Installation of an Operating System on Raspberry Pi

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February 17, 2016

Contents

0.1 Objective

This tutorial will help a Windows or a Linux user to install an operating system on Raspberry Pi successfully.

0.2 Prerequisites

- An idea about Windows or Linux operating system and their features.

0.3 Hardware Requirement

1. Raspberry Pi (I will be using Version 2 Model-B)

2. Adapter (To power up an R-pi)

3. SD card reader

4. PC (either Linux or Windows machine)

0.4 Software Requirement

1. Utorrent

2. 7-zip (or any other zip tool)

0.5 Experiment

Instructions for installing operating system in Raspberry Pi: The operating system will be installed in the memory card and this memory card will be inserted in Raspberry Pi. You will require a Memory Card of minimum 4GB storage.

1. There are different types of OS which can be used for RPi such as, Noobs, Raspbian, Ubuntu Mate, Windows 10 IoT and so on.

2. For beginners Noobs is recommended.We are using Raspbian OS.

3. There are few memory cards available with pre-installed Noobs OS. In this case, you dont have to install the OS, you can use as it is. For others,

Connect the sd card to the system using the sd card reader.If you are using used Memory card, then you have to first format it.
Note: Do not format with Quick Format option. Memory cards have a "Protected Area" on the card for the SD standard's security function. Please use appropriate application software or SD-compatible device that provides SD security function to format the "Protected Area" in the memory card. We are using SD formatter s/w. You can download it from link: `https://www.sdcard.org/downloads/formatter_4/index.html` .It is available for windows and MAC.

Download Raspbian software from raspberry pi website. It should be available in the form of a zip file. Download it from the following link: `https://www.raspberrypi.org/downloads/` Also download win32DiskManager from the following link:`http://sourceforge.net/projects/win32diskimager/` and then install it.

A windows user should follow these steps:

- Insert an sd card(4GB or greater size) into the laptop in the memory card slot if available or use a memory card reader. Run win32DiskImager and choose the Raspbian image and select the drive corresponding to your sd card.

- Click "Write" to copy the files of the image on to the sd card.

- Eject SD card and insert it into the sd card slot of the Raspberry Pi.

A Linux user should follow these steps:

- Insert an sd card(4GB or greater size) into the laptop in the memory card slot if available or use a memory card reader.

- Run df -h to see what devices are currently mounted. The new device that has appeared is your SD card. The left column gives the device name of your SD card; it will be listed as something like /dev/mmcblk0p1 or /dev/sdd1. The last part (p1 or 1 respectively) is the partition number but you want to write to the whole SD card, not just one partition. Therefore you need to remove that part from the name (getting, for example, /dev/mmcblk0 or /dev/sdd) as the device for the whole SD card. Note that the SD card can show up more than once in the output of df; it will do this if you have previously written a Raspberry Pi image to this SD card, because the Raspberry Pi SD images have more than one partition.

- Note down your device name. You need to unmount it so that files can't be read or written to the SD card while you are copying over the SD image.

- Run umount /dev/sdd1, replacing sdd1 with whatever your SD card's device name is (including the partition number). If your SD card shows up more than once in the output of df due to having multiple partitions on the SD card, you should unmount all of these partitions.

- In the terminal, write the image to the card with the command below, making sure you replace the input file if= argument with the path to your .img file, and the /dev/sdd in the output file of= argument with the right device name. This is very important, as you will lose all data on the hard drive if you provide the wrong device name. Make sure the device name is the name of the whole SD card as described above, not just a partition of it; for example sdd, not sdds1 or sddp1; or mmcblk0, not mmcblk0p1.

  dd bs=4M if=2015-05-05-raspbian-wheezy.img of=/dev/sdd

  Please note that block size set to 4M will work most of the time; if not, please try 1M, although this will take considerably longer.

  Also note that if you are not logged in as root you will need to prefix this with sudo.

- The dd command does not give any information of its progress and so may appear to have frozen; it could take more than five minutes to finish writing to the card. If your card reader has an LED it may blink during the write process. To see the progress of the copy operation you can run pkill -USR1 -n -x dd in another terminal, prefixed with sudo if you are not logged in as root. The progress will be displayed in the original window and not the window with the pkill command; it may not display immediately, due to buffering.

Instead of dd you can use dcfldd; it will give a progress report about how much has been written.

You can check what's written to the SD card by dd-ing from the card back to another image on your hard disk, truncating the new image to the same size as the original, and then running diff (or md5sum) on those two images.

- The SD card might be bigger than the original image, and dd will make a copy of the whole card. We must therefore truncate the new image to the size of the original image. Make sure you replace the input file if= argument with the right device name. diff should report that the files are identical.

  dd bs=4M if=/dev/sdd of=from-sd-card.img truncate –reference 2015-05-05-raspbian-wheezy.img from-sd-card.img diff -s from-sd-card.img 2015-05-05-raspbian-wheezy.img

- Run sync; this will ensure the write cache is flushed and that it is safe to unmount your SD card.
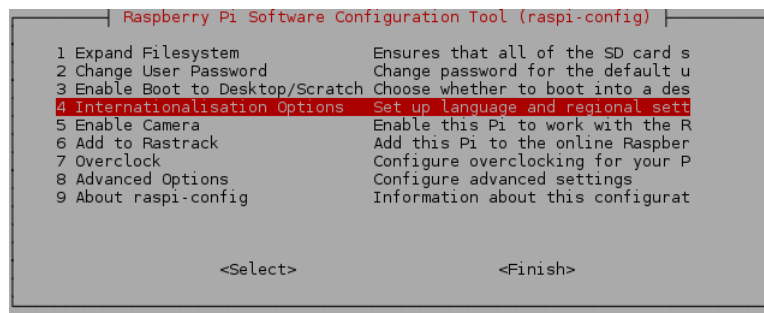
Remove the SD card from the card reader and insert it into Raspberry Pi's SD card slot. [1]
After inserting the SD card into Raspberry Pi follow these steps:

1. Connect the keyboard and mouse.Use HDMI cable to connect the board to the VGA monitor

2. Power on the board and the monitor. You will notice a set of code running on the monitor.

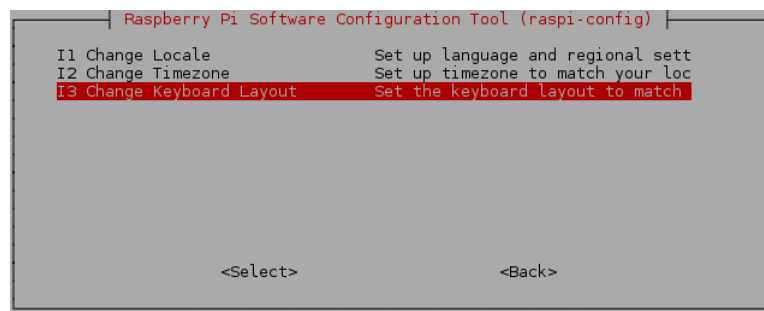3. After a while a software configuration tool opens.
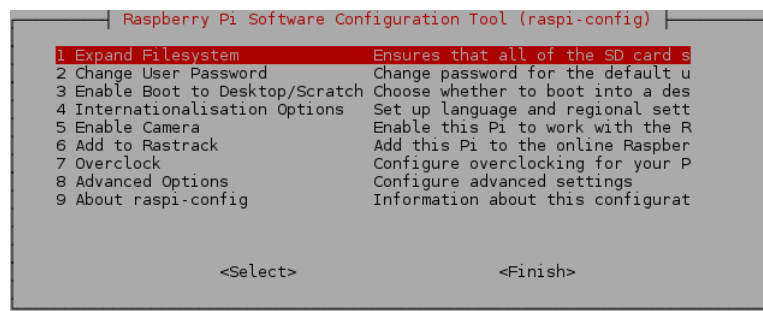
4. In case the size of the SD card is greater than 4GB you can select the 1st option i.e.Expand file system in the configuration tool as shown above.

5. Select the internationalisation options.

```
┤ Raspberry Pi Software Configuration Tool (raspi-config) ├
    1 Expand Filesystem            Ensures that all of the SD card s
    2 Change User Password         Change password for the default u
    3 Enable Boot to Desktop/Scratch Choose whether to boot into a des
    4 Internationalisation Options  Set up language and regional sett
    5 Enable Camera                Enable this Pi to work with the R
    6 Add to Rastrack              Add this Pi to the online Raspber
    7 Overclock                    Configure overclocking for your P
    8 Advanced Options             Configure advanced settings
    9 About raspi-config           Information about this configurat


            <Select>                        <Finish>
```

6. Change the keyboard and language settings as per your choice.
   Default keyboard will be of UK. Step by step change to US keyboard
   is as shown:

   - First select the option change Keyboard layout and click ok

```
┤ Raspberry Pi Software Configuration Tool (raspi-config) ├
    I1 Change Locale               Set up language and regional sett
    I2 Change Timezone             Set up timezone to match your loc
    I3 Change Keyboard Layout      Set the keyboard layout to match



            <Select>                        <Back>
```

- Then select the respective keyboard you are using and if you dont find your kind then select any of the generic types.
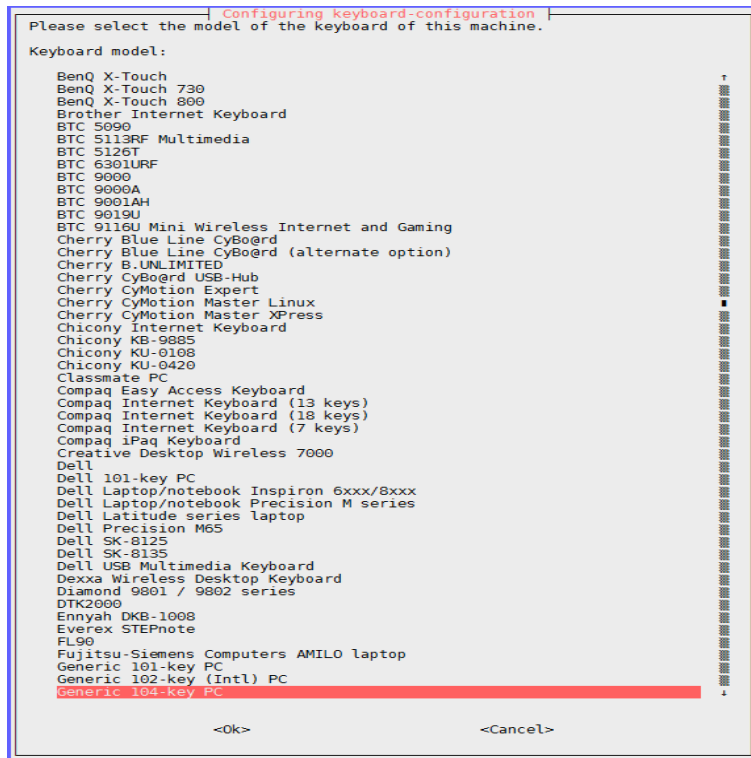
- Select "English US" which will be available at the top. Then for the rest of the process simply click enter till you reach the main configuration menu.
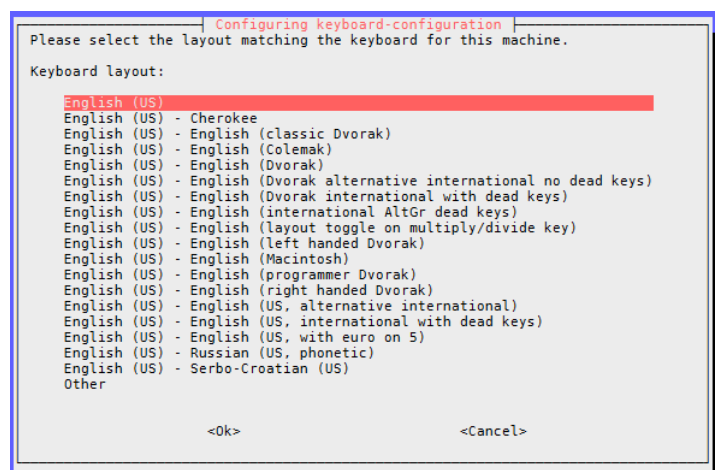
7. Click on finish using the keyboard by using arrow keys and enter key.

8. Click on "ok" when prompted for reboot.

9. Upon reboot, enter 'pi' as user id and 'raspberry' as password. Then type 'startx' to enter the graphical interface.

10. The linux based raspbian interface will be displayed on the monitor. Some of the softwares will be preloaded such as wolfram, python etc.

11. The command prompt will be the lx terminal.

With this we end the installation of Raspbian OS in R-Pi.

0.6   References

1. `https://www.raspberrypi.org/`

2. `http://en.wikipedia.org/wiki/Raspberry_Pi`

3. `https://www.raspberrypi.org/wp-content/uploads/2014/11/Raspberry_Pi_Family_A-annotated-15001.jpg`

4. `http://assets.windowsphone.com/3f82dfe6-a179-4ddf-9738-91989190c3fa/IoT-rpi2-board_InvariantCulture_Default.png`