– General Linux 1 –

Set Up USB devices [2]

(Linux Professional Institute Certification)

a

```
   .~.          by: Andrew Eager
   /V\              andy@linuxivr.com
  // \\
  @._.@
```

```
$Id: gl1.101.7.slides.tex,v 1.3 2003/05/29 14:10:18 geoffr Exp $
```

Set Up USB devices [2]

Objective

Candidates should be able to activate USB support, use and configure different USB devices. This objective includes the correct selection of the USB chipset and the corresponding module. It also includes the knowledge of the basic architecture of the layer model of USB as well as the different modules used in the different layers.

Set Up USB devices [2]

Key files, terms, and utilities

```
lspci(8)
usb-uhci.o
usb-ohci.o
/etc/usbmgr/
usbmodules
/etc/hotplug
```

Set Up USB devices [2]

Resources of interest

The Linux-USB Project :

`http://www.linux-usb.org:`

The Linux USB Sub System : by Brad Hards, Sigma Bravo Pty Ltd

The Universal Serial Bus

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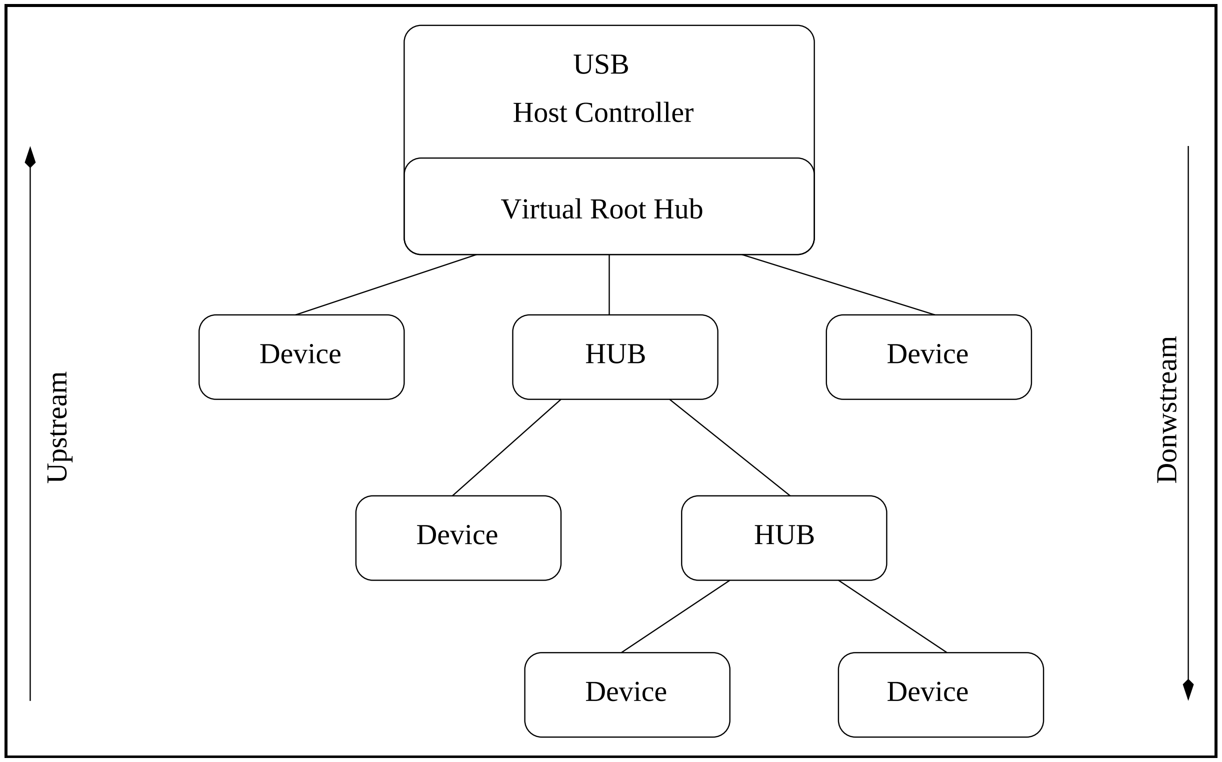
  - supports speeds up to 480Mbit/s
- Devices can be self or bus powered

USB Topology

The system unit contains the host controller and one virtual root hub with at least one (and normally two) USB interfaces. These interfaces can then be connected directly to a USB device or to another HUB.

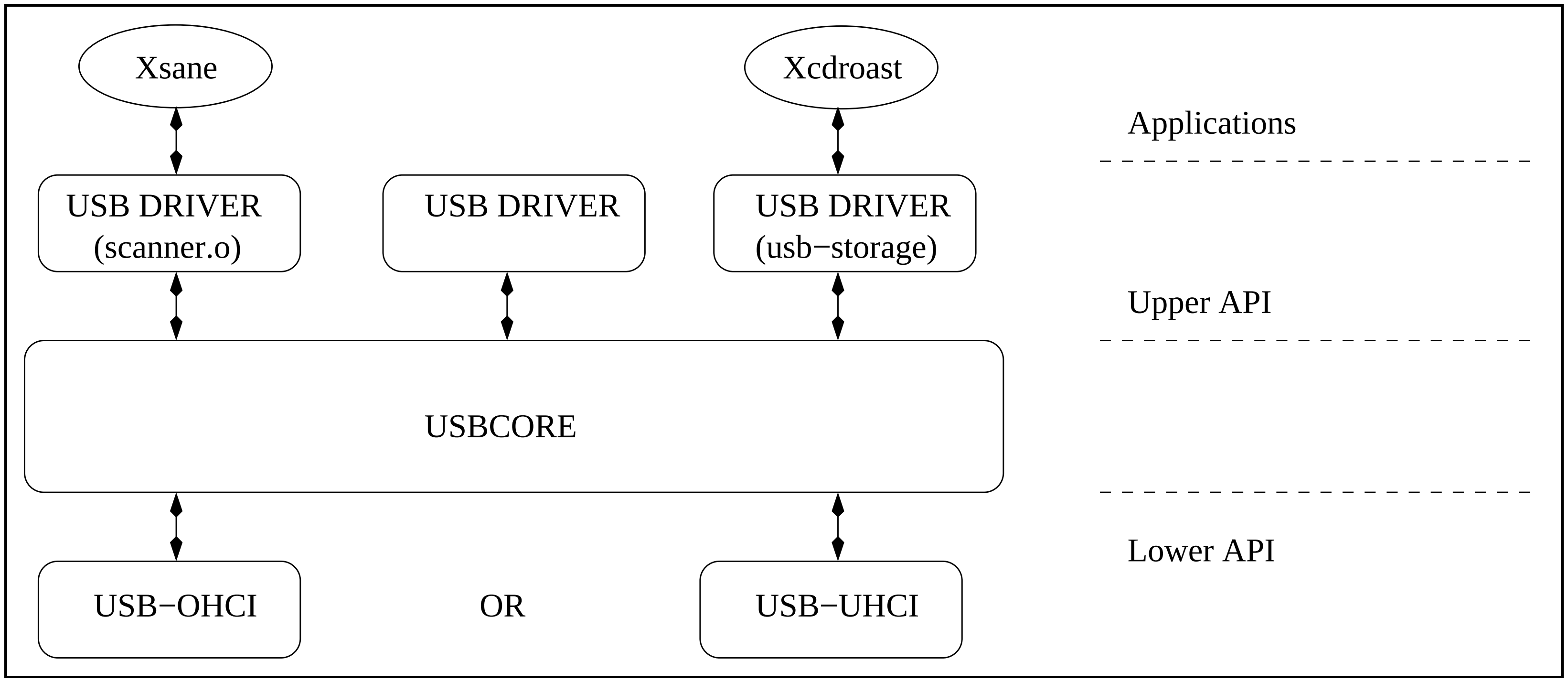


USB Device Driver Layers

The Device drivers for the USB sub-system are split into two distinct layers:

Hardware Layer usbcore & usb-uhci / usb-ohci

API Layer - Application / Product specific



USB Controllers

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usb-uhci For Intel, PIIX4, Via controllers

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  ```

- The OHCI controllers use a 32 bit memory address:

  ```
  memory at 0xHH000000    eg memory at 0xee000000
  ```

USB Controllers

To determine your controller type, examine `/proc/pci` for a clue:

```
[root@Node4] root]# cat /proc/pci
PCI devices found:
   .........
Bus  0, device   7, function  2:
    USB Controller: VIA Technologies Inc. UHCI USB(rev 17).
      IRQ 10.
      Master Capable.  Latency=32.
      I/O at 0xe400 [0xe41f].
   .........
```

USB Modules

Assuming you have a modular kernel, the following modules will be required:

usbcore The base usb kernel module

plus one of the controller specific modules either

- **usb-uhci** For Intel, PIIX4, Via controllers
- **usb-ohci** For Compaq, iMacs, OPTi, SiS, ALi controllers

USB Modules

Configuration

An entry in `/etc/modules.conf` aliases the specific controller to usb-controller as follows:

```
alias usb-controller usb-uhci
```

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To startup manually, do the following steps:

- insmod usbcore
- insmod usb-uhci (or usb-ohci)
- mount the usbdevfs filesystem (optional but highly recommended)

USB Modules

Example

- `usbcore`

```
[root@Node4]# insmod usbcore
Using /lib/modules/2.4.18-4/kernel/drivers/usb/usbcore.o
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- usb-uhci

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- `usb-uhci`

```
[root@Node4] root]# insmod usb-uhci
Using /lib/modules/2.4.18-4/kernel/drivers/usb/usb-uhci.o
```

- `mount`

```
[root@Node4]# mount -t usbdevfs usbdevfs /proc/bus/usb
```

USB Modules

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- `usbcore`

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[root@Node4]# insmod usbcore
Using /lib/modules/2.4.18-4/kernel/drivers/usb/usbcore.o
```

- `usb-uhci`

```
[root@Node4] root]# insmod usb-uhci
Using /lib/modules/2.4.18-4/kernel/drivers/usb/usb-uhci.o
```

- `mount`

```
[root@Node4]# mount -t usbdevfs usbdevfs /proc/bus/usb
```

- Once this is done, you should see the following entries in /proc/bus/usb:

```
[root@Node4] root]# ls /proc/bus/usb
001  devices  drivers
```

USB Interrogation Utilities

LSUSB - A console view of USB devices

Lsusb is a text utility contained in the usbutils package. Use ’rpm -Uvh usbutils.xxx.rpm’ to install.

```
[root@node4]# lsusb
Bus 001 Device 001: ID 0000:0000 Virtual Hub
Device Descriptor:
  bLength                  18
  bDescriptorType           1
  bcdUSB                 1.00
  bDeviceClass              9 Hub
  iProduct                  2 USB UHCI Root Hub
 ..........
```

LSUSB - A console view of USB devices

```
Bus 001 Device 002: ID 03f0:0601 Hewlett-Packard ScanJet 6300c
Device Descriptor:
  bLength                18
  bDescriptorType         1
  bcdUSB               1.00
  bDeviceClass            0 Interface
  bDeviceSubClass         0
  bDeviceProtocol         0
  bMaxPacketSize0         8
  idVendor           0x03f0 Hewlett-Packard
  idProduct          0x0601 ScanJet 6300c
  bcdDevice            1.00
  iManufacturer           1
  iProduct                2 HP ScanJet 6300C
  iSerial                 3 SG9941706SPE
```

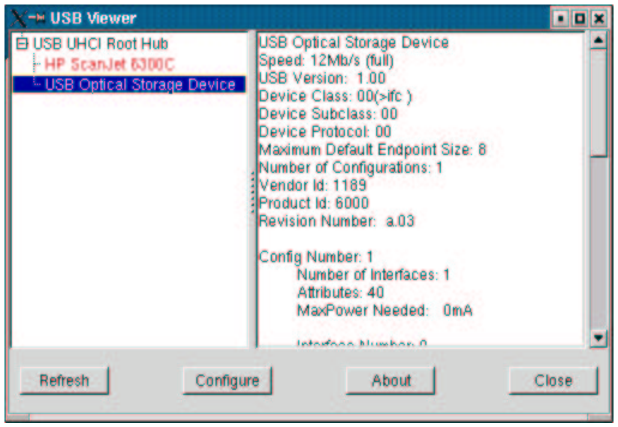
LSUSB - A console view of USB devices

```
Bus 001 Device 003: ID 1189:6000
Device Descriptor:
  bLength                18
  bDescriptorType         1
  bcdUSB               1.00
  bDeviceClass            0 Interface
  bDeviceSubClass         0
  bDeviceProtocol         0
  bMaxPacketSize0         8
  idVendor           0x1189
  idProduct          0x6000
  bcdDevice            a.03
  iManufacturer           0
  iProduct                1 USB Optical Storage Device
  iSerial                 0
```

USB Interrogation Utilities

USBVIEW - An X view of USB devices

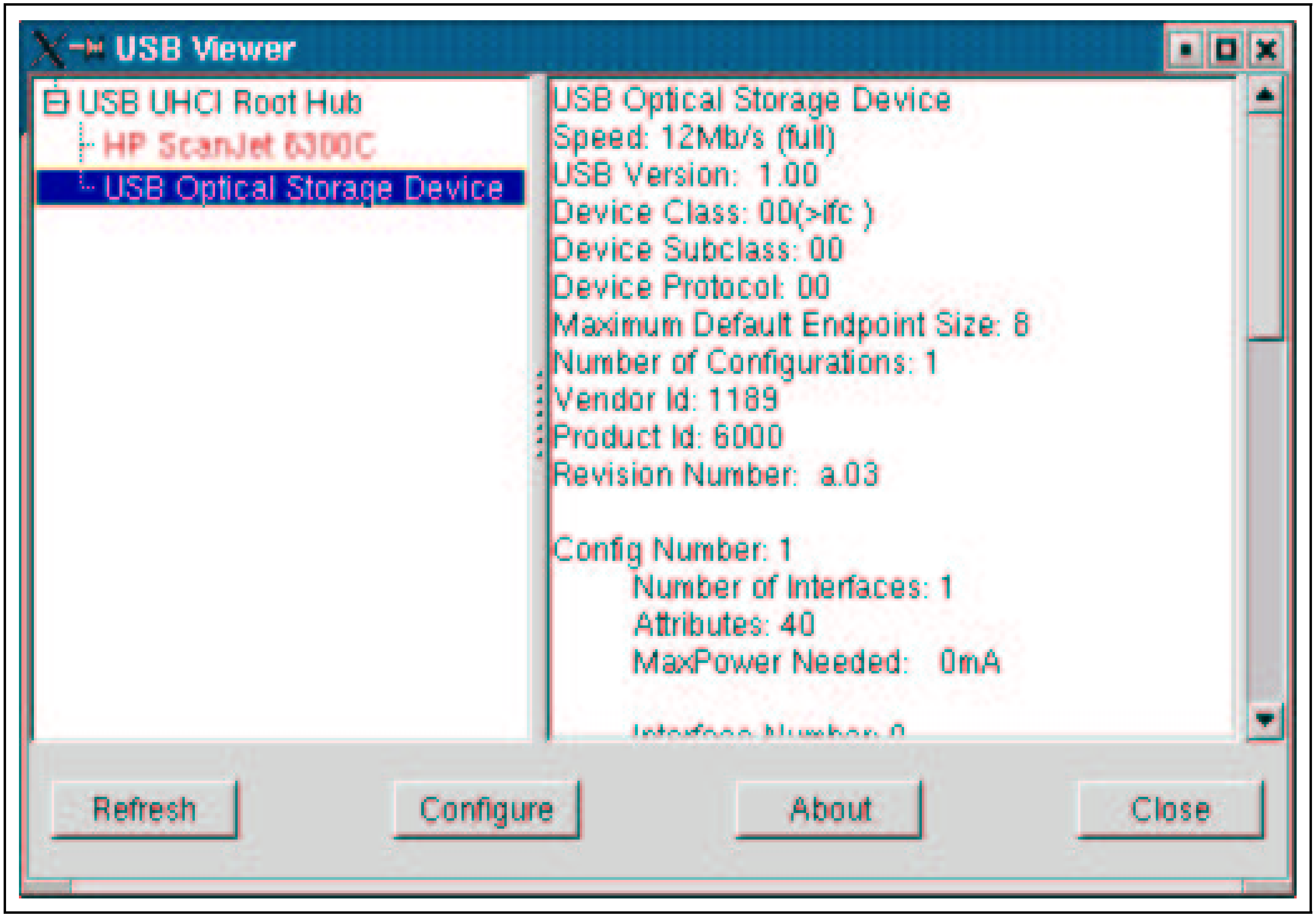
- Usbview is a gui utility contained in the usbview package. Use 'rpm -Uvh usbview.rpm' to install.
- Usbview parses /proc/bus/usb/devices for connected USB devices. Any device that has a problem will be printed in red.



```
USB Optical Storage Device
Speed: 12Mb/s (full)
USB Version:  1.00
Device Class: 00(>ifc )
Device Subclass: 00
Device Protocol: 00
Maximum Default Endpoint Size: 8
Number of Configurations: 1
Vendor Id: 1189
Product Id: 6000
Revision Number:  a.03

Config Number: 1
        Number of Interfaces: 1
        Attributes: 40
        MaxPower Needed:   0mA

        Interface Number: 0
```



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```
$ ls /proc/sys/kernel/hotplug
/sbin/hotplug
```

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- `/sbin/hotplug` is an executable which is called by the kernel (kernel space to user space interface)
- `/etc/hotplug` is a directory containing configuration information for hotplug (which drivers to load when a device is plugged in)

The End