

9000/800 Hardware Recovery Workshop

D-CE42-HWREC2



EFI Workshop

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1 Overview

From operation point of view, the main difference between PA-Risc-Systems and IPF-Systems is the existence of EFI (Extensible Firmware Interface). EFI is a interface between system firmware (SAL,PAL) and the OS. This interface is an Intel Standard and exists as firmware on the system. It contains a shell and native-commands.

The Operating System builds a EFI-Partition on the root-disk during installation. On the partition you find the OS-loader and additional utilities and tools.

The firmware also contains a BOOT – Manager that handles the OS loading.

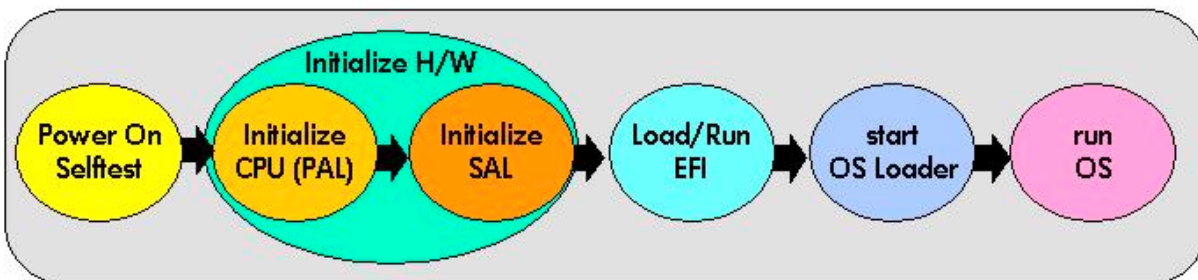
1.1 Differences from PA

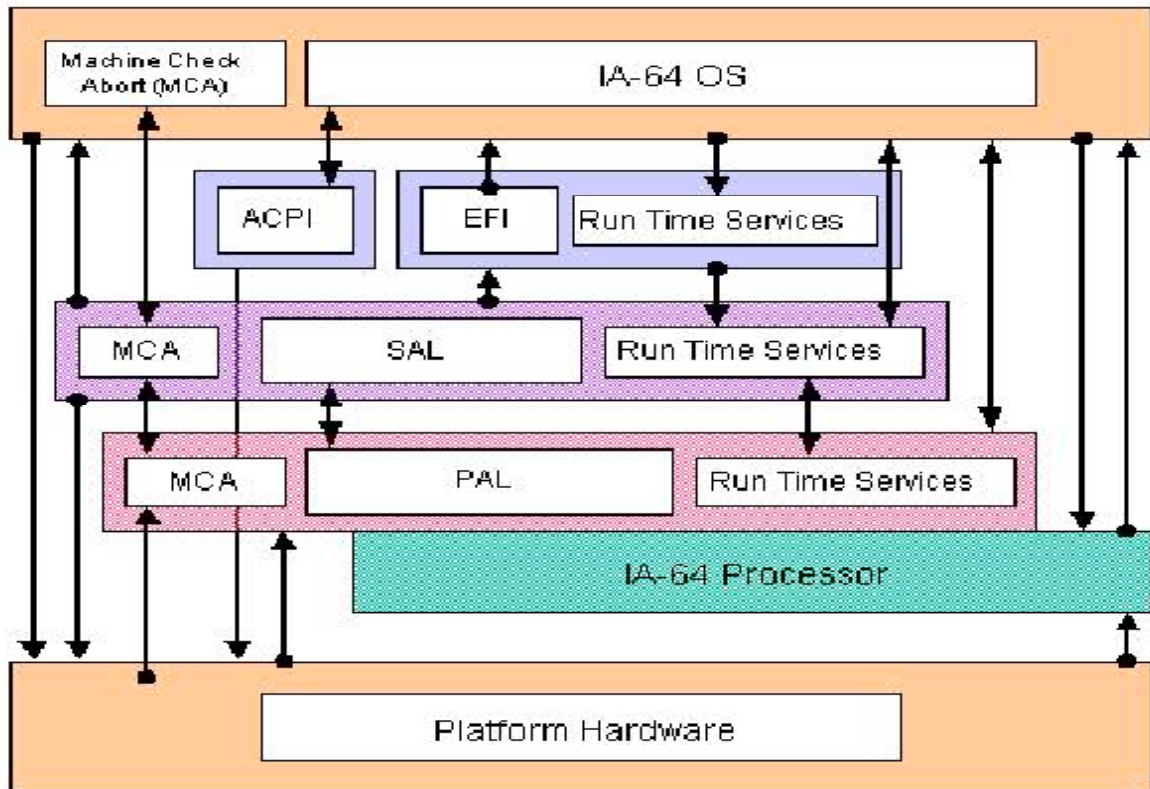
PA	IPF
BCH / ISL	Boot Manager / Shell
Proprietary	Open
IODC	EFI Drivers
Boot path	EFI Device Paths

1.2 BOOT Order of IPF Systems

- Firmware initializes and tests the CPU and the Platform
- Transfers control to EFI
- EFI initializes boot services and launches the Boot Manager
- Boot Manager loads hpux.efi
- Transfers control to hpux.efi
- hpux.efi loads the HPUX Kernel from the UX filesystem

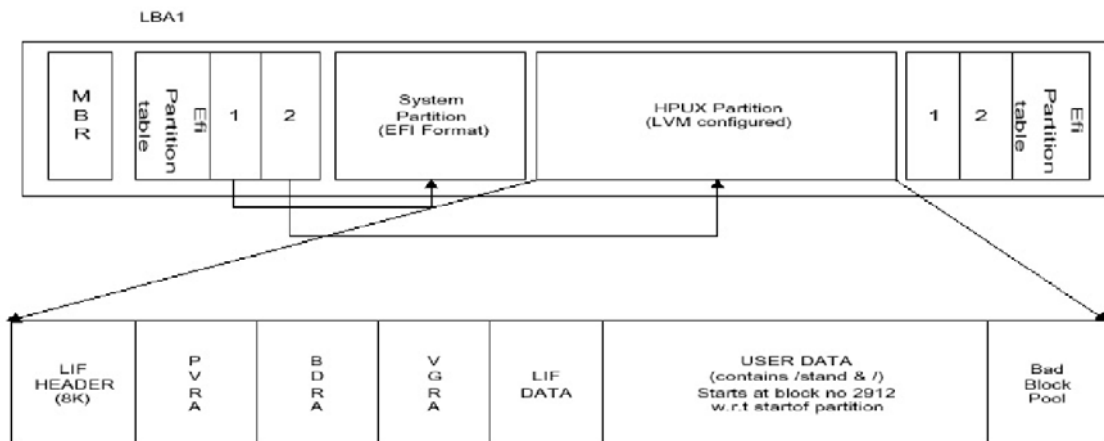
1.3 Operational Model





1.4 Structure of the Root-Disk (lvm)

The file system of a system-partition, which is supported by EFI, has to be FAT-32.



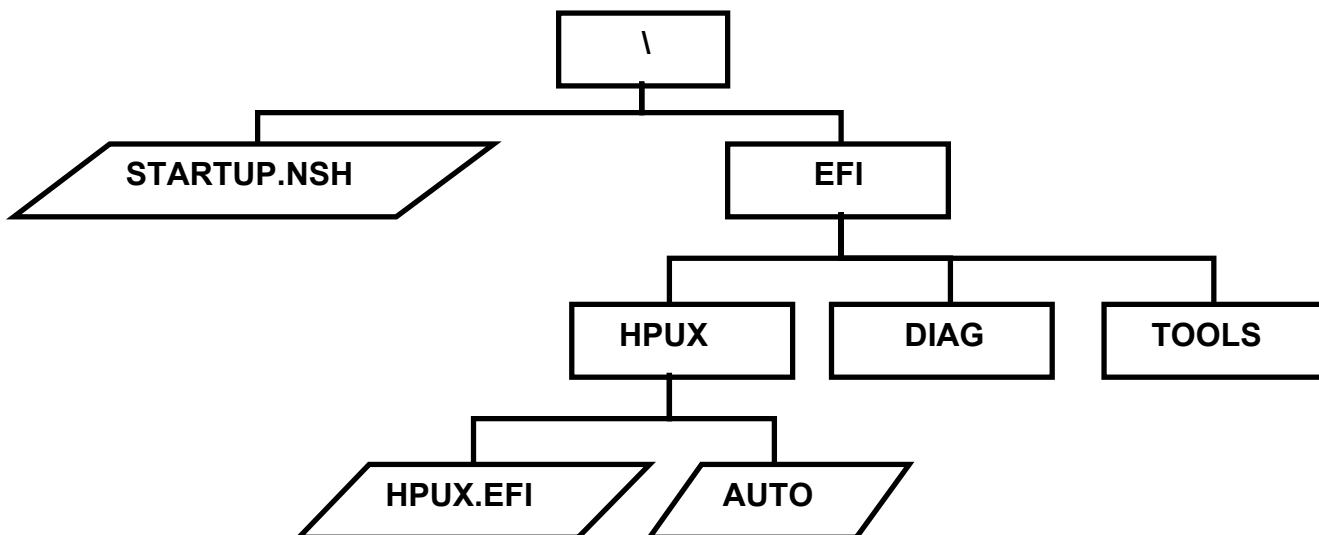
LVM configured IA64 Boot disk Layout.

The HP-UX device-files of the root disc are:

/dev/CxTyDz the whole drive
/dev/CxTyDzs1 the EFI partition
/dev/CxTyDzs2 the HP-UX partition

The HP-UX partition CxTyDzs2 looks like a PA-Risc boot disk. For all LVM tasks you need to work with the HP-UX partition device-file instead of the device-file of the whole drive.

1.5 EFI file system of a HP-UX boot-disk



2 EFI Shell

The EFI Shell is an interactive console interface. From the shell you have access to the EFI Partition. Diagnostic, configuration and launching of applications can be done from this shell. The shell includes scripting capabilities and can handle automatic execution of startup batch files.

2.1 Standard EFI-Shell commands

<code>cd</code>	- Displays or changes the current directory
<code>cp</code>	- Copies one or more files/directories to another location
<code>edit</code>	- Edits an ASCII or UNICODE file in full screen
<code>exit</code>	- Exits the EFI Shell
<code>help</code>	- Displays help menus, command list, or verbose help of a command
<code>ls</code>	- Displays a list of files and subdirectories in a directory
<code>mkdir</code>	- Creates one or more directories
<code>mv</code>	- Moves one or more files/directories to destination
<code>reset</code>	- Resets the system
<code>rm</code>	- Deletes one or more files or directories
<code>type</code>	- Displays the contents of a file

2.2 HELP command

```
Shell> help
```

```
List classes of commands:
```

```
boot          -- Booting options and disk-related commands
configuration -- Changing and retrieving system information
device        -- Getting device, driver and handle information
memory        -- Memory related commands
shell         -- Basic shell navigation and customization
scripts       -- EFI shell-script commands
```

```
Use 'help <class>' for a list of commands in that class
```

```
Use 'help <command>' for full documentation of a command
```

```
Use 'help -a' to display list of all commands
```

2.2.1 HELP BCH command

The HELP BCH command shows the equivalence between BCH commands and EFI commands.

```
Shell> help bch
```

```
----- Main Menu -----
Command                Type at shell prompt:
-----
```

```
COntfiguration        help bch co
INformation            help bch in
PAth                   help bch pa
ScRoll                 help bch sr
SEArch                 help bch sea
SERvice                help bch ser
BOot                   help bch bo
HElp                   help bch he
RESET                  help bch reset
MAin                   help bch ma
```

```
For a quick list of all BCH to shell command translations, type:
```

```
help bch list
```

```
For more information on BCH help, at the shell prompt type:
```

```
help bch he
```

Example:

```
Shell> help bch me
```

```
ME help information
```

```
-----
The BCH functionality previously provided by the MEmory command is
now available with the "info mem" command.
```

```
For more information on the "info mem" EFI command, at the shell
prompt type:
```

```
help info
```

```
End of ME help
```

2.3 BOOT commands

Shell> help boot

Boot and disk commands:

```
autoboot    -- View or set autoboot timeout variable
bcfg        -- Displays/modifies the driver/boot configuration
boottest    -- Set/View BootTest bits
dblk        -- Displays the contents of blocks from a block device
lanboot     -- Performs boot over lan from EFI Shell
mount       -- Mounts a file system on a block device
reset       -- Resets the system
vol         -- Displays volume information of the file system
```

2.3.1 autoboot

View or set autoboot timeout variable

Syntax:

```
autoboot [on|off|time <value>]
```

```
fs0:\> autoboot
```

Autoboot: OFF

'Timeout' variable disabled/deleted.

2.3.2 boottest

Set/View BootTest bits

```
fs0:\> boottest [on|off] or
```

```
fs0:\> boottest test [on|off]
```

```
BOOTTEST Settings Default Variable
```

```
OS is not speedy boot aware.
```

Selftest	Setting
-----	-----
early_cpu	Run this test
late_cpu	Run this test
platform	Run this test
chipset	Run this test
io_hw	Run this test
mem_init	Run this test
mem_test	Run this test

2.4 CONFIGURATION commands

```
Shell> help configuration
Configuration commands:
cpuconfig  -- Deconfigure or reconfigure cpus
date       -- Displays the current date or sets the date in the system
err        -- Displays or changes the error level
esiproc    -- Make an ESI call
errdump    -- View/Clear logs
info       -- Display hardware information
monarch    -- View or set the monarch processor
palproc    -- Make a PAL call.
salproc    -- Make a SAL call
time       -- Displays the current time or sets the time of the system
ver        -- Displays the version information
```

2.4.1 cpuconfig

Deconfigure or reconfigure cpus

Syntax:

cpuconfig [cpu #] [on/off]

```
fs0:\> cpuconfig
```

PROCESSOR INFORMATION

CPU	Speed	Proc Rev	Model	Family	Arch Rev	Processor State
0	900 MHz	B3	0	31	0	Active
1	900 MHz	B3	0	31	0	Active

2.4.2 date

Displays the current date or sets the date in the system

Syntax:

Date [mm/dd/[yy]yy]

```
fs0:\> date
07/05/2003
```

2.4.3 time

Displays the current time or sets the time of the system

Syntax:

Time [hh:mm[:ss]]

```
fs0:\ time
10:30:55
```

2.4.4 monarch

View or set the monarch processor

Syntax:

monarch [cpu #]

fs0:\> **monarch**

Current Monarch	Preferred Monarch	Possible Warnings
----- 0	----- 0	-----

2.4.5 errdump

Displays or clears the machine check logfiles of the system

Syntax:

errdump [mca | cpe | cmc | init | clear]

Parameters

mca dumps the Machine Check Abort error log
cpe dumps the Corrected Platform Error log
cmc dumps the Corrected Machine Check log
init dumps the Initialization log
clear erases all of the logs (mca, cpe, cmc, init)

2.4.6 info

Display hardware information

Syntax:

info [target]

valid targets are:

all	display everything
cpu	display information on cpus
cache	display information on cache
mem	display information on memory
io	display information on io
boot	display boot-related information
chiprev	display information on chip revisions
fw	display firmware version information
sys	display short information on all cells

Shell> **info boot**

BOOT INFORMATION

Monarch CPU:

Current Preferred

Monarch Monarch Possible Warnings

0 0
AutoBoot: OFF - Timeout is disabled

Boottest:

BOOTTEST Settings Default Variable

OS is not speedy boot aware.

Selftest Setting

early_cpu Run this test
late_cpu Run this test
platform Run this test
chipset Run this test
io_hw Run this test
mem_init Run this test
mem_test Run this test

LAN Address Information:

LAN Address Path

*Mac(00306E38A2EA) Acpi(HWP0002,100)/Pci(1|0)/Pci(4|0)/Mac(00306E38A2EA)

Shell> **info cache**

CACHE INFORMATION

CPU	Instruction L1	Data L1	Unified L2	Unified L3
0	16 KB	16 KB	256 KB	1536 KB
1	16 KB	16 KB	256 KB	1536 KB

Shell> **info cpu**

PROCESSOR INFORMATION

CPU	Proc Speed	Rev	Arch Model	Processor Family Rev	State
0	900 MHz	B3	0 31	0 0	Active
1	900 MHz	A0	0 0	0 0	SW Deconf

Shell> **info fw**

FIRMWARE INFORMATION

Firmware Revision: 2.21 [4306]
PAL A Revision: 7.31
PAL B Revision: 7.40
SAL Spec Revision: 0.20
SAL A Revision: 2.00
SAL B Revision: 2.00
EFI Spec Revision: 1.10
EFI Intel Drop Revision: 14.60
EFI Build Revision: 1.22
POSSE Revision: 0.10
ACPI Revision: 7.00
BMC Revision 1.30
IPMI Revision: 1.00
SMBIOS Revision: 2.3.2a
Management Processor Revision: E.02.10

```
Shell> info mem
MEMORY INFORMATION
Extender 0:
  ---- DIMM A ----  ---- DIMM B ----  ---- DIMM C ----  ---- DIMM D ----
    DIMM  Current    DIMM  Current    DIMM  Current    DIMM  Current
  ----  -
0    256MB    Active    256MB    Active    256MB    Active    256MB    Active
1    256MB    Active    256MB    Active    256MB    Active    256MB    Active
2    ----
3    ----
4    ----
5    ----
Active Memory      : 2048 MB
Installed Memory   : 2048 MB
```

```
Shell> info sys
SYSTEM INFORMATION
Product Name: server rx5670
Serial Number: USR42446MM
UUID: F8576C3D-040B-11D7-B644-8064E94A142E
```

```
Shell> info warning
WARNING AND STOP BOOT INFORMATION
Warning[51]: CPU deconfigured by SAL_B
```

```
Shell> info io
I/O INFORMATION
BOOTABLE DEVICES
```

```
Order  Media Type  Path
-----  -
1      HARDDRIVE    Acpi (HWP0002,0) /Pci (2|0) /Scsi (Pun0,Lun0) /HD (Part1,Sig01947F3A-2C7E-11D7-8106-91C3EE5D7780)
2      HARDDRIVE    Acpi (HWP0002,0) /Pci (2|0) /Scsi (Pun2,Lun0) /HD (Part1,Sig4F580000)
3      HARDDRIVE    Acpi (HWP0002,100) /Pci (1|0) /Pci (1|1) /Scsi (Pun0,Lun0) /HD (Part1,Sig2B7F9A68-32D0-44C0-97C7-43D8035B323)
4      HARDDRIVE    Acpi (HWP0002,100) /Pci (1|0) /Pci (1|1) /Scsi (Pun0,Lun0) /HD (Part2,Sig183C0EF2-DBE4-417A-8C3F-4CAE743A34D)
```

```
Seg  Bus  Dev  Fnc  Vendor  Device Slot  Path
#    #    #    #    ID      ID    #
---  -
00   00   01   00   0x103C  0x1290  01  Acpi (HWP0002,0) /Pci (1|0)
00   00   01   01   0x103C  0x1048  01  Acpi (HWP0002,0) /Pci (1|1)
00   00   02   00   0x1000  0x000B  01  Acpi (HWP0002,0) /Pci (2|0) . . .
```

2.4.7 lanaddress

Displays the MAC address of the core-io.

```
Shell> lanaddress
```

LAN Address Information

```
LAN Address  Path
-----
*Mac(00306E38A2EA) Acpi(HWP0002,100)/Pci(1|0)/Pci(4|0)/Mac(00306E38A2EA))
```

2.5 MEMORY commands

Shell> **help memory**

Memory commands:

```
default      -- Sets, Resets, or Clears default NVM values
dmpstore     -- Displays all NVRAM variables
dmem         -- Displays the contents of memory
memmap       -- Displays the memory map
mm           -- Displays or modifies MEM/IO/PCI
pdt          -- View or set pdt
```

2.5.1 pdt

View or clear the PDT.

Syntax:

pdt [clear]

Shell> **pdt**

PDT Information for PD

```
                Last Clear time for PD: 10/29/02 07:43a
Number of total entries in PD PDT:          100
Number of used entries in PD PDT:           0
Number of free entries in PD PDT:          100
Number of single-bit entries in PD PDT:     0
Number of multi-bit entries in PD PDT:      0
Address of first multi-bit error in PD: 0x0000000000000000
```

2.6 DEVICE commands

Shell> **help device**

Device, driver and handle commands:

```
baud          -- Set Serial port com settings
connect       -- Binds an EFI driver to a device and starts the driver
devices       -- Displays the list of devices being managed by EFI drivers
devtree       -- Displays the tree of devices that follow the EFI Driver Model
disconnect    -- Disconnects one or more drivers from a device
dh            -- Displays the handles in the EFI environment
drivers       -- Displays the list of drivers that follow the EFI Driver Model
drvcfg        -- Invokes the Driver Configuration Protocol
drvdiag       -- Invokes the Driver Diagnostics Protocol
guid          -- Displays all the GUIDs in the EFI environment
lanaddress    -- Display core I/O MAC address
load          -- Loads and optionally connected EFI drivers
loadpcirom    -- Loads a PCI Option ROM
map           -- Displays or defines mappings
openinfo      -- Displays the protocols on a handle and the agents
optload       -- Lists all optional ROM-based efi drivers and applications
pci           -- Displays PCI devices or PCI function configuration space
reconnect     -- Reconnects one or more drivers from a device
unload        -- Unloads a protocol image
```

2.6.1 devices

Displays the list of devices being managed by EFI drivers

```
Shell> devices
C   T   D
T   Y   C   I
R   P   F   A
L   E   G   G   #P   #D   #C   Device Name
==  =  =  =  ==  ==  ==

=====
0C R - - - 1 9 Acpi (HWP0002,0)
0D R - - - 1 4 Acpi (HWP0002,100)
0E R - - - 1 - Acpi (HWP0002,200)
0F R - - - 1 - Acpi (HWP0002,300)
10 R - - - 1 4 Acpi (HWP0002,400)
11 R - - - 1 - Acpi (HWP0002,500)
12 R - - - 1 - Acpi (HWP0002,600)
13 R - - - 1 - Acpi (HWP0002,700)
18 D - - 1 - - Acpi (HWP0002,0)/Pci (1|0)
19 B - - 1 1 1 Acpi (HWP0002,0)/Pci (1|1)
1A D X X 1 1 - LSI Logic Ultra2 SCSI Controller
1B D X X 1 1 - LSI Logic Ultra2 SCSI Controller
1C D - - 1 - - Acpi (HWP0002,0)/Pci (4|0)
1D D - - 1 - - Acpi (HWP0002,0)/Pci (4|0)/Pci (4|0)
1E B - - 1 3 1 Acpi (HWP0002,0)/Pci (4|0)/Pci (4|1)
1F D - - 1 - - Acpi (HWP0002,0)/Pci (4|0)/Pci (4|2)
20 B - - 1 5 2 Acpi (HWP0002,0)/Pci (4|0)/Pci (5|0)
21 D - - 1 - - Acpi (HWP0002,100)/Pci (1|0)
22 D X X 1 1 - LSI Logic Ultra160 SCSI Controller . . .
```

2.6.2 devtree

Displays the tree of devices that follow the EFI Driver Model

```
Shell> devtree
Device Tree
  Ctrl[04]
  Ctrl[0C] Acpi (HWP0002,0)
    Ctrl[18] Acpi (HWP0002,0)/Pci (1|0)
    Ctrl[19] Acpi (HWP0002,0)/Pci (1|1)
      Ctrl[39] 16550 Serial UART Driver
        Ctrl[3A] VT-100 Serial Console
          Ctrl[37] Primary Console Input Device
          Ctrl[38] Primary Console Output Device
          Ctrl[36] Primary Standard Error Device
    Ctrl[1A] LSI Logic Ultra2 SCSI Controller
    Ctrl[1B] LSI Logic Ultra2 SCSI Controller
    Ctrl[1C] Acpi (HWP0002,0)/Pci (4|0)
    Ctrl[1D] Acpi (HWP0002,0)/Pci (4|0)/Pci (4|0)
    Ctrl[1E] Acpi (HWP0002,0)/Pci (4|0)/Pci (4|1)
      Ctrl[37] Primary Console Input Device
    Ctrl[1F] Acpi (HWP0002,0)/Pci (4|0)/Pci (4|2)
    Ctrl[20] Acpi (HWP0002,0)/Pci (4|0)/Pci (5|0)
      Ctrl[38] Primary Console Output Device
      Ctrl[36] Primary Standard Error Device
  Ctrl[0D] Acpi (HWP0002,100)
    Ctrl[21] Acpi (HWP0002,100)/Pci (1|0)
    Ctrl[22] LSI Logic Ultra160 SCSI Controller
    Ctrl[23] LSI Logic Ultra160 SCSI Controller
  . . .
```

2.6.3 drivers

Displays the list of drivers that follow the EFI Driver Model

```
Shell> drivers
          T   D
D         Y C I
R         P F A
V  VERSION  E G G #D #C DRIVER NAME                IMAGE NAME
== ===== = = = == == =====
=====
14 00000010 B - - 8 17 PCI Bus Driver                PciBus
25 01030000 D - - 1 - HP NetRAID EFI (BIOS) DRIVER   PciRom
Seg=00000000
2A 00000020 D - - 1 - USB Keyboard Driver                UsbKeyBoard
2B 00000010 ? - - - - UGA Console Driver                GraphicsConsole
2C 00000000 D - - 1 - PCI VGA Mini Port Driver            PciVgaMiniPort
2D 00000010 D - - 1 - VGA Class Driver                VgaClassDriver
2E 00000010 B - - 1 1 Serial 16550 UART Driver          Serial16550
2F 00000010 B - - 1 1 Serial Terminal Driver            Terminal
30 00000010 D - - 2 - Platform Console Management Driver   ConPlatform
31 00000010 D - - 2 - Platform Console Management Driver   ConPlatform
32 00000010 B - - 2 2 Console Splitter Driver            ConSplitter
33 00000010 D - - 1 - Console Splitter Driver            ConSplitter
34 00000010 B - - 2 2 Console Splitter Driver            ConSplitter
35 00000010 B - - 2 2 Console Splitter Driver            ConSplitter
3B 00000010 D - - 12 - Generic Disk I/O Driver                DiskIo
3C 00000010 B - - 3 9 Partition Driver (MBR/GPT/El Torito) Partition
3D 00000010 D - - 4 - FAT File System Driver                Fat
3E 01000500 D X X 3 - LSI Logic Ultra160 SCSI Driver      LsiScsi160
3F 00000010 ? X X - - PCI IDE/ATAPI Bus Driver          Ide
40 00000010 ? - - - - Intel(R) PRO 100 UNDI Driver        Undi
41 00030007 B X X 1 1 Broadcom Gigabit Ethernet Driver    b75Undi64
```

2.6.4 pci

Displays PCI devices or PCI function configuration space

```
Shell> pci
  Seg  Bus  Dev  Func
  ---  ---  ---  ----
    00  00  01  00 ==> Simple Communications Controllers - Other
communicat
      Vendor 0x103C Device 0x1290 Prog Interface 0
    00  00  01  01 ==> Simple Communications Controllers - Serial
controlle
      Vendor 0x103C Device 0x1048 Prog Interface 2
    00  00  02  00 ==> Mass Storage Controller - SCSI controller
      Vendor 0x1000 Device 0x000B Prog Interface 0
    00  00  02  01 ==> Mass Storage Controller - SCSI controller
      Vendor 0x1000 Device 0x000B Prog Interface 0
    00  00  04  00 ==> Bridge Device - PCI/PCI bridge
      Vendor 0x8086 Device 0xB154 Prog Interface 0
    00  01  04  00 ==> 00  01  04  02 ==> Serial Bus Controllers -
USB
      Vendor 0x1033 Device 0x00E0 Prog Interface 20
    00  01  05  00 ==> Display Controller - VGA/8514 controller
      Vendor 0x1002 Device 0x5159 Prog Interface 0
    00  20  01  00 ==> Bridge Device - PCI/PCI bridge
      Vendor 0x1014 Device 0x01A7 Prog Interface 0 Serial Bus
Controllers - USB
      Vendor 0x1033 Device 0x0035 Prog Interface 10
    00  01  04  01 ==> Serial Bus Controllers - USB
      Vendor 0x1033 Device 0x0035 Prog Interface 10
. . .
```

2.6.5 drvcfg

Invokes the Driver Configuration Protocol

```
Shell> drvcfg
Configurable Components
  Drv[3E]  Ctrl[1A]  Lang[eng]
  Drv[3E]  Ctrl[1B]  Lang[eng]
  Drv[3E]  Ctrl[22]  Lang[eng]
  Drv[3E]  Ctrl[23]  Lang[eng]
  Drv[41]  Ctrl[24]  Lang[eng]

Shell> drvcfg -s 3E 1B
è Config Program
  e.g. scsi-address and speed of the controller
```


2.6.6 drvdiag

Invokes the Driver Diagnostics Protocol

```
Shell> drvdiag
Available Diagnostics
  Drv[3E]  Ctrl[1A]  Lang[eng]
  Drv[3E]  Ctrl[1B]  Lang[eng]
  Drv[3E]  Ctrl[22]  Lang[eng]
  Drv[3E]  Ctrl[23]  Lang[eng]
  Drv[41]  Ctrl[24]  Lang[eng]
Shell> drvdiag -s 3e 1a
Run Diagnostics
  Drv[3E]  Ctrl[1A]  Lang[eng] - PASSED
```

2.6.7 sysmode

Displays or sets the system mode (Hidden Command)

Syntax:

```
sysmode [admin|service|mfg]
```

```
fs0:\> sysmode
```

```
Current System Mode: MFG
```

2.6.8 sysset

Displays or sets some Stable Storage Values. (Hidden Command)

Syntax:

sysset	shows stable-storage values (service or mfg-mode)
sysset uuid xxxxx	writes uuid (mfg mode)
sysset serial xxxx	system-serial
sysset prodnum xxx	product-number
sysset prodname xxx	product-name

```
fs0:\> sysset
```

```
System Information:
```

```
Manufacturer: hp
Product Name: server rx5670
Product Number: A6837A
Serial number: USR42446MM
UUID: f8576c3d-040b-11d7-b644-8064e94a142e (Valid)
Secondary UUID is Valid - identical
```

2.6.9 map

Displays or defines mappings

Syntax:
map [-r]

Shell> **map**

Device mapping table

```
fs0 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig01947F3A-2C7E-11D7-8106-91C3EE5D7780)
fs1 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun2,Lun0)/HD(Part1,Sig4F580000)
fs2 : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part1,Sig2B7F9A68-32D0-44C0-97C7-843D8035B323)
fs3 : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part2,Sig183C0EF2-DBE4-417A-8C3F-64CAE743A34D)
blk0 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun0,Lun0)
blk1 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun0,Lun0)/HD(Part1,Sig01947F3A-2C7E-11D7-8106-91C3EE5D7780)
blk2 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun0,Lun0)/HD(Part2,Sig0194CC56-2C7E-11D7-8106-91C3EE5D7780)
blk3 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun0,Lun0)/HD(Part3,Sig019514AE-2C7E-11D7-8106-91C3EE5D7780)
blk4 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun2,Lun0)
blk5 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun2,Lun0)/HD(Part1,Sig4F580000)
blk6 : Acpi(HWP0002,0)/Pci(2|0)/Scsi(Pun2,Lun0)/HD(Part2,Sig4F580000)
blk7 : Acpi(HWP0002,0)/Pci(2|1)/Scsi(Pun3,Lun0)
blk8 : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)
blk9 : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part1,Sig2B7F9A68-32D0-44C0-97C7-843D8035B323)
blkA : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part2,Sig183C0EF2-DBE4-417A-8C3F-64CAE743A34D)
blkB : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part3,Sig8EDBCFDA-2916-11D7-8941-B58D729EDC53)
blkC : Acpi(HWP0002,100)/Pci(1|0)/Pci(1|1)/Scsi(Pun0,Lun0)/HD(Part4,Sig8EDC2FC0-2916-11D7-8941-B58D729EDC53)
```

3 EFI Boot Manager

Note:

The best way to view the Boot Manager is with Windows / Hyperterminal. On a Terminal or Reflection session, VT100 must be chosen, anyway the formatting is still not correct.

After POST and initializing boot services, EFI starts the Boot Manager. The Boot Manager handles the booting of the OS. It defines the boot order and configures the active console(s). The Boot Manager allows access of the EFI Shell. The Boot Manager can be configured via the Boot Option Maintenance Menu.

3.1 Boot Option Maintenance Menu

The Boot Option Maintenance Menu enables the user to:

- Add some default boot options
- Change Bootorder
- Change Active Console Setting (Serial / MP-Serial / VGA)
- Delete all boot options

```
EFI Boot Manager ver 1.10 [14.57] Firmware ver 1.41 [4232]
```

```
Please select a boot option
```

```
EFI Shell [Built-in]  
HP-UX Primary Boot: 0/1/4/0.0.0  
Linux RedHat  
Microsoft Windows .NET Advanced Server LE Ver1.2  
Microsoft Windows .NET (Build 3663)  
Boot option maintenance menu  
Security/Password Menu
```

```
Use ^ and v to change option(s). Use Enter to select an option
```

Figure3.1: EFI Boot Manager

```
EFI Boot Maintenance Manager ver 1.10 [14.57]
```

```
Main Menu. Select an Operation
```

```
Boot from a File  
Add a Boot Option  
Delete Boot Option(s)  
Change Boot Order  
  
Manage BootNext setting  
Set Auto Boot TimeOut  
  
Select Active Console Output Devices  
Select Active Console Input Devices  
Select Active Standard Error Devices  
  
Cold Reset  
Exit
```

```
Timeout-->[10] sec SystemGuid-->[76126178-DEC5-11D6-862A-C24614C7D4A3]  
SerialNumber-->[(null)]
```

Figure 3.2: Boot Option Maintenance Menu

EFI Boot Maintenance Manager ver 1.10 [14.57]

Select the Console Output Device(s)

```
Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(PcAnsi)
Ncpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100)
Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)
Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(VtUtf8)
Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(PcAnsi)
Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100)
* Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100+)
Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(VtUtf8)
* Acpi(HWP0002,700)/Pci(2|0)
```

Save Settings to NVRAM
Exit

Onboard RS-232
MP RS-232
VGA - Output

Figure 3.3: Console Configuration Screen

3.2 New Boot Menu

EFI Boot Manager ver 1.10 [14.62]

Boot Menu

- Efi Shell
- HPUX 0/1/1/1.13.0
- HP Service Partition
- Internal Bootable DVD
- Linux RedHat SCSI ID 0
- RedHat Linux SCSI ID 1
- Windows Server 2003, Enterprise
- hp OpenVMS IA64

System Overview

hp server rx4640
Serial #: DEH44070A3

System Firmware: 3.11 [4445]
BMC Version: 3.47
MP Version: E.03.13
Installed Memory: 1024 MB

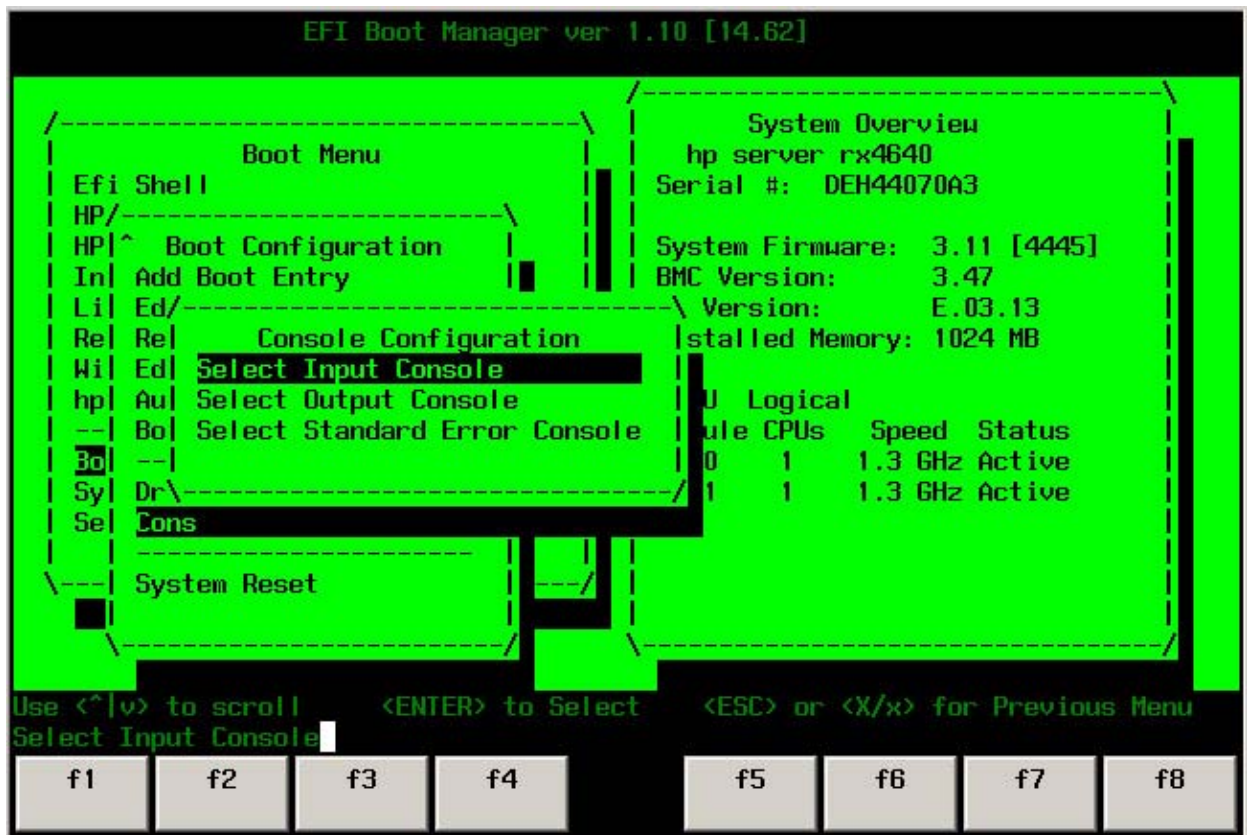
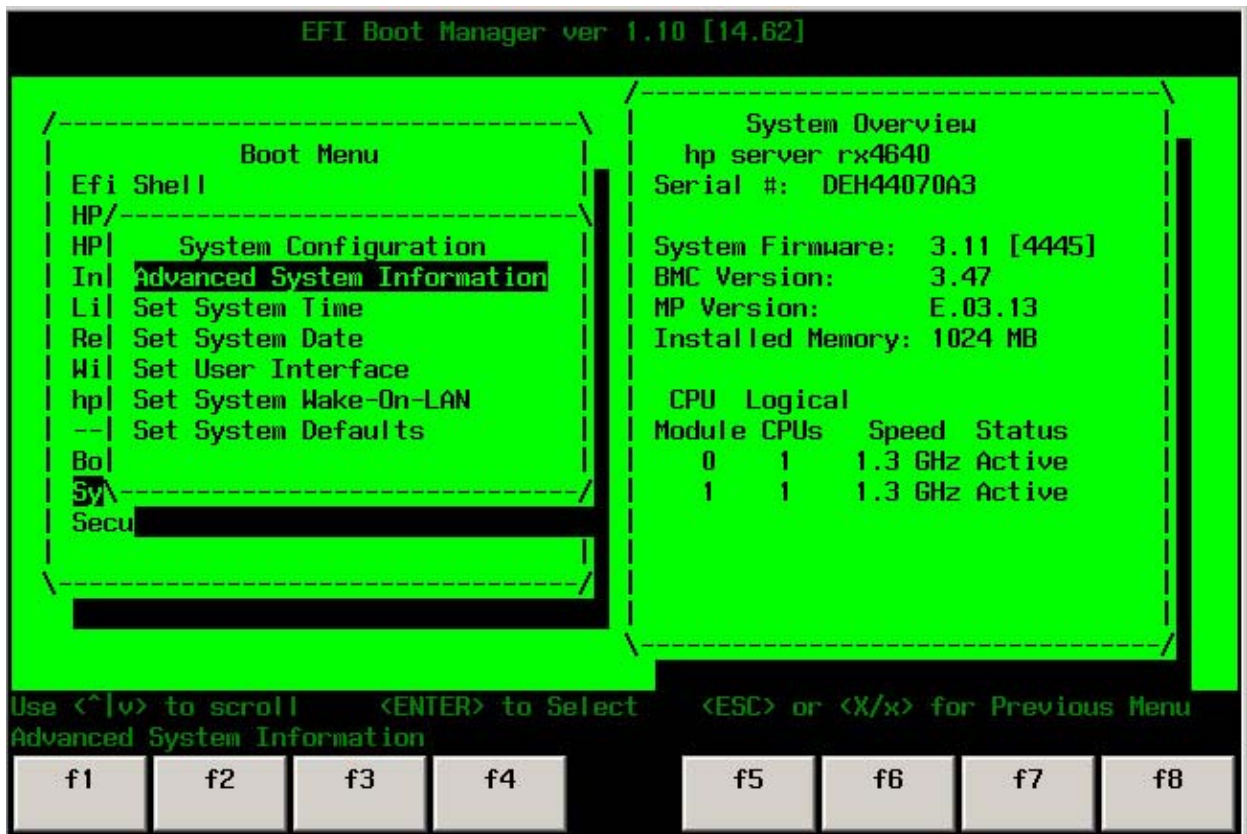
CPU Logical

Module	CPUs	Speed	Status
0	1	1.3 GHz	Active
1	1	1.3 GHz	Active

Use ^ and v to change option(s). Use Enter to select an option

Efi Shell

f1 f2 f3 f4 f5 f6 f7 f8



4 Booting from alternate path

4.1 Mirroring the boot-disk

Assume that the primary disk is at c2t0d0 and secondary disk is at c2t1d0.

1. Use vi to create a partition description file by doing the following:

```
# vi /tmp/partitionfile
```

For HPUX < 11.23 the 3 line entry should look like this:

```
2
EFI 100MB
HPUX 100%
```

For HPUX 11.23 or later the 4 lines should look like this:

```
3
EFI 500MB
HPUX 100%
HPSP 400MB
```

2. Use idisk to setup the disk partitioning using the file created above:

```
# idisk -wf /tmp/partitionfile /dev/rdisk/c2t1d0
```

3. Use insf to create the new device dfiles (c2t1d0s1 and c2t1d0s2)

```
# insf -e
```

4. pvcreate the new subpartition - make sure specify s2 !

```
# pvcreate -B /dev/rdisk/c2t1d0s2
```

5. Use mkboot to format and populate the newly created EFI partition:

```
# mkboot -e -l /dev/dsk/c2t1d0
```

6. Extend vg to include new disk sub-partition s2.

```
# vgextend /dev/vg00 /dev/dsk/c2t1d0s2
```

7. extend lvol to new sub-partition on the disk

```
# lvextend -m 1 /dev/vg00/lvol1 /dev/dsk/c2t1d0s2
.... lvextend -m 1 (additional LV)...
```

8. update lvol boot paths

```
# lvolboot -r /dev/vg00/lvol3 /dev/vg00
# lvolboot -b /dev/vg00/lvol1 /dev/vg00
# lvolboot -s /dev/vg00/lvol2 /dev/vg00
```

```
# lvlnboot -d /dev/vg00/lvol2 /dev/vg00
```

9. Use `efi_ls` to confirm that the EFI partition is present and populated on the new disk:

```
# efi_ls -d /dev/rdisk/c2t1d0s1
```

10. edit the AUTO file so we can boot when one disk is missing:

```
# efi_cp -d /dev/rdisk/c2t0d0s1 -u /EFI/HPUX/AUTO /tmp/AUTO
# vi /tmp/AUTO
modify "boot vmunix" to "boot vmunix -lq"
```

then put back the file on both EFI partitions with:

```
# efi_cp -d /dev/rdisk/c2t1d0s1 /tmp/AUTO /EFI/HPUX/AUTO
# efi_cp -d /dev/rdisk/c2t0d0s1 /tmp/AUTO /EFI/HPUX/AUTO
```

11. set the alternate EFI Bootpath to the mirrored disk

```
# setboot -a HW-path to the mirrored disk
```

12. Test booting from each drive.

5 HP-UX access of the EFI partition

IPF-versions of HP-UX contain new commands to access the EFI partition from the OS. The device file name is needed to access the partition.

5.1 Device files of the root disk

```
Everest[rx5670]:/#ioscan -fnkCdisk
Class      I  H/W Path      Driver  S/W State  H/W Type  Description
=====
disk       1  0/0/2/0.2.0  sdisk   CLAIMED    DEVICE     HP
36.4GMAN3367MC
           /dev/dsk/c0t2d0    /dev/rdisk/c0t2d0
           /dev/dsk/c0t2d0s1  /dev/rdisk/c0t2d0s1
           /dev/dsk/c0t2d0s2  /dev/rdisk/c0t2d0s2
```

```
c0t2d0      is the device-file of the whole disk
c0t2d0s1    is the device-file of the efi-partition
c0t2d0s2    is the device file of the ux-partition
```

5.2 HP-UX commands for EFI access

5.2.1 efi_cp

Copies a file between the UX filesystem and the EFI partition.

Example 1 (copy file from ux to efi):

```
efi_cp -d /dev/rdisk/c0t2d0s1 file_ux /efi/tools/
```

Example 2 (copy file from efi to ux):

```
efi_cp -d /dev/rdisk/c0t2d0s1 -u /efi/file_efi file_ux
```

5.2.2 efi_ls

Lists files in the EFI Partition.

Example:

```
efi_ls -d /dev/rdisk/c0t2d0s1 /efi
```

5.2.3 efi_rm

Purges a file in the EFI partition.

Example:

```
efi_rm -d /dev/rdisk/c0t2d0s1 file_efi
```

5.2.4 efi_rmdir

Removes a directory on the EFI partition

Example:

```
efi_rmdir -d /dev/rdisk/c0t2d0s1 /efi/dir
```

5.2.5 efi_mkdir

Creates a directory on the EFI partition

Example:

```
efi_mkdir -d /dev/rdisk/c0t2d0s1 /efi/dir
```


6 Errors on IPF Systems

6.1 Error Types

IPF Systems uses other Types of Errors. HPMC and LPMC are not longer used. The Error Types of IPF Systems are:

- **Machine Check Abort (MCA)**
such as: multi-bit memory error
- **Corrected Machine Check (CMC) – fixed by Itanium**
such as: single-bit processor cache error
- **Corrected Platform Error (CPE) – fixed by system HW**
such as: sbe from Itanium to Pluto, Pluto fixes

6.2 Error Logfiles

The IPF Error Logfiles can be accessed with the “errdump” command. Any type of error has its own NVM. The system keeps one error of each type. For analysis, you can redirect the output of “errdump” to a file, reboot the system and copy the file from the EFI partition to the UX Partition. There is a PC-based Analyzer Program available to analyze the logfiles.

```
SHELL > errdump mca
SHELL > errdump cpe
SHELL > errdump cmc
```

To redirect errdump mca log:
fs0:\> errdump mca > errdump_mca.log

7 Tasks on the EFI Shell

7.1 Networking on the EFI Shell

Configuring networking on an EFI Partition!
(Available on ECU11-CD5)

Load TCP/IP version 4 driver support first.

- `load tcpipv4.efi`

Next run ifconfig to set IP Address and Netmask.

On rx2600:
sni0 is onboard 10/100Mb LAN and
sni1 is onboard 1Gb LAN

Check with ifconfig -a

- `ifconfig -a`
- `ifconfig sni0 xxx.xxx.xxx.xxx netmask yyy.yyy.yyy.yyy`

Next set your default Gateway.

- `route add default zzz.zzz.zzz.zzz 1`

Again check your configuration.

- `ifconfig -a`

Now you can ping or ftp and put/get your file(s).

- `ftp aaa.aaa.aaa.aaa`

7.2 Configuration of SCSI - HBA

Step 1:

**Find the controller-handle, by searching the SCSI controller.
In our example "1C" and "1D"**

```
efi-shell> devtree
```

A tree of all EFI-capable devices installed in the system is displayed. The output could look like this:

```
Device Tree
Ctrl[04]
Ctrl[0C] Acpi(HWP0002,0)
  Ctrl[17] Acpi(HWP0002,0)/Pci(1|0)
  Ctrl[18] Acpi(HWP0002,0)/Pci(1|1)
    Ctrl[35] Primary Console Input Device
  Ctrl[19] Acpi(HWP0002,0)/Pci(1|2)
  Ctrl[1A] PCI IDE/ATAPI Controller
    Ctrl[4E] DV-28E-B
  Ctrl[1B] Acpi(HWP0002,0)/Pci(3|0)
    Ctrl[4F] Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E3809C6)
Ctrl[0D] Acpi(HWP0002,100)
  Ctrl[1C] LSI Logic Ultra320 SCSI Controller
  Ctrl[1D] LSI Logic Ultra320 SCSI Controller
  Ctrl[1E] Acpi(HWP0002,100)/Pci(2|0)
    Ctrl[53] Acpi(HWP0002,100)/Pci(2|0)/Mac(00306E3889E3)
....
```

Step 2:

**Find the device-handle for the SCSI-controller.
In our example "4A"**

```
efi-shell> drvcfg
```

A list of all EFI-capable configurable components in the system is displayed.
The output could look like this:

```
Drv[40]   Ctrl[1A]   Lang[eng]
Drv[4A]   Ctrl[1C]   Lang[eng]
Drv[4A]   Ctrl[1D]   Lang[eng]
```

Step 3:

Start the configuration program and make the config changes.

```
efi-shell> drvcfg -s device-handle controller-handle
```

Our example:

```
efi-shell> drvcfg -s 4A 1C   or
efi-shell> drvcfg -s 4A 1D
```

Step 4:

Reset the system

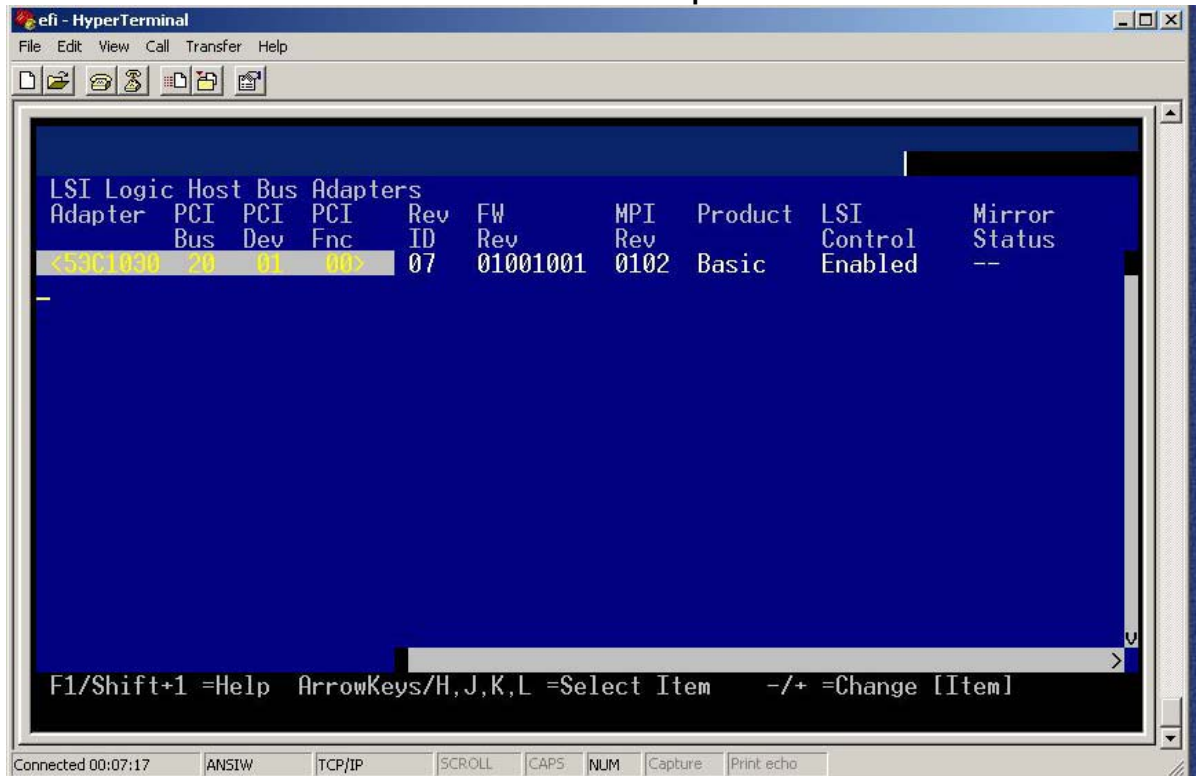
```
efi-shell> reset
```

7.2.1 Screenshots of drvcfg:

Note: drvcfg is only visible with Hyperterminal or on the VGA Port

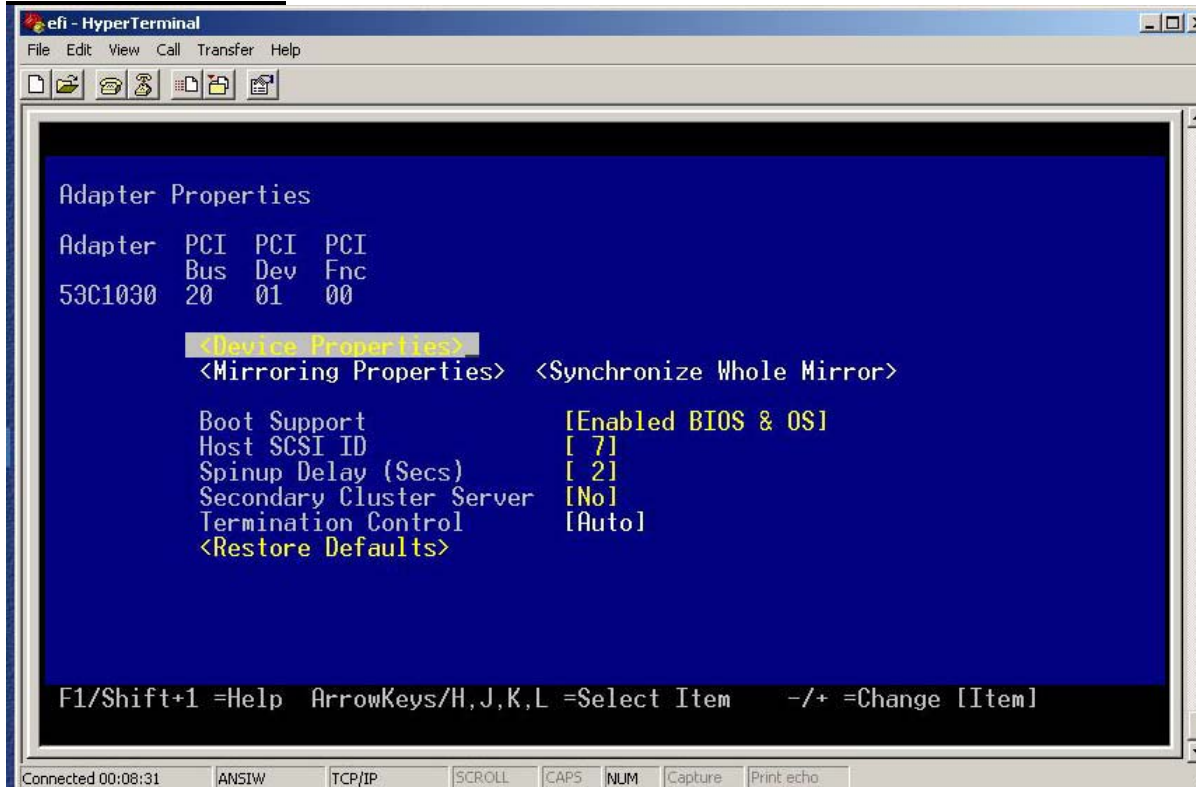
Main Screen:

Caution: Do not select the <GLOBAL PROPERTIES> option!



next Screen with <Return> / exit with <esc>

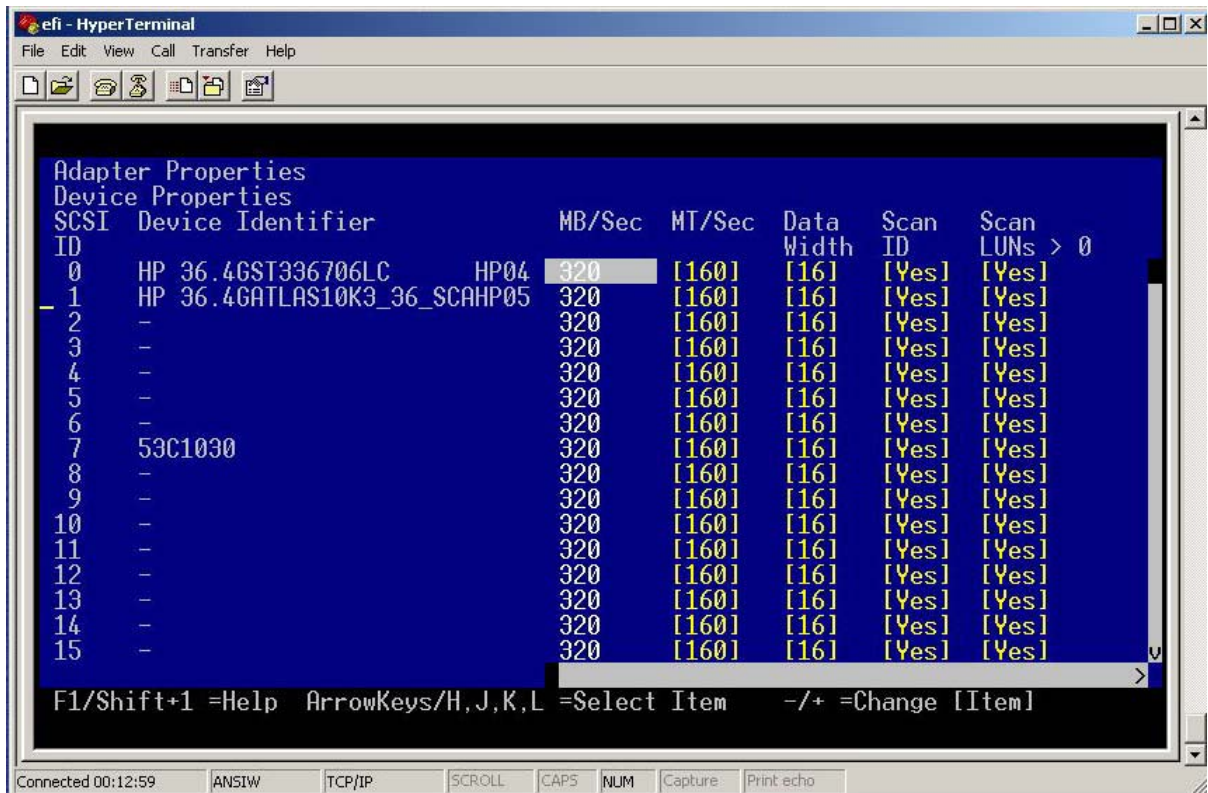
Controller Screen:



next Screen with <Return> / exit with <esc>

Device Screen:

Change the SCSI-Rate by setting the speed of device 7 (controller) !



back with <esc>

7.3 Export / Import Boot-Entries with NVRBOOT.EFI

The Boot-Entries of the Bootmanager can be saved with NVRBOOT.EFI. This Tool is on the ECU-CD and on the Windows-Smartsetup CD.

This is very helpful if you have to exchange the systemboard.

Start the program and choose "X" for export. You should save all entries. After exchanging the board you can import the entries with "I".

Screenshot:

NVRBOOT: OS Boot Options Maintenance Tool [Version 5.2.3683]

1. EFI Shell [Build-in]
2. HP-UX 11.23 Path 0/1/1/0/1/1.2.0
- * 3. Windows 2003 Server EE (original install)
4. Bootable DVD

* = Windows OS boot option

(D)isplay (M)odify (C)opy E(x)port (I)mport (E)rase (P)ush (H)elp (Q)uit

7.4 Replacement of a System Board

Following Actions should be performed if the Systemboard has to be exchanged:

- Export the bootoptions with nvrboot.efi (on ECU-CD)
- Check the console-config (Boot Option Maintenance Menu)
- Check the SCSI-HBA Config for the core-io (with drvcfg)
- Copy NVRAM from second location to primary (is done automatically, just answer "Y" to the question during the first reboot with the new systemboard)

7.4.1 Initialize the Systemboard

Use SYSIDDEFAULTS.EF if the systemboard NVRAM values needs to be set to "magic".

Usage sysiddefaults.efi (runs only on rx2600, zx6000)

Upon replacing either the system board or status panel on an rx2600/ zx6000/ zx2000/ rx4640 and rx5670 the system should prompt with the following question:

(Example)

```
..... Boot up information .....
```

```
...
```

```
EFI POST code
```

```
EFI version 1.10 [14.61]
```

```
Intel(R) Itanium Processor Family
```

```
EFI 1.10 IPF zx6000/rx2600/zx2000 1.22 [Fri May 2 14:40:36 2003] - HP
```

```
Primary system ID values are undefined
```

```
Do you want to copy the valid system ID values to the new board?
```

```
(y/[n]) y
```

```
2 0 0x0002F2 0x0000000000000000 Set system IDs to valid values
```

```
WARNING: The system MUST be rebooted for the new UUID to take effect.
```

```
Press any key to continue...
```

```
..... Boot up information .....
```

```
....
```

```
Shell> sysmode service
```

```
Current System Mode: ADMIN
```

```
You are now in SERVICE mode.
```

```
Shell> sysset
```

```
System Information:
```

```
Manufacturer: hp
```

```
Product Name: server rx2600
```

```
Product Number: A6870A
```

```
Secondary Product Number is Identical
```

```
Serial number: DE23500471
```

```
Secondary Serial Number is Identical
```

```
UUID: 4E213664-DA49-11D6-A392-C1CE9369B6DD (Valid)
```

```
Secondary UUID is Identical
```

```
Product ID: 0x103
```

If the system does not prompt to copy the valid UUID to the new board, it may be necessary to reset or copy the System ID's. This may happen, if the exchange PCA already contains a valid UUID and is not set to magic (FFFFFFF). So before sending a non defective system board back, make sure, it is always set to magic !

Step 1) Determine the correct and unique UUID, serial number and product number of the system. This should be recorded on a slide-out label on the front of the unit.

Step 2) Run sysiddefaults.efi utility, available on ECU CD 12

```
fs0:\EfiUtilities\McKinley> sysmode service
```

```
Current System Mode: ADMIN  
You are now in SERVICE mode.
```

```
fs0:\EfiUtilities\McKinley> sysiddefaults ( To list all available options)
```

```
*****  
**** System ID Defaults Utility ****  
**** This utility is intended for HP use only on ****  
**** zx6000/rx2600/zx2000 and rx5670 Systems ****  
**** Any unauthorized use is prohibited ****  
**** SysIdDefaults ver 1.2 ****  
*****
```

Verify SysIdDefaults parameters before executing

The SysIdDefaults utility should be removed immediately after use

SysIdDefaults

pri : Set primary (System Board) values to default magic value
copy pri : Copy primary values to secondary (Status Panel) location
copy sec : Copy secondary values to primary (System Board) location
clear all : Sets primary and secondary values to default magic value

Note: Default ProductID is only set for zx6000 and rx2600 replacement boards.
Defaulting ProductID sends an automatic BMC reset.

```
fs0:\EfiUtilities\McKinley> sysiddefaults pri
```

```
*****  
**** ****  
**** System ID Defaults Utility ****  
**** This utility is intended for HP use only on ****  
**** zx6000/rx2600/zx2000 and rx5670 Systems ****  
**** Any unauthorized use is prohibited ****  
**** SysIdDefaults ver 1.2 ****  
**** ****  
*****
```

```
Lockword :ZE5322F37
```

```
Enter Password (Hex): ***** (See sskeygen)
```

```
Updating primary UUID
```

```
Updating primary product order number
```

```
Updating primary serial number
```

```
(Only Valid on zx6000 and rx2600 systems) Default Product Id? [y/n] > n
```

Run 'sysset' command to further verify changes

```
fs0:\EfiUtilities\McKinley> sysmode service
```

```
Current System Mode:ADMIN  
You are now in Service mode
```

```
fs0:\EfiUtilities\McKinley> sysset
```

```
System Information:
```

```
Manufacturer: hp
```

```
Product Name: server rx2600
```

```
Product Number: (Magic)
```

```
Secondary Product Number is Valid - Different
```

```
Serial number: (Magic)
```

Secondary Serial Number is Valid - Different
UUID: FFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFFFF (Magic)
Secondary UUID is Valid - Different
Product ID: 0x103

```
fs0:\EfiUtilities\McKinley> reset
..... Self Test .....
....
EFI POST code
EFI version 1.10 [14.61]
Intel(R) Itanium Processor Family
EFI 1.10 IPF zx6000/rx2600/zx2000 1.22 [Fri May 2 14:40:36 2003] - HP
Primary system ID values are undefined
Do you want to copy the valid system ID values to the new board?
(y/[n]) y

2 0 0x0002F2 0x0000000000000000 Set system IDs to valid values
WARNING: The system MUST be rebooted for the new UUID to take effect.
```

7.4.2 Setting NVRAM Values from MFG-Mode (rx1600, rx4640)

With new versions of System-Firmware (2.13 on rx4640), the NvrAM values can be set from the MFG-Mode.

To enter the MFG-Mode:

```
fs0:\ sysmode mfg
```

Current System Mode: SERVICE

Lockword is: D55E0BB19CCED81190B12AC37DF06542

Use Z and leading 8 characters for skey-password
(example: Zd55e0bb1)

Now, the values can be set with the sysset command:

```
fs0:\> sysset
System Information:
  Manufacturer: hp
  Product Name: server rx5670
  Product Number: A6837A
  Serial number: USR42446MM
  UUID: f8576c3d-040b-11d7-b644-8064e94a142e (Valid)
  Secondary UUID is Valid - identical
```

Syntax:

sysset	shows stable-storage values (service or mfg-mode)
sysset uuid xxxxx	writes uuid (mfg mode)
sysset serial xxxx	system-serial
sysset prodnum xxx	product-number
sysset prodname xxx	product-name

8 Documentation

You can reach the actual IPF web pages of the MUHW Team at:

<http://hprtdt58.grc.hp.com/documents/systems/longspeak/start.htm>

http://hprtdt58.grc.hp.com/documents/systems/mt_diablo/start.htm

<http://hprtdt58.grc.hp.com/documents/systems/everest/start.htm>