SPP-UX System Administration Course Notes

CONVEX Education Center

April 3, 1995

TRN-XXXX

CONVEX Computer Corporation

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Terms

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Topics:

- Hardware Terms
- Software Terms

Hardware Terms

Slice

A slice consists of 2 cpus, 1 cpu agent, 1 ccmc, 1 memory board.

CSB

Camelot System Board. This is the backplane of the system.

CCMC

Convex Coherent Memory Controller. This is the gate array that keeps everything in its correct location.

Agent

This is the mechanism that a cpu uses to access any memory or IO that is not on board the cpu board.

MAUI

MPP Agent for Utilities and I/O gate array.

Test Station

HP-UX 712 that may boot and does monitor the Exemplar nodes.

Software Terms

OBP

Stands for Open Boot ~~Program~~. OBP is loaded out of an eprom at boot time and will boot SPP-UX.

complex

Refers to all processor and memory resources on all nodes in the machine.

Sub-Complex Manager

A utility enabling the system administrator to maintain a database of sub-complex definitions and to control the loading of sub-complexes onto the complex

default processor set

Every node has a default processor set. All processors in a node are initially assigned to the default set when the node is booted. A processor will remain in the default set until it is explicitly assigned to a sub-complex. When a processor is removed from a sub-complex, it is returned to the default set.

global memory

Memory which is accessible by all nodes in a sub-complex.

node

A set of processors and physical memory organized as asymmetric multiprocessor (SMP) running a single image of the Mach microkernel.

CTI cache

Convex Toroidal Interconnect Cache is the physical memory on a node which is reserved for caching references made over the network to other nodes.

overlay

A verb meaning to merge a new configuration with an old configuration by taking the new sub-complex definition and replacing any unallocated processors with their definitions from the old configuration

processor set

A collection of zero or more processors from a single node. Each mach thread is assigned to a processor set, and the threads of the task may only run on processors belonging to that processor set.

selected set

The set of processors that are currently highlighted in the graphical user interface.

server set

The set of processors on a node which will run server tasks for the node. Server tasks and mach kernel tasks will run only on processors belonging to the server set. Every node has a server set, and it must contain at least one processor at all times.

sub-complex

A logical entity which provides control over the allocation of processors and physical memory to different applications and users.

sub-complex server

A subsystem within the process manager which provides the system call interface for creating and manipulating sub-complexes and server sets on the complex.

system sub-complex

A sub-complex which is automatically created at boot time by the operating system to run system processes, including init and processes spawned by init. The Sub-Complex Manager will not allow users to destroy this sub-complex, nor to remove the last processor from this sub-complex.

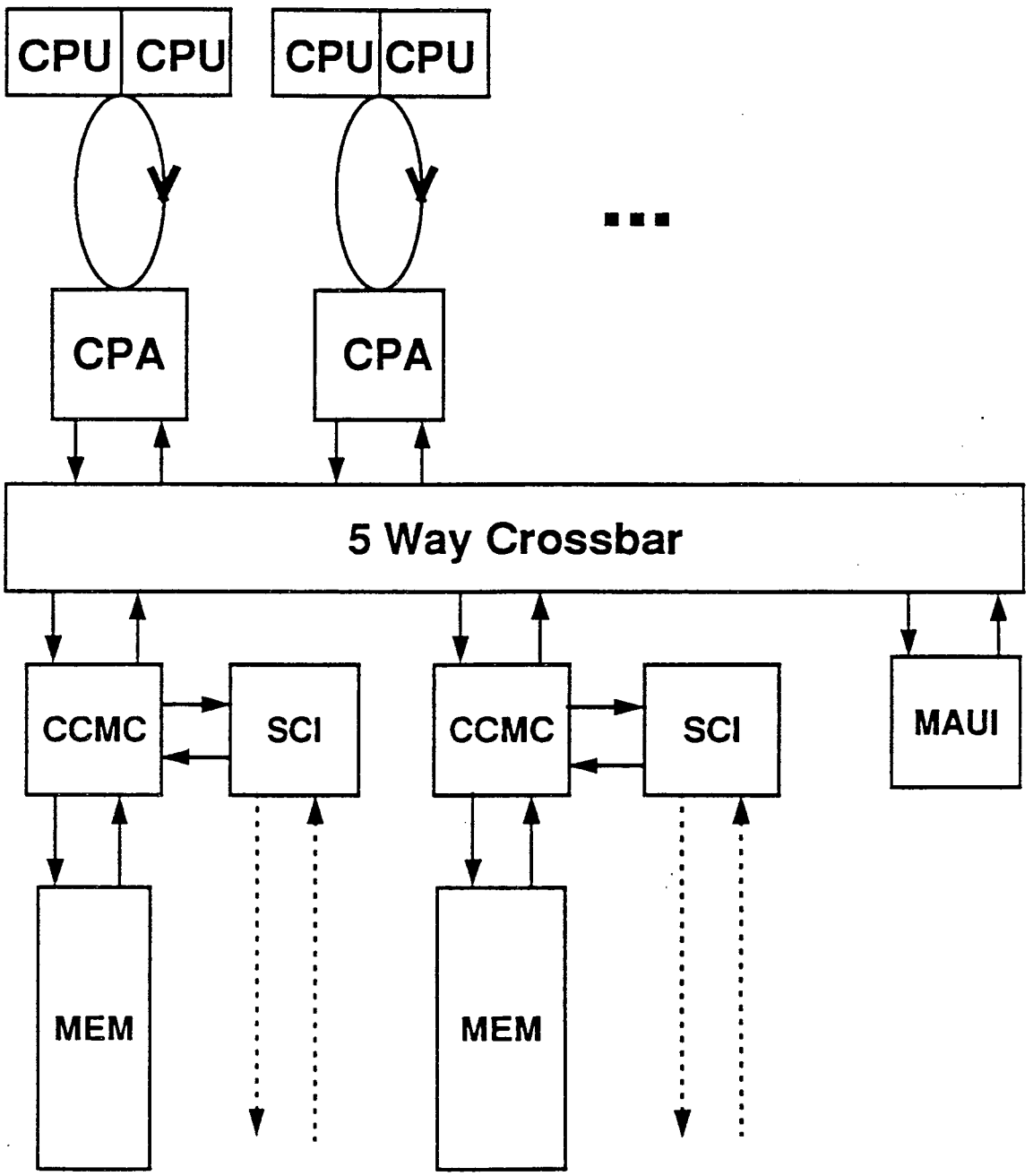
Architecture Overview 2

Topics:

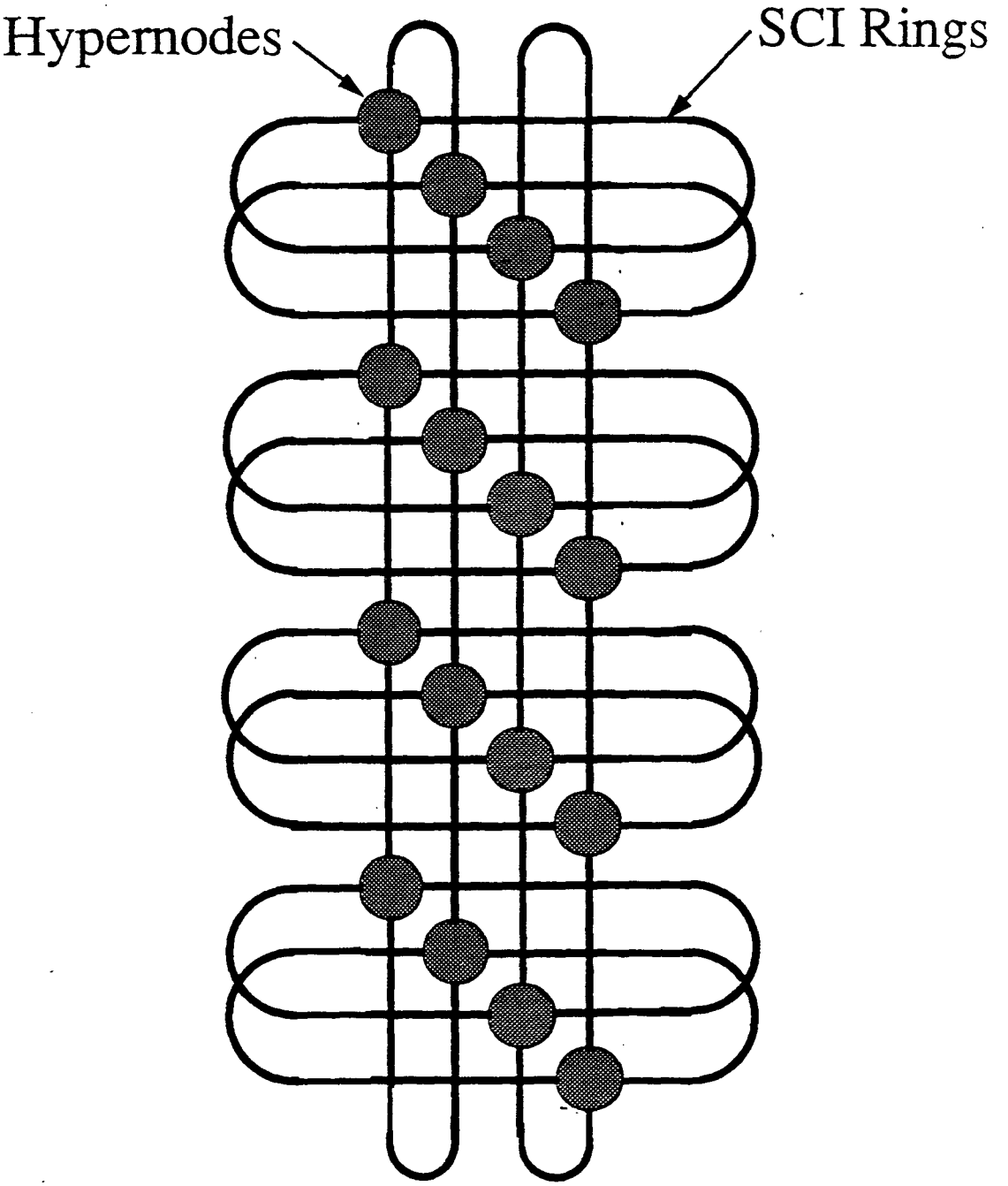
- Hypernode Layout
- Hypernode Block Diagram
- Multi-node Diagram
- LCD Module
- Memory Types

Hypernode Layout

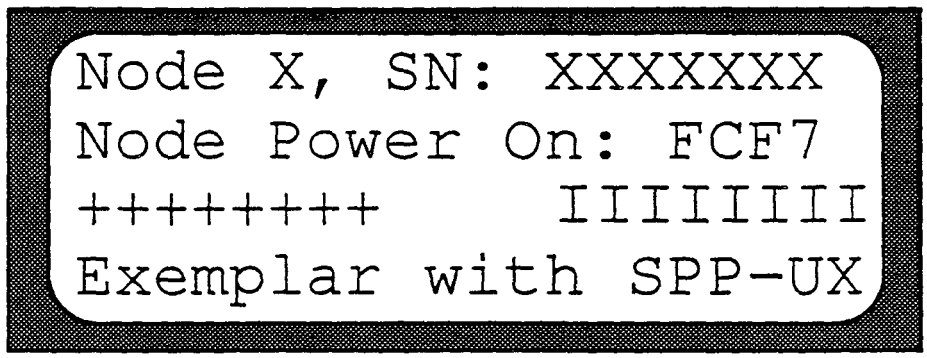
Hypernode Block Diagram



Mulit-Node Diagram



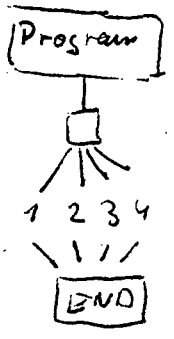
LCD Module



+,* - means not available	*The heartbeat of the each cpu in the hypernode.*
I	*The cpu is idle.*
E	*The cpu is executing the Emulator.*
U	*The cpu is executing User code.*
S	*The cpu is executing the Server.*
M	*The cpu is executin the Mach Kernel*

Memory Types

Memory Type	Description	Access Type	Latency
Cache	This is memory that is on the same board as the cpu.	Local	1 clock
Thread Private	Memory that is private to a thread of execution		50 clocks
Node Private	Memory used for the mach kernel and servers.		50 clocks
CTI Cache	Memory used to cache transfers over the CTI.		50 clocks
Near Shared	Global memory that resides on the same node as the process requesting the memory	Global	50 clocks
Far Shared	Global memory that resides on a different Hypernode than the the process that has made the request.		200 - 2000 clocks



SAM 3

Topics:

- Overview
- Subject Window
- List Window
- Data Entry Windows
- Example on Users and Groups

Overview

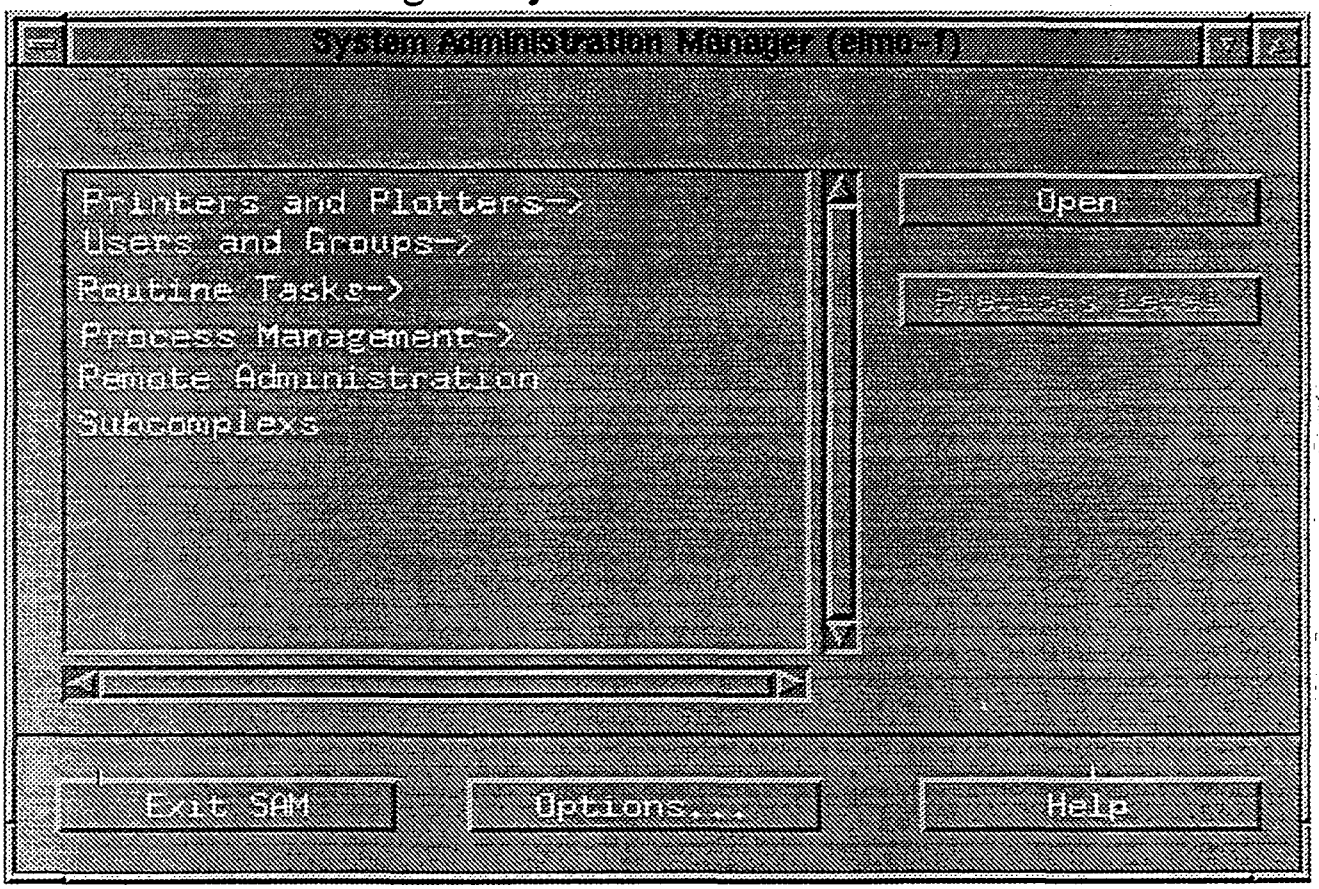
- One tool to perform most system administration tasks.
- Menu based.
- Runs on vt100, hpterm, or X11 window.
    - On some keyboards its difficult to use vt100 term type.
    - Here are the key strokes for a vt100:

```
PF1=^[OP

PF2=^[OQ

PF3=^[OR

pf4=^[OS
```

- Logs everything it does.
- Does **NOT** do everything.

Subject Window

- The primary window is for navigating around the various areas of administrating the system.



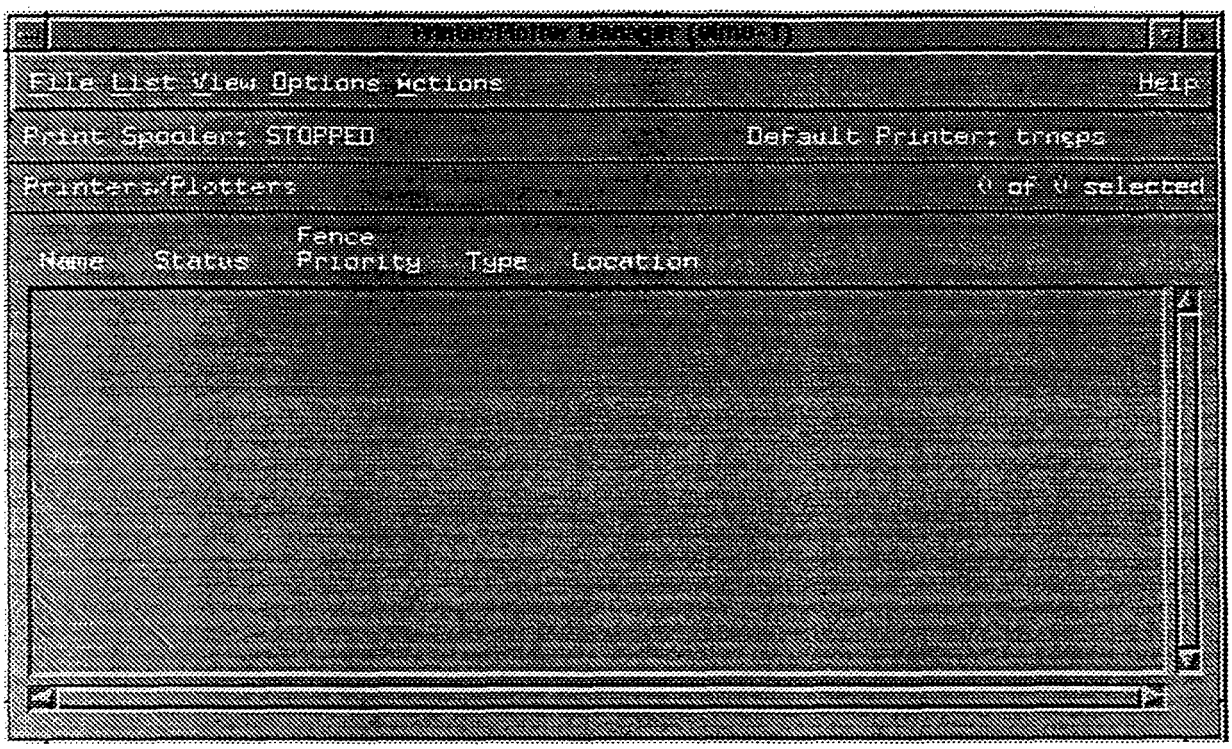
- Entries ending with -> designate that there is a sub menu.
- The **help button** will bring up hypertext-like on-line help. Clicking on an underlined item will bring up more details.
- The **options button** will allow you to control logging.

  Location of logfile.

  Degree of logging.

List Window

- The window for displaying information or for selecting items to be acted upon.



- Menus to use:

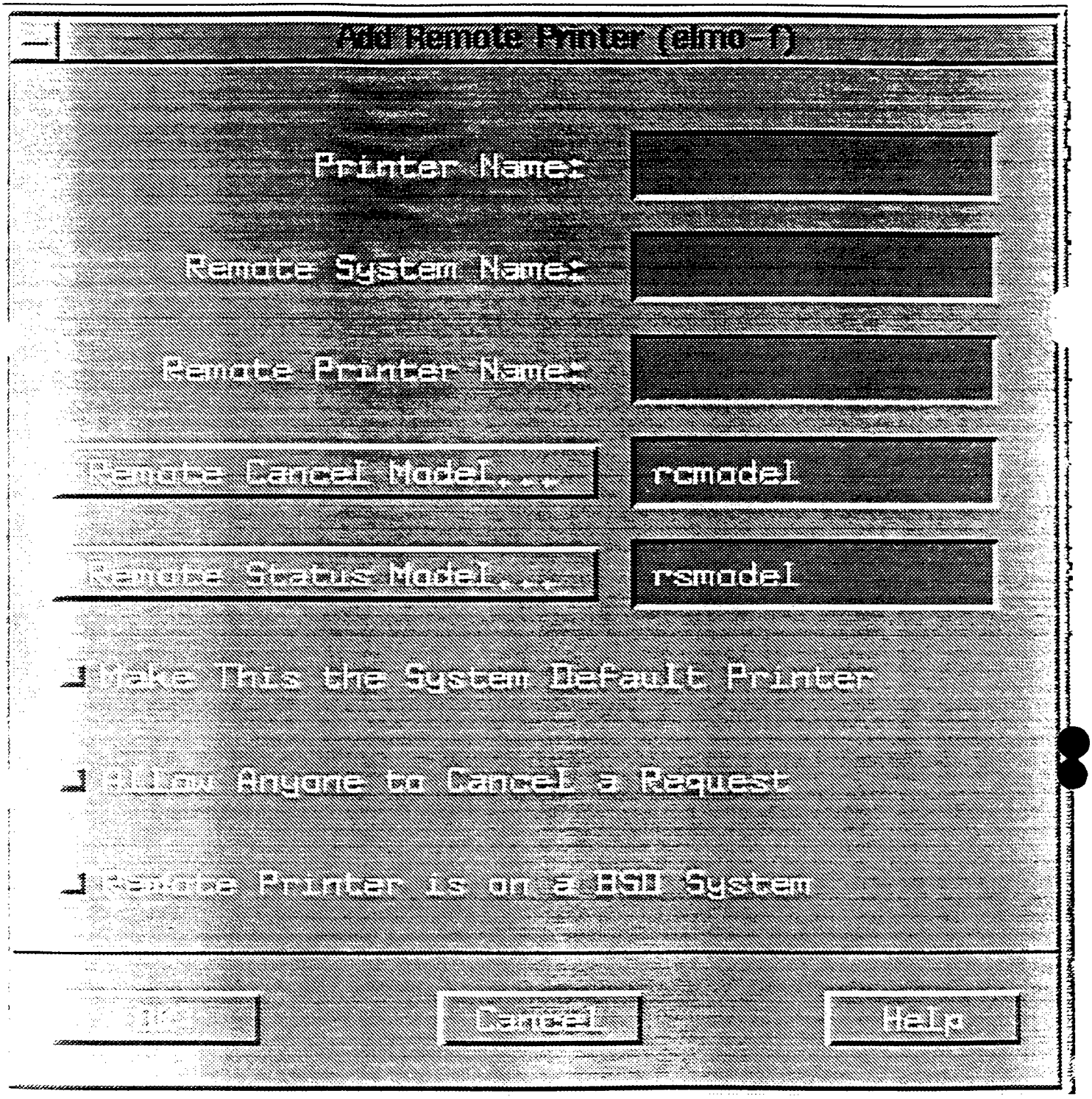
  `List` – Change or exit list window.
  `View` – Modify how or what is listed.
  `Options` – Usually, refresh the list.
  `Action` – Depends on which section you are in.

- Some actions require that one or more items be selected.

Data Entry Windows

- No standard format. The format of the window will be determined by the data required.
- Displayed as a result of selecting an action that requires sor kind of information.

- Sample Data Entry Window:



Open Boot PROM(OBP) 4

Topics:

- What is it?
- Commands
- NVRAM
- Devices

What is it?

Open Boot PROM(OBP) is a piece of software that controls the computer before the operating system has begun execution. Generally, this is reffered to as *firmware*. It is stored programmable read-only memory(PROM), so there is no need to load any software from media(disk, tape, etc...). The software then will be able executed immediately after the computer is turned on.

OBP will perform the following tests:

- test the hardware(cpu's, agents. xbar, etc...)
- search for external devices(disk drives, tape drives, network interfaces, etc...)
- boot the operating system

OBP provides the following:

- Low level device drivers(device tree)
- FORTH interpreter
- User configuration interface
- Operating system debugging

Commands

There are few commands that the System Administrator will nee to be familiar with. Although there are many more commands than what is presented here, the need to use most of the command will be small(if any).

- node
- cd
- ls
- boot
- setenv
- printenv
- set-default
- set-defaults
- nvalias
- nvunalias
- devalias
- show-devs

node

This command switches to the OBP's on the other nodes that are connected to the DART bus.

ok node <num>

Where num is the node number, which ranges from 0 to 15.

cd

This command changes the current node that is being accessed in the **device tree.**

ok cd /landmarc@0,ffec0000

This command is very similar to the UNIX command of the same name. Instead of tranfersing a tree of files, a tree of devices are being transferred.

ls

This command will display what is at the current node in the device tree.

```
ok ls
```

This command, again, is quite similar to the UNIX command. Remeber these are all devices, or a path to a device.

boot

This command tell OBP to boot the machine.

```
ok boot
```

The command can take several arguments. The most notable being the **-s** argument, which tells the machine to boot to single user.

printenv

This command will give you the current setting of the NVRAM parameters.

```
ok printenv
```

The list that is displayed includes the default as well as the current value. To look at just one parameter provide the parameter as an argument to the command.

setenv

This command will allow the setting of any of the NVRAM parameters.

```
ok setenv boot-args -1root sd16a
```

The command will set the the current value of the parameter. However, it will not modify the default setting.

set-default

This command will set the current value of a parameter to what is listed in the defaults for that parameter.

```
ok set-default boot-args
```

The parameter must be provided.

set-defaults

This command will set **all** of the parameter in the NVRAM back to what is listed in the defaults.

```
ok set-defaults
```

This is a very useful command as it puts the machine into known state.

nvalias

This command will set an alias for a device into NVRAM.

```
ok nvalias sd0a /land-
marc@0,ffec0000/sbus@f,fcffff00/Con-
vex,afws@1,10000:narrow/sd@2,0:a
```

This actually modifies the NVRAM parameter **nvramrc**, so that eveytime the machine is reset the alias is there.

nvunalias

This command will delete an alias for a device.

```
ok nvunalias sd0a
```

Again, this will modify the **nvramrc** parameter.

devalias

This command allows you to display and temporaily set an alias.

```
ok devalias
```

The command issued with no parameters will show all the aliases on the system, with 1 parameter will show the alias that correspond to that name, and with 2 will set a temporary alias.

show-devs

This command will show all of the devices known to the system

```
ok show-devs
```

NVRAM

The NVRAM parameters are the charateristic under which OBP will operate. These are values that are stored into memory that will not be erased when there is no power applied.

Here are some of the more important parameters

Table 1:

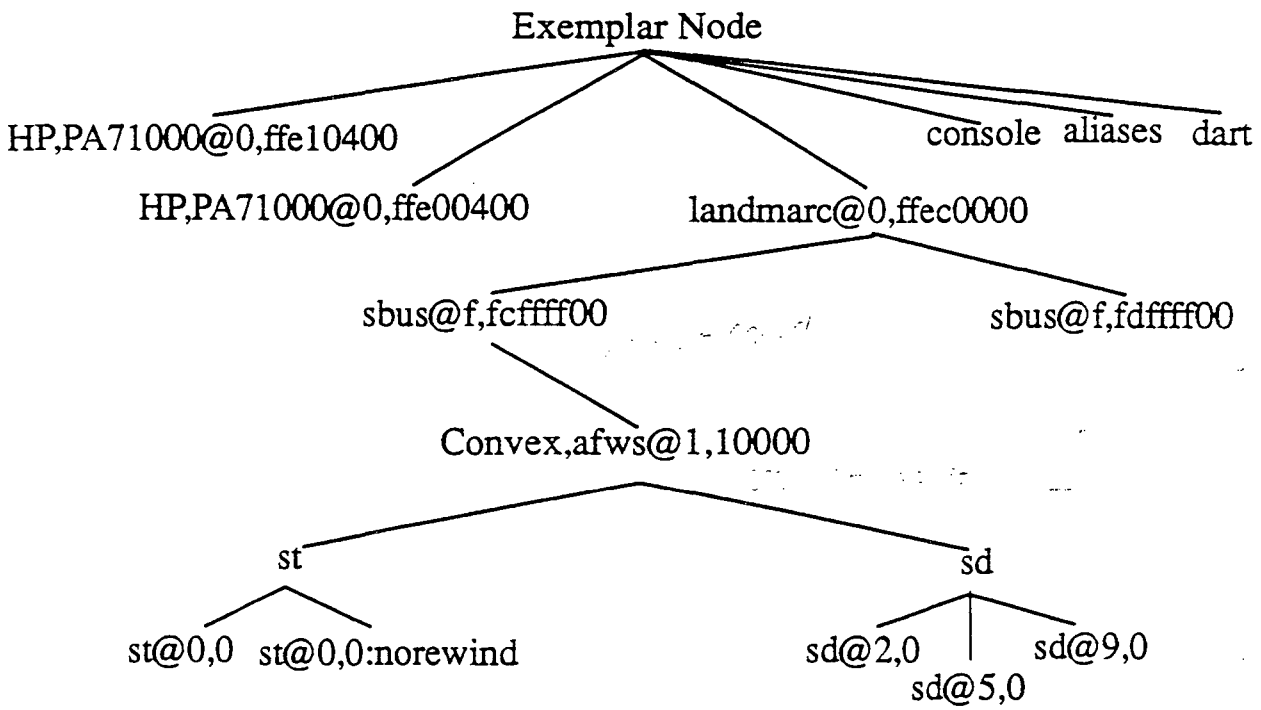
Parameter	Setting	Description
auto-boot?	ture/flase	If true, the machine will boot automatically after a power-on or reset.(Interrupt with ESC).
boot-args	null/chars	default boot arguments
boot-device	path	device from which to get SPP-UX
boot-file	path	File to boot, usually 'mach'
load-tunables	true/false	If true, the load the tunables file.
nvramrc	null/chars	Contentes of the NVRAMRC
use-nvramrc?	true/false	if true, use the information in NVRAMRC

boot-directory /os - default

/alternate-os alternate

Devices

The device tree is how OBP informs SPP-UX what is connected to the system. Here is a typical device tree:



Booting SPP-UX

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Topics:

- Current Booting Methods
- The do_reset Command
- SPP-UX files
- Boot Multi-User
- Boot Single-User
- Single to Multi-User
- Boot an Alternate OS
- Getting a Console
- Example Boot Session
- Boot Sequence
- Shutdown Sequence

Current Booting Methods

- Booting off of the Teststation.
- Booting off of the local disk.
- Boot scratch tape:
  Scratch Install Tape

Booting off of the Teststation.

- Uses script /spp/os/sppboot.
- Resets the machine.
- Loads OBP into memory from an EPROM.
- Starts OBP.
- Loads the kernel over the DART bus.
- Tells OBP to boot SPP-UX.

Booting off of the local disk.

- Will use the **/spp/bin/do_reset** command to reset the machine.
- Loads and executes OBP.
- After presented with the OBP prompt issue the boot command.

The do_reset command

This is the command to use in order to reset the SPP machine. It is generally needed after a hang/crash, or after halting the machine.

- The syntax of the command:

  ```
  do_reset [level] [node]
  ```

  Where:

level		is the Level to reset the machine. There are three.
	1	is the same as powering the machine off and then back on.
	2	Reset the IO and memory.
	3	Resets memory if needed
node		is the node to reset. If no node number is specified, then all nodes connected to the teststation are reset.

sn_cnsld - consol-window-daemon

default-level: 3

SPP-UX Files

Unlike most UNIX systems the kernel is not one file. Infact to load SPP-UX it takes 3 files. The files in question are located in the default location /os. Here is what you should have in /os:

- cluster.conf.fth - FORTH file that obp will execute
- conf.fth - FORTH file that obp will execute
- license - license server. This is not enabled at the time.
- mach - the low level kernel
- mach_init - initiator for the low level kernel
- server - provides systems services. What is conventionally thought of as the kernel on most UNIX systems.
- tunables - file to tune the server, and mach without recompilation.

Booting Multi-User

- On the test station:
  1. cd /spp/os
  2. Issue the command:

     ```
     $ sppboot
     ```

  3. This will take about 5 minutes.
- Off of the local disk
  1. Issue the command:

     ```
     $ do_reset 3 0
     ```

  2. After the OBP prompt issue the command:

     ```
     ok boot
     ```

Booting Single-User

- On the test station:
  1. cd /spp/os
  2. Issue the command:

     ```
     $ sppboot -s
     ```

  3. This will take about 5 minutes.
- Off of the local disk
  1. Issue the command:

     ```
     $ do_reset 3 0
     ```

  2. After the OBP prompt issue the command:

     ```
     ok boot -s
     ```

Single to Multi-User

- On most BSD machine transistion from single to multi-user is accomplished by exiting the single-user shell.
- To go from single the multi-user on a SYS V machine do the following steps:

  1. Decide which run-level is desired.

     For the standard multi-user boot check the file **/etc/inittab**. Look for the run-level indicated by the action **initdefault.**

  2. Issue the init command to take the machine to the desired run-level:

     ```
     # init 2
     ```

multi → single

init s

Boot an Alternate SPP-UX

There are two defeinitions to booting an Alternate SPP-UX:

- Boot a different version of the SPP-UX from the standard root partition(sd0a).
- Boot a different version of SPP-UX from a **different** root partition.

Different SPP-UX same Root Partition

Follow these steps to boot a new SPP-UX:

1. Install the new SPP-UX files in the a known place. Lets say **/os/new.**

2. Shut the system down.

   ```
   #/etc/shutdown -r 600
   ```

3. When OBP gives the prompt, enter the following:

   ```
   ok setenv boot-directory /os/new
   ```

4. The OS should now boot using your newly installed files:

   ```
   ok boot
   ```

check if autoboot is set

determine patch level:
sysinfo

Different SPP-UX different Root Partition

Follow these steps to create and boot off of a alternate partition:

1. Decide which disk you will use. This is usually an entire disk due to the paging and crashdump partitions. Layout the disk using **diskutil**. Here is what the disk should look like:

```
a:            0K    819200K
b:       819200K    102400K
c:       921600K     40960K
d:       962560K   1024000K
c should be marked for crashdump.
d should be marked as a default_pager.
```

2. Make a copy of the current root partition:

```
# dd if=/dev/rdsk/sd0a
of=/dev/rdsk/sd16a seek=1 skip=1 bs= 8k
```

3. Make a directory to mount the partition:

```
# mkdir /sd16a
```

4. Mount the disk onto the partition

```
# mount /dev/rdsk/sd16a /sd16a
```

5. Edit the checklist file on the new root partition changing all occurances of the previous disk(sd0a) to sd16a.

```
# vi /sd16a/etc/checklist
```

6. Shutdown the machine

   ```
   # /etc/shutdown -r now
   ```

7. Make a NVRAM alias if needed

   ```
   ok nvalias sd16a <device string>
   ```

8. Set the OBP parameters

   ```
   ok setenv boot-device sd16a

   ok setenv boot-args -root sd16a
   ```

9. Boot the machine.

   ```
   ok boot
   ```

The machine should now be booted multi-user off of the new partition.

The Console

- The daemon is started by inetd. Here is an example entry in /etc/inetd.conf:

```
cnsl dgram udp wait root /spp/etc/sn.cnsld sn.cnsld -t 1
```

-t	The -t option specifies the number of minutes. If there is no -t option, then the window is not restarted.

- To start up a new console use the command:

```
% sn_cnsl [-f]|[-s]|[-F]|[-S] <N>
```

-f	Force a console connection. It will take over the console from any other console that currently exists.
-s	Start a console in spy mode. It will display the same information that is on the real console. Entering commands is not allowed.
N	The node to pull up a console on. Nodes start at 1.

- The capitalized versions of the flags will display the console buffer when the console is activated.
- Only one console window may exist at a time (that has keyboard activated)

The Console (continued)

- To exit from the console

  ^Ec.

- To force a change in a spy window into the console window,

  ^Ecf

- To force a change in a console window to a spy window,

  ^Ecs

setenv boot-device sd16a
setenv boot-args -root sd16a
devalias
nvalias sd16a ... sd3,0:c
lsi-id

Example Boot Session

```
zing_d:/spp/os$ sppboot
Default node is 0
Default ccmc is 0
/spp/bin/do_reset:  attempting a level 3 reset of node 0
/spp/bin/do_reset:  waiting 2 seconds to be sure reset is complete.
/spp/bin/do_reset:  checking for completion on node 0
CPU number is 6
CPU number is 4
CPU number is 2
CPU number is 0
Trace got : 0x20
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0x800
Trace got : 0xffffffff
Status returned is : 0x10000
**** loading server ****

Entry address : 0x1c84f8
Text address  : 0x1000
Text size     : 0x1e31dc
Text pointer  : 0x1000
Data address  : 0x1e5000
Data size     : 0x8b000
Data pointer  : 0x1e5000
BSS size      : 0x0
Addr Offset   : 0x1000000
Physical entry point is : 0x11c84f8
**** loading mach_kernel ****

Entry address : 0x1e7568
Text address  : 0x100000
Text size     : 0x16a65c
Text pointer  : 0x1f6000
Data address  : 0x26b000
Data size     : 0x38000
Data pointer  : 0x361000
```

```
BSS size     : 0x8ad38
Addr Offset  : 0x0
Physical entry point is : 0x1e7568
**** loading mach_kernel header ****
Load point is : 0x2000000
**** loading server header ****
Load point is : 0x2100000
**** loading tunables size ****
Load point is : 0x2200000
**** loading tunables ****
Load point is : 0x2200004
**** pushos done ****
Console zing_d closed.
zing_d:/spp/os$
```

On the Exemplar console:

```
OBP Hard boot

Scaliac-8/128, OBP Release 2.8X Version 592 created 94/03/24 17:49:56
4 CPUs installed, 512 MB memory installed, I/O installed, Keyboard
Present.
Complex Serial Number: -1, Node Serial Number: 1999097.
Network address 0:0:0:0:0:0, Host ID #: 00000000.

This version of OBP supports loadhack.
Type  help  for more information
[0:2] ok
Console : Node 0 is forced by zing_d
setenv boot-args
Usage: setenv option-name value
[0:2] ok gohack
no /ramdisk device created
Creating tunables property of /options
Creating server-load-map device node
Setting CPU state for OBP client program
[62000001 001d6890] Mach 3.0 NORMA_MK16.1 V16.18 viggen:/work14/finger 03-25-94
[62000001 001d61b0] Scaliac, 1024K Icache, 1024K Dcache
[62000001 001d4510] Combined TLB, 16 block entries
[62000001 001f1058] kgdb initialized, protocol 7, cpu 2
[62000001 00162f08] physical memory (bytes) = 0x20000000 (512 Mbytes)
[62000001 00162f34] free memory (bytes)     = 0x1ea69000 (490 Mbytes)
[62000001 00162f58] physical address range  = 0x00000000 - 0x1fffffff
[424f6003 001c02a0] Event logger initialization complete
[02500000 0021d5b8] Successful probe of device /landmarc@0,ffed0000
[02430000 00209f88] Successful probe of device /landmarc@0,ffed0000/sbus@f,fcfff
```

```
f00/CRES,cddi@1,400000
[02430000 0020b678] Successful attach of fddi /landmarc@0,ffed0000/sbus@f,fcffff
00/CRES,cddi@1,400000  Address 00:40:0b:40:18:59
[02500000 0021d5b8] Successful probe of device /landmarc@0,ffec0000
[62000001 0020dba0] scsi: controller 0:0 probed
 Console 1 reconnected ...
[62000001 002142e4] scsi disk: disk 0:0:2:0 attached
[62000001 00214c90] scsi disk: disk 0:0:2:0 mapped to sd0
[62000001 00214e74] scsi disk: partition sd0d reserved for default pager
[62000001 001f7910] tgdb initialized, protocol 7
[62000001 00173790] (default pager): Added paging device sd0d
[63000001 0017d540] Mach 3.0 NORMA_MK16.1 V16.18 viggen:/work14/finger 03-25-94
[63000001 0017d558] Mach 3.0 U:Server:AD 1.0.2 V16.4 scalios:/scalios 03-25-94
[63000001 0017dd8c] physical memory = 512.00 megabytes
[63000001 0017e42c] available memory = 477.28 megabytes
[63000001 0017e528] using 819 buffers containing up to 51.18 megabytes of memory
[83490000 0002d340] host_control 10004004
[43461fe9 000776c0] Creating Subcomplex id =  1
[43461fff 00075960] Assigning Node  0 Cpu  0 to Subcomplex id  1
[43461fff 00075960] Assigning Node  0 Cpu  2 to Subcomplex id  1
[43461fff 00075960] Assigning Node  0 Cpu  4 to Subcomplex id  1
[43461fff 00075960] Assigning Node  0 Cpu  6 to Subcomplex id  1
[63000001 00006800] Waiting for nameserver on local node...
[63000001 00006eec] Root device sd0a: major=1 minor=0
[63000001 00176ed0] Base is Fri Mar 25 17:15:58 1994
[63000001 00176ed0] Current time is Fri Mar 25 18:13:22 1994
[63000001 00176ed0] Time is set to Fri Mar 25 18:13:22 1994
[63000001 00007b20] Server initialization finished.
[63000001 00128354] emulator [900510] Mach 3.0 Emulator:AD 1.0.2 V16.2 scalios:/
 scalios 03-25-94
[63000001 00128354] emulator [900510] File descriptor table initialized.
Checking root file system.
Root check done, starting up init.
cnode id:    1, cnode name:  standalone
/etc/bcheckrc:

/etc/fsclean: /dev/dsk/sd0a not ok, run fsck
/etc/fsclean: /dev/dsk/sd0b clean
FILE SYSTEM(S) NOT PROPERLY SHUTDOWN, BEGINNING FILE SYSTEM REPAIR
FILE SYSTEM IS FIXED

/etc/recoversl: Checking shared libraries
/etc/brc:
 Removing /etc/rcflag.
 Removing /etc/mnttab.
 Setting up /dev/crt.
```

```
/etc/rc:
Starting up standalone system
Is the date Fri Mar 25 17:13:47 CST 1994 correct? (y or n, default: y)
swapon: adding /paging/space as paging file: low water mark 16777216, high water
 mark 67108864
swap device(s) active
syncer started
preserving editor files (if any)
cleaning up uucp
/usr/spool/uucp directory unreadable
add net default: gateway 130.168.85.254
   starting NFS networking
      NIS domain name not set
      /etc/portmap
   Network Information Service not started.
   starting up the mountd
      /usr/etc/rpc.mountd
   starting up the NFS daemons
      /etc/nfsd 4
   starting up the BIO daemons
      /etc/biod 4
   starting up the Status Monitor daemon
      /usr/etc/rpc.statd
   starting up the Lock Manager daemon
      /usr/etc/rpc.lockd
ARPA/Berkeley daemons started: inetd  sendmail
      mounting remote NFS file systems ...
   starting up the Automount daemon
      /usr/etc/automount
      No Maps were specified
Network management daemons started: NETWORKING started.
cron started
starting the ptydaemon
System message logger started
System message logger started
Fri Mar 25 17:14:49 CST 1994

Exemplar Series SPP-1000, SPP-UX Snapshot V3.0
Console Login:
```

Boot Sequence

- /etc/pre_init_rc
    1. executes fsck on /dev/rroot (/)

- /etc/init

  1. reads /etc/inittab

  2. Example of an /etc/inittab file:

```
init:4:initdefault:
stty::sysinit:stty 9600 clocal icanon echo opost onlcr ienqak ixon icrnl ignpar
</dev/systty
brc1::bootwait:/etc/bcheckrc </dev/console >/dev/console 2>&1 # fsck, etc.
slib::bootwait:/etc/recoversl </dev/console >/dev/console 2>&1 #shared libs
brc2::bootwait:/etc/brc >/dev/console 2>&1     # boottime commands
link::wait:/bin/sh -c "rm -f /dev/syscon;         ln /dev/systty /dev/syscon"
>/dev/console 2>&1
rc  ::wait:/etc/rc </dev/console >/dev/console 2>&1 # system initialization
powf::powerwait:/etc/powerfail >/dev/console 2>&1   # power fail routines
lp  ::off:nohup sleep 999999999 </dev/lp & stty 9600 </dev/lp
halt:6:wait:/usr/lib/X11/ignition/shutdown.ksh  # NOTE: run-level 6 is reserved
for system shutdown
cons:012456:respawn:/etc/getty -h console console     # system console
vue :34:respawn:/etc/vuerc# VUE validation and invocation
```

- The sturcture of /etc/inittab:

  id:rstate:action:process

- Where:

id	a 1 to 4 character string that uniquely identifies the entry.
rstate	defines the run level at which the entry should be processed. Valid rstates are: s0123456
action	key words that tell init how to handle the process
process	is an sh command to be executed. The process field is prefixed with a command and passed to sh as *sh -c 'exec command'*

- Here are the valid actions

respawn	If the process does not exist, start the process and do not wait for its termination.
wait	Start the process and wait for the process to terminate.
once	Start the process once upon entering the run level. Do not wait for termination and do not restart the entry.

boot	Process the entry only at boot-time.
bootwait	Process the entry only at boot-time and wait for the termination of the process.
powerfail	Execute the process only if init receives a SIGPWR.
powerwait	It executes the same as powerfail, but waits for the process to terminate.
off	If the process is running the send a SIGTERM, wait 20 seconds then send a SIGKILL.
initdefault	The entry is scanned only when init is first invoked.
sysinit	These are entries that will be executed before init tries to access the console.

3. /etc/bcheckrc

    1. Executes /etc/fsclean on all file systems.
    2. If a problem is encountered, will spawn a shell to allow the correction of the file system
    3. Executes /etc/src.sh, setting the SYSTEM_NAME and TZ variables.
    4. Mounts all HFS file systems.

4. /etc/recoversl

    1. Checks the owner, and group permissions for the following file:

    - /lib/dld.sl
    - /lib/libc.sl

5. /etc/brc

    1. Sets system PATH.
    2. Removes /etc/rcflag to indicate later that the machine is in a start-up condition.
    3. Removes /etc/mnttab if it exists.

6. /etc/rc

    1. Mounts all file systems listed in /etc/checklist
    2. Checks that SYSTEM_NAME and TZ are set.
    3. Call the command **savecore** to save a core image of a previously crashed system. if the directory /tmp/syscore exists. If there is not enough space to save a complete core, **savecore** will print a message and exit.

4. An /etc/rc:

```
#! /bin/ksh
## Configured using SAM by root on Sat Mar  5 14:12:54 1994
# @(#) $Revision: 1.12 $

# This Instant Ignition version of the /etc/rc script replaces the
# standard messages from /etc/rc with a status "checklist."  Output
# and error messages from various commands are routed to the file
# /usr/adm/rc.log.
#
# NOTE: This script must run under Korn Shell.  It sources the file
# /etc/rc.utils which depends on ksh.  If you need to use Bourne shell
# for the rc script, then you may want to use the standard version
# found in /etc/newconfig/rc.

# Definitions of functions used within this script
#
# The initialize() and localrc() functions below contain
# most of what must be customized in this script.
# This structure has been adopted to minimize the number
# and difficulty of changes required to adopt new functionality
# in future releases of /etc/rc for HP-UX.
#
# Other portions of this script may be customized also, but HP
# recommends that changes be minimized to simplify future updates.
#

initialize()
{
# The following parameters may be modified for the specific
# needs of your local system.

#
# Set the device file(s) used by /etc/rbootd
# If no device is specified, /etc/rbootd will
# use the device corresponding to the ethernet
# address of the machine.
#
RBOOTD_DEVICES=""

# Set the system's network name:
# This is done automattically at the first bootup
# by the /etc/set_parms script.  The system name is
# written to the /etc/src.sh file for subsequent bootups.
# The /etc/src.sh file is sourced by this script to set
# the SYSTEM_NAME variable.

if [ "$SYSTEM_NAME" = "" ]
```

```
then
   SYSTEM_NAME=unknown
   export SYSTEM_NAME
fi

# set the timeout length for date setting:
# TIMEOUT=0  # skips date setting
TIMEOUT=20

# setup for the optional vt gateway, see vtdaemon(1m)
vtgateway=""# name of system acting as the gateway
vtgopts=""# vtdaemon options
vtginterfaces=""# gateway devices
}

localrc()
{
# This function is intended for adding local initialization
# functions to rc.  This function is called after all other
# system initialization is completed.

# The following line is required for function syntax.
: # do nothing instruction (a function must contain some command)

# For example:
# For HP-IB printers:
#Uncomment the 'slp' line below to
#set indentation to 0 for /dev/lp.
#Similar lines should be added for additional printers.
#/usr/bin/slp -i0 > /dev/lp &

if [ -x /usr/lib/nqs/nqsdaemon ] ; then
/usr/lib/nqs/nqsdaemon &
echo Starting NQS+
fi

# Stuff to start the lsf daemons
LM_LICENSE_FILE=/usr/cxcommon/licenses/license.dat
export LM_LICENSE_FILE

if [ -f /usr/cxsoft/etc/lim ]; then
/usr/cxsoft/etc/lim
echo " lim\c" > /dev/console
fi

if [ -f /usr/cxsoft/etc/res ]; then
/usr/cxsoft/etc/res
echo " res\c" > /dev/console
fi
```

```
if [ -f /usr/cxsoft/etc/sbatchd ]; then
/usr/cxsoft/etc/sbatchd
echo " sbatchd" > /dev/console
fi

}

# The following functions should require no additional customization:

set_date()
{
  if [ $SET_PARMS_RUN -eq 0 ] ; then
if [ $TIMEOUT -ne 0 ] ; then
# This section confirms that the date and time are
# correct.
# Systems with battery-backed real-time clock will
# be correct.  Therefore, the default answer is yes.
# The question will timeout in $TIMEOUT seconds.  If the
# question is not answered within the specified timeout,
# the default answer will be returned.  To increase the
# timeout, change the value assigned to TIMEOUT (above).
# TIMEOUT of 0 will skip this question.

echo "\007Is the date `date` correct? (y or n, default: y) \c"
reply=`line -t $TIMEOUT`
echo ""

if [ "$reply" = y -o "$reply" = "" -o "$reply" = Y ]
then
return
else
if [ -x /etc/set_parms ]; then
/etc/set_parms time_only
fi
fi
fi

   fi# if SET_PARMS_RUN
}

hfsmount()
{
# create /etc/mnttab with valid root entry
/etc/mount -u >/dev/null

# enable quotas on the root file system
# (others are enabled by mount)
[ -f /quotas -a -x /etc/quotaon ] && /etc/quotaon -v /

# Mount the HFS volumes listed in /etc/checklist:
```

```
/etc/mount -a -t hfs -v
# (NFS volumes are mounted via net_start() function)

# Uncomment the following mount command to mount CDFS's
/etc/mount -a -t cdfs -v

# Preen quota statistics
[ -x /etc/quotacheck ] && echo checking quotas && /etc/quotacheck -aP
}

syncer_start()
{
# Syncer helps minimize file system damage in the event
# of a power failure or other system crash.
# run at rtprio to avoid being swapped out
if /usr/bin/rtprio 127 /etc/syncer
then
echo syncer started
        else
                return 1
fi
}

lp_start()
{
#
# Start lp printer scheduler, if configured.
#
# NOTE:
# For RS-232 printers:
#     If your line printer interface is RS232 and not set
#     to 300 baud, then change the 'lp' line in
#     /etc/inittab from 'off' to 'once' and make sure the
#     baud rate set there is correct for your printer.
#
if [ -s /usr/spool/lp/pstatus ]
then
lpshut > /dev/null 2>&1
rm -f /usr/spool/lp/SCHEDLOCK
lpsched
echo line printer scheduler started
fi

}

clean_ex()
{
if [ -x /usr/bin/ex ]
then
echo "preserving editor files (if any)"
```

```
( cd /tmp; expreserve -a )
fi
}

clean_uucp()
{
if [ -x /usr/lib/uucp/uuclean ]
then
echo "cleaning up uucp"
/usr/lib/uucp/uuclean -pSTST -pLCK -n0
                return $?
fi
}

net_start()
{
if [ -x /etc/netlinkrc ] && /etc/netlinkrc
then
echo NETWORKING started.
        else
                return 1
fi
}

swap_start()
{
# Turn on swapping on alternate swap devices.
# /etc/checklist "swap" entries configured in the kernel are used.
if /etc/swapon -a
then
echo 'swap device(s) active'
        else
                return 1
fi
}

cron_start()
{
if [ -x /etc/cron ]
then
if [ -f /usr/lib/cron/log ]
then
mv /usr/lib/cron/log /usr/lib/cron/OLDlog
fi
/etc/cron
                if [ $? -eq 0 ]
                then
                   echo cron started
                else
                   return 1
```

```
                fi
fi
}

pty_start()
{
# Not supported on all systems
# ptydaemon allocates pty's to various processes
if [ -x /etc/ptydaemon ]
then
echo "starting the ptydaemon"
/etc/ptydaemon
                return $?
fi
}

vt_start()
{
# Not supported on all systems
# vtdaemon responds to vt requests from other systems
#  See vtdaemon(1m) for more information about the vtdaemon.

if [ -x /etc/vtdaemon ] && [ -c /dev/ieee ]
then
case `hostname` in
    $vtgateway)echo "starting the gateway vtdaemon"
/etc/vtdaemon $vtgopts $vtginterfaces
    ;;
    *)echo "starting the vtdaemon"
/etc/vtdaemon
    ;;
                esac
                return $?
        fi
}

list_tmps()
{
for dir in /tmp /usr/tmp /lost+found
do
if [ "`ls -A $dir`" ]
then
echo "NOTE:  Files in $dir:"
ls -lA $dir
fi
done
}

clean_adm()
{
```

```
mask=`umask`
umask 022
for LOG in sulog diaglog messages syslog
do
if [ -f /usr/adm/$LOG ]
then
mv /usr/adm/$LOG /usr/adm/OLD$LOG
if [ $LOG != sulog ]
then
> /usr/adm/$LOG
fi
fi
done
umask $mask
}

switch_over()
{
if [ -x /etc/switch/switchsetlan ] && ([ ! -x /bin/getcontext ] ||
    (/bin/getcontext | /bin/egrep "localroot|standalone" > /dev/null))
then
    . /etc/switch/switchrc
    SWITCH_INFO="${SWITCH_INFO:-/etc/switch/Switchinfo}"
    if [ $SYSTEM_NAME != "unknown" ]; then
if [ -f $SWITCH_INFO ]; then
    /etc/switch/switchsetlan -f $SWITCH_INFO $SYSTEM_NAME
else
    echo "SwitchOver/UX: $SWITCH_INFO not found"
fi
    else
echo "SwitchOver/UX: SYSTEM_NAME unknown"
    fi
fi
}

envd_start()
{
if [ -x /etc/envd ] && [ -f /etc/envd.conf ]
then
set -- `ps -e | grep envd` ||
{
                  /etc/envd ;
 if [ $? -eq 0 ] ;
 then echo "Environmental daemon started" ;
 else return 1 ;
 fi ;
                }
fi
}
```

```
set_state()
{
# Determine what kind of system this is
# (standalone, cluster server or client)
# Set hostname to cnode name if diskless,
# otherwise use the value from initialize()
if [ -x /bin/getcontext ] &&  set -- `getcontext` && cnodename=$1 &&
[ "$cnodename" != standalone ]
then
cnodes -s || /etc/cluster
SYSTEM_NAME=$cnodename
rootname=`cnodes -r`
if [ ! "$rootname" ]
then
# something is wrong, emit a warning and come up standalone
echo "\007ERROR: cannot determine name of DISKLESS ROOTSERVER"
echo "\tCorrect, then reboot."
echo "\tBringing system up STANDALONE."
state=standalone
elif [ "$SYSTEM_NAME" = "$rootname" ]
then
state=localroot
else
state=remoteroot
fi
else
state=standalone
fi
}

csp_start()
{
if ncsp=`/etc/csp`
then
echo "$ncsp cluster server process(es) started"
return 0
else
return 1
fi
}

rbootd_start()
{
    if [ -x /etc/rbootd -a -n "$RBOOTD_DEVICES" ] || \
       [ -x /etc/rbootd -a -s /etc/clusterconf -a -x /bin/cnodes ]; then
#
# rbootd is started if we are the rootserver.
#
# rbootd is also started if we are a cnode with local swap
# and >0 csp's running (this is so that cnodes who swap to
```

```
# this cnode can boot).
        #
case $state in
localroot|standalone)
    if /usr/bin/rtprio 64 /etc/rbootd $RBOOTD_DEVICES; then
echo "remote boot daemon started"
    else
echo "Could not start remote boot daemon"
                return 1
    fi
;;
remoteroot)
    ncsps=`/usr/bin/awk -F: '$3 == name && $1 !~ /#/ \
{ i = $NF+0; print i }' name=$SYSTEM_NAME /etc/clusterconf`
    set -- `cnodes -l -m`
    if [ "`cnodes -m`" = "$3" -a "$ncsps" -gt 0 ]; then
if /usr/bin/rtprio 64 /etc/rbootd; then
    echo "remote boot daemon started"
else
    echo "Could not start remote boot daemon"
                    return 1
fi
    fi
;;
esac
    fi
}

save_core()
{
# Not supported on all systems
# save old kernel core dumps
if [ -x /etc/savecore ] && [ -d /tmp/syscore ]
then
/etc/savecore /tmp/syscore

# savecore returns 2 if no core is present.  This gets mapped to 0
# so that it does not get reported as a failure.

val=$?

if [ $val -eq 2 ]
then
                    val=0
fi
return $val
fi
}

diag_start()
```

```
{
# Supported on Series 800 only
if [ -x /usr/diag/bin/DIAGINIT ]
then
echo "Diagnostic system started"
        /usr/diag/bin/DIAGINIT
                return $?
fi
}

audit_start()
{
# Start up the auditing subsystem
if [ -x /etc/auditrc ] && /etc/auditrc
then
echo "Audit subsystem started"
fi
}

audio_start ()
{
# Start up the audio server
if [ -x /etc/audiorc ] && /etc/audiorc
then
echo "Audio server started"
fi
}

syslogd_start()
{
    #
    # Start up the system message logger, see syslogd(1M).
    #
    # The system logger is only started here if networking is not
    # installed.  If networking is installed, syslogd is started by
    # /etc/netlinkrc
    #
    if [ -x /etc/syslogd -a -f /etc/syslog.conf ]
    then
#
# If syslogd is already running, we do nothing
#
[ -s /etc/syslog.pid ] &&
kill -0 "`cat /etc/syslog.pid`" 2>/dev/null &&
    return

if [ -f /usr/adm/syslog ]
then
   mv /usr/adm/syslog /usr/adm/OLDsyslog
   mask=`umask`
```

```
    umask 022
    > /usr/adm/syslog
    umask $mask
fi
/etc/syslogd
        if [ $? -eq 0 ]
        then
             echo "System message logger started"
        else
             return 1
        fi
    fi
}

set_privgrp()
{
    if [ -f /etc/privgroup ]
    then
/etc/setprivgrp -f /etc/privgroup
        if [ $? -ne 0 ]
        then
             return 1
        fi
    fi
}

setparms()
{
#
# Set system configuration values
#
if [ ! -f /etc/src.sh -a -x /etc/set_parms ]
then# set the system name, IP addr., TZ, time/date.
   /etc/set_parms
   SET_PARMS_RUN=1
else
   SET_PARMS_RUN=0
fi

if [ -r /etc/src.sh ]
then
   . /etc/src.sh
else
   echo "\nWARNING: /etc/src.sh not created by /etc/set_parms."
   echo "Time zone and system name not set.\n"
fi
}

afs_start()
{
```

```
        if [ -d /usr/afs/bin/dkload ]; then
                echo 'Invoking dynamic kernel loader...'>/dev/console
                cd /usr/afs/bin/dkload
                if [ -f libafs.a ]; then
                        echo "Loading AFS" > /dev/console
                        ./dkload -path /usr/vice/etc/dkload -quiet
/usr/vice/etc/dkload/libafs.a 1> /dev/console 2>&1
                        if [ $? != 0 ]; then
                           echo "Error loading AFS" > /dev/console
                        fi
                else
                      echo "Cannot load AFS - no kernel library" > /dev/console
                fi
                cd /
        fi
        if [ -f /usr/afs/bin/bosserver ]; then
                echo 'Starting bosserver' > /dev/console
                /usr/afs/bin/bosserver &

        fi
        if [ -f /usr/vice/etc/afsd ]; then
                /usr/vice/etc/afsd -nosettime > /dev/console
                /etc/nfsd 4 &
                /usr/etc/exportfs -a
                echo "afsd"
        fi
}


#
# Here is the heart of the rc script:
#

# Where to find commands:
PATH=/bin:/usr/bin:/usr/lib:/etc

# Set termio configuration for output device.
stty clocal icanon echo opost onlcr ixon icrnl ignpar

if [ ! -f /etc/rcflag ]# Boot time invocation only
then
# /etc/rcflag is removed by /etc/brc at boot and by shutdown
touch /etc/rcflag

hfsmount
setparms
initialize
switch_over
set_state# determine if standalone, diskless server or
# client.  Also sets SYSTEM_NAME for diskless
```

```
uname -S $SYSTEM_NAME
hostname $SYSTEM_NAME


        # Check to see if Instant Ignition utilities are present.
        # These utilities provide a friendlier startup.

        if [ -f /etc/rc.utils -a -r /etc/rc.utils ]
        then
            . /etc/rc.utils

            init_list "HP-UX Start-up In Process"

            # Add items to the checklist.
    # Note that the functions init_system, start_networking,
    # start_cluster, start_sys_functions, start_diags, and
    # start_auditing are defined in the /etc/rc.utils file.

            add_list "init_system"          "Initializing system"
            add_list "start_networking"     "Starting networking"

            # Start-up functions for diskless client/server
            if [ "$state" = "localroot" ]
            then
                add_list "start_cluster"    "Starting diskless cluster server"
            elif [ "$state" = "remoteroot" ]
            then
                add_list "start_cluster"    "Starting diskless cluster client"
            fi

            add_list "start_sys_functions" "Starting system functions"

    # Comment out the following line to disable diagnostic daemons.
            add_list "start_diags"          "Starting diagnostics"

            if [ "$state" != "remoteroot" ]
    then
                add_list "start_auditing"       "Starting auditing"
    fi

            run_list
            afs_start
        else

            # Resort to the old ways
    # Actions based on system type:
    case $state in
    standalone)# Not a member of a diskless cluster
echo "Starting up standalone system"
```

```
set_privgrp
set_date
save_core
swap_start
syncer_start
lp_start
clean_ex
clean_uucp
net_start
rbootd_start
cron_start
pty_start
vt_start
list_tmps
clean_adm
diag_start
syslogd_start     # must be invoked after net_start
envd_start  # must be invoked after syslogd_start
audit_start
audio_start
;;

    localroot)# This is a root server in a Diskless system
echo "Starting up CLUSTER SERVER: $rootname"
set_privgrp
set_date
save_core
swap_start
syncer_start
lp_start
clean_ex
clean_uucp
net_start
csp_start
rbootd_start
cron_start
pty_start
vt_start
list_tmps
clean_adm
diag_start
syslogd_start     # must be invoked after net_start
envd_start  # must be invoked after syslogd_start
audit_start
audio_start
;;

    remoteroot)# This is a client in a Diskless system
SWAP_SITE=`awk -F: '{if (substr($1,1,1)!="#" && $3==sn) print $5}'
sn=$SYSTEM_NAME /etc/clusterconf`
```

```
SWAP_SERVER=`awk -F: '{if (substr($1,1,1)!="#" && $2==ss) print $3}'
ss=$SWAP_SITE /etc/clusterconf`

echo "Starting up CLUSTER CLIENT: $SYSTEM_NAME"
echo "\troot server: $rootname"
echo "\tswap server: $SWAP_SERVER"
set_privgrp
save_core
swap_start
net_start
csp_start
rbootd_start
cron_start
pty_start
vt_start
list_tmps
clean_adm
diag_start
syslogd_start     # must be invoked after net_start
envd_start  # must be invoked after syslogd_start
audio_start
;;
            esac
        fi
        localrc
fi
date
#  HP REMOTEWATCH --  DO NOT MODIFY THIS LINE OR THE NEXT FIVE LINES
#  HP REMOTEWATCH --  These lines are part of Remote Watch.
if [ -x /usr/remwatch/bin/rwrc ]                    #  HP REMOTEWATCH
then                                                #  HP REMOTEWATCH
/usr/remwatch/bin/rwrc > /dev/null 2>&1             #  HP REMOTEWATCH
fi                                                  #  HP REMOTEWATCH
```

Shutdown Sequence

After the execution of the /etc/shutdown command the following events take place:

- User authorization is checked
    - The file /etc/shutdown.allow is checked for the user that issued the command. Here is an example of the file:

```
# this is a comment

sunrise pulcher
```

    - Users in the file can only halt or reboot the system. ONLY the super-user may bring the system down the single user.
- Asks whether you wish to send a message. If there are no users, shutdown will not broadcast a message.
- Waits the number of seconds specified on the command line. If there is no specification the wait will be 60 seconds.
- Executes any user-supplied scripts in the directory /etc/shutdown.d
- If -h or -r specified on the command line then /etc/reboot is called to finish the job.

- If you are bringing the system to single user the follow occur:
    - All currently executing processes are killed.
    - All mounted file systems are unmounted.

SPP-UX File Systems

6

Topics:

- References
- Creating File Systems
- /etc/newfs Command
- Disk Types
- Mounting Filesystems
- Using File Systems
- Network Filesystems
- Swap Space

References

ConvexOS System Administration Course Notes

SPP-UX System Administration Guide.

How HP-UX works: Concepts for the System Administrator.

UNIX System Adminstration Handbook

Man pages

mount

diskutil

Creating a File System

There are many questions that need to be answered when creating file systems. Hopefully, the section will provide some to the answers to those questions.

- Disk Names
- Disk Device Files
- Creating Disk Device Files
- Disk Partitioning
- The /etc/diskutil Command

Disk Names

- The naming convention of the drives serves to help in identifiying the particular drive.
- The naming convention is as follows:

  sdNa

  Where:

sd	stands for "Scsi Disk".
N	is an integer starting at 0 for the root disk and incrementing by for every disk that is on the system.
a	is an alphbetic character that denotes which partition.

- The interface for talking directly to the controller is

  sdNcntl

Disk Device Files

- Both character and block device files are required for correct operation of the disk drives.
- /dev/dsk - contains block disk drive device files.
- /dev/rdsk - contains the raw disk drive devices

Creating Disk Device Files

- Use the /etc/mknod command to create any special file.
- Most of the files should already be there.
- The MAKEDEV script will provide an easy way create the needed the device files.

Disk Paritioning

- Disks may be partitioned in any fashion.
  - There is no limit on the size of a partition.
  - ~~There is not limit to the number of partitions on a disk drive.~~ a ... o ≤ 15 partitionen
- The following actions may be performed on a disk:
  - Resize a partition
  - Create a new partition
  - Delete a partition
  - Add a description of the partition to the partition table
  - Show all the partitions on a disk drive

The /etc/diskutil Command

- This is the command that will allow the system adminstrator to modify the partitions on a disk drive.
- Usage:

```
# /etc/diskutil [-d disk] [-v] [command]
```

Where:

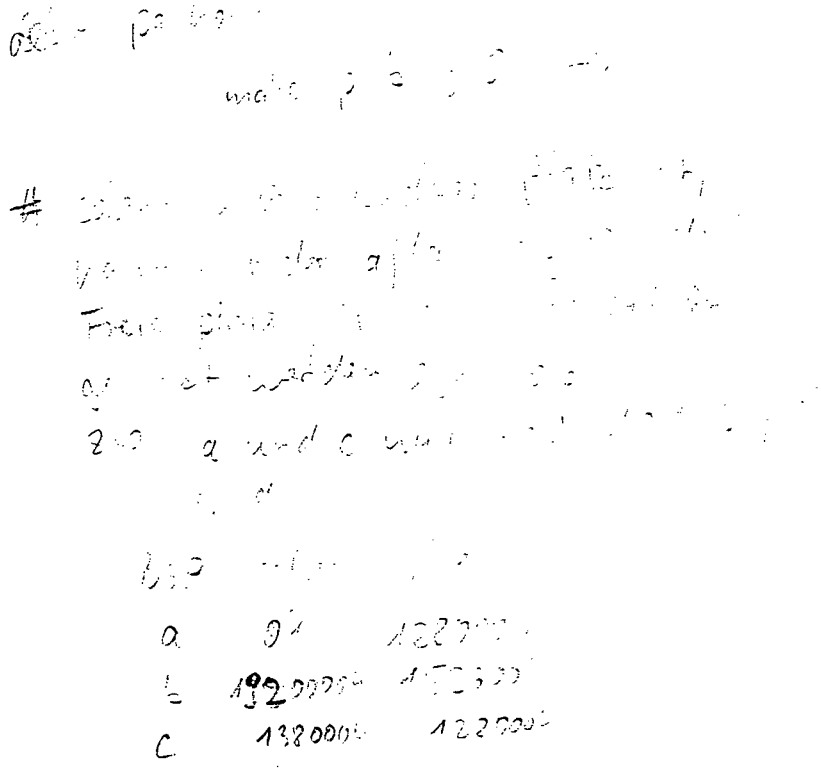
-d disk	is equivalent to the "Select Disk" command.
-v	sets the verbose mode on.
command	is a command to issue.

- The **diskutil** allows the following commands:

exit or quit	exit the program
Help <command>	Each command has its own help section. The sequence of upper and lowercase letters indicate the shortest acceptable version of the command
MAKe Partition	Allows you to make or delete a partition from a drive.
MAP Disk To	Allows you to change the current mapping of device files to actually hardware.
SELect Disk	Allows you to select a new target disk.
SET Partition	Allows you to set the partitions description of flag field.

DiskUtil: make p S 128meg o 128meg D "Lotte"

SHow Partitions	Will display all of the partition information on the selected disk.
UNMap Disk	Will unmap the disk from the logical connection to the device file.
UNSet Partition	Will remove a description or clear a flag.



- Examples of usage:

DiskUtil: select disk sd2

DiskUtil: sel d sd2

DiskUtil: show partitions

```
Logical disk name: sd2
partition table: (space available for file systems = 2098744)
part    offset      size    | partition description          | flags
-------------------------------------------------------------------
 a:          0K  1024000K  |                                | *
 b:    1024000K  1024000K  |                                | *
```

DiskUtil: help show

```
The keyword 'SHow' prefixes the following command(s):

          SHow Disks
          SHow Lif_directory
          SHow Partitions
          SHow Stripe
```

DiskUtil: mak p a size 10m o 0 d "number 1"

```
DiskUtil: show p
Logical disk name: sd8
partition table: (space available for file systems = 2098744)
part    offset      size    | partition description          | flags
-------------------------------------------------------------------
 a:          0K    10240K  |number 1                        |
 b:    1024000K  1024000K  |                                | *
```

Flags

There are several possiblilties for the type of a partition. These are denoted by the **Flags** field. Here are the known flags:

Table 2:

Flag	Meaning
None	Standard filesystem
*	Busy filesystem. It is either mounted or in use by the default pager.
D	Default_Pager partition. This is swap space
V	Vnode_pager. This is swap space for the kernel. It is on its way out.
S	Stripe. The partition is part of a stripe.
C	Crashdump partition. This is the partition that will be used by crashdump
R	Raw Parition.

Stripes

- With the conventional method of creating filesystems, the size of the filesystem is constrained by the size of the physical disk.
- Stripes allows for the combination of several physical disk into a single logical unit that is of almost any size.
- Reasons for striping disks:
  1. Create a filesystem larger than one physical drive.
  2. Possibly an increase in performance.
  3. Increased filesystem flexiblilty.
- A Stripe maybe used like any other filesystem.

Stripe Advantages

- Create large filesystems
- Make use leftover space on disk drives.
- Performance

Stripe Disadvantages

- Increased loss of data
- The larger the filesystem the longer it takes to backup.

Stripe Devices

- There is a character(raw) device:

  `/dev/rdsk/stripe0`

- There is a block device:

  `/dev/dsk/stripe0`

- They are both created at the time the stripe is created.

Using diskutil

To create a stripe do the following:

1. Decide which partitions that are in the stripe(sd17a, sd15c, sd19b)
2. Enter diskutil:

   ```
   # diskutil
   ```

3. Issue the command to create the stripe:

   ```
   DiskUtil: create stripe stripe0 (sd17a
   sd15c sd19b)
   ```

4. Make sure the stripe is created:

   ```
   DiskUtil: show stripe stripe0
   ```

5. Exit diskutil.

/etc/newfs(cnx_newfs) command

Command

/etc/newfs [-v] [-n] [mkfs-options] special disk_type

- Where:

-v	prints out all the actions taken.
-n	prevents the bootstrap programs from being installed on the disk
special	The character(raw) device file that references the disk.
disk_type	For SPP-UX there is only on type **scalios**.

- Some mkfs-options:

-b block-size	specify the block size in bytes.
-f fragment	specify the fragment size in bytes.
-i bytes/inode	Allows for the controlling of the number of inodes on the file system. The default is 2048 bytes/inode
-m %-free-space	specifies the amount of space that is only accessible by root.

DiskTypes

Example of /etc/disktab:

```
hpC2247_noswap|HP_C2247_noswap|hpC2247_noreserve|HP_C2247_noreserve:\
        :No swap or boot:ns#38:nt#13:nc#2075:\
        :s0#1025050:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_42MB|HP_C2247_42MB:\
        :42 MB reserved for swap & boot:ns#38:nt#13:nc#1988:\
        :s0#982072:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_64MB|HP_C2247_64MB:\
        :64 MB reserved for swap & boot:ns#38:nt#13:nc#1943:\
        :s0#959842:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_96MB|HP_C2247_96MB|hpC2247|HP_C2247:\
        :96 MB reserved for swap & boot:ns#38:nt#13:nc#1876:\
        :s0#926744:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_120MB|HP_C2247_120MB:\
        :120 MB reserved for swap & boot:ns#38:nt#13:nc#1826:\
        :s0#902044:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_150MB|HP_C2247_150MB:\
        :150 MB reserved for swap & boot:ns#38:nt#13:nc#1764:\
        :s0#871416:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_200MB|HP_C2247_200MB:\
        :200 MB reserved for swap & boot:ns#38:nt#13:nc#1661:\
        :s0#820534:b0#8192:f0#1024:\
        :se#512:rm#5400:
hpC2247_300MB|HP_C2247_300MB:\
        :300 MB reserved for swap & boot:ns#38:nt#13:nc#1453:\
        :s0#717782:b0#8192:f0#1024:\
        :se#512:rm#5400:
```

Mounting Filesystems

- The command to use is /etc/mount
- Standard UNIX command.
- Reads file /etc/checklist for mounting file systems
- Updates file /etc/mnttab to keep track of mounted file systems.

Update /etc/checklist

- Performs the same function as /etc/fstab on the CONVEX.
- Example:

```
#
# Local mounts
#
/dev/dsk/c207d6s0 / hfs defaults 0 1 28276 304
/dev/dsk/c207d5s0 /vicepa hfs rw,suid, 0 2 31491 0
/dev/dsk/c201d2s0 /cdrom cdfs defaults 1 1 16408 31485
#
# LSF mounts
#
starbase:/usr/cxmaster/hppa /usr/cxsoft nfs rw,intr,bg,hard,grpid 0 0 25632
21024
starbase:/usr/cxmaster/cxcommon /usr/cxcommon nfs rw,intr,bg,hard,grpid 0 0
18771 17732
```

Using a File System

After creating a file system, it needs to be put to use.

- Checking Free Space
- Checking Disk Usage

Checking Free Space

- There are two commands to check the free space of the various file system that are mounted.
  1. The **df** command
  2. The **bdf** command
- The **bdf** command is generally the more useful of the two.
- The command format for both are:

```
# df [-i] [file_system]

# bdf [-i] [file_system]
```

- The -i option will display the usage of the file system in terms of inodes.

als root:

dumpfs /dev/rdsk/sd-x | more

um frag, blocksize anzuzeigen

Checking Disk Usage

- The **du** command display the amount of disk spce that is in use by a specific directory. The space is listed in 512 byte blocks.

  The **du** command foramt:

  ```
  # du [-s] [-a] [name]
  ```

  Where:

-s	will give only the grand total.
-a	will display the disk space used by the files. Normally it is just for directories.
name	will give the result on the named file or directory. If not given **du** will use "." as the name.

Network File Systems

1. Decide which file systems will be imported/exported.
2. Edit /etc/netnfsrc, search for "NFS_CLIENT". Notice the "NFS_SERVER" on the next line. This will control whether or not you can import or export(respectively) file system via NFS. Setting these to "1" to enable the service.
3. If exporting file systems, edit /etc/exports and add the file system that will be exported. Due to changes in HP-UX, specifically in 9.0.5, the command /etc/exportfs will need to be executed.
4. If importing file systems, edit /etc/checklist and add the mount entries.

- A /etc/netnfsrc

```
#!/bin/sh
## Configured using SAM by root on Tue Sep  7 13:17:33 1993
##@(#)netnfsrc:$Revision: 1.51.109.9 $$Date: 92/08/18 13:48:27 $
#netnfsrc--NFS startup file
##
#Depending on the configuration parameters you set within,
#this script sets up some or all of the following:
#NIS specific:
#     domainname--the NIS domain name
#
#and starts up some or all of the following programs:
#     portmap--RPC (program_#,version) -> port_# mapper
#     nfsd--NFS daemons
#     biod--async BIO daemons
#     pcnfsd--PC-NFS daemon
#NIS specific:
#     ypbind--NIS client process (all NIS nodes)
#     ypserv--NIS server process (NIS server only)
#     yppasswdd--NIS password daemon (NIS master server only)
##
#NFS_CLIENT--1 if this node is an NFS client, 0 if not
#NFS_SERVER--1 if this node is an NFS server, 0 if not
#Note:it is possible for one host to be a client, a server, both
#or neither!  This system is an NFS client if you will be
#NFS mounting remote file systems; this system is a server
#if you will be exporting file systems to remote hosts.
#See Also:  nfsd(1M), mount(1M).
##
NFS_CLIENT=1
NFS_SERVER=1
##
#       START_MOUNTD    --      1 if this script should start rpc.mountd.
#                               0 if /etc/inetd.conf has an entry for mountd.
#       Note:   rpc.mountd should be started from netnfsrc. However, it
#               can be started from either netnfsrc or inetd, and
#               MUST only be configured in one place.
##
START_MOUNTD=1
##
#NIS_MASTER_SERVER  --  1 if this node is the master NIS server, 0 if not
#NIS_SLAVE_SERVER   --  1 if this node is a slave NIS server, 0 if not
#NIS_CLIENT         --  1 if this node is a NIS client, 0 if not
#
#Note:- NIS_MASTER_SERVER and NIS_SLAVE_SERVER are mutually exclusive,
#  i.e., only one, not both, should be set if either is set.
#- All NIS servers must also be NIS clients, so if you set either
#  NIS_MASTER_SERVER or NIS_SLAVE_SERVER to 1, you should set
```

```
#  NIS_CLIENT to 1, too.
#- Refer to NFS administration manual and ypinit(1M) for the
#  steps required to create NIS servers.
##
NIS_MASTER_SERVER=0
NIS_SLAVE_SERVER=1
NIS_CLIENT=1
##
#NISDOMAIN--the NIS domain name
#See Also:  domainname(1).
##
NISDOMAIN=mikey
NISDOMAIN_ERR=""
##
#PCNFS_SERVER--1 if this node is a server for PC-NFS requests.
#This variable controls the startup of the
#pcnfsd(1M) server.  See Also:  pcnfsd(1M).
##
PCNFS_SERVER=1

##
#The following code tests to see if the host has a localfile system.
#If there are NO local file systems, then we will not start nfsd.
##
#NOTE:This is an automated test, you should not have to modify it!
#LFS is zero if we have a local file system.
##

# save the return status of the first error
returnstatus=0
...
```

Swap Space

There are two(2) types of swap space on SPP-UX:

1. Default Pager

   This is the space that user programs will use. It is what is equivelent to the swap know to normal UNIX kernels.

   To specify swap space:

   1. Enter diskutil
   2. Select the disk
   3. Use the set command to set the D flag on a partition

      ```
      set part b flag default_pager
      ```

   On the next reboot, the system will search all the partitions marked with a 'D' flag. The kernel will activate them as swap.

2. Vnode Pager

   This is the space that the server will use to do any swaping that is needed.

   To specify vnode pager space:

   1. Create a new filesystem
   2. Mount the filesystem under /paging
   3. update /etc/src.sh

Networking 7

Topics:

- HP-UX vs. SPP-UX
- Setup
- /etc/netlinkrc

HP-UX vs. SPP-UX

The only real difference between HP-UX and SPP-UX is the name of the network device located in the /dev.

For HP-UX the device is:

`/dev/lanN`

For SPP-UX the device is:

`/dev/fddiN`

Where N is the number of the lan card that is being referenced.

Setup

- /etc/netlinkrc is where the route, ifconfig, etc commands are located.
- /etc/netlinkrc must be executable.
- Use the commands "lanscan" and "landiag" for checking the network interface hardware.
- If two interfaces are on a system, they must be on different subnets.

/etc/netlinkrc

```
#! /bin/sh
## Configured using SAM by root on Tue Sep  7 13:29:47 1993

# @(#)netlinkrc: $Revision: 1.6.109.7 $ $Date: 92/07/13 08:21:12 $
# $Locker:  $

#
# Shell script for initialization of link networking product.
#
# net_init flag is used for Instant Ignition. If net_init is set,
# then netlinkrc return "exit 1". In order for Instant Ignition
# to work correctly, netlinkrc needs to check the STATUS variable
# after each program or scripts it calls.
#
net_init=0

if [ -f /etc/clusterconf ]
then
ROOTSERVER=`/bin/cnodes -r`
NODENAME=`/bin/cnodes -m`
DOMAIN=`/bin/cnodes -r`
ORGANIZATION=diskless
else
ROOTSERVER=`hostname`
NODENAME=$ROOTSERVER
DOMAIN=`/bin/uname -n`
ORGANIZATION=standalone
fi

#
# Start logging daemon *before* any other networking initialization.
# See nettl(1m) for more information.
#
/etc/nettl -start
STATUS=$?
if [ ! $STATUS -eq 0 ]
then
   net_init=1
fi
#
# Remove the existing /etc/netstat_data file.  The first time
# netstat is executed, a new /etc/netstat_data file will be
# created.
#
/bin/rm -f /etc/netstat_data
```

/etc/netlinkrc

```
#
# Initialize networking interfaces.
...
#
# SEE ALSO: ifconfig(1m), lanconfig(1m)

case $NODENAME in
  $ROOTSERVER)
/etc/ifconfig fddi0 inet 130.168.49.211 netmask 255.255.255.0 up
STATUS=$?
if [ ! $STATUS -eq 0 ]
then
   net_init=1
fi
        /etc/lanconfig lan0 ether
        STATUS=$?
        if [ ! $STATUS -eq 0 ]
        then
           net_init=1
        fi
;;
  *) /etc/ifconfig fddi0 inet `hostname` netmask 255.255.255.0 up
     STATUS=$?
     if [ ! $STATUS -eq 0 ]
     then
        net_init=1
     fi
     /etc/lanconfig lan0 ether
     STATUS=$?
     if [ ! $STATUS -eq 0 ]
     then
        net_init=1
     fi
     ;;
esac
/etc/ifconfig lo0 inet 127.0.0.1 up
STATUS=$?
if [ ! $STATUS -eq 0 ]
then
   net_init=1
fi
# The x25init(1m) command configures X.25 network interface parameters.  The

...

#
# Initialize network routing.
#
# (STEP 2) (OPTIONAL, FOR NETWORKS WITH GATEWAYS ONLY)
#
```

```
# The route(1m) command manipulates the network routing tables.
# The "case $NODENAME" construct below allows each node in a diskless
# cluster to execute node specific route calls if necessary.  Add entries
# to the case construct for specific nodes in the diskless cluster if needed.
# The STATUS checking is for Instant Ignition.
#
# For example,
#
#   case $NODENAME in
#     $ROOTSERVER) /etc/route add 192.0.2 gatenode 1
#                  STATUS=$?
#                  if [ ! $STATUS -eq 0 ]
#                  then
#                     net_init=1
#                  fi
#                  ;;
#                *) /etc/route add default 15.2.104.69 1
#                   STATUS=$?
#                   if [ ! $STATUS -eq 0 ]
#                   then
#                      net_init=1
#                   fi
#                   ;;
#   esac
#
# adds network destination "192.0.2" to the rootserver's routing tables,
# indicating a correspondence between that destination and the gateway
# "gatenode", and specifying the number of hops to the gateway as 1.  For
# all other nodes (* is the wildcard), the default gateway is set to
# 15.2.104.69.
#
# The route command should be invoked once per gateway.
#
# SEE ALSO: route(1m), routing(7)

case $NODENAME in
  $ROOTSERVER)
if [ ! $STATUS -eq 0 ]
then
   net_init=1
fi
        /etc/route add  default rosebud-49 1
        STATUS=$?
        if [ ! $STATUS -eq 0 ]
        then
           net_init=1
        fi
;;
  *) /etc/route add default rosebud-49 1
;;
```

```
esac

#
# Initialize the network node name.
#
# (STEP 3)
#
# The nodename(1m) command assigns an NS node name to the node.
# Nodename takes an option of the form "nodename.domainname.orgname" where,
#
#   nodenameis the name of the local node
#   domainnameis the name of the domain
#   orgnameis the name of the organization
#
# Each name must start with an alphabetic character.
#
# It is strongly recommended that the string used for "nodename" above be
# identical to the string used as an argument to the hostname(1) command,
# which is typically invoked from the system initialization shell script
# file "/etc/rc".  The NS nodename used on each node in your network needs
# to be unique within that network. The "case $NODENAME" construct below
# allows each node in a diskless cluster to execute a node specific
# nodename(1) call if necessary.  Add entries to the case construct for
# specific nodes in the diskless cluster only if needed.
#
# For example,
#
#   case $NODENAME in
#     * )  /bin/nodename `/bin/uname -n`.mydomain.myorg
#          ;;
#   esac
#
# sets the NS nodename for all nodes (* is the wildcard) in domain
# "mydomain" and organization "myorg".
#
# The nodename command line below sets the nodename field to the system
# hostname, the domainname field to the rootserver's name, and the orgname
# field to "diskless".
#
# SEE ALSO: nodename(1)

if [ -x /bin/nodename ]
then
   case $NODENAME in
           *) /bin/nodename `/bin/uname -n`.$DOMAIN.$ORGANIZATION
              STATUS=$?
              if [ ! $STATUS -eq 0 ]
              then
                 net_init=1
              fi
```

```
                ;;
   esac
fi

...

/bin/echo "Network Link started"

#
# Start NFS.  This requires installation of the NFS product.
#
if [ -x /etc/netnfsrc ]
then
    /etc/netnfsrc
    STATUS=$?
    if [ ! $STATUS -eq 0 ]
    then
       net_init=1
    fi
fi

/bin/echo "ARPA/Berkeley daemons started: \c"

#
# Start the Internet daemon.
#

[ -x /etc/inetd ]  &&  /etc/inetd  &&  /bin/echo "inetd  \c"
STATUS=$?
if [ ! $STATUS -eq 0 ]
then
   net_init=1
fi
```

↑ /etc/netbsdrc
└ named

SPP-UX Kernel Configuration 8

Topics:

- Tunables

8

Tunables

- reside in /os/tunables on the local disk.
- reside in /spp/os/tunables on the teststation.
- Read at boot time.
- To make new values take effect you must reboot
- Listed in Appendix A of the *SPP-UX System Administration Guide*

- An example tunables:

```
#       $CHeader: tunables 1.1 93/12/17 01:30:41 $
#
#       Copyright 1993, CONVEX Computer Corporation.
#       This document is copyrighted.  All rights are reserved.  This
#       document may not, in whole or part, be copied, duplicated,
#       reproduced, translated, electronically stored or reduced to
#       machine readable form without prior written consent from CONVEX
#       Computer Corporation.
#
# Knowledge of the internal operations of SPP-UX is recommended before
# altering these values.  The following formats for values are accepted -
#       s       string
#       n       decimal numeric
#       0xn     hex numeric
#       nK      n * 1024
#       nM      n * 1024 * 1024
#
# Where ranges are present in the key, such as "1[0..15]", this generally
# refers to the values on each of the possible nodes in the system.  With
# this format all entries in the array range are set to the single value
# specified.
#
#
#       Microkernel tunables
#
# Event Logger internal buffer
Event Logger,buffer size:desc=Event Logger Buffer
Size:1=64k:default=64k:

# Control the LCD processor heartbeat update (0:Off, 1:On)
LCD Heart Beat,control:desc=Control for LCD update:1=1:default=1:
#
#       Server tunables
#

# Percent of memory dedicated to the filesystem buffer cache
Fileserver,buffer_cache_percent:1[0..15]=10:

# Have all servers panic gracefully when any server panics (0:off, 1:on)
Server,distribute_panic:1[0..15]=1:

# Default stack size limit
Server,dflssiz:desc=Default Stack Size Limit:1=8M:

# Maximum stack size adjustable via rlimit
Server,maxssiz:desc=Maximum Stack Size Limit:1=766M:
```

```
# Default size of data segment
Server,dfldsiz:desc=Default Data Size Limit:1=512M:

# Maximum size of data segment adjustable via rlimit
Server,maxdsiz:desc=Maximum Data Size Limit:1=3072M:

# number of ptys
Server,number_pty:1=16:

# Tune the maximum number of mounted filesystems
Server,nmount:desc=number of fs to mount:1=40:
```

Crashdump

9

Topics:

- **Avaliability**

Availibilty

The ability to take a valid crashdump of SPP-UX is available in release 3.0.3 and above. This section is still under construction.

Users and Groups 10

Topics:

- Adding Users
- Removing Users
- Adding Groups
- /etc/logingroup
- Removing Groups

Adding Users

1. Select a username, user id number, primary group, and shell.
2. Create an /etc/password entry.
3. Issue the command:

   ```
   # /etc/pwck
   ```

4. This command will check the /etc/passwd file.
5. Assign a password.
6. Create a home directory.
7. Place standard start-up files in the home directory
8. If there are no start-up files, they will be read from the standard start-up files in /etc.
   - Bourne shell:/etc/d.profile
   - C shell:/etc/d.login and /etc/d.cshrc
   - Korn shell:/etc/d.profile and /etc/d.kshrc
9. Test the account
   - telnet to the machine and login as the user.
   - make sure the user can edit/update file in their directory.

Removing Users

1. Make a copy of the /etc/passwd, /etc/group, and /etc/logingroup files.
2. Decide what will happen to the users files.
3. Edit the /etc/group file and remove every occurrence of the login name.
4. Issue the command:

   ```
   # /etc/grpck
   ```

5. Using *vipw* remove the users entry.
6. Issue the command:

   ```
   # /etc/pwck
   ```

Adding Groups

1. Select a group name, GID, and the users to belong to the group.
2. Make a copy of the file /etc/group.
3. Edit /etc/group and add the group entry.
4. Issue the command:

   ```
   # /etc/grpck
   ```

   - This command will check the consistency of the /etc/group file.

Note: The maximum number of group that one user can be in at any one time is 20.

The /etc/logingroup File

- Provides the default access list for each user when the user logs in.
- If /etc/logingroup is empty or does not exist, then there is no default group access. The exception is the login group to which you are assigned.
- For ease of maintenance, /etc/logingroup has the same format as the /etc/group file.
- The group_name and passwd fields are never used.
- Most sites will make /etc/logingroup a link to /etc/group.

Removing Groups

1. Copy /etc/passwd, and /etc/group.
2. Using *vipw*, edit the /etc/passwd file.
   - Search for users whose primary group is about to be destroyed.
   - Assign users to another primary group.
3. Edit /etc/group and remove the group entry.
4. Issue these commands to verify /etc/group and /etc/passwd.

```
# /etc/pwck

# /etc/grpck
```

Backup and Recovery 11

Topics:

- Tape Devices
- Backup
- Restoring a Filesystem
- A Graph File

Tape Devices

- All tape drives device files will be contained in the directory **/dev/rmt**.
- The files will have the following format:

  N<D|c>[n]

  Where:

N	is the address to which the tape drive is mapped.
D	is the density. l for low, m for medium, h for high. Currently there is only one density for DAT's. It is medium.
c	indicates that the drive will compress the data.
n	indicates a no-rewind device.

- Example

  /dev/rmt/0mn

  This is a tape drive with medium density at address 0 that will not rewind after a close.

Full backup of the system

1. Put a tape into the tape drive.
2. Issue the backup command.

   # /etc/fbackup -f device [-0-9] [-u] [-i path] [-e path] [-g graph]

device	The tape drive, such as /dev/rmt/3m for the DAT drive
-0-9	The level of the backup. Level 0 is always a full backup.
-u	update the file /usr/adm/fbackupfiles/dates if you want to create a graph file that contains included and excluded files. The directory must be created before executing fbackup.
-i path	path to include in the backup. May be specified multiple times.
-e path	path to exclude in the backup. May be specified multiple times.
-g graph	use a graph of included and exclude files instead of using -i and -e.
-I path	generate a listing of the files that we backedup.

Restoring a file system

1. Put the tape in the tape drive.
2. Issue there restore command

   # /etc/frecover [-r] [-x] [-I path] [-f device] [-i path] [-e path] [-X]

-r	The backup is read and all the file are written to the original destination from which they were backed up.
-x	The files or directories named in the -i, and -e options are restored or not restored according to the option.
-I path	Generate an index of the current volume and write it to path.
-f device	The tape device, such as /dev/rmt/3m the DAT tape.
-i path	path to include in the backup. May be specified multiple times.
-e path	path to exclude in the backup. May be specified multiple times.
-X	Extract the files relative to the current working directory. Normally files are extracted to the absolute path they were backed up with.

The Graph File

- A graph is an ASCII text file that will be used to instruct fbackup which filesystems to work on.
- Should be used with the '-u' option.
- An example

```
i /work1

i /usr

i /scratch

e /tmp

e /rmt
```

Software Installation 12

Topics:

- Reference
- Overview of Software Distributor
- Installation on an Exemplar
- Installation on the Test Station Software
- Commands
- An Example installation

Overview of Software Distributor

- This is how all of the products will be installed. If there are special actions that need to taken, they will be mentioned in the release note for that product.
- Both local(DAT drive) and remote(network) installs are supported.
- There are two machines to install software on:
    - The test station, which will allow you to upgrade OBP, diagnostics, and other utilities.
    - The Exemplar Hypernode, which will include system software, layer products, and third party products.
- There are three types of install formats:
    - SD format. This is the succesor to update.
    - update format. This is the current procedure on HP's.
    - tar format. This is widely used across multiple platforms.

Installation on a Exemplar

- Must be root to install any software.
- Must be running SPP-UX.
- The directory /usr/sbin should be in the PATH variable.
- The Exemplar must connected to an active network.
- The commands rely on the daemon /usr/sbin/swagentd to running.
- swinstall will log all invocations in the the file /var/adm/sw/swinstall.log
- All product that are installed will be listed in /var/adm/sw/products, the product database.
- There are two ways to use the command /usr/sbin/swinstall:
  - Graphically
  - Command Line

Graphically

There is a graphical interface. We will demostrate this in class.

/usr/sbin/swinstall

The Command Line

- Normally will install file in reference to the root(/) directory. This may be changed.
- Will execute any vendor-supplied configuration scripts. These scripts usually perform actions to make the product executable on the system.
- Most actions that swinstall makes are configurable.
- swinstall only allows the selection of compatible software from the source.
- swinstall will only install software at a higher revisions level than is current on the machine.
- swinstall will follow hard or soft links and update the correct file.
- swinstall does not remove files before installing the new ones. Files being replaced are overwritten where possible; those that can not be overwitten are moved aside.
- The swinstall command supports kernel building and rebooting.

- Usage:

```
# swinstall [-p] [-v] [-r] [-s source] \
  [-x option=value] [-f file] [-t file] \
  [-S file] selection
```

Where:

-p	Previews an install task by running the session through the analysis phase only.
-r	Causes swinstall to install software into alternate root directories (e.g. root filesystems other than /).
-v	Turns on verbose output to stdout.
-s source	Specifies the source depot (or tape) from which software will be installed.
-x option=value	Set the session option to value and override the default value. Multiple -x options can be specified.
-f file	Read the list of selections from file instead the command line.
-S file	Execute swinstall based on the options and operands saved from a previous session, as defined in file.

Options

- Options may be specified two(2) ways:
  - through the command-line with the '-x' option.
  - Using the default options file named /var/adm/sw/defaults.
- The options are specified in the file in the following manner:

  `command.option = value`

  An Example:

  `swinstall.reinstall = true`

- The some current options are:

`source_type=directory`	Defines the default source type, directory or tape.
`source_tape=file`	Defines the default location of the source tape, usually the tape device.
`verbose=1`	Controls the verbosity of the swinstall. A value of 0 disables output to stdout.
`loglevel=1`	Controls the log level for the events logged. A value of 1 enables verbose logging. A value of 2 enables very verbose logging.
`logfile=file`	This is the default command log file for the command.

mount_all_filesystems=true	Attempt to mount all filesystems in the /etc/checklist file.
autoreboot=false	Prevents the installation of software requiring a reboot from the non-interactive interface.
reinstall=false	When re-installing an existing version of a fileset, this option causes that fileset to be skipped.
allow_downdate=false	Prevents the installation of an older revision of fileset that already exists at the target(s).
allow_multiple_versions=false	Prevents the installation of another, version of a product when a version already is already installed.
enforce_dsa=true	Prevents the command from proceeding past the analysis phase if there is not enoght disk space.
defer_configure=false	Causes swinstall to automatically configure the software after installation.
reinstall_files=true	Causes all the files in a fileset to always be re-installed.

Installation on the Test Station

- There are various stages to installing the software. Involving loading software, uploading pieces of the boot strap to the Exemplar, etc...
- The DAT tape drive(/dev/rdsk/3mn) will be used.
- Most of the software is in tar format.
- Perform a backup before proceeding with the install.

installsw

Commands

These are several commands to help in the management of the software on the system. All them live in /usr/sbin.

- swagentd
- swconfig
- swcopy
- swlist
- swremove
- swverify

on Exemplar

swagentd

This is the daemon that will handle all of the processing requested by the other commands.

- The daemon may be started at boot time in the local portion of the /etc/rc script, or started manually by root.
- Usage:

```
# /usr/sbin/swagentd [-n] \
[-x option=value] [-X file]
```

Where:

`-n`	The "no fork" option runs the daemon as a synchronous process rather than the default behavior of forking.
`-x option=value`	sets a particular option to the value specified.
`-X option_file`	specifies a different file to read the options and values.

- Some of the current options are:

`logfile=/var/adm/sw/swagentd.log`

This is the default daemon log file.

`max_agents=-1`

The maximum number of agents that are permitted to run simultaneously.

`kernel_build_cmd=/usr/lbin/kernel_build`

```
                          Defines the script called by
                          the agent for kernel building.

reboot_cmd=/etc/reboot    Defines the command called by
                          the agent to reboot the system.

mount_cmd=/etc/mount      Defines the command called by
                          the agent to mount all
                          filesystems.
```

swconfig

The swconfig command allows for the configuration of software that has been installed on the system. For the most part, swconfig will execute the vendor-supplied scripts.

- Usage:

  # /usr/sbin/swconfig [-p] [-v] [-u] [-x option=value] [-X file]

-p	Previews a configuration.
-v	Turns on verbose output to stdout.
-u	Causes swconfig to unconfigure the software.
-x option=value	Set the session option to value and override the default value.
-X file	Read the session options and behaviors from file.

- Here are some of the options:

logfile=/var/adm/sw/swconfig.log	This is the default command log file for the command.
verbose=1	Controls the verbosity of the swconfig output (stdout).
loglevel=1	Controls the log level for the events logged to the command logfile.
mount_all_filesystems=true	

	By default, the swconfig command attempts to automatically mount all filesystems in the /etc/checklist file.
reconfigure=false	Prevents software which is already in the CONFIGURED state from being reconfigured.

swcopy

This command works very similar to the swinstall command. The difference is that it allows the software to be copied into a depot, so that other hosts may access the software for installation.

- Usage:

```
/usr/sbin/swcopy [-p] [-v] [-r] \
[-s source] [-x option=file] [-X file] \
[-f file] [-t file] [-S file] [selection]
...
```

Where:

- These options are the same as swinstall. See the swinstall section.

swlist

This is the command to list the avaiable products either on the system or available to be installed from a source.

- Usage:

```
swlist [-l level] [-v] [-a attribute] \
[-s source] [-x option=value] \
[-X option_file] [selection] ...
```

Where:

`-l level`	List all objects down to the specified level. There are various levels that may be set. See the man page for all of them.
`-v`	If no -a options are specified, then list all the attributes for an object.
`-a attribute`	Will only display the attribute that is specified.
`-s source`	Specifies the software source to list.
`-x option=value`	Set the session option to value and override the default value.
`-X file`	Read the session options and behaviors from file.

- Here are some of the options:

`level=`	`Defines the default level to which objects are listed.`
`verbose=0`	`Controls how attribute values are displayed.`
`select_local=true`	`If no target_selections are specified, select the default root directory /.`
`software=`	`Defines the default selections.`

swremove

This command will remove a product from the system.

- Usage:
- swremove [-p] [-v] [-x option=value] [-X file] [-f file] [selections] ...

  Where:

`-p`	`Previews a remove task.`
`-v`	`Turns on verbose output to stdout.`
`-x option=value`	`Set the session option to value and override the default value.`
`-X file`	`Read the session options and behaviors from file.`
`-f file`	`Read the list of selections from file instead of the command line.`

- Here are some of the options:

`verbose=1`	`Controls the verbosity of the swremove output (stdout).`
`loglevel=1`	`Controls the log level for the events logged.`
`logfile=/var/adm/sw/swremove.log`	`This is the default command log file for the swremove command.`

`write_remote_files=false`

Prevents the removal of files from a remote (NFS) filesystem. swverify

swverify

The swverify command verifies the software at one or more machines. swverify will execute vendor-specific verify scripts if the software products are marked configured. swverify will report missing files, check all file attributes.

- Usage:

  swverify [-v] [-x option=value] [-X file] [-f file] [selections]

  Where:

`-v`	`Turns on verbose output to stdout.`
`-x option=value`	`Set the session option to value.`
`-X file`	`Read the session options and behaviors from file.`
`-f file`	`Read the list of selections from file instead of the command line.`

  Here are some options:

`verbose=1`	`Controls the verbosity of the swverify output.`
`loglevel=1`	`Controls the log level for the events logged.`
`logfile=/var/adm/sw/swverify.log`	`This is the default command log file for the command.`

`allow_multiple_versions=false`

Causes swverify to generate an ERROR message for each selection found on the machine.

`check_permissions=true` Causes swverify to verify permissions and ownership of all the files in the selection.

`check_contents=true` Causes swverify to verify th timestamp, size, and checksu attributes of files.

`check_scripts=true` Causes swverify to run the fileset/product verify scripts for installed software.

An Example Installation

Here is what swinstall will show:

```
# swinstall -v -s /dev/rmt/0m -x loglevel=2 CXdb cxtrace Fortran C ALL PVM Mlib NQS

=======  07/11/94 14:52:08 CDT  BEGIN swinstall SESSION
         (non-interactive)

       * Session started for user "root@nkk01-f".

       * Beginning Selection Phase.
       * Options:
            preview                         no
            target type                     root
            verbose                         1
            option file
            session file
            software file
            target file

       * Target connection succeeded for "nkk01-f:/".
       * "nkk01-f:/dev/rmt/0m":  This source is a tape device.
       * "nkk01-f:/dev/rmt/0m":  Cannot open the logfile on this target
         or source.  Possibly the media is read-only or there is a
         permission problem.  Check the deamon logfile and
         "/tmp/swagent.log" on this host for more information.
       * Source:                 /dev/rmt/0m
       * Targets:                nkk01-f:/
       * Software selections:
            ALL.All,r=3.3.0.5,a=1XA_SPP-UX_9.0,v=CONVEX
            ALL.DefaultALL,r=3.3.0.5,a=1XA_SPP-UX_9.0,v=CONVEX
            C.DefaultC,r=6.0.0.4,a=1XA_SPP-UX_9.0,v=CONVEX
            C.Files,r=6.0.0.4,a=1XA_SPP-UX_9.0,v=CONVEX
            CXdb.CXDB-RUN,r=3.0.0.4,a=1XA_SPP-UX_9.0,v=CONVEX
            Fortran.Compiler,r=9.0.0.4,a=1XA_SPP-UX_9.0,v=CONVEX
            Fortran.DefaultFortran,r=9.0.0.4,a=1XA_SPP-UX_9.0,v=CONVEX
            Mlib.mlib,r=2.0.0.3,a=1XA_SPP-UX_9.0,v=CONVEX
            NQS.NQS-ENV,r=2.0.0.2,a=1XA_SPP-UX_1.0,v=CONVEX
            NQS.NQS-MAN,r=2.0.0.2,a=1XA_SPP-UX_1.0,v=CONVEX
            NQS.NQS-PRG,r=2.0.0.2,a=1XA_SPP-UX_1.0,v=CONVEX
            PVM.PVM,r=3.2.0.3,a=1XA_SPP-UX_9.0,v=CONVEX
            cxtrace.CXTRACE-RUN,r=02.01.00,a=1XA_SPP-UX_9.0,v=CONVEX
       * Selection Phase succeeded.


       * Beginning Analysis Phase.
       * Session selections have been saved in the file
         "/.sw/sessions/swinstall.last".
tail           * The analysis phase succeeded for "nkk01-f:/".
       * Analysis Phase succeeded.
```

```
        * Beginning Execution Phase.
        * The execution phase succeeded for "nkk01-f:/".
        * Execution Phase succeeded.


NOTE:     More information may be found in the agent logfile (location
          is nkk01-f:/var/adm/sw/swagent.log).

=======  07/11/94 15:29:47 CDT  END swinstall SESSION (non-interactive)
```

Here is what the logfile of the session will show:

```
# 1/94 14:52:41 CDT  BEGIN install AGENT SESSION (pid=1091)

        * Agent session started for user "root@nkk01-f.convex.com".
          (pid=1091)

        * Beginning Analysis Phase.
        * Source:           nkk01-f.convex.com:/dev/rmt/0m
        * Target:           nkk01-f:/
        * Target logfile:   nkk01-f:/var/adm/sw/swagent.log
        * Options:
              loglevel                      2
              create_target_path            true
              use_alternate_source          false
              mount_all_filesystems         true
              autoreboot                    false
              enforce_dsa                   true
              mount_cmd                     /etc/mount
              kernel_build_cmd              /usr/lbin/kernel_build
              reboot_cmd                    /etc/reboot

              autorecover_product           false
              reinstall                     false
              allow_downdate                false
              allow_multiple_versions       false
              allow_incompatible            false
              enforce_dependencies          true
              enforce_scripts               true
              defer_configure               false

              reinstall_files               true
              reinstall_files_use_cksum     true
              write_remote_files            false
              compress_files                false

        * Reading source for product information.
        * Reading source for file information.
        * Checking mounted filesystems.
        * Checking existing products and filesets.
        * Running any "checkinstall" scripts.
        * Checking product and fileset dependencies.
        * Checking disk space requirements.
NOTE:     The estimated disk space used on filesystem "/" is 81832 Kbyte
          blocks.
          This will leave -883458 Kbyte blocks of available user disk
          space after the installation.

        * Summary of Analysis Phase:
              New Install   ALL.All,r=3.3.0.5
              New Install   ALL.DefaultALL,r=3.3.0.5
              New Install   C.DefaultC,r=6.0.0.4
              New Install   C.Files,r=6.0.0.4
              New Install   CXdb.CXDB-RUN,r=3.0.0.4
              New Install   Fortran.Compiler,r=9.0.0.4
```

```
            New Install   Fortran.DefaultFortran,r=9.0.0.4
            New Install   Mlib.mlib,r=2.0.0.3
            New Install   NQS.NQS-ENV,r=2.0.0.2
            New Install   NQS.NQS-MAN,r=2.0.0.2
            New Install   NQS.NQS-PRG,r=2.0.0.2
            New Install   PVM.PVM,r=3.2.0.3
            New Install   cxtrace.CXTRACE-RUN,r=02.01r00
        * The Analysis Phase succeeded.


        * Beginning the Install Execution Phase.
        * Filesets:          13
        * Files:             2290
        * Kbytes:            68405
        * Installing fileset "ALL.All,r=3.3.0.5" (1 of 13).
        * / (0 bytes)
        * /bin (0 bytes)
        * /bin/as (389120 bytes)
        * /bin/ld (356352 bytes)
        * /lib (0 bytes)
        * /lib/as_msgs.cat (8942 bytes)
        * /lib/libM.a (72094 bytes)
        * /lib/libM.sl (53248 bytes)
        * /lib/libcps.a (115378 bytes)
        * /lib/libm.a (72682 bytes)
        * /lib/libm.sl (53248 bytes)
        * /lib/milli.a (224754 bytes)
        * /lib/pa1.1 (0 bytes)
        * /lib/pa1.1/libM.a (187382 bytes)
        * /lib/pa1.1/libm.a (190202 bytes)
        * /usr (0 bytes)
        * /usr/convex (0 bytes)
        * /usr/convex/all3.3.0.5 (0 bytes)
        * /usr/convex/all3.3.0.5/as (360448 bytes)
        * /usr/convex/all3.3.0.5/as_msgs.cat (11264 bytes)
        * /usr/convex/all3.3.0.5/crt0.o (8192 bytes)
        * /usr/convex/all3.3.0.5/crt1.o (1184 bytes)
        * /usr/convex/all3.3.0.5/crtx.o (1104 bytes)
        * /usr/convex/all3.3.0.5/gcrt0.o (12288 bytes)
...

* Running "postinstall" script for fileset "C.Files".
        * Running "preinstall" script for fileset "CXdb.CXDB-RUN".
preinstall: removing previous installation of CXdb...
        * Installing fileset "CXdb.CXDB-RUN,r=3.0.0.4" (5 of 13).
        * /usr/convex/cxdb (0 bytes)
        * /usr/convex/cxdb/.cxdbinit (147 bytes)
        * /usr/convex/cxdb/X11 (0 bytes)
        * /usr/convex/cxdb/X11/Cxdb (7204 bytes)
        * /usr/convex/cxdb/aliases (0 bytes)
        * /usr/convex/cxdb/aliases/csd_aliases (3051 bytes)
        * /usr/convex/cxdb/aliases/gdb_aliases (3952 bytes)
        * /usr/convex/cxdb/bin (0 bytes)
        * /usr/convex/cxdb/bin/cxdb (7827456 bytes)
        * /usr/convex/cxdb/bin/stampstring (4322 bytes)
...
```

```
postinstall: installing links...

        * Beginning the Configure Execution Phase.
        * Running "configure" script for fileset "NQS.NQS-ENV".
NOTE:     The "nqs" service has been added to the
          bottom of the "/etc/services" file.
          Utility [nqsmkdirs]:  NQS database subdirectory construction is complete.
          Utility [nqsmkdirs]:  Exiting.
          Utility [nqsmktrans]:  Beginning transaction descriptor construction:
          Utility [nqsmktrans]:  Waiting for permanent storage update.
          Utility [nqsmktrans]:  Wait time = 10 seconds.
         Utility [nqsmktrans]:  Completing construction of final transaction descrip-
tor.
          Utility [nqsmktrans]:  NQS transaction descriptor construction complete.
          Utility [nqsmktrans]:  Exiting.

        * Summary of Execution Phase:
             Configured    ALL.All,r=3.3.0.5
             Configured    ALL.DefaultALL,r=3.3.0.5
             Configured    C.DefaultC,r=6.0.0.4
             Configured    C.Files,r=6.0.0.4
             Configured    CXdb.CXDB-RUN,r=3.0.0.4
             Configured    Fortran.Compiler,r=9.0.0.4
             Configured    Fortran.DefaultFortran,r=9.0.0.4
             Configured    Mlib.mlib,r=2.0.0.3
             Configured    NQS.NQS-ENV,r=2.0.0.2
             Configured    NQS.NQS-MAN,r=2.0.0.2
             Configured    NQS.NQS-PRG,r=2.0.0.2
             Configured    PVM.PVM,r=3.2.0.3
             Configured    cxtrace.CXTRACE-RUN,r=02.01r00
        * The Execution Phase succeeded.

        * Removing product information used for analysis.

=======  07/11/94 15:30:09 CDT  END install AGENT SESSION (pid=1091)
```

Sub-Complex Manager(SCM) 13

Topics:

- Overview
- What is a Sub-Complex
- Object Oriented OS
- X-Windows Interface
- Command Line Interface
- Configuration File
- mpa Command

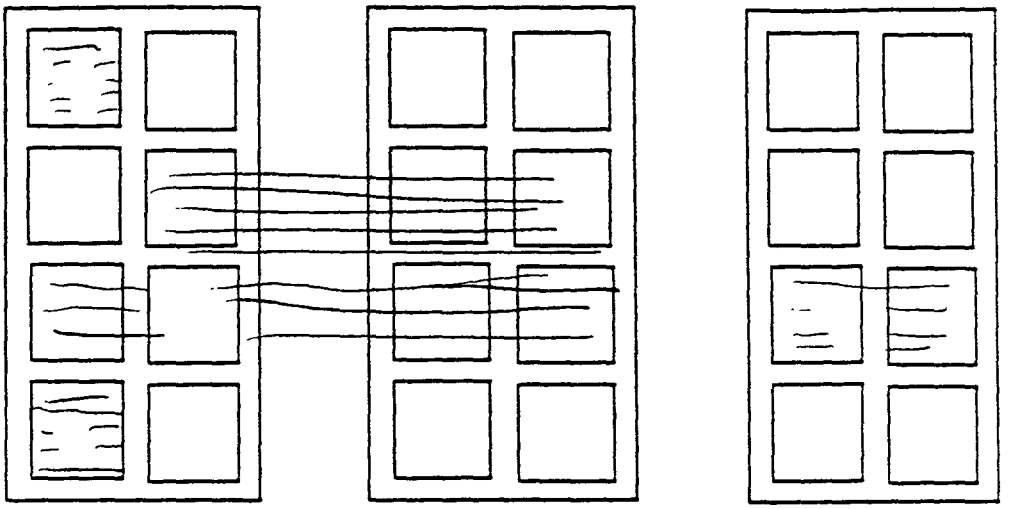
Overview

An Exemplar system may potentially consist of a large number processors (up to 128) and a large quantity of memory. A single system may be used for a variety of different applications, each having different resource requirements. In order to make it easier to control and optimize the use of the machine's resources, the operating system provides the interface with which a system administrator can control the machine configuration dynamically

The Sub-Complex Manager utility provides a graphical interface, enabling the system administrator to specify complex configuration and load the configurations onto the complex.

A command line interface is also provided. The interface enables users to load or remove sub-complexes or reconfigure code server sets and network cache size without having to use the graphical interface. The command line interface is useful for configuring the machine following reboot as part of the start up scripts, or re-configuring from a script file between jobs in a batch queue.

What is a Sub-Complex

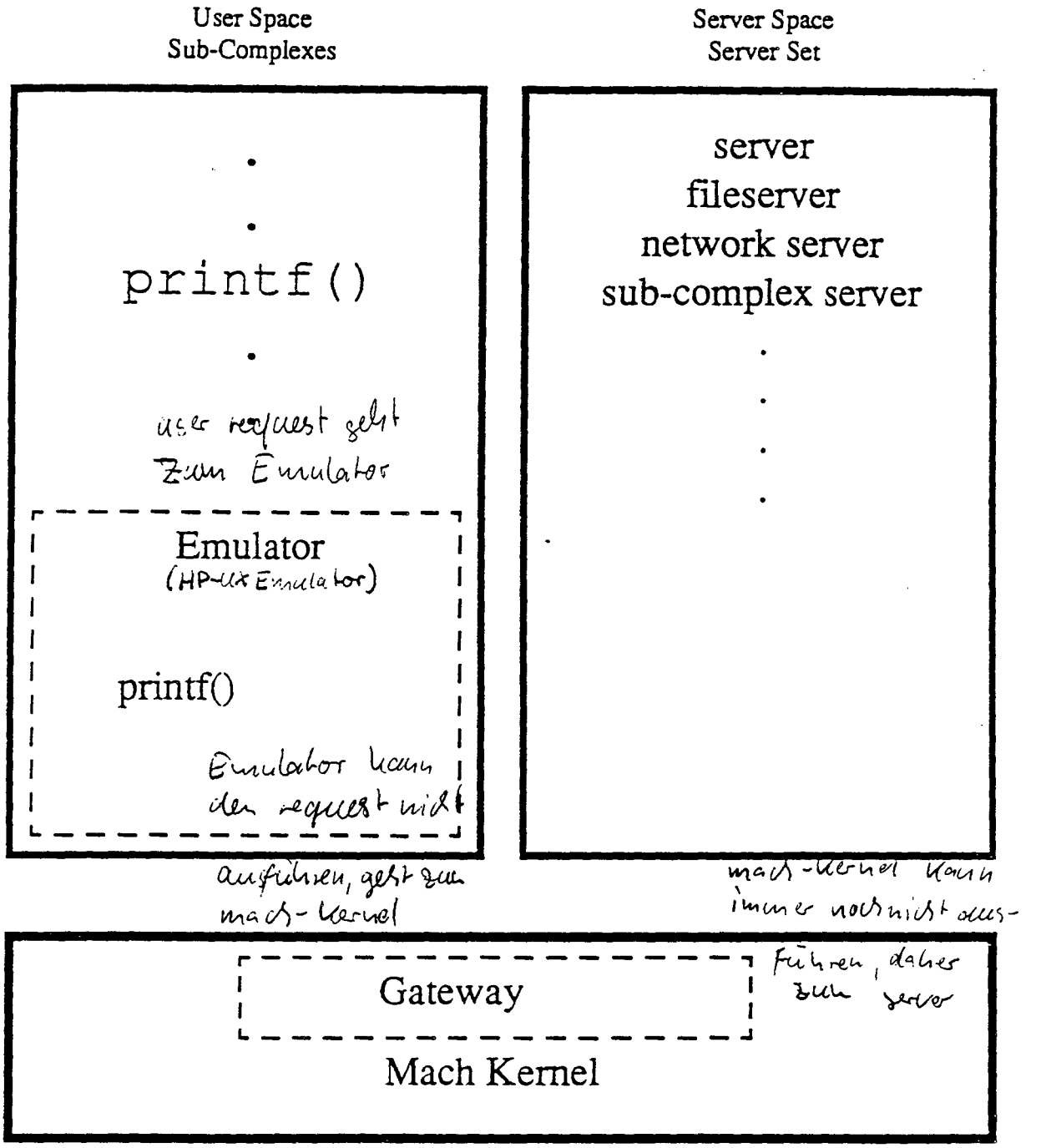


Sub-Complex

≡ Processor Set

Server Set

Object Oreiented OS



What SCM will do

- Configure sub-complexes
- ~~Configure node server sets~~
- Set the amount of Global memory
- Set the amount of CTI (Network) cache

What SCM will not do

- Schedule processes onto sub-complexes
- Display Statistical Information
- Configure Peripherals
- Modify the NVRAM configuration

Properties of a sub-complex

Attributes

- Name - a unique name identifying the sub-complex must be supplied by the user. Limited to 32 characters.
- User - must reference a valid user login.
- Group - must reference a valid group ID.
- Permissions - read, write, and execute permissions for the user, group, and world.
    - read - allows the examining of the attributes and resources of the sub-complex.
    - write - allows for the changing of a sub-complex.
    - execute - allows for the execution of the process on the sub-complex.
- Scheduling policies - Time Share is always enabled on the sub-complex. There is also Fixed Priority. This currently has no good definition.
- Icon - a picture used to represent which sub-complex.

Properties of (cont.)

Resources

- Processors - any number of processors from an number of nodes maybe allocated to the sub-complex.
- Global Memory - global memory may be allocated on any node having at least one processor assigned to the sub-complex.
- CTI Cache - for each node being used by a sub-complex, the user may request the CTI cache be enlarged by a certain number of bytes.

Restrictions On Allocating Resources

- Each processor in the complex may be assigned to at most one sub-complex at any one point in time.
- The global memory allocated on each node cannot exceed the memory available on the node.
- For each node in the complex, at least one processor must remain in the server set at all times.
- The CTI Cache size allocated on each node must not exceed the quantity of memory available on the node.

Re-configuration Constraints

There are some constraints which apply when re-configuring the complex while it is in use, or when making changes to a sub-complex which is currently loaded in the complex (even if it is not yet in use). A sub-complex which has one or more user processes currently assigned to it is "busy".

The constraints are as follows:

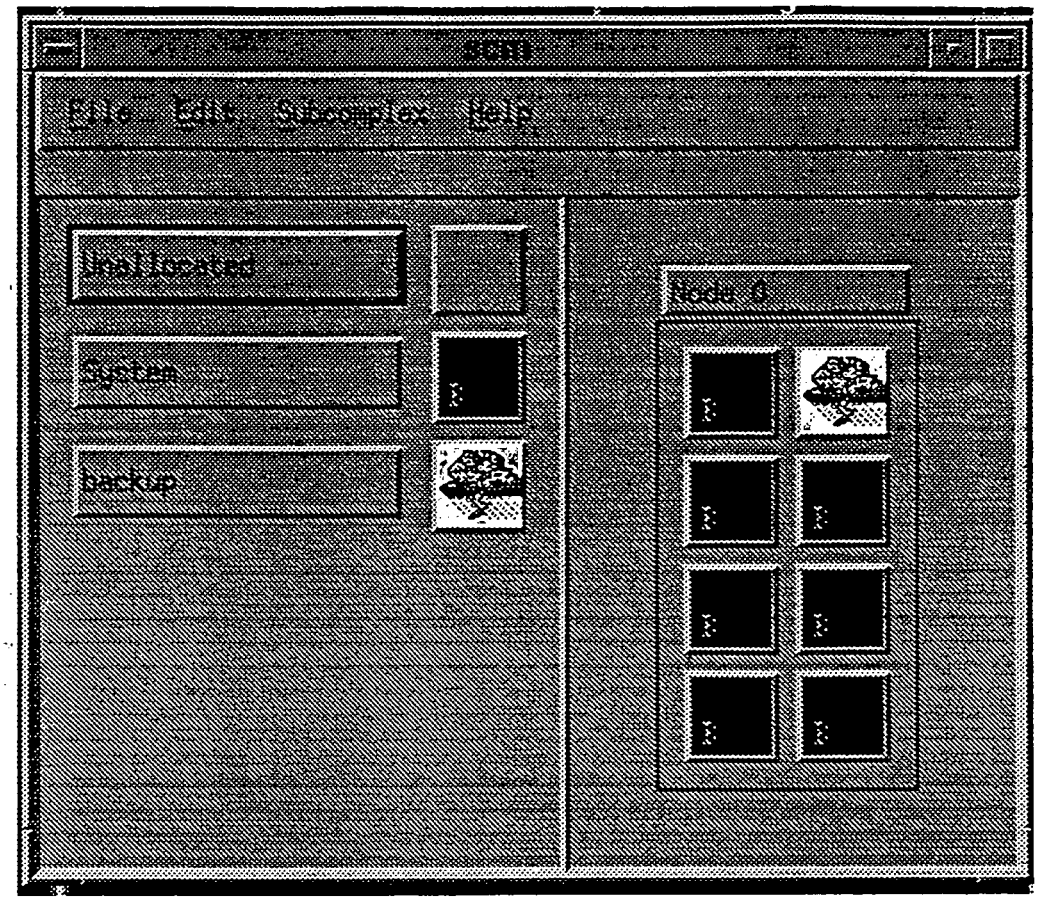
- A busy sub-complex cannot be removed from the complex without first killing all user processes on that sub-complex. The Sub-Complex Manager will not kill processes.
- the global memory of a sub-complex cannot be re-configured while the subcomplex is busy.
- the system sub-complex can never be removed from the complex, and it must have at least one processor on the "root node" (node 0) assigned to it at all times.

Re-configuration Constraints

The following re-configuration actions are allowed on a busy sub-complex:

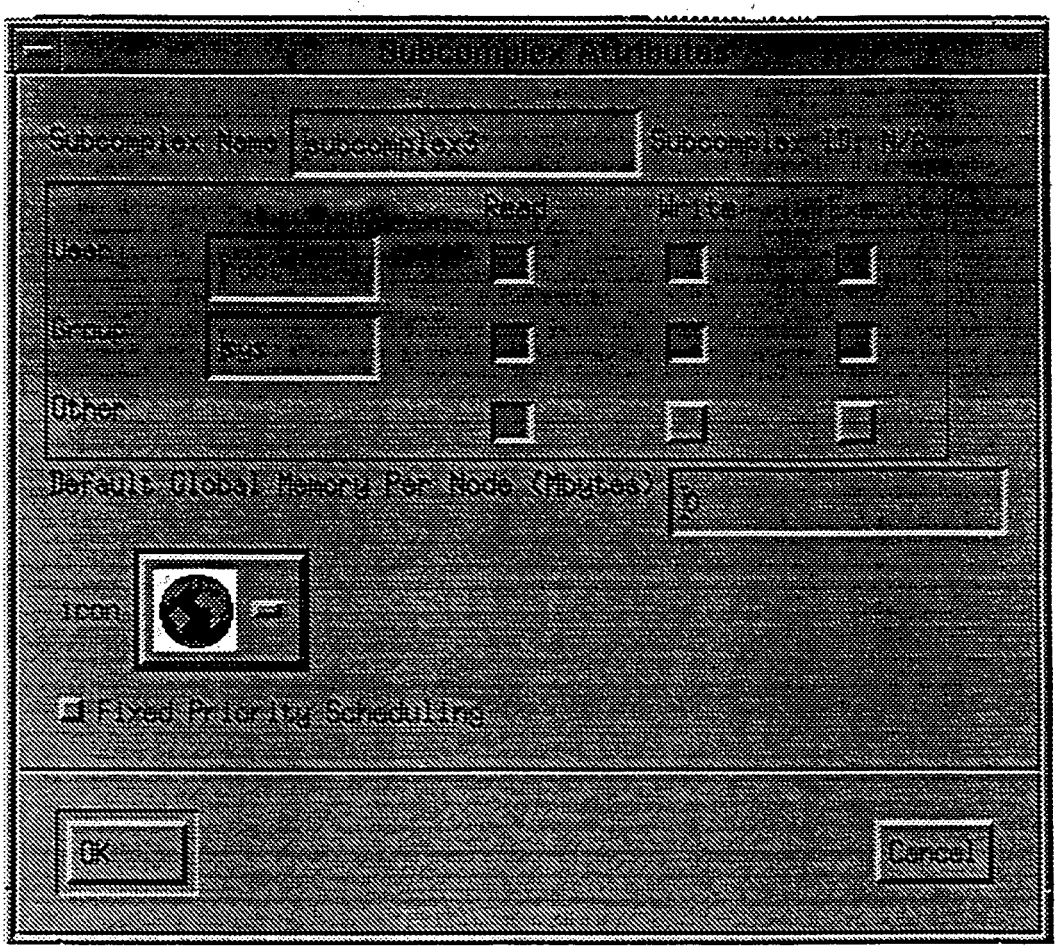
- Processors may be added to or removed from a sub-complex at any time (except as noted above, if global memory has been allocated).
- All processors may be removed from a busy sub-complex, but doing so will cause the user processes to remain suspended until processor resources are once again allocated to the sub-complex.
- Sub-complex attributes including name, uid, gid, permissions and icon may be changed at any time.
- Scheduling policies may be enabled or disabled on a sub-complex at any time.
- Processors may be added to or removed from the server set on a node at any time, provided that at least one processor remains in the server set at all times on each node.
- Requests to adjust the CTI cache size may be made at any time. Users may indicate that a sub-complex requires a specific amount of CTI cache, but it will still be left up to the sub-complex Server to determine whether the CTI cache will be adjusted in response to the request. The CTI cache is increased in powers of 2 megabyte chunks.

X-Windows Interface



scm

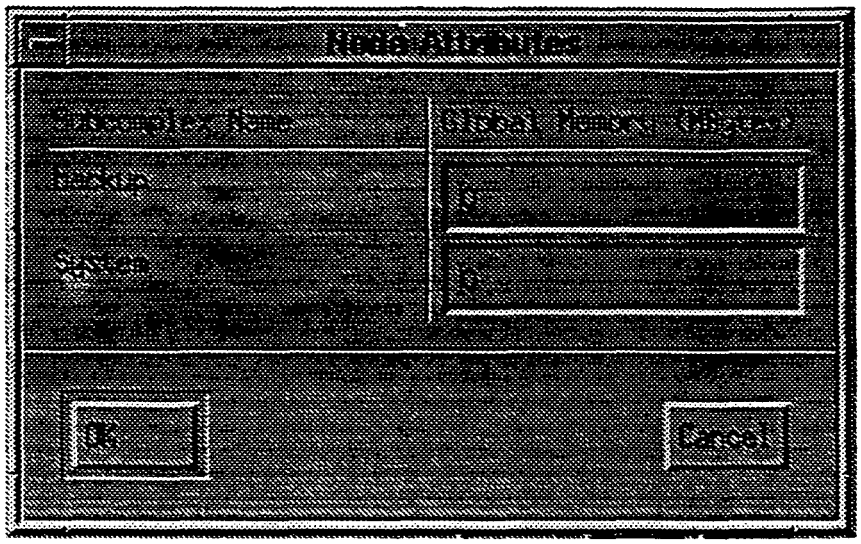
Creating a New Sub-Complex



Modifying Sub-Complex Attributes

- The Modify screen is accessed by clicking on the name of the subcomplex.
- It exactly like the create subcomplex screen. The execption being the subcomplex is already setup correctly.

Memory Allocations:



* bei single node kein GSM !!!

Command Line Interface

The scm command:

```
# /bin/scm [-c] [-sc] [-a file] [-o file] [-r name]
```

-c	Provide a full description of the current configuration.
-sc	List the names of all the sub-complexes currently loaded.
-a file	Apply the sub-complex configuration from the named file
-o file	Overlay a complex configuration from the named file
-r name	Remove the name sub-complex from the system.

Configuration File

Here is an example of the configuration file:

```
NODEID=0: CTICACHE=16:
NODEID=1: CTICACHE=16:
NODEID=2: CTICACHE=16:

SC=System:
          UID=0: GID=0: PERM=0774:
          DEFAULT_GM=0: POLICY=1:
          FIXEDPRI=0:
          NODEID=0:
                    GMEM=32:
                    PROCID=0:
                    PROCID=1:
                    PROCID=2:
                    PROCID=3:
SC=Math:
          UID=0: GID=0: PERM=0774:
          DEFAULT_GM=0: POLICY=1:
          FIXEDPRI=0:
          NODEID=1:
                    GMEM=32:
                    PROCID=0:
                    PROCID=1:
                    PROCID=2:
                    PROCID=3:
                    PROCID=4:
                    PROCID=5:
                    PROCID=6:
                    PROCID=7:
          NODEID=2:
                    GMEM=32:
                    PROCID=0:
                    PROCID=1:
                    PROCID=2:
```

```
            PROCID=3:
            PROCID=4:
            PROCID=5:
            PROCID=6:
            PROCID=7:
NODEID=3:
            GMEM=32:
            PROCID=0:
            PROCID=1:
            PROCID=2:
            PROCID=3:
            PROCID=4:
            PROCID=5:
            PROCID=6:
            PROCID=7:
```

/etc/mpscfg

#.scm

scm -f mpscfg.scm

mpa Command

The mpa command is used to modify the attributes of an executable program. There are three areas that have attributes:

The following attributes may be changed:

process	Options that will only apply to a running executable.
execution	Options that set the attributes of the program at execution time.
file	Options that will modify the attributes of an executable on the disk.

Most of the option will take a numeric value. The letters m, M, k, K, as well as, hex and octal values are accepted.

Process Attributes

There are several process attributes for an executing process. However, what is reported may be set in the following pages.

This command will only work on ESOM files. These are files that have been linked with the link supplied by CONVEX.

To check whether or not a file is ESOM:

```
% file filename
```

Example

```
% file mflops

mflops:PA-RISC1.1 ESOM shared executable
parallel dynamically linked -not stripped
```

To check a processes attributes:

```
% mpa -pid #
```

Execution Attributes

The following options will take effect at the time of execution.

The options will control almost every attribute of the executable.

Options;

-v	print the options specified before executing.
-sc, -scid #	subcomplex of execution.
-node #	node for execution
-cpu #	CPU time limit
-fsize #	file size limit
-data #	data size limit
-stack #	stack size limit
-core #	core file size
-rss #	resident set size
-nofile #	number of open files

File Attributes

The following options will not execute the program. They will modify the attributes in the file. At the next execution, the attributes will take effect.

Options:

-l+locality	allow/disallow the creation of the process on a different node.
-l+parallel	turn off/on the ESOM flag.
-l+over	turns off/on the oversubscription of cpus.
-min #	the minimum number of cpus required to execute the job.
-max #	the maximum number of cpus required to execute the job.

Accounting

14

Topics:

- Setting Up
- Directories

Setup

- Accounting must be set up and turned on.

  1. Make sure the user ***adm*** exists, is uid and gid 4, and has a password.

     - Home directory should be /usr/adm
     - The startup files should include the following

     For borne or korn shell:

     export PATH=/usr/lib/acct:/bin:/usr/bin:/etc:/usr/adm

     For csh or tcsh:

     set path = (/usr/lib/acct /bin /usr/bin /etc /usr/adm)

  2. Add the following line to the *localrc* function in **/etc/rc**.

     ```
     /bin/su - adm -c /usr/lib/acct/startup
     ```

  3. Create the following crontab entries for the user ***adm***:

```
 0 4 * * 1-6 /usr/lib/acct/runacct 2> /usr/adm/acct/nite/fd2log
 0 2 * * 4   /usr/lib/acct/dodisk
 5 * * * *   /usr/lib/acct/ckpacct
15 5 1 * *   /usr/lib/acct/monacct
```

Accounting directories

- /usr/lib/acct — Accounting commands.
- /usr/adm — Active data collection files.
- /usr/adm/acct/
  - nite — Files processed daily by runacct.
  - sum — Summary files updated by runacct.
  - fiscal — Monthly files from runacct.

More Toys

15

Topics:

- **Printing**
- **Cron**
- **Monitoring Processes**
- **Sysinfo**
- syspic

Printing

- No local printers on the HP nodes.
- HP nodes use a print schedular instead of a print daemon.

Function Performed	HP-UX	ConvexOS
Print a text file.	**lp -d***printer*	**lpr -P***pirnter*
Allow jobs to queue up.	**accept** *printer*	**lpc enable** *printer*
Allow queued jobs to go to the printer	**enable** *printer*	**lpc start** *printer*
Check printer status.	**lpstat -t**	**lpc status** *printer*
Check print queue status	**lpstat -o**	**lpq**
Add a printer to the system.	**lpadmin**	/etc/printcap (create entry in this file)

- Users can specify which printer they want as default by setting the environmental variable **LPDEST** to the name of the printer.

  For csh:

  ```
  % setenv LPDEST postlp
  ```

  For ksh:

  ```
  $ export LPDEST=postlp
  ```

- Remote printer setup:

  1. Make sure the print schedular is down.

     ```
     # /usr/lib/lpshut
     ```

  2. Add a printer to the system.

     ```
     # /usr/lib/lpadmin -pprinter_name \
       -v/dev/null -mrmodel -ormhostname \
       -orpremote_printer -ocmrcmodel \
       -osmrsmodel -orc -ob3
     ```

printer_name	Local printer name.
hostname	Host the printer is connected to.
remote_printer	Name of printer on the remote host.
-orc	restrict users to be allowed to only cancel thier remote jobs.
-ob3	Remote printer uses a BSD type printer daemon.

  3. Create a spool directory.

     ```
     # mkdir /usr/spool/lp/request/printer
     # chown lp /usr/spool/lp/request/printer
     ```

  4. Tell the printer queue to accept jobs.

     ```
     # /usr/lib/accept printer
     ```

5. Tell the printer queue to enable printing.

   # **/usr/bin/enable** *printer*

6. Turn on the print schedular.

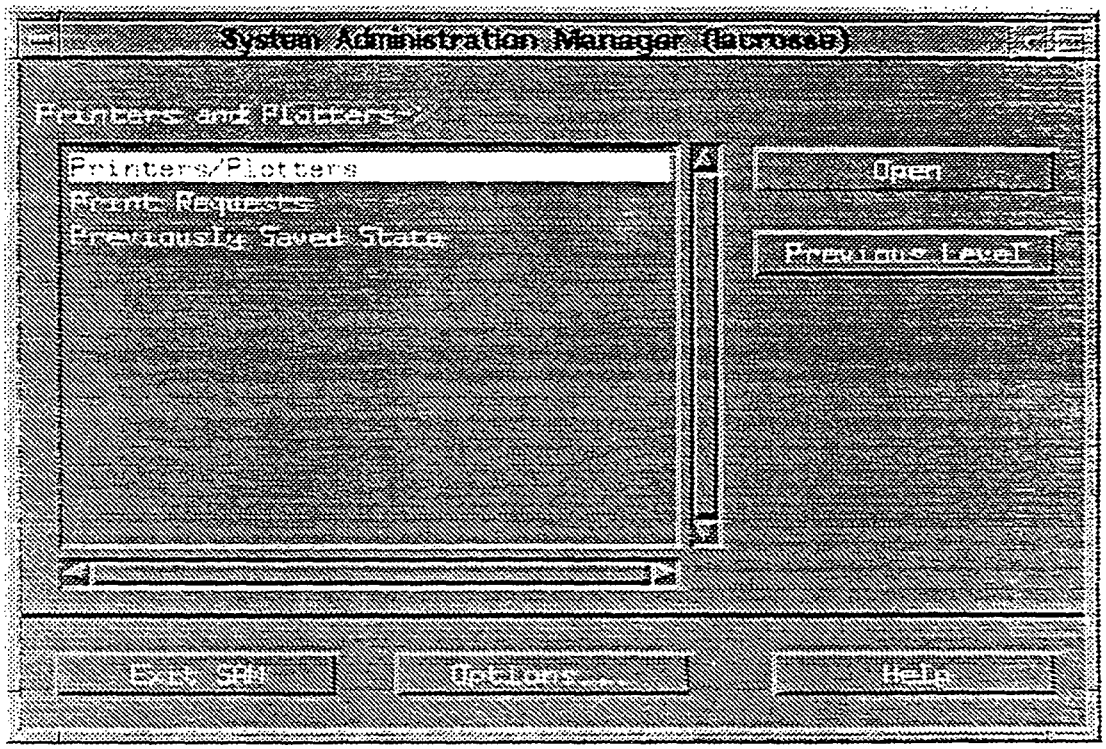
   # **/usr/lib/lpsched**

7. If you wish to set the default printer for this system.

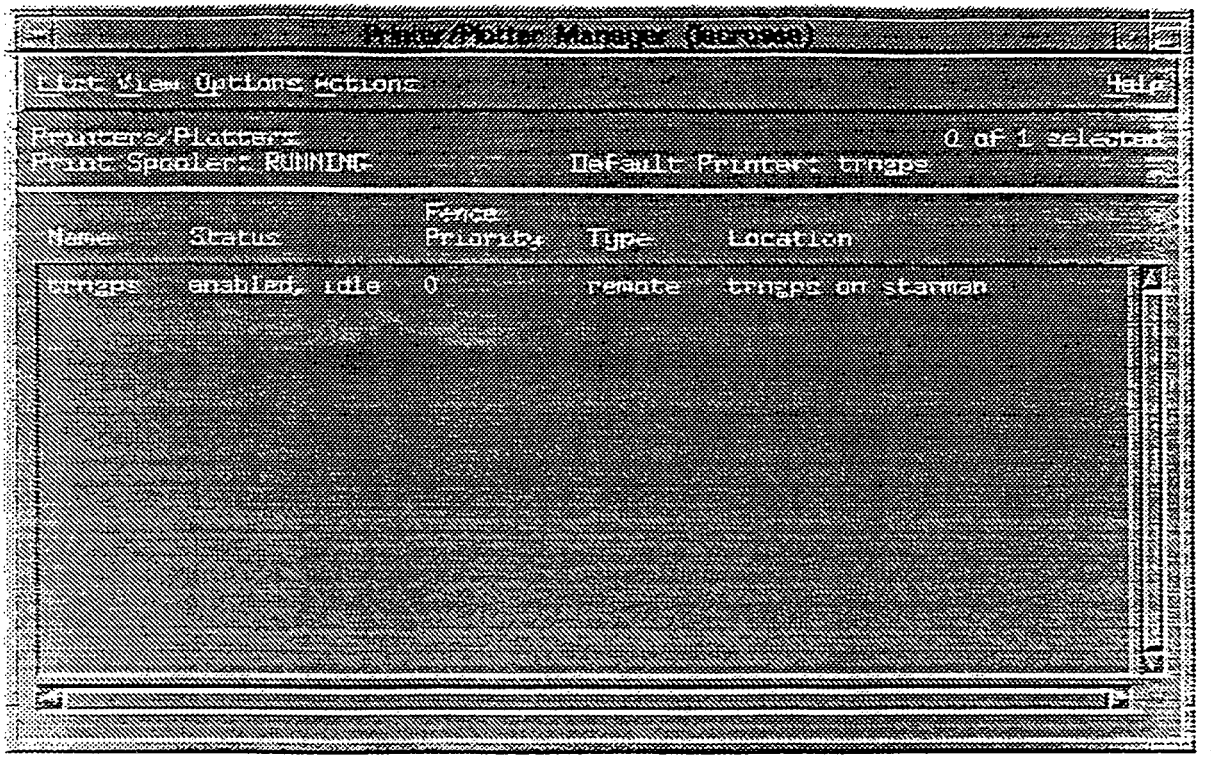
   # **/usr/lib/lpadmin -d***printer*

Using SAM to set up the printer

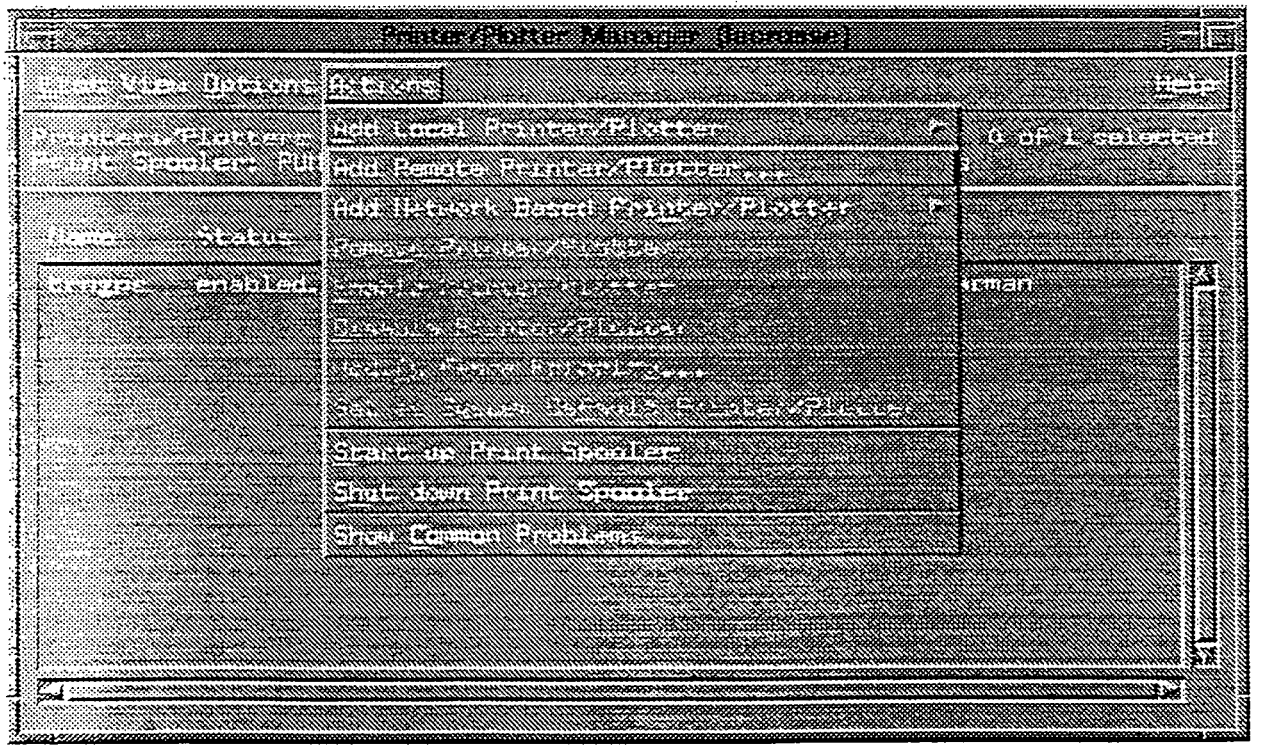
Select "Printers and Plotters"



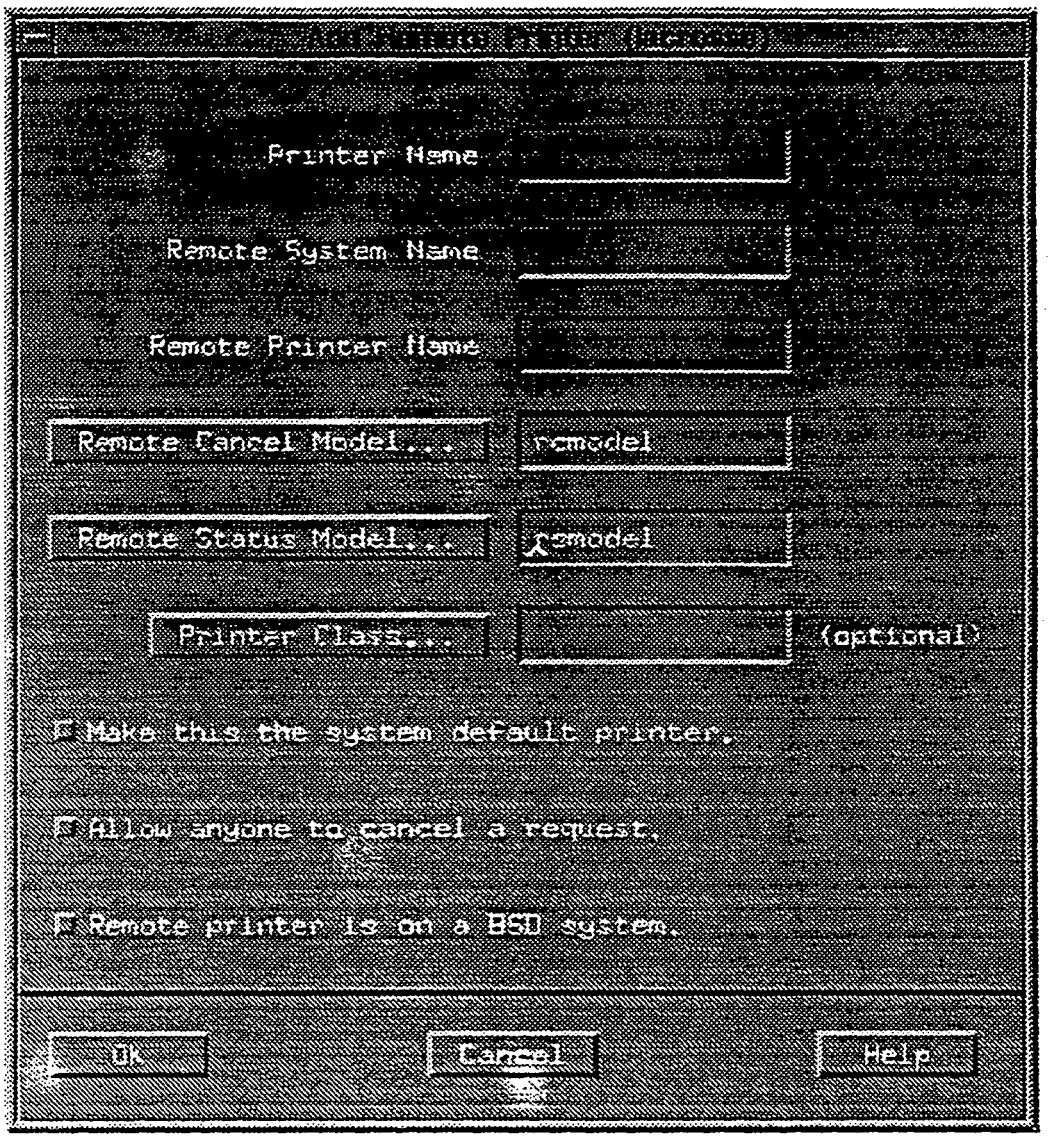
Select Printers/Plotters



Select Add Remote Printer/Plotter



Fill in the first three blocks



- Don't change the two model types.
- The printer class may be left blank.
- The printer can be designated as the systems default.
- Don't forget to select specify if the remote printer is on a BSD type system.

Cron

- Schedule jobs to be run at a later time.

	HP-UX	ConvexOS
Location of the cron database file.	/usr/spool/cron/cronjobs/*name*	~/.crontab
Command to notify cron of new entries.	**crontab** *filename*	**tellcron** Also, cron re-reads each .crontab file every hour.
Valid numbers for Sunday.	0	0 or 7
Restricted use available.	YES	NO

- The form for a crontab entry is the same as that in ConvexOS.

  Note: One exception is the field for day-of-week cannot be 7 for Sunday.

- The cron daemon, **/etc/cron**, needs to be running and is normally started from /etc/rc.

- Valid users can access the cron system with the crontab command.

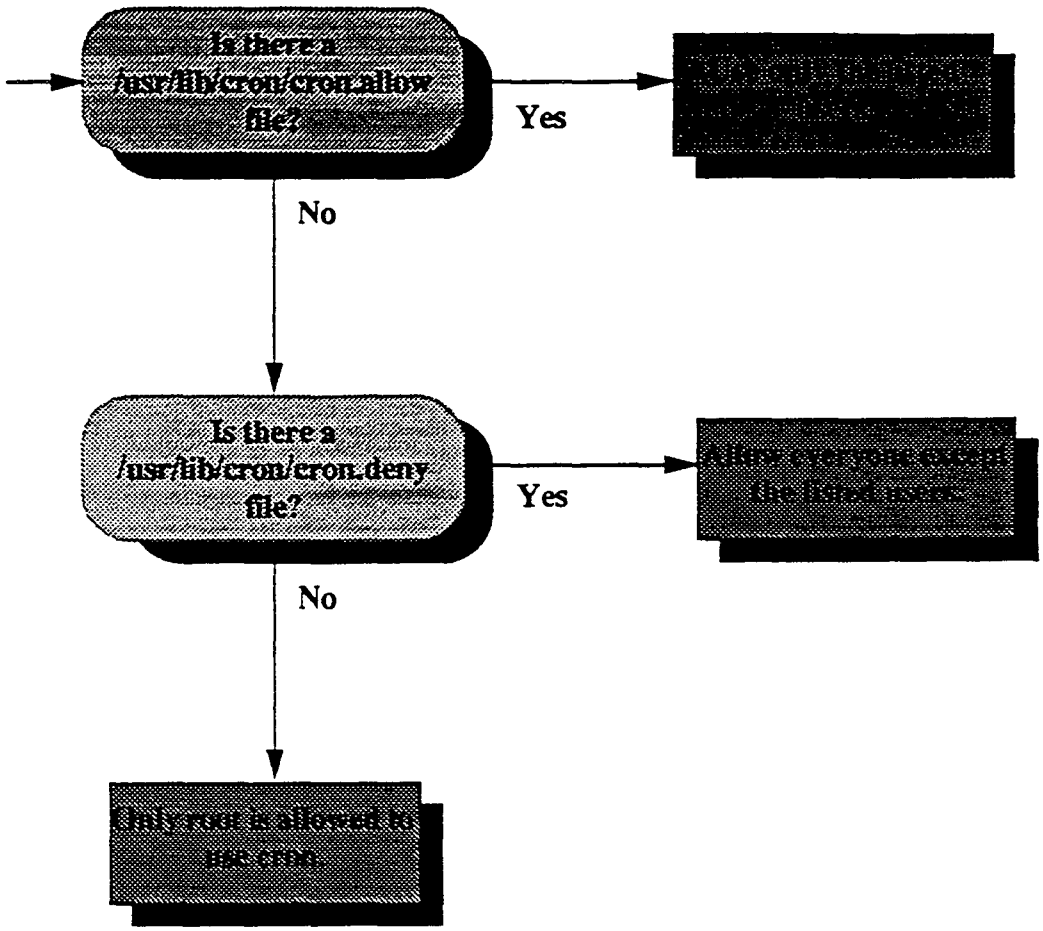
  Options:

  filename — The name of the file containing the commands to be used. Previous commands will be replaced.

  -l — List the current cron entries for the user.

  -r — Remove all cron entries for the user.

- Users can be permitted or denied use of the cron.

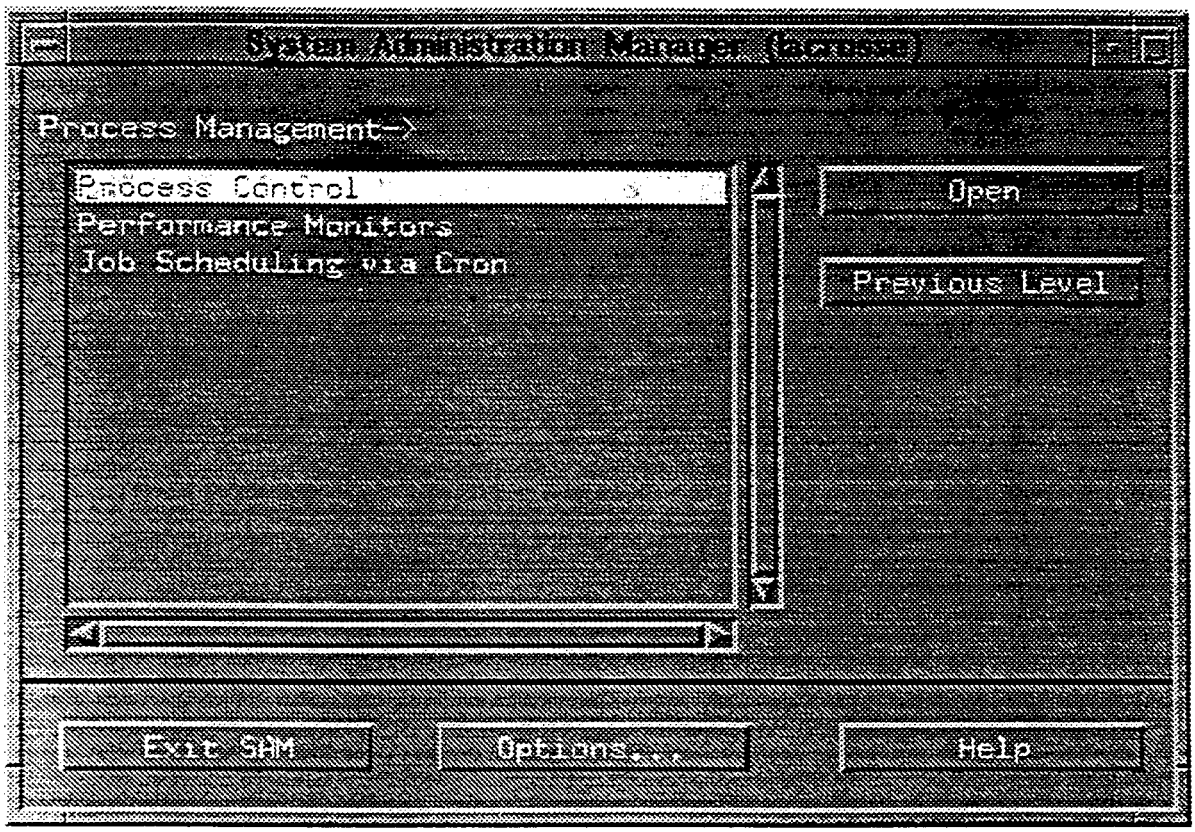


crontab -l > cron.out
vi cron.out
crontab -e filename

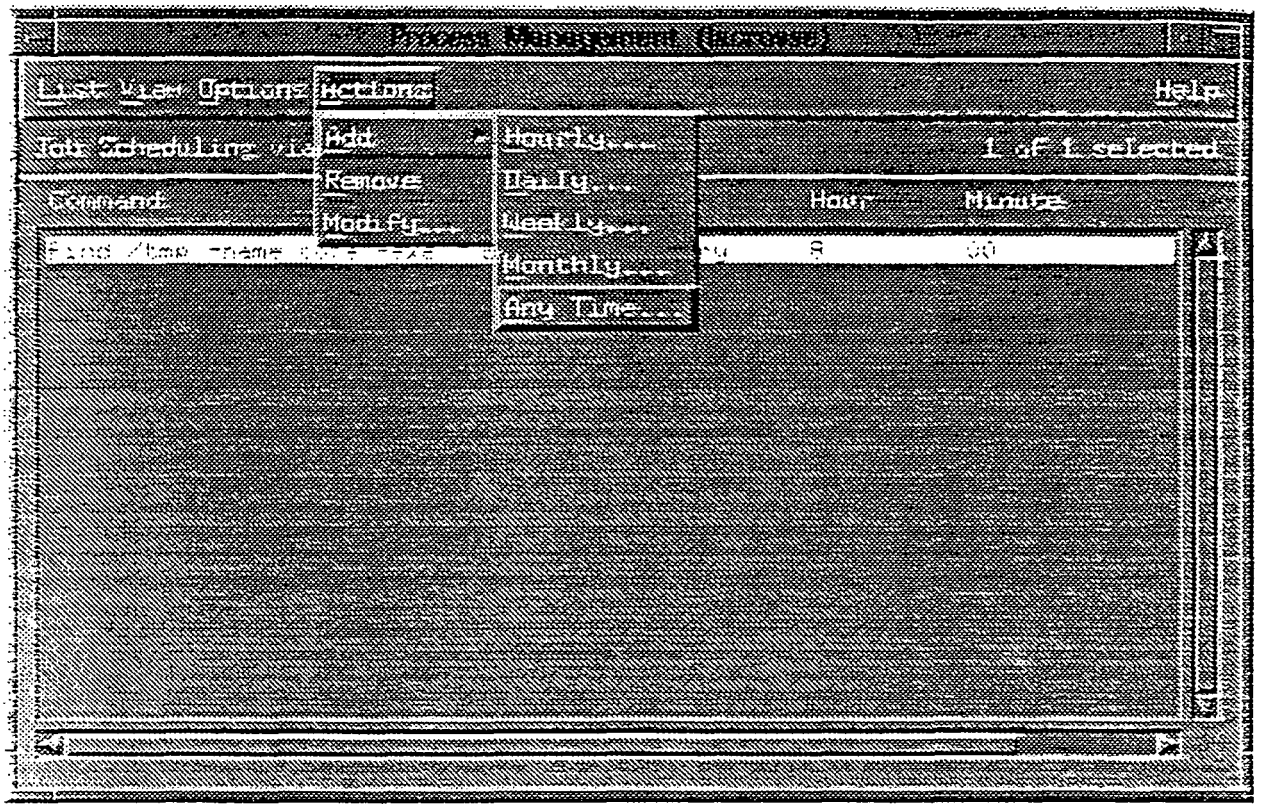
Cron with SAM

- The SAM tool can be used to set up cron jobs for "root".

Select Process Management and then Job Scheduling via Cron

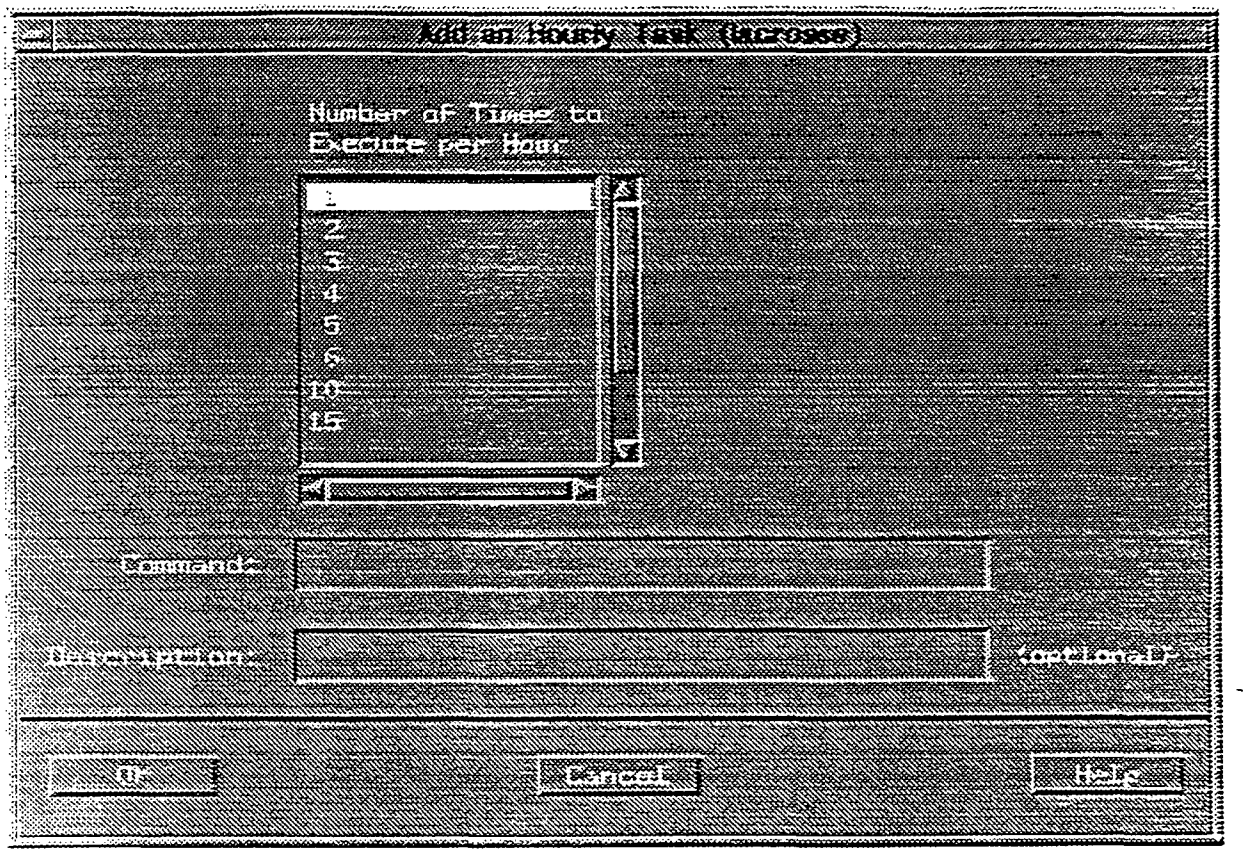


Select from the menu add, delete, or modify a job.



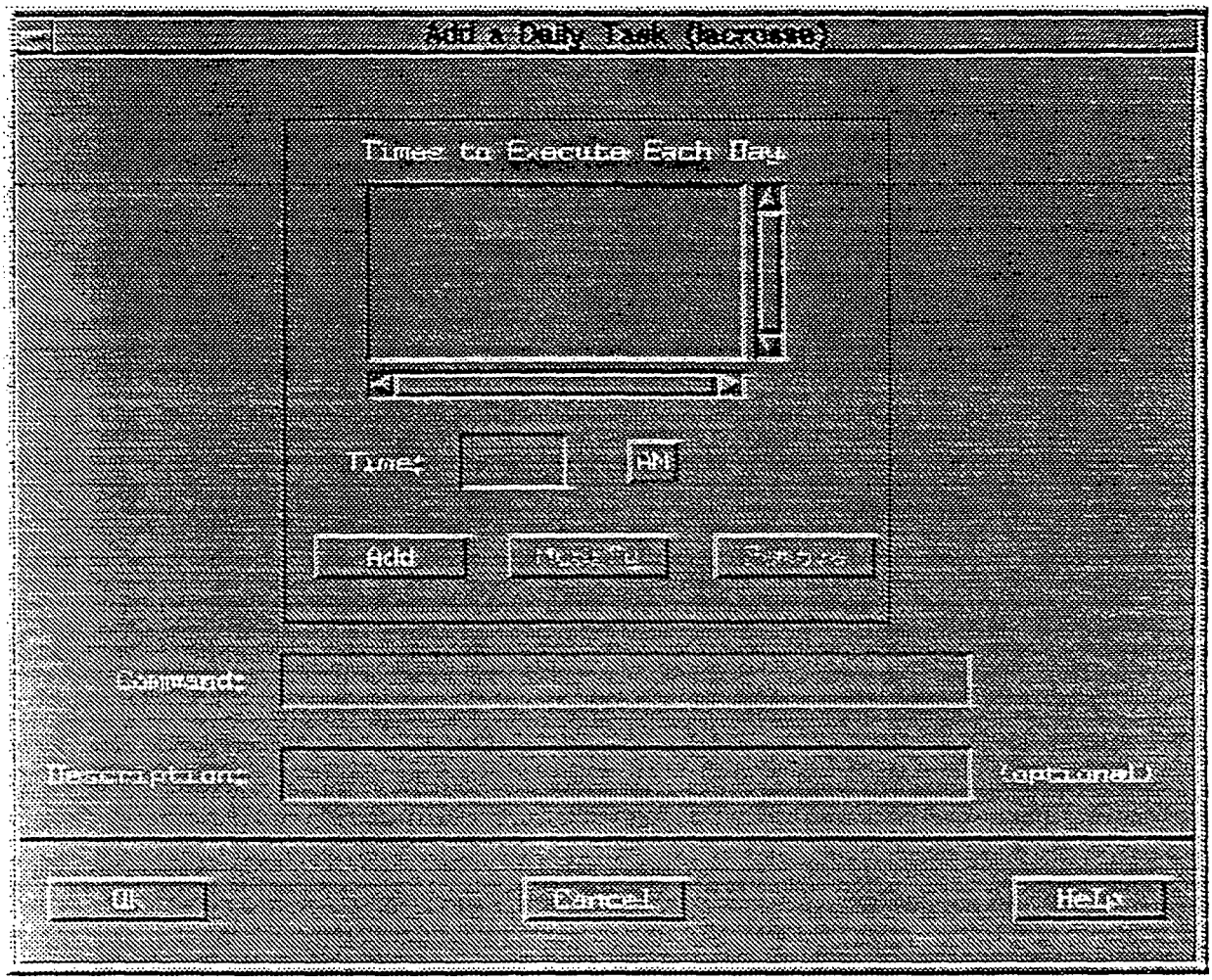
- If you are deleting or modifying a job, you will need to select the job first.
- When adding a job you need to select from the menu, a frequency.
  - Hourly
  - Daily
  - Weekly
  - Monthly
  - Anytime

Hourly:



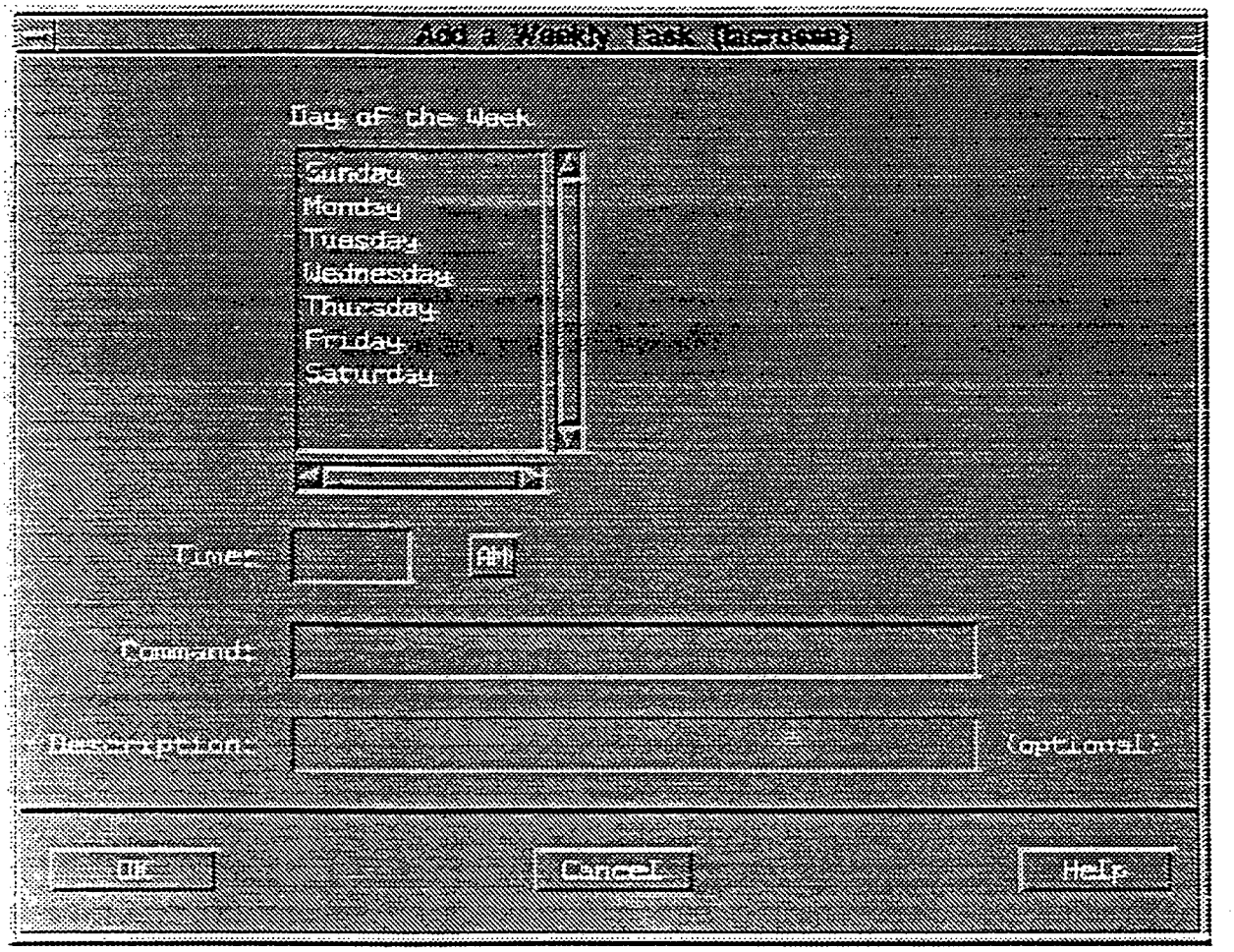
- Specify how often to execute the command.
- Specify the command and an optional comment.

Daily:



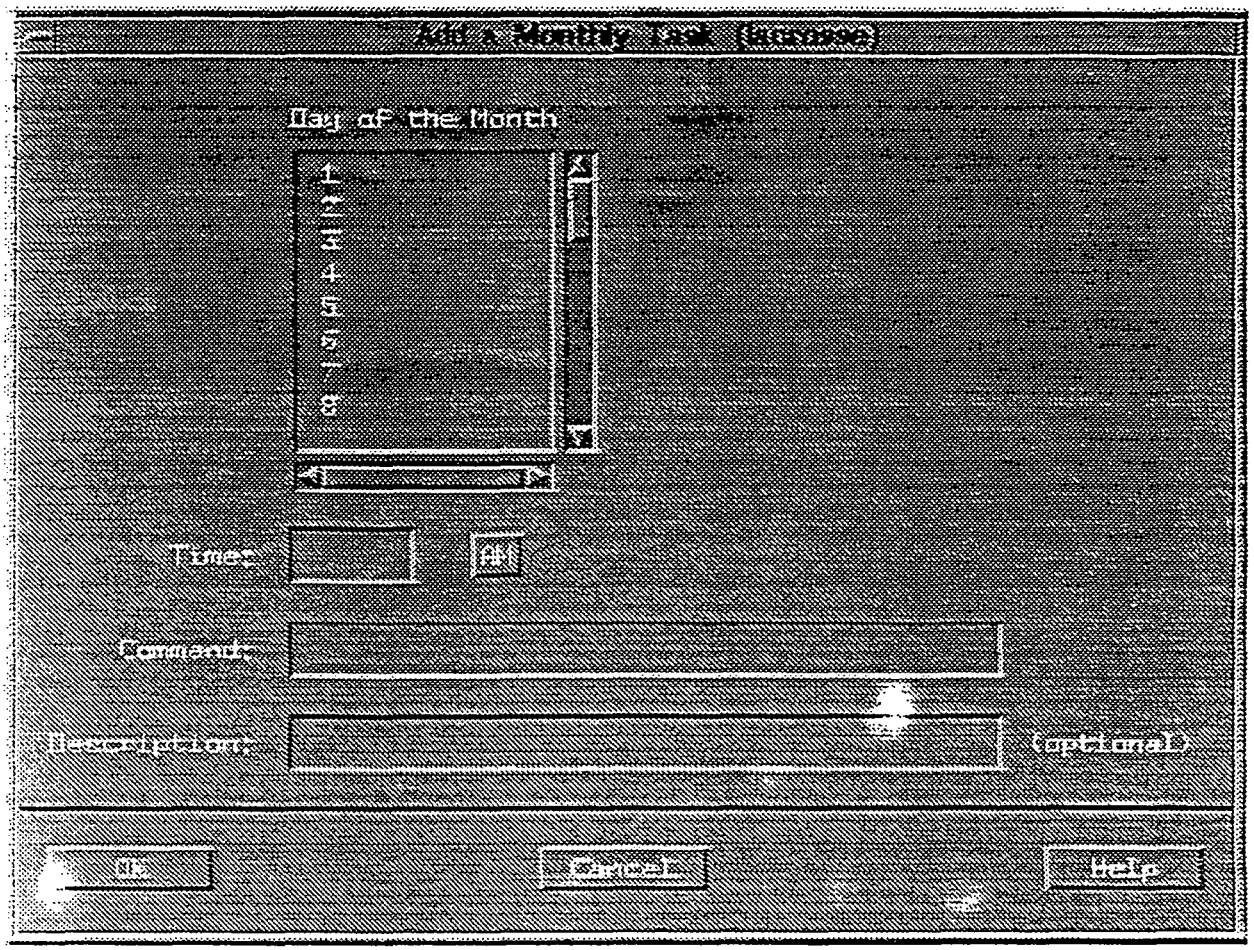
- Add or remove the times you want the command run every day.
- Specify a command and comment.

Weekly:



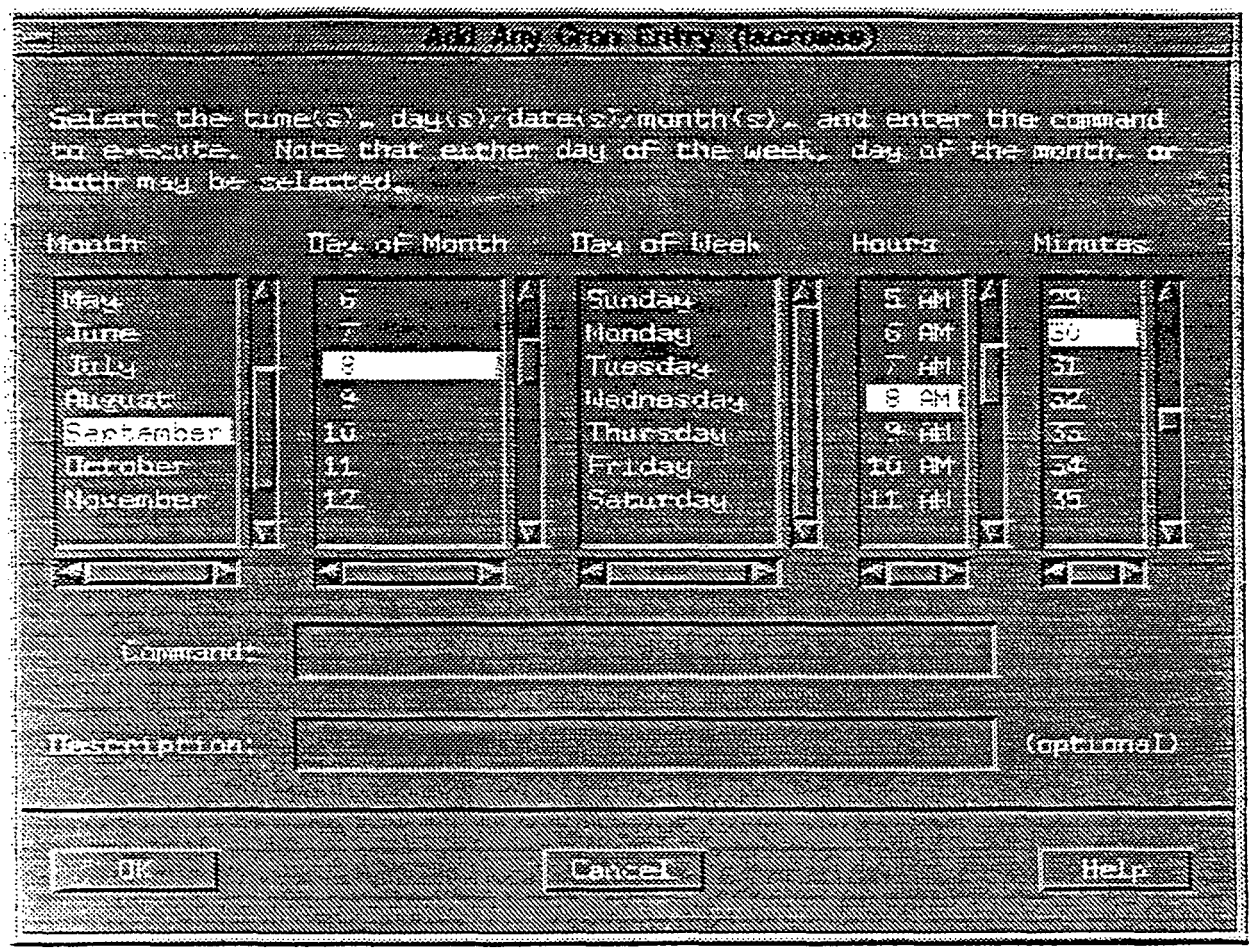
- Select one day of the week and one time of day for a command to run.
- Specify the command and comment.

Monthly:



- Select one day of the month and one time of day for a command to run.
- Specify the command and comment.

Anytime:


Add Any Cron Entry (Jacques)
Select the time(s), day(s)/date(s), month(s), and enter the command to execute. Note that either day of the week, day of the month, or both may be selected.
Month:
Day of Month:
Day of Week:
Hours:
Minutes:
May
June
July
August
September
October
November
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
29
30
31
32
33
34
35
Command:
Description:
Optional
OK
Cancel
Help

Monitoring processes

- The HP ps command has different options than the Convex ps.
- All options are grouped together and must begin with a minus sign (-).
- By default you are shown only your own processes. Use the -e option to include all others.
- The -t option works the same as the Convex ps.
- The output has 3 forms regular, full, and long.

  -f option indicates full listing.

  -l option indicates long listing.

```
$ ps
   PID    TTY      TIME  COMMAND
  9120    ttyp2    0:02  ksh
 26817    ttyp2    0:03  cbox
 27287    ttyp2    0:00  ps
 17856    ttyp2    0:08  datebook
$ ps -f
   UID   PID   PPID   C  STIME    TTY    TIME   COMMAND
chavez  9120   9119   6  Aug 27   ttyp2  0:02   ksh
  root 26817  26800  13  08:27:58 ttyp2  0:03   cbox
chavez 27288   9120  10  11:33:41 ttyp2  0:00   ps -f
chavez 17856   9120  13  Aug 29   ttyp2  0:08   datebook
$ ps -l
 F S   UID   PID   PPID  C    PRI NI  ADDR    SZ  WCHAN   TTY    TIME COMD
 1 S 26114  9120   9119  6    158 24  1145040 74  2cc368  ttyp2  0:02 ksh
 0 S     0 26817  26800 10    154 28  1063c80 133 1e3100  ttyp2  0:03 cbox
 1 R 26114 27153   9120  7    187 24  1145200 17          ttyp2  0:00 ps
 1 S 26114 17856   9120 10    154 28  10f4780 135 1e3100  ttyp2  0:08 datebook
```

Heading	Option	Meaning
F	l	Flags
S	l	State
UID	f, l	Owner of the process.
PID	all	Process ID.
PPID	f, l	Parent Process ID.
C	f. l	Processor utilization for scheduling.
PRI	l	Process Priority.
NI	l	Nice value.
ADDR	l	Address of process (memory or disk)
SZ	l	Size in blocks of core image of the process.
WCHAN	l	Event the process is sleeping or waiting for.
STIME	f	Starting time for the process.
TTY	all	Controlling terminal.
TIME	all	Total cpu time.
CMD	all	Command executed.

Top

- `/usr/bin/top` displays:

  System name and time.

  Load average.

  Process counts.

  Percent of CPU usage.

  Memory usage.

  An output similar to ps, but the processes are in order of cpu usage.

- The following options are useful:

  -n *count* Number of processes shown

  -q Useful for root only. Runs at higher priority.

Example:

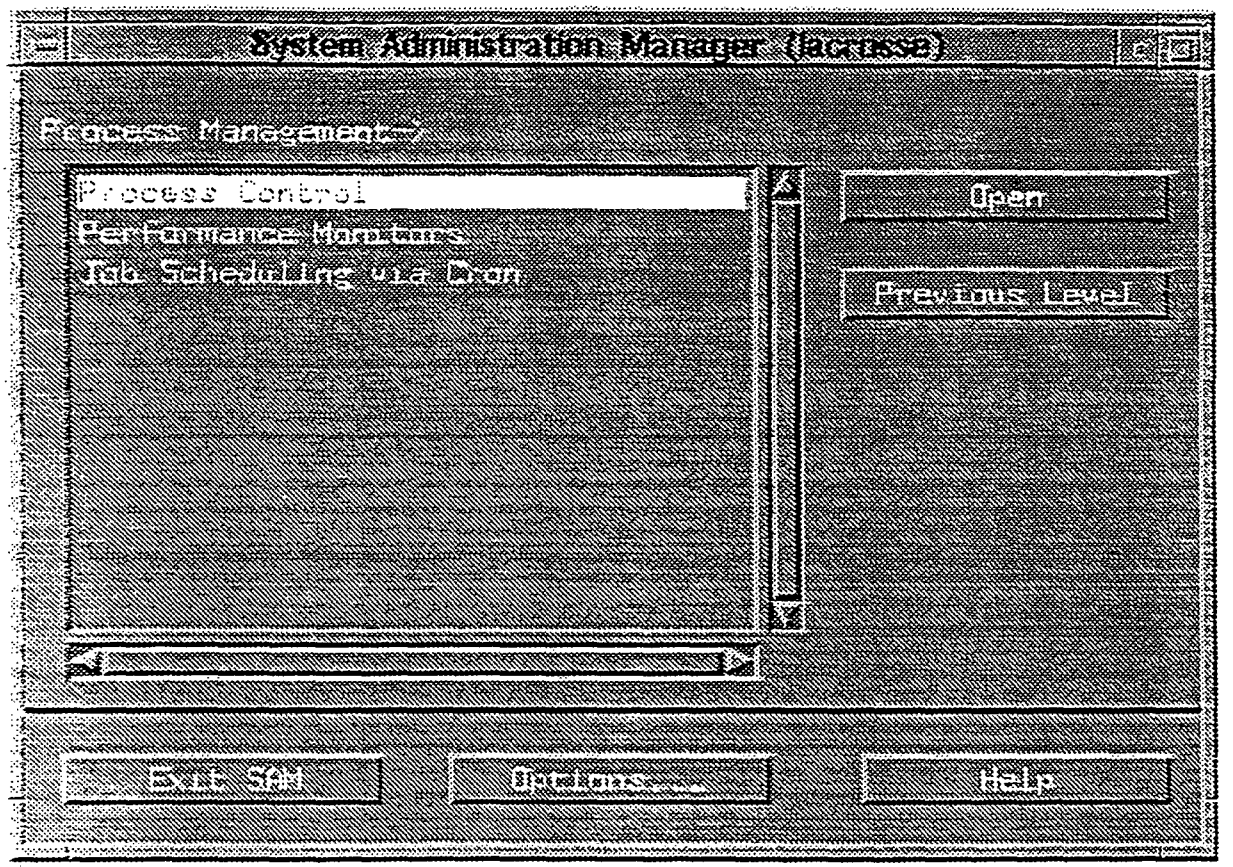
```
System: elmo-f                                  Thu Oct 13 12:06:31 1994
Load averages: 4.74, 4.76, 4.76
43 processes: 42 sleeping, 1 running
Memory: 524288K avail, 375580K free      Screen # 1/2

TTY   PID USERNAME  PRI  NI  SIZE   STATE  TIME   %CPU COMMAND
q1    914 root        4  20  14K    sleep  0:01   1.5  rlogind
q1    915 mbecker     4  20  2240K  sleep  0:02   0.8  tcsh.limits
q3    974 pulcher     4  20  47K    sleep  0:00   0.7  csh
co    176 root        4  20  37K    sleep  0:00   0.0  getty
q0    810 pulcher     4  20  47K    sleep  0:00   0.0  csh
q0    819 root        4  20  52K    sleep  0:00   0.0  sh
q1    970 root        4  20  195K   sleep  0:00   0.0  top
```

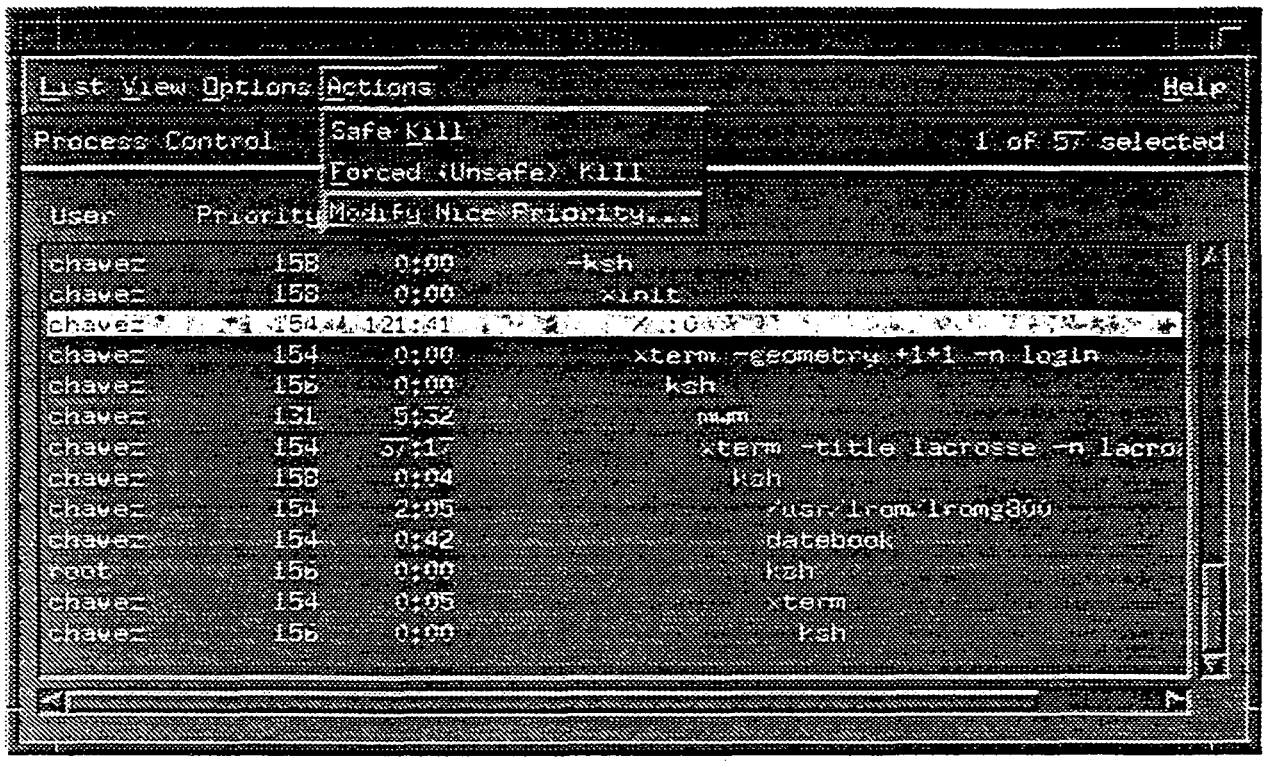
Renice processes

- Renice (like on C-series machines) is available.
- Can be accessed through SAM

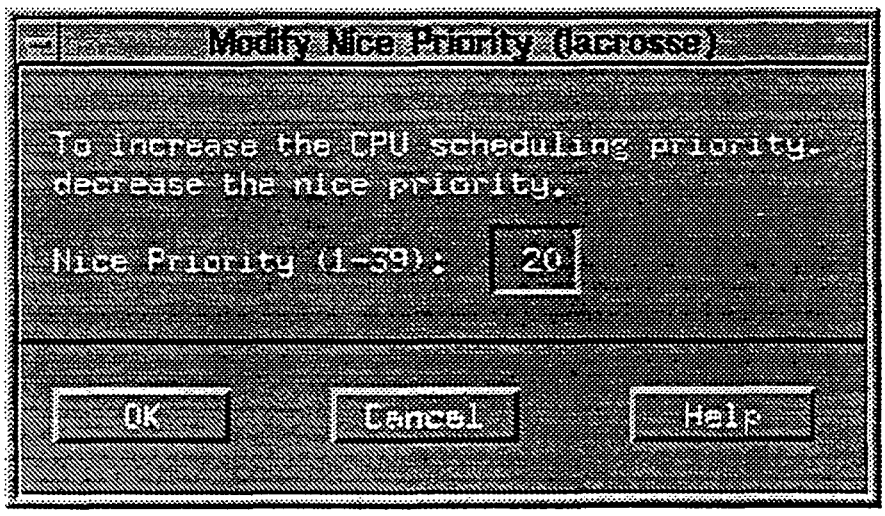
Select Process Management and Process Control



Select a process and then select Modify Priority from the menu.



Set the new nice value.



The sysinfo Command

The sysinfo command will display a variety of information related to the system.

Usage:

```
sysinfo [-a] [-mv] [-sv] [-stat] [-cpu]
        [phys_node[cpu]] [-ls[sc_name]]
```

Where:

-a	Print all available system information.
-mv	Print the Mach kernel version string. Assumed if no other options are specified.
-sv	Print the Unix server version string. Assumed if no other options are specified.
-cpu [phys_node [cpu]]	Print the basic cpu information. If no node or cpu given all the information on all nodes will be printed.
-ls [sc_name]	Print the load average for all sub-complexes, or for a particular sub-complexes.

- For some information you will need to be root.
- This utility reads information using cnx_sysinfo system call.