

Drivers and kernel

`uname -r` → 4.15.0-43-generic (print the kernel release)

Annotations:
4.15.0: Kernel Version (4: major revision, 15: minor revision, 0: Bug fix/Revision Detail)
-43: kernel type
-generic: minor device number, defines which device within type

`ls -l /dev/sda` → `brw-rw---- 1 root disk 8 0`

Annotations:
brw-rw----: block device (can be c, character device)
1: nr of hard links
root: major device number, defines type of device and hence the driver
disk: minor device number, defines which device within type
8 0: minor device number, defines which device within type

pseudo-devices: pseudo-TTY (PTY), /dev/zero, /dev/null, /dev/urandom

Operation on devices: { VFS operations: function pointer implemented by device drivers
non-VFS operations: ioctl

create device manually: `mknod filename type major minor`

Automatic device management: udev on /dev type devtmpfs
and sysfs on /sys type sysfs (from mount command)

`udev` daemon listens to the kernel for device changes and do thing in user space. Conf file /etc/udev/udev.conf
Local rules /etc/udev/rules.d/ (modify here)
default rules /lib/udev/rules.d/ (do not change here)

device find: { `lsusb`
`dmesg` find device adding, then `$udevadm info -a -n sda`
`journaltl`

udev rules:

`ACTION == "add", ATTRS{mode} == "USB2FlashStorage",`
`KERNEL == "sd[a-z]1",` # these are match keys, match clause
`RUN += "/bin/mkdir -p /mnt/ate-flash/%n"` # these are assign clause
%n is next int in seq

`$sudo udevadm control --reload-rules` to reload rules.

Sub directory of /sys

/block Information about block devices (eg, hard disk)
/bus Buses known to kernel, PCI-E, SCSI, USB, etc
/class A tree organised by functional types of devices
/dev Device info split between char and block devices
/devices Ancestrally correct representation of all discovered devices

firmware: interfaces to platform specific subsystems such as ACPI (Advanced Configuration and Power Interface)
fs. dir for some, but not all, kernel-known filesystems
kernel: kernel internals such as cache and virtual memory status.
module: dynamic modules loaded by the kernel
power: some details about power state, mostly unused.