Raspberry Pi Shareables

Triangle Area Robotics (TAR)

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Raspberry Pi Essentials

- The GPIO is not 5 volt tolerant: don't plug it directly into any regular (5 volt) Arduino like Uno

  - Use a 3.3v Arduino or level shifters

- Info: raspberrypi.org elinux.org/RPi_Hub

- Vendors: newark.com adafruit.com

- Most PC USB connectors won't power RP. A 2-amp powered USB hub is ideal.

Raspberry Pi Headless but GUI

- There is an alternative to the serial console if no permanent mouse/keyboard/display available

- You may have heard about VNC, but have you heard about x11vnc?

- Allows full Raspberry Pi Linux desktop via network connection

- Key feature of x11vnc: It **just works**

Wait, what is VNC?

- VNC is used to display an X windows session running on another computer. Unlike a remote X connection, the xserver is running on the remote computer, not on your local workstation. Your workstation (Linux or Windows) is only displaying a copy of the display (real or virtual) that is running on the remote machine.

- The x11vnc program on Raspberry Pi provides a default no-hassle server that makes a full desktop GUI available vs a "terminal window."

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- Use "sudo apt-get install x11vnc" to get the package on your RP.

- Put something like this into a personal crontab file: @reboot /usr/bin/x11vnc -loop >/dev/null 2>&1

- Install it with: crontab <path to file above>

- Use /boot/config.txt for always-on video support (next slide)

Raspberry Pi Headless but GUI 3

- /boot/config.txt needs something like this to force video on w/o HDMI connection & to force frame size:

- hdmi_force_hotplug=1 # video support even if no monitor

- hdmi_group=2   # digital video mode

- hdmi_mode=28   # 1280x800 60hz

- framebuffer_width=1280

- framebuffer_height=800

- Forcing these parameters means your temporary display has to play with them. You **must** tune the last four variables your display and situation (Your mileage will vary)

- Details: http://elinux.org/RPiconfig (use group 2 res table)

Raspberry Pi Headless but GUI 4

- With the RP running x11vnc as described, pointing a viewer at it's IP address gives immediate joy

- VNC offers tons of security mechanisms beyond the scope of this presentation. this hack is aimed at the privacy of your own home.

Arduino IDE on Raspberry Pi

- Arduino IDE is a Java program. Oracle is catching up, but only supports ARM with software floating point.

- The one Linux distro that "just works" with Java is the original "soft-float Wheezy" from the downloads page @ http://raspberrypi.org (sha1 ends in 05d5a)

- Strongly suggest (sudo) "apt-get update" and then "apt-get upgrade" after basic install/resize. (no need for apt-get clean). This will take roughly 20-60 minutes depending mostly on the speed of your broadband connection.

- An "apt-get arduino" installs both the Arduino IDE and Java

- The Arduino device presents as /dev/ttyACM0

- The arduino IDE is now installed under the electronics start sub-menu

Alternatives to SD-Card for root

- It's pretty easy to steer the RP startup process to an alternative root device

- Why do this?

  - Small SD card is all you've got. Only really need 64mb for /boot partition.

  - SD card is old and tired: do you want to be invested in it at the point the load-leveling runs out of alternate storage sites?

  - Your SD card is too slow and/or too small, but you've got faster alternatives

- Two minor hassles: partition resize & device naming

Alternatives to SD-Card for root (2)

- Boot process controlled by /boot/cmdline.txt, which is to say this file in the 1st SD-card partition (the 50-60mb FAT filesystem on the card after a .img file is copied to it.)

- Simple text file that can be edited to change default mmcblk0p2 device

- Many ways to set up alternative root: What follows is a relatively simple way assuming use of a Linux system for setup.

Alternatives to SD-Card for root (3)

1) Copy RP Linux .img file to SD card as usual. Needless to say **be careful with dd.** Would be wise to unmount any target device filesystems before dd.

2) Use fdisk on the SD card device and delete the 2nd partition. This is important because of the device naming hazard explained later.

3) **Carefully** repeat process with alternative USB drive.

4) Unmount/remount SD card to force automount. Should be just the one FAT filesystem.

5) Edit SD card's FAT fs cmdline.txt file to change "root=/dev/mmcblk0p2" to "root=/dev/sda2". (would be wise to save orig)

6) Force automount, edit **alternative drive's** ext4 fs files (next)

Alternatives to SD-Card for root (4)

- RP files hard-wired for SD-card, so resize w raspi-config would fail. To prevent this:

  - Edit /usr/bin/raspi-config and change mmcblk0p2 to sda2

- RP fstab not conscious of cmdline.txt root device assignment:

  - Edit /etc/fstab and change mmcblk0p2 to sda2

  - Note /boot entry in fstab stays the same

- BE SURE to plug your alt root device into an RP USB socket, not a hub plugged into the RP (hazard #2)

- Now boot the RP and go through usual config

Alternatives to SD-Card for root (5)

- The other hazard: device assignment

- Linux assigns device names in relation to finding and enumerating the hardware

- Here's the problem:

  - You set up your fast/big root device as described

  - Later you add another storage device

  - The system won't boot any more: can't find root fs

- What was sda2 yesterday might be sdb2 today

- Putting alt root dev into 2nd RP USB socket, any other storage into the hub appears to solve this problem.

- This is a Linux fact of life: not specific to this setup.

Coming in January: Introduction to Raspberry Pi

- Presentations/demos @ TriLUG January 10 meeting
  - (late breaking: probably separate workshop at @Splat Space Saturday January 12th. See TriLUG web page for details)
- Most presenters/contributors from Splat Space
  - BUT additional help welcome! (contact pete@soper.us)
- At TriLUG January Meeting
  - Thursday, January 10, 2013 @ 7pm
  - RedHat (@NCSU), 1801 Varsity Dr, Raleigh, NC
- TriLUG web site is http://trilug.org
- Splat Space web site is http://splatspace.org