

Multi-OS Boot on Single Itanium System

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This document describes the steps followed to install and boot the three supported operating systems (HP-UX 11i version1.5, Microsoft Windows 64-bit Advanced Server and Red Hat Linux 7.1) on a single Itanium machine.

Requirements

Itanium machine with both internal hard disk drives, OS installation media and the installation instructions.

Targeted Configuration

| | |
|-------------------|-----------------|
| Disk at SCSI ID 0 | LINUX , WINDOWS |
| Disk at SCSI ID 1 | HP-UX |

NOTE: This test was performed on rx4610 with no attached peripherals. (Output of `ioscan` of the test machine is in the Appendix)

Step 1: Preparation

- Low-Level Disk Formatting:** Format the disk to remove any pre-existing partitions. Use the low-level format utility accessible during SCSI POST.
 - Press `<Alt-Q>` to enter `Fast!UTIL` menu.
 - Select `SCSI Disk Utility` and press enter.
 - Select `Select SCSI Bus 0` and press enter.
 - Select `ID 0` to format disk at SCSI ID 0.
 - Select `Low-level format` and press enter.
 - Select `Continue With Format` and press enter.
 - Repeat the same for disk at SCSI ID 1. (goto e)
- Remove Old OS Boot Options:** During boot process, remove any pre-existing boot options for any of the operating system.
 - Select `Boot Option maintenance` menu option.
 - Select `Delete Boot Option(s)`.
 - Select the pre-existing operating system boot options and delete them
- Turn Edd30 on:** Make sure that `edd30` is on. If `edd30` is off, the root disk *must* be located at target id 0. Since we will have boot disks on target id 0 and 1, we need to turn the option on. During boot process select `EFI shell`. Type `edd30 on` at the `Shell>` prompt. NOTE: You can set the option when you execute Step 2 described below.

Step 2: Install HP-UX 11i version 1.5 on *Disk at SCSI ID 1*

The following outlines steps relevant to the multi-OS installation. Refer to the installation instructions for HP-UX 11i v1.5 for completion:

- Insert the HP-UX 11i v1.5 DVD into in drive and power on the system
- During the boot process, select the `EFI Shell` option, press enter.
- Type `edd30 on` at the prompt. E.g. `Shell> edd30 on`
- Look at the list of devices (displayed as `fs0`, `fs1`, etc.) and identify DVD-ROM device entry. E.g.:
`fs0 : Acpi(PNP0A03,0)/Pci(3|1)/Ata(Secondary,Master)/CDROM(Entry1)`
- Type device name at the prompt. E.g. `Shell>fs0:`
- Type `install` to start the HP-UX Boot Loader. E.g. `fs0:>install`

7. Select `Install HP-UX` option.
8. Select `Guided Installation` option.
9. This will start the `Install HP-UX Wizard`. Accept default option: `HP-UX 11i Version 1.5 (B.11.20)`
10. Select system environment.
11. Select root disk. In this screen select the `Disk at SCSI ID 1` for installation of HP-UX. E.g:
`Quantum ATLAS_v_36_SCA 0/18/1/2/0.0.1.0`
12. Follow the HP-UX 11i v1.5 installation instructions to complete installation.
13. The system will reboot. `HP-UX Primary Boot:` option will automatically appear in the boot menu after the reboot.
E.g.: `HP-UX Primary Boot:0/18/1/2/0.0.1.0`
14. Select `HP-UX Primary Boot` option and verify boot.

Step 3: Pull out *Disk at SCSI ID 1*

Refer to problem #1 described in the Troubleshooting section towards the end of this document. The manual installation of Windows on Disk at SCSI ID 0 fails when Disk at SCSI ID 1 is in. The problem goes away when Disk at SCSI ID 1 is unplugged¹.

Step 4: Install Red Hat Linux 7.1 on *Disk at SCSI ID 0*

The following outlines steps relevant to the multi-OS installation. Refer to the installation instructions for Red Hat Linux 7.1 for completion:

1. Insert CD#1 in the CD drive and power on the system
2. During the boot process, select the `EFI Shell` option, press enter.
3. Look at the list of devices (displayed as `fs0`, `fs1`, etc.) and identify DVD-ROM device entry. E.g.:
`fs0 : Acpi(PNP0A03,0)/Pci(3|1)/Ata(Secondary,Master)/CDROM(Entry1)`
4. Type device name at the prompt. E.g. `Shell>fs0:`
5. Type `elilo` to start the Red Hat Boot Loader. E.g. `fs0:>elilo`
6. Select language, keyboard and mouse.
7. In the `Automatic Partitioning` screen select `Manually Partition`.
8. Select `Disk Druid` utility to partition the Disk at SCSI ID 0.
9. Partitions: Add partitions to match the table below:

| Mount Point | Device | Requested | Actual | Type |
|-------------|--------|-----------|--------|-----------------|
| /boot/efi | sda1 | 101M | 101M | DOS 16-bit<=32M |
| / | sda2 | 6000M | 6000M | Linux Native |
| <swap> | sda3 | 1000M | 1004M | Linux Swap |

10. Format the above created partitions.
11. Follow the Red Hat Linux installation instructions to complete installation.
12. The system will reboot. `Red Hat Linux` option will automatically appear in the boot menu after the reboot.
13. Select `Red Hat Linux` option and verify boot.

¹ NOTE: this happens regardless of HP-UX existing or not existing on Disk at SCSI ID 1.

Step 5: Install Microsoft Windows 64-bit Advanced Server on *Disk at SCSI ID 0*

The following outlines steps relevant to the multi-OS installation. Refer to the Microsoft Windows 64-bit Advanced Server installation instructions for completion:

1. Make sure that the *Disk at SCSI ID 1* is not plugged in.
2. Follow the Manual Installation Procedure².
3. Power on the system.
4. Insert Microsoft Windows 64-bit Advanced Server CD in the DVD-ROM drive.
5. Select `EFI Shell` at the boot option menu.
6. Look at the list of devices (displayed as `fs0`, `fs1`, etc.) and identify DVD-ROM device entry. E.g.:
`fs0 : Acpi(PNP0A03,0)/Pci(3|1)/Ata(Secondary,Master)/CDROM(Entry1)`
7. Type device name at the shell prompt. E.g. `Shell>fs0:`
8. Type `setupldr.efi` to launch the Microsoft EFI OS boot loader. E.g. `fs0:>setupldr.efi`
9. Windows XP Setup begins. Accept licensing agreement.
10. Partitions: This screen will display the existing partitioned and unpartitioned spaces on the disk. Note that you will see the Red Hat Linux partitions. E.g.

```
8755 MB disk 0 at id 0 on q12160 [GPT]
:- Partition 1 [FAT]           102MB      (83 MB free)
C: Partition2 [Unknown]      6001MB    (6000MB free)
F: Partition3 [Unknown]      1004MB    (1004MB free)
Unpartitioned                 1647MB    (1647MB free)
```

11. Select Unpartitioned space. Press enter.
12. Partition may be formatted using FAT, FAT (quick), NTFS, NTFS (quick) types. I chose the selected NTFS option.
13. Follow Microsoft Windows 64-bit Advanced Server installation instructions to complete installation.
14. The system will reboot. Microsoft Windows 2002 Advanced Server option will automatically appear in the boot menu after the reboot.
15. Select Microsoft Windows 2002 Advanced Server option and verify boot.

Step 6: Verify Boot of each Operating System

Re-plug Disk at SCSI ID 1 and reboot system. *Make sure both disks are plugged in well.* The green light should be on and the disks should show up during scan at boot time. Verify boot of each operating system separately.

Trouble Shooting

1. **Problem:** Manual installation of Microsoft Windows 2002 Advanced Server fails .

Condition: Both Disks at SCSI ID 0 and 1 are plugged in. Steps followed:

- a) Selected `EFI Shell` option. Typed `setupldr.efi` at the prompt.

```
Shell>setupldr.efi
'setupldr.efi' not found
```

² Note that the Automatic Installation performed with the Auto Install diskette wipes out the disk drive and creates a single partition on the boot drive.

Exit status code: Invalid Parameter

- b) Alternatively, selected device for DVD-ROM with the installation CD. E.g. Shell>fs2: Typed
setupldr.efi

```
INF file txtsetup.sif is corrupt or missing, status 2.  
Setup cannot continue. Press any key to exit.
```

Fix: Unplugged Disk at SCSI ID 1. Rebooted system. Installation of Microsoft Windows was successful.

2. **Problem:** Cannot load an operating system.

E.g.: Load of HP-UX Primary Boot: 0/18/1/2/0.0.1.0 failed: Not found.

Fix: Make sure that the disk with that operating system is plugged in properly. The green light should be on and the disk should show up during scan at boot. Make sure the disk is at the same SCSI ID at which it was installed.

3. **Warning:** Once the operating systems are installed, switching the disks such that the SCSI ID# of disk is different from the one at which it was installed, will cause HP-UX to not load and Linux to panic.

Appendix

ioscan Ouput of the Test Machine

| Class | I | H/W Path | Driver | S/W State | H/W Type | Description |
|-----------|---|------------------|--------------------|-----------|---------------------|---------------------------------------|
| root | 0 | | root | CLAIMED | BUS_NEXUS | |
| ioa | 0 | 0 | sba | CLAIMED | BUS_NEXUS | System Bus Adapter |
| ioa | 1 | 0/16 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 0 | 0/16/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ba | 1 | 0/16/1/3/0 | legacyio | CLAIMED | BUS_NEXUS | Legacy IO Core I/O Adapter |
| tty | 0 | 0/16/1/3/0/1 | asio0 | CLAIMED | INTERFACE | Built-in RS-232C |
| | | | /dev/diag/mux0 | | /dev/mux0 | /dev/tty0p0 |
| tty | 1 | 0/16/1/3/0/2 | asio0 | CLAIMED | INTERFACE | Built-in RS-232C |
| | | | /dev/diag/mux1 | | /dev/mux1 | /dev/tty1p0 |
| ext_bus | 0 | 0/16/1/3/0/3 | LCentIf | CLAIMED | INTERFACE | Built-in Parallel Interface |
| | | | /dev/c0t0d0_lp | | | |
| ps2 | 0 | 0/16/1/3/0/4 | keybd_ps2 | CLAIMED | INTERFACE | Built-in Keyboard |
| | | | /dev/keybd_ps2 | | | |
| ipmi | 0 | 0/16/1/3/0/5 | ipmi | CLAIMED | INTERFACE | IPMI Controller |
| | | | /dev/ipmi | | | |
| acpi_node | 0 | 0/16/1/3/0/6 | acpi_node | CLAIMED | INTERFACE | ACPI Device |
| sideba | 0 | 0/16/1/3/1 | side_ba | CLAIMED | INTERFACE | Intel IDE controller |
| ext_bus | 1 | 0/16/1/3/1.0 | ide_ch | CLAIMED | INTERFACE | ide_ch |
| target | 0 | 0/16/1/3/1.0.0 | tgt | CLAIMED | DEVICE | |
| disk | 0 | 0/16/1/3/1.0.0.0 | sflop | CLAIMED | DEVICE | MATSHITALS-120 SLIM4 00 |
| | | | /dev/floppy/clt0d0 | | /dev/rfloppy/clt0d0 | |
| target | 1 | 0/16/1/3/1.0.7 | tgt | CLAIMED | DEVICE | |
| ctl | 0 | 0/16/1/3/1.0.7.0 | sctl | CLAIMED | DEVICE | Initiator |
| | | | /dev/rscsi/c1t7d0 | | | |
| ext_bus | 2 | 0/16/1/3/1.1 | ide_ch | CLAIMED | INTERFACE | ide_ch |
| target | 2 | 0/16/1/3/1.1.0 | tgt | CLAIMED | DEVICE | |
| disk | 1 | 0/16/1/3/1.1.0.0 | sdisk | CLAIMED | DEVICE | HITACHI DVD-ROM GD-S200 |
| | | | /dev/dsk/c2t0d0 | | /dev/rdsk/c2t0d0 | |
| target | 3 | 0/16/1/3/1.1.7 | tgt | CLAIMED | DEVICE | |
| ctl | 1 | 0/16/1/3/1.1.7.0 | sctl | CLAIMED | DEVICE | Initiator |
| | | | /dev/rscsi/c2t7d0 | | | |
| pid | 0 | 0/16/1/4/0 | pid | CLAIMED | INTERFACE | PCI PIC (8086123d) |
| lan | 0 | 0/16/1/5/0 | intl100 | CLAIMED | INTERFACE | Intel PCI Pro 10/100Tx Server Adapter |
| graphics | 0 | 0/16/1/6/0 | graph3 | CLAIMED | INTERFACE | PCI Display (10024752) |
| ha | 0 | 0/16/1/16/0 | sac | CLAIMED | INTERFACE | System Address Controller |
| ioa | 2 | 0/17 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ioa | 3 | 0/18 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 2 | 0/18/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| qlispba | 0 | 0/18/1/2/0 | qlisp_multi | CLAIMED | INTERFACE | QLogic 12160 dual Ultra3 SCSI |
| ext_bus | 3 | 0/18/1/2/0.0 | qlisp | CLAIMED | INTERFACE | QLogic SCSI bus |
| target | 4 | 0/18/1/2/0.0.0 | tgt | CLAIMED | DEVICE | |
| disk | 2 | 0/18/1/2/0.0.0.0 | sdisk | CLAIMED | DEVICE | QUANTUM ATLAS IV 9 SCA |
| | | | /dev/dsk/c3t0d0 | | /dev/rdsk/c3t0d0 | |
| target | 5 | 0/18/1/2/0.0.1 | tgt | CLAIMED | DEVICE | |
| disk | 3 | 0/18/1/2/0.0.1.0 | sdisk | CLAIMED | DEVICE | QUANTUM ATLAS_V_36_SCA |
| | | | /dev/dsk/c3t1d0 | | /dev/rdsk/c3t1d0 | |
| | | | /dev/dsk/c3t1d0s1 | | /dev/rdsk/c3t1d0s1 | |
| | | | /dev/dsk/c3t1d0s2 | | /dev/rdsk/c3t1d0s2 | |
| target | 6 | 0/18/1/2/0.0.6 | tgt | CLAIMED | DEVICE | |
| ctl | 2 | 0/18/1/2/0.0.6.0 | sctl | CLAIMED | DEVICE | ESG-SHV SCA HSBP M12 |
| | | | /dev/rscsi/c3t6d0 | | | |
| target | 7 | 0/18/1/2/0.0.7 | tgt | CLAIMED | DEVICE | |
| ctl | 3 | 0/18/1/2/0.0.7.0 | sctl | CLAIMED | DEVICE | Initiator |
| | | | /dev/rscsi/c3t7d0 | | | |
| ext_bus | 4 | 0/18/1/2/0.1 | qlisp | CLAIMED | INTERFACE | QLogic SCSI bus |
| target | 8 | 0/18/1/2/0.1.7 | tgt | CLAIMED | DEVICE | |
| ctl | 4 | 0/18/1/2/0.1.7.0 | sctl | CLAIMED | DEVICE | Initiator |
| | | | /dev/rscsi/c4t7d0 | | | |

| | | | | | | |
|-----------|---|-------------|-----------|---------|-----------|-------------------------|
| ha | 1 | 0/18/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| ioa | 4 | 0/19 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 3 | 0/19/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ha | 2 | 0/19/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| ioa | 5 | 0/20 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 4 | 0/20/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ha | 3 | 0/20/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| ioa | 6 | 0/21 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 5 | 0/21/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ha | 4 | 0/21/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| ioa | 7 | 0/22 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 6 | 0/22/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ha | 5 | 0/22/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| ioa | 8 | 0/23 | sba | CLAIMED | BUS_NEXUS | F16 Port |
| ba | 7 | 0/23/1 | lba | CLAIMED | BUS_NEXUS | lba Bridge |
| ha | 6 | 0/23/1/15/0 | wxb_hp | CLAIMED | INTERFACE | WXB hot plug controller |
| processor | 0 | 100 | processor | CLAIMED | PROCESSOR | Processor |
| processor | 1 | 101 | processor | CLAIMED | PROCESSOR | Processor |
| processor | 2 | 102 | processor | CLAIMED | PROCESSOR | Processor |
| processor | 3 | 103 | processor | CLAIMED | PROCESSOR | Processor |