Raspberry Pi Kernel Compile

Posted by michael on Jun 8, 2012 in Raspberry Pi, Tutorials, Ubuntu | 25 comments

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This tutorial will demonstrate how to cross compile the kernel for the Raspberry Pi on Ubuntu 12.04 LTS. The kernel is functional with both the Debian and Arch Linux Raspberry Pi images. First, install the package dependencies, git and the cross-compilation toolchain:

```
sudo apt-get install git-core gcc-4.6-arm-linux-gnueabi
```

Create a symlink for the cross compiler:

```
sudo ln -s /usr/bin/arm-linux-gnueabi-gcc-4.6 /usr/bin/arm-linux-gnueabi-gcc
```

Make a directory for the sources and tools, then clone them with git:

```
mkdir raspberrypi
cd raspberrypi
git clone https://github.com/raspberrypi/tools.git
git clone https://github.com/raspberrypi/linux.git
cd linux
```

Generate the .config file from the pre-packaged raspberry pi one:

```
make ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi-
bcmrpi_cutdown_defconfig
```

If you want to make changes to the configuration, run make menuconfig (optional):

```
make ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi- menuconfig
```

Once you have made the desired changes, save and exit the menuconfig screen. Now we are ready to start the build. You can speed up the compilation process by enabling parallel make with the -j flag. The recommended use is 'processor cores + 1′, e.g. 5 if you have a quad core processor:

```
make ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi- -k -j5
```

Assuming the compilation was sucessful, create a directory for the modules:

```
mkdir ../modules
```

Then compile and 'install' the loadable modules to the temp directory:

```
make modules_install ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi-
INSTALL_MOD_PATH=../modules/
```

Now we need to use imagetool-uncompressed.py from the tools repo to get the kernel ready for the Pi.

```
cd ../tools/mkimage/
./imagetool-uncompressed.py ../../linux/arch/arm/boot/Image
```

This creates a kernel.img in the current directory. Plug in the SD card of the existing Debian image that you wish to install the new kernel on. Delete the existing kernel.img and replace it with the new one, substituting "boot-partition-uuid" with the identifier of the partion as it is mounted in Ubuntu.

```
sudo rm /media/boot-partition-uuid/kernel.img
sudo mv kernel.img /media/boot-partition-uuid/
```

Next, remove the existing /lib/modules and lib/firmware directories, substituting "rootfs-partition-uuid" with the identifier of the root filesystem partion mounted in Ubuntu.

```
sudo rm -rf /media/rootfs-partition-uuid/lib/modules/
sudo rm -rf /media/rootfs-partition-uuid/lib/firmware/
```

Go to the destination directory of the previous make modules_install, and copy the new modules and firmware in their place:

```
cd ../../modules/
sudo cp -a lib/modules/ /media/rootfs-partition-uuid/lib/
sudo cp -a lib/firmware/ /media/rootfs-partition-uuid/lib/
sync
```

That’s it! Exject the SD card, and boot the new kernel on the Raspberry Pi!

25 Comments

1. 
snake
June 16, 2012

if you copt the boot directory from the firmware github onto the sdcard boot partition, you can just copy the kernel image arch/arm/boot/bzImage to sdcard/boot_partitiion/kernel.img – it will work straight away.

reply

   - 
michael
June 16, 2012

Thanks for the tip snake!

reply

2. 
sokkaaj
June 18, 2012

What is the modification you’re talking about on the external USB rootfs page?

reply

   - 
michael
June 22, 2012

The modification allows you to move the root filesystem (ie ‘/’) from the SD card to a USB

drive. I have several USB drives in excess of 16GB, but only a 4GB SD card. Moving '/' to the USB drive gives me much more space.

reply

3. 

iqzer0++
July 14, 2012

is there any way to change the root password ?

reply

- 

  Koenkk
  August 4, 2012

  sudo passwd root

  reply

4. 

Ludolf Kolligs
August 14, 2012

Moin dear Michel and interrogators!
Thank You for detailed instruction which I was looking for since I found no direct ADSL connection over PPPoE provided for on RP.
Perhaps some more advice available in this direction?
Greetings from Hamburg, North Germany!
Ludolf

reply

- 

  michael
  August 17, 2012

  Hi Ludolf,
  It looks like PPP is supported by default, but PPPoE is not. For kernel support, you will need to enable the PPPoE module. In the .config file, change:

```
# CONFIG_PPPOE is not set
```

to
`CONFIG_PPPOE=m`
Then you should be able to follow the official Debian instructions to configure PPPoE here: http://wiki.debian.org/PPPoE

reply

5. 

smith
October 26, 2012

hey, i've followed all the steps above and the new kernel runs, but a can't load modules and getting Exec format error after modprobe

reply

6. 

Zia
November 5, 2012

Hey ,

All steps are very clear to me. I successfully built the kernel and run on the board. but it fails to load any module as even mouse and keyboard attached to board stop responding. Please guide me through this…Thanks.

Zia

reply

7. 

Sb
December 19, 2012

make modules_install ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi- INSTALL_MOD_PATH=../modules/

should be

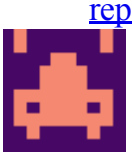
make modules_install ARCH=arm CROSS_COMPILE=/usr/bin/arm-linux-gnueabi-gcc-4.6 INSTALL_MOD_PATH=../modules/

reply

Brian H Wilson
January 2, 2013

Thanks, worked first try for me! I needed to build a kernel to use a Displaylink monitor.

reply

8. 

Jasmin
February 18, 2013

Thank you very much for this tutorial please help me I cannot locate xorg.conf file.
I'm using raspbmc and compiling went well but I'm missing xorg.conf.
Touch is now working but I cannot do anything until edit this file.

reply

9. 

Pedro
February 27, 2013

Very nice tutorial!

reply

10. 

110202820
March 3, 2013

Whenever I try to move the kernel to the sd card, it tells me that kernel.img doesnt exist. Help?

reply

11. 

Levi
March 14, 2013

When I type in the first line it says "could not locate package" please help

reply

- 

  gigavolt
  May 20, 2013

  You have to be using 12.04 and everything has to be updated. Install or upgrade to 12.04lts and run sudo apt-get update.

  reply

  - 

    J L
    April 12, 2014

    12.04 of what?

    reply

    - 

      arm
      April 15, 2014

      Ubuntu 12.04

      reply

12. 

    Ramesh
    May 21, 2013

    I followed the above steps and It worked fine for me..Thanks a lot

    reply

13. 

    JessD
    June 25, 2013

    Worked for me; thanks very much!

reply

14. 

Noam
September 15, 2013

Thank you very much for the tutorial, it the easiest out there to follow. Maybe you can add how to calibrate it in the end. http://engineering-diy.blogspot.dk/2013/01/adding-7inch-display-with-touchscreen.html This tutorial dose almost as you do (You do it better) but in the end there are some calibration instructions.

Ok. to my question I have followed your tutorial and the touch screen is working perfectly. But my WiFi USB dongle is stop working… Is it some thing in the configuration file that is missing or some bad communication between the injected kernel.img and the drivers? have suggestions?

Thanks.

Noam

reply

- 

  Tomas Žeimys
  March 18, 2014

  Same problem here. WiFi dongle stops working

  reply

15. 

J L
April 12, 2014

I also got the failed message on the first step. Has the version number been updated since 12.04ls?

reply

16. 

Ken
April 20, 2014

Snake Hi, I have not had luck with the instructions. I am trying to use a AOC usb monitor with my

Pi. Can you provide instruction for copying the kernel.
Thanks
Ken

reply

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