain and exchange various types of information, including programs, documents, and interesting articles.

To access GSYINFO, use either:

- From HP Desk, at address *GSYINFO/HP4700*

  or

- From HP-UX systems, at address *gsyinfo@hpcugsya*

GSYINFO is easy to use, and has only a few basic rules. These are:

1. Your message *subject* can be anything you choose.
2. Commands (listed below) must be in the body (or text) portion of the message.

Commands

Command	Description
comment	All lines following this are mailed in a separate message to the Server Administrator. You may use *comment* to send Server bug reports, enhancement requests, or use this feature to submit new information to the database.
find pattern	Returns a list of files that match pattern. You may then use the *send* command to have any of these files mailed to you.
grep pattern	Returns a list of files that contain pattern in them, by doing a case-insensitive search. You may then use the *send* command to have any of these files mailed to you.

Commands, cont.

Command	Description
help	Returns help information (this list). When you receive this message from the Server you will be able to select specific help topics by entering an asterisk (*) before the pathname of the topic(s) and then mailing this message back to the Server. Your selection(s) will be mailed back to you in subsequent mail message(s). (See *send* below).
run	This command allows you to run specific programs and have the results of program execution mailed to you. Some programs may require that you send a template to the Server so that the necessary information can be provided to the program you wish to execute.
send [shar]	*index* is an alias for *send*. Returns a complete list of files that can be mailed to you, or use this command to have specific files mailed to you. When you receive the *send* message from the Server, you will be able to select specific files by entering an asterisk (*) before their pathname(s) and then mailing the message back to the Server. Your selection(s) will be mailed to you in subsequent mail message(s). If you use the [shar] option, all the files that you have requested will be "shar"ed, and then mailed to you.

C

New HP-UX 8.0 Products

This appendix briefly describes three new products that are now available with the introduction of HP-UX 8.0.

These products are:

- Mirror Disks/Data Pair, HP product number 9262XA
- SwitchOver UX
- Disk Quotas

Mirror Disks/Data Pair

With HP-UX 7.0 and 8.0 disk mirroring is available as a separate product for all Series 800 systems (except HP 9000 Model 815) with HP 7936/37 FL disk. Disk mirroring helps prevent data loss from occurring due to disk drive failures by maintaining two identical copies of data on separate disks. Disk mirroring is facilitated by a new device driver that makes two disk sections appear as a single section to applications. When the two sections are both on-line, writes are sent to both drives while reads are sent to the drive that can respond the fastest. The system will continue to operate when one of the disks is brought off-line, either through user interaction or disk failure.

Reference Documentation

- *DataPair/800 Data Sheet*, HP part number 5959-7881.
- *DataPair/800 Field Training Manual*, HP part number 5952-6577.
- *Software Release Planing* (SWEEP).
- *Managing Mirrored Disks*, HP part number 92453-90023.
- *DataPair* on 800 man pages.

SwitchOver/UX

The SwitchOver/UX software is a separate product to detect system failures and allow application processing to be switched to a backup system. To prevent data loss to disk failures adding HP DataPair/800 will further increase the availability of the entire system.

SwitchOver/UX allows one standby SPU to backup up to 7 primary SPUs and takeover on a failure. A monitor process (readpulse) will run on a backup process checking the health (heartbeat) of up to seven primary processors using an Ethernet Lan. If the backup notices a failure of one of the primaries, it will reboot using the multi-ported Fiber Link connected disk of the failed processor, effectively becoming that processor. The failed primary, it still running, will be halted by this process. Although the disks are connected to multiple processors, concurrent disk sharing between SPU's is not supported with the exception of the dedicated dump disk. This can be sharable between SPUs allowing a primary to dump a memory core image at the same time that the standby reboot from the primary's disks. This dump device can be integrated HP-IB disk embedded in NIO machines, in which case there would be 1 per SPU, or shared. If no dump device is available, a memory core dump will not be available for analysis. This will impact the customer's down time resulting in a non-supportable system.

SwitchOver/UX requires new link-level addresses for each host in the SwitchOver/UX host group. This address must be uniquely assigned. The new link-level addresses supplied with the SwitchOver/UX product will be associated with the software host as opposed to the link-level addresses which are found on the LAN card and therefore associated with the hardware. SwitchOver/UX sets the new link-level address during the system initialization phase. Associating this new address with the host software allows the host to have the same link-level address regardless of which SPU the host is running on. Two addresses per host are distributed so that each SPU may have two lan cards allowing for access to two networks and thereby removing any one lan as a single point of failure.

Reference Documentation

- *Managing SwitchOver/UX Manual*, HP part number 92668-90001.
- *SwitchOver/UX* on 800 man pages.

Disk Quotas

Disk quotas provide the system administrator of a multi-user system or clustered system, the capabilities to assign each user on the system, both a file and block quota for each writable file system.

Disk quotas not only provide the system administrator with means of managing disk resources among all of the users, but also helps to prevent users from accidently filling up an entire filesystem.

Disk quotas allow the system administrator to turn quotas on or off for each filesystem. Disk quotas also provide utilities to report on the file and block usage of users as well as current quota status of users.

Reference Documentation

- *HP-UX System Administration Tasks Manual*, HP part number 92453-90038.
- Man pages for the following commands: *edquota*, *quot*, *quota*, *quotacheck*, *quotaon/off*, *repquota*.

Index

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