udev

devfs done right

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/dev

- how userspace talks to devices
- all devices need a major and minor number

```
brw-------    1 gregkh   disk       3,   0 Jan 30 02:24 /dev/hda
brw-------    1 gregkh   disk       3,  64 Jan 30 02:24 /dev/hdb
crw-rw-rw-    1 root     uucp     188,   0 Jan 30 02:24 /dev/ttyUSB0
crw-rw-rw-    1 root     uucp     188,   1 Jan 30 02:24 /dev/ttyUSB1
```

- new major and minor number freeze during 2.3

/dev problems

- no dynamic allocation of entries
- /dev is big (18 thousand entries)
- which entry is which device?
- no persistent naming

devfs

- everyone else does it
  - standard in FreeBSD
- solves "/dev is too big" issue
- solves dynamic allocation of entries

devfs problems

- implementation...
- requires lots of system configuration changes
- different /dev namespace from LSB standard
- forces device naming policy into the kernel
- no dynamic allocation of numbers

sysfs

- shows all devices in the system
- shows lots of information about these devices
  - location
  - attributes (names, serial numbers)
  - major/minor number

/sbin/hotplug

- called whenever a device is added or removed
- runs outside of the kernel

putting the two together - udev

- device naming from userspace
- does everything devfs does today
- only 6kb big (smaller than /bin/true)

udev’s goals

- run in userspace
- create a dynamic /dev
- allow everyone to not care about major/minor numbers
- provide LSB standard names
- provide consistent device naming if wanted

three major pieces

- namedev
  - handle all device naming issues
- libsysfs
  - access sysfs in a standard way
- udev
  - dynamic replacement for /dev

namedev

- allow pluggable naming schemes
  - LSB standard
  - devfs "standard"
- persistent device naming policy
- able to be queried to determine current devices
  - uses tdb

namedev - 5 step sequence

- label or serial number
- bus device number
- topology on bus
- replace name
- kernel name

namedev config file - naming

```
# USB Epson printer to be called lp_epson
LABEL, BUS="usb", serial="HXOLL0012202323480", NAME="lp_epson"

# USB HP printer to be called lp_hp
LABEL, BUS="usb", serial="W0909020710124133O", NAME="lp_hp"

# sound card with PCI bus id 00:0b.0 to be the first sound card
NUMBER, BUS="pci", id="00:0b.0", NAME="dsp"

# sound card with PCI bus id 00:07.1 to be the second sound card
NUMBER, BUS="pci", id="00:07.1", NAME="dsp1"

# USB mouse plugged into the third port of the first hub to be called mouse0
TOPOLOGY, BUS="usb", place="1.3", NAME="mouse0"

# USB tablet plugged into the second port of the second hub to be called mouse1
TOPOLOGY, BUS="usb", place="2.2", NAME="mouse1"

# ttyUSB1 should always be called visor
```

namedev config file - permissions

```
# name:user:group:mode
ttyUSB0:root:uucp:0660
ttyUSB1:root:uucp:0666
visor:root:uucp:0666
dsp1:::0666
```

libsysfs

- provides standard way to talk to sysfs
- found on kernel.org as part of sysfsutils
- Written by Dan Stekloff and others

udev

- handles /sbin/hotplug call
- provides protection for "out of order" invocations

Where is it?

- source:
  kernel.org/pub/linux/utils/kernel/hotplug/
- BitKeeper tree:
  bk://kernel.bkbits.net/gregkh/udev/
- mailing list:
  linux-hotplug-devel@lists.sourceforge.net

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