

CS415 Module 8 Part D - Device Drivers and Kernel Modules

Athens State University

Definition of a Device Driver

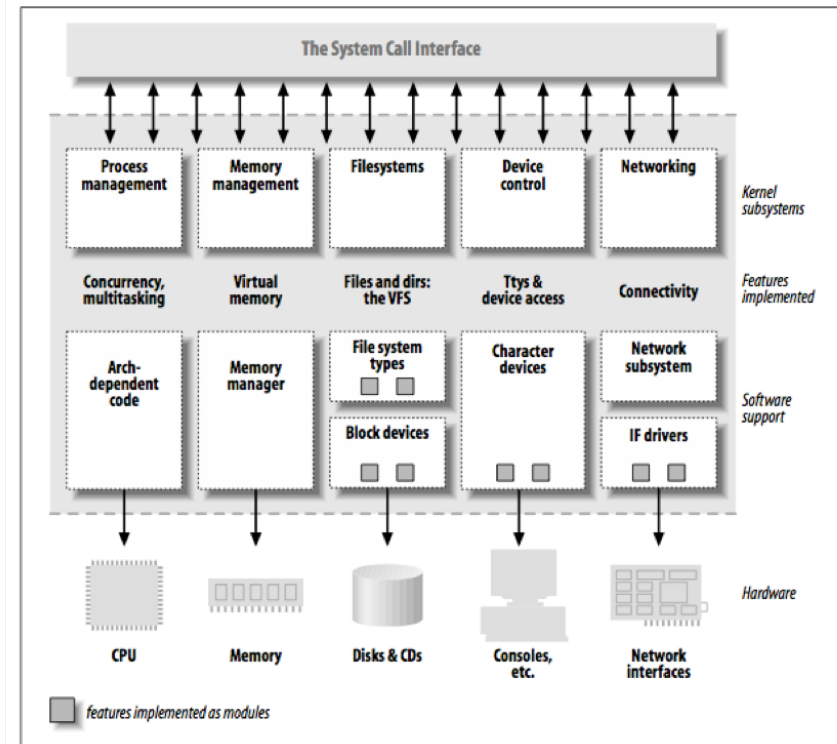
A software component that provides an interface between the operating system and a hardware device

- Configures and manages the device
- Converts requests from the kernel into requests to the hardware

Three Key Interfaces

- Interface between the driver and the kernel
 - For communicating requests and accessing OS services
- Interface between the driver and the device
 - For executing device operating commands
- Interface between the driver and the bus
 - For managing communication with the device

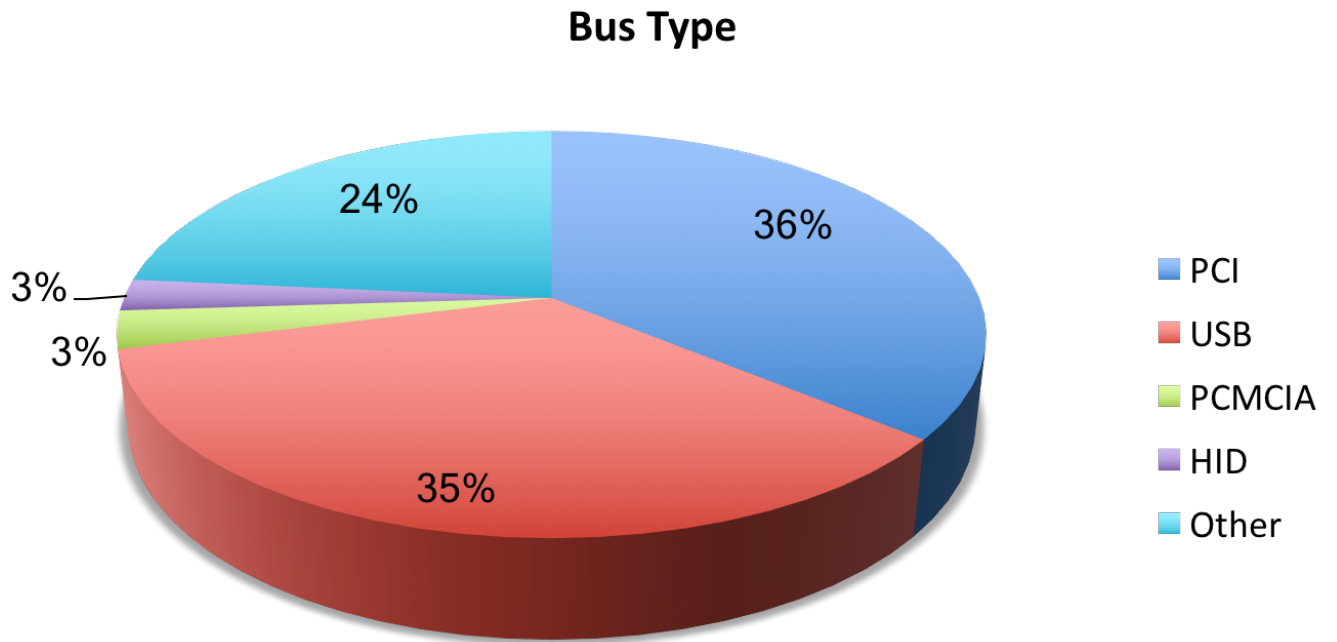
The Linux Kernel Architecture



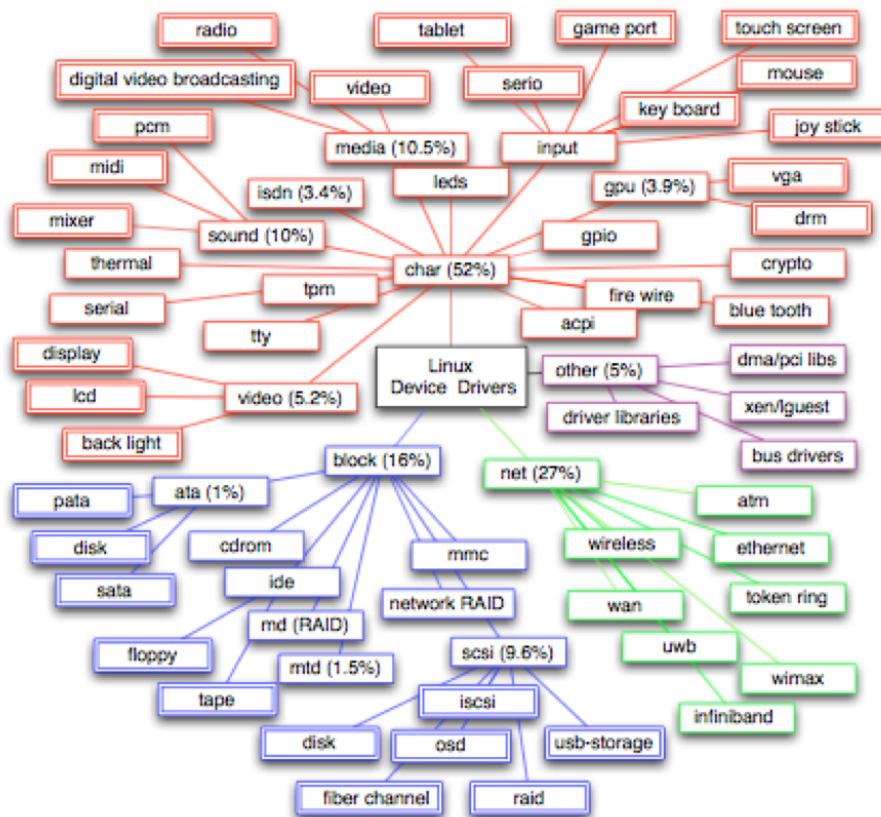
Device Driver Categories

- Character drivers
 - Byte-stream oriented
- Block drivers
 - Optimized for random access to block devices
- Network drivers
 - Packet-stream oriented

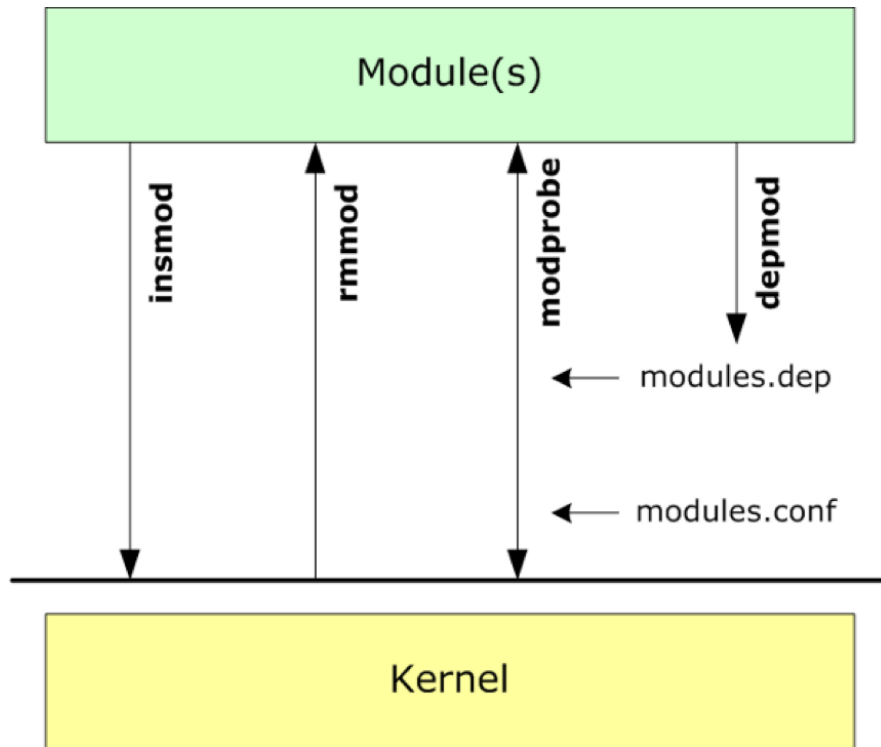
Ways Devices Connect



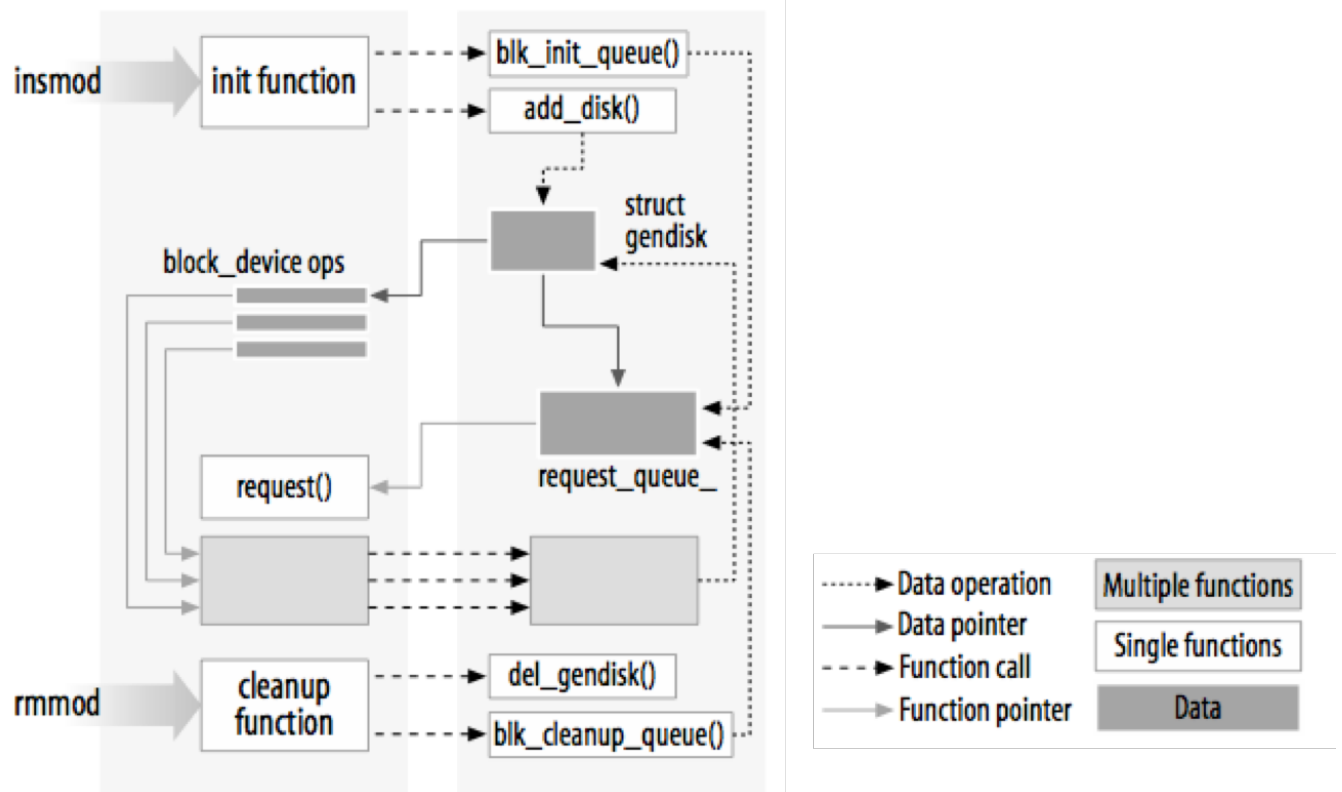
Linux Device Driver Taxonomy



Loadable Kernel Modules



Loadable Kernel Modules



Devices and Filesystems

```

crw-rw-rw-  1 root    root      1,   3 Apr 11  2002 null
crw-----  1 root    root     10,   1 Apr 11  2002 psaux
crw-----  1 root    root      4,   1 Oct 28 03:04 tty1
crw-rw-rw-  1 root    tty       4,  64 Apr 11  2002 ttys0
crw-rw----  1 root    uucp      4,  65 Apr 11  2002 ttyS1
crw--w----  1 vcsa    tty       7,   1 Apr 11  2002 vcs1
crw--w----  1 vcsa    tty      7, 129 Apr 11  2002 vcsa1
crw-rw-rw-  1 root    root      1,   5 Apr 11  2002 zero

```

Major

Minor

The Proc File System

```
alewis@mcs:/proc$ cat devices
```

```
Character devices:
```

```
1 mem
4 /dev/vc/0
4 tty
4 ttyS
5 /dev/tty
5 /dev/console
5 /dev/ptmx
5 ttyprintk
6 lp
7 vcs
9 st
10 misc
13 input
21 sg
29 fb
108 ppp
128 ptm
136 pts
180 usb
189 usb_device
```

```
Block devices:
```

```
1 ramdisk
259 blkext
7 loop
8 sd
9 md
11 sr
65 sd
66 sd
67 sd
```

Linux Device Model

- Device related kernel tasks:
 - Power management and system shutdown
 - Communication with user space
 - Hot-pluggable devices
 - Device class
 - Object lifecycles

Linux Device Model

