Persistent names for usb-serial devices

I own a bunch of devices that appear as `/dev/ttyUSB<something>` in the system. At least three of them I use regularly: Arduino, BusPirate and a simple USB-to-RS232 converter to talk to my ARM boards. I keep plugging them in and pulling them out from the USB ports and they keep getting names like `/dev/ttyUSB0` or `ttyUSB1` or `ttyUSB2` or so. Sadly the device names are not persistent — whether the BusPirate pops up as `/dev/ttyUSB0` or `/dev/ttyUSB2` depends on the order in which are the devices discovered by the kernel. That makes things difficult — it usually requires a trial and error approach to find out what the hell is the ARM board's tty name this time.

Wouldn't it be nice to have persistent, descriptive device name for each of these toys? Like `/dev/arduino`, `/dev/buspirate` and `/dev/arm`?

usb-serial devices

All the above mentioned gadgets have *usb-serial* interface, which in essence means that the serial port traffic (UART) is passed to the host in a USB data stream instead of through a dedicated RS232 serial port.

Every USB device has a *Vendor ID* and a *Product ID* as seen for instance in `lsusb` output:

```
~ # lsusb
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 011: ID 0403:6001 FTDI FT232 USB-Serial (UART) IC
Bus 001 Device 010: ID 0403:6001 FTDI FT232 USB-Serial (UART) IC
Bus 001 Device 005: ID 0402:5632 ALi Corp. USB 2.0 Host-to-Host Link
Bus 002 Device 005: ID 0403:6001 FTDI FT232 USB-Serial (UART) IC
[...]
```

Unfortunately all the three peripherals apparently use the same chip — FT232 (these days probably the most common usb-serial interface) and therefore have the same VendorID:ProductID pair as emphasized in the listing. To distinguish between them we need some other unique identifier — in this case a se-

rial number. These are the messages recorded in `/var/log/messages` when Arduino is plugged in:


```
usb 2-4: new full speed USB device using ohci_hcd and address 5
ftdi_sio 2-4:1.0: FTDI USB Serial Device converter detected
drivers/usb/serial/ftdi_sio.c: Detected FT232RL
usb 2-4: FTDI USB Serial Device converter now attached to ttyUSB1
usb 2-4: New USB device found, idVendor=0403, idProduct=6001
usb 2-4: Product: FT232R USB UART
usb 2-4: Manufacturer: FTDI
usb 2-4: SerialNumber: A6008isP
```

(Update, as pointed out by Martijn in the comments...) Another way to find out the serial number is using `udevadm` command:

```
~ # udevadm info -a -n /dev/ttyUSB1 | grep '{serial}' | head -n1
    ATTRS{serial}=="A6008isP"
```

UDEV rules

Now with the list of serial numbers in hand let's create a UDEV ruleset that'll make a nice symbolic link for each of these devices. UDEV rules are usually scattered into many files in `/etc/udev/rules.d`. Create a new file called `99-usb-serial.rules` and put the following lines in there:

```
SUBSYSTEM=="tty", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6001",
ATTRS{serial}=="A6008isP", SYMLINK+="arduino"
SUBSYSTEM=="tty", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6001",
ATTRS{serial}=="A7004IXj", SYMLINK+="buspirate"
SUBSYSTEM=="tty", ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6001",
ATTRS{serial}=="FTDIF46B", SYMLINK+="ttyUSB.ARM"
```

By now it should be obvious what these lines mean. Perhaps just a note for the last entry on each line — `SYMLINK+="arduino"` means that UDEV should create a symlink `/dev/arduino` pointing to the actual `/dev/ttyUSB*` device. In other words the device names will continue to be assigned ad-hoc but the symbolic links will always point to the right device node. Let's see. Unplug Arduino and plug it back again...

```
~# ls -l /dev/arduino
lrwxrwxrwx 1 root root 7 Nov 25 22:12 /dev/arduino -> ttyUSB1

~# ls -l /dev/ttyUSB1
crw-rw---- 1 root uucp 188, 0 Nov 25 22:12 /dev/ttyUSB1
```


That looks good. The last step is to configure `minicom`, `avrdude` and all the other relevant tools to use these new names and forget about chasing the right `/dev/ttyUSB*` every second day.

November 26, 2009 Michael Ludvig

6 thoughts on “Persistent names for usb-serial devices”

Bengt-Arne Fjellner

July 22, 2014 at 1:14 pm

Thanks. This was exactly what I needed.

Massimo Perrone

August 25, 2014 at 3:53 pm

I have a similar problem, so I tried your solution, and it works well. Anyway, is there a method to map a given converter directly to the device name, ttyUSB1 for example ?
I tried to substitute SYMLINK+=”my_device_name” with NAME=”ttyUSB1" in the rule above, but it seems that doesn’t work, that is the (unique) converter always gets ttyUSB0.
Thank you very much.

Pingback: How to use USB to RS232 serial with persistent names | Adi's Blog

Pedro

October 31, 2014 at 1:51 am

Great tutorial man!!.
I´m tryng to figure out the same process for hotplug.d on OpenWrt, no UDEV in that linux.

By any chance, do you know how to tell hotplug.d to enumerate and map the devices on specific dev files?

Regards
Pedro Guillem

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