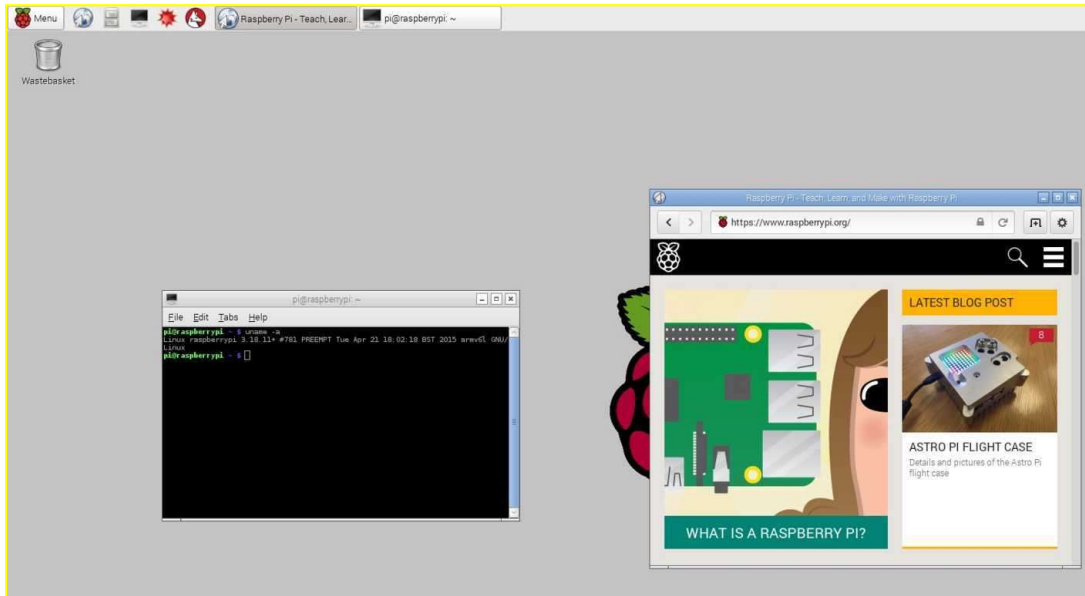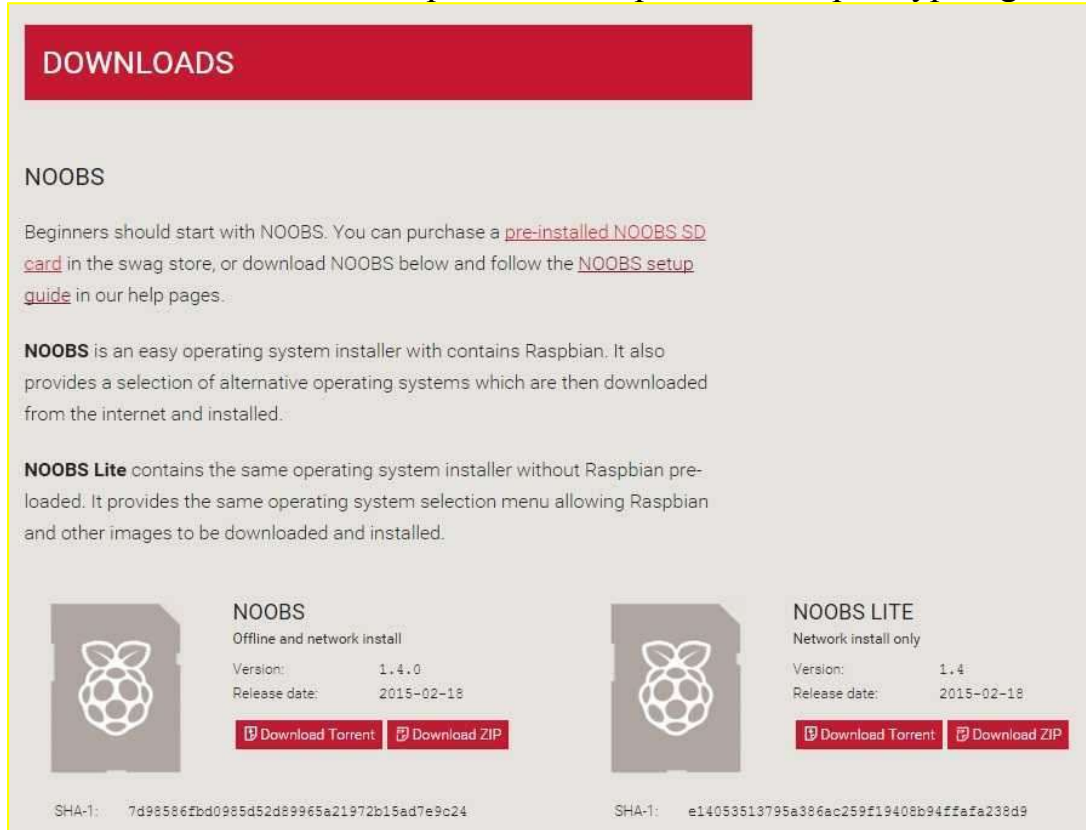## Installing Raspbian

Rasbian is the operating system of choice for a beginner. It is based on a popular Linux distribution called Debian and was specially designed for the Raspberry Pi. Raspbian contains a lot of pre-installed programs that will help get you up and running and features a nice GUI:

Raspbian runs LXDE (Lightweight X11 Desktop Environment) as the desktop environment, and Openbox as the window manager. It can be installed using NOOBS, the recommended install manager for the Raspberry Pi. Here is how you can do just that:

1. Download the NOOBS zip file from https://www.raspberrypi.org/downloads.

2. Extract the zip file to a folder of your choice and transfer the files to your SD card:

3. Place the SD card in your Raspberry Pi. Connect the USB keyboard and the USB mouse. Use the HDMI port to connect your monitor.

4. Finally, power on your device by connecting it to the power outlet or the USB port on your PC. The NOOBS installer should start. Tick the checkbox next to Raspbian and click the Install button. The installation procedure should start:
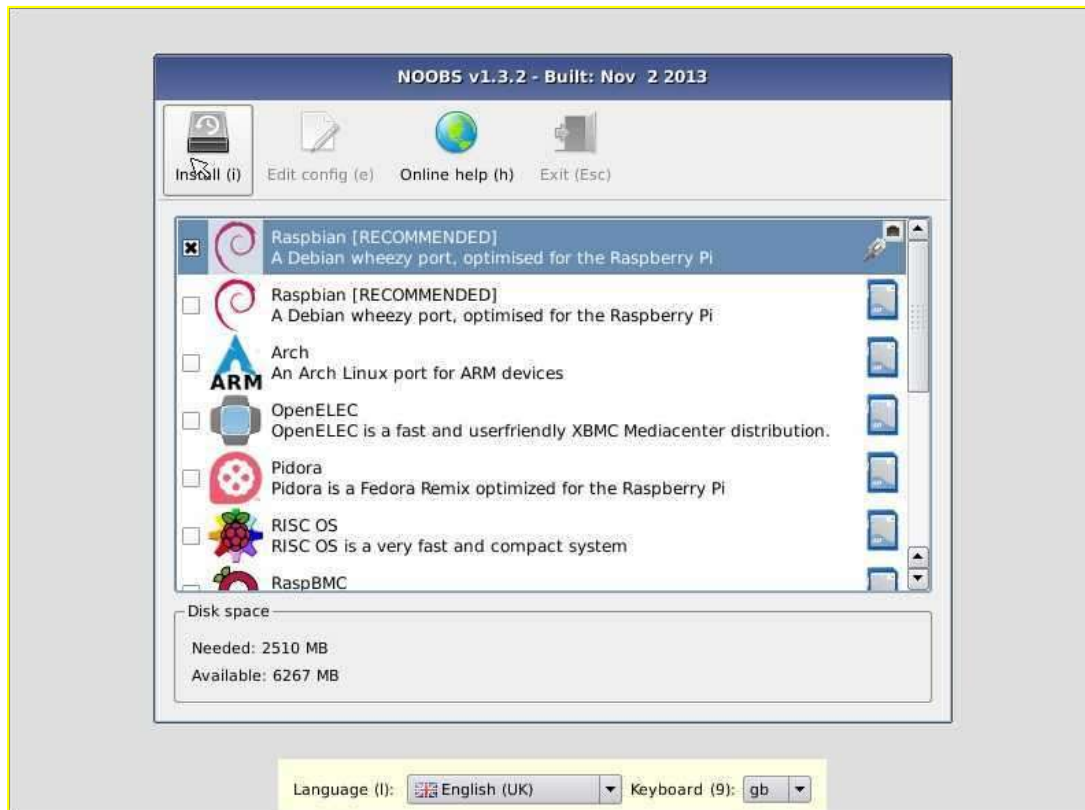
5. When the install process is completed, the Raspberry Pi configuration menu (raspi-config) will load. To start Raspbian, select Finish:
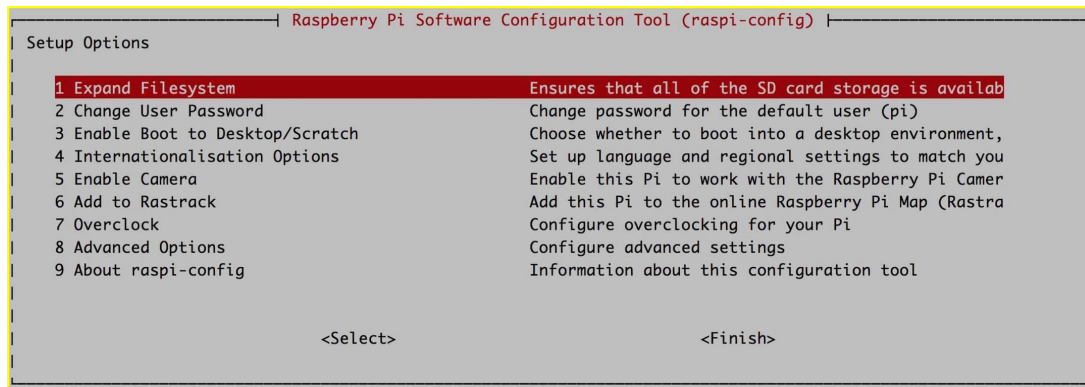
Raspbian uses the default username pi and password raspberry. To load the graphical user interface, type the startx command in the shell.

Using Raspbian

The Raspbian desktop environment is similar to the one found in Windows operating systems. You have a file manager, a web browser, a menu bar, a terminal, etc:
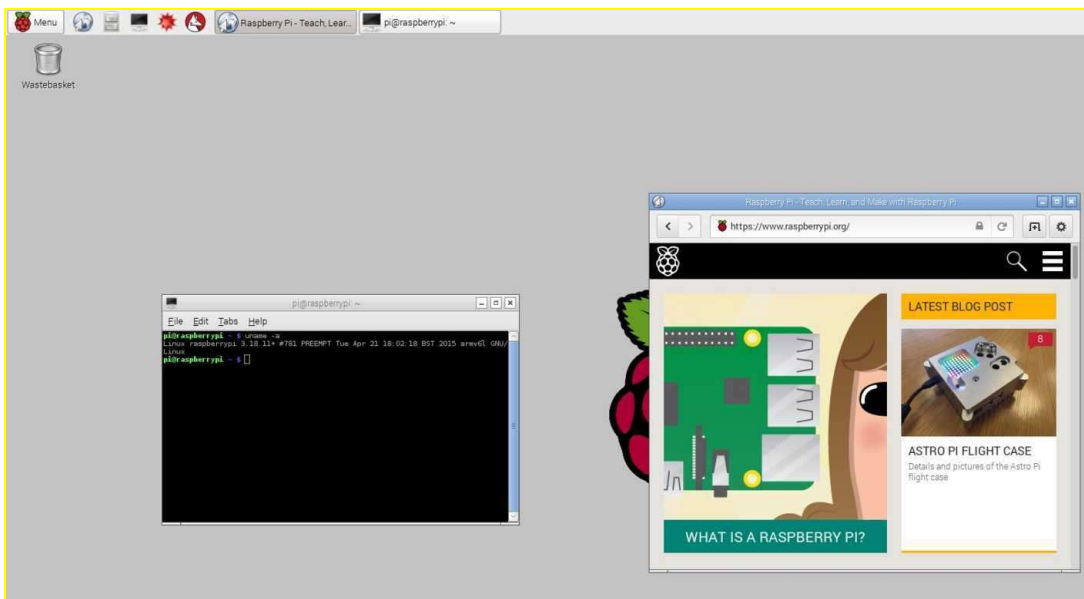
Raspbian features a Menu bar similar to the Start menu found in Windows. This Menu bar allows you to quickly start applications or turn of your device:

Raspbian also includes a file manager called PCMan File Manager (PCManFM) that allows you to manipulate files and folders. To start it, click the second icon on the right of the Menu bar:
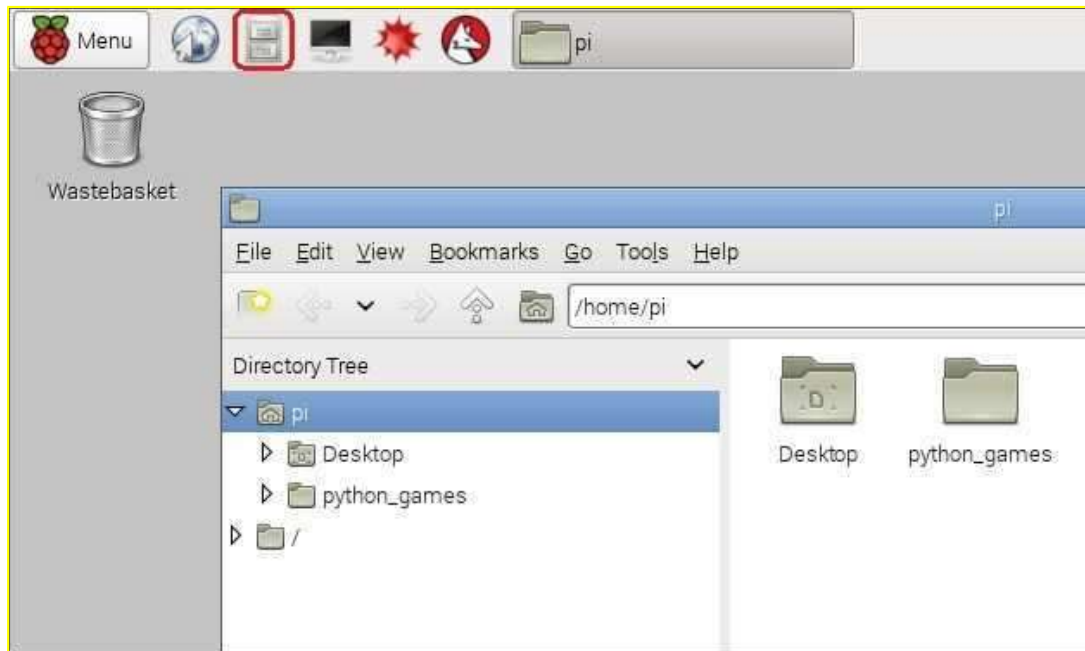
A web browser included in Raspbian is called Epiphany. It can be accessed by clicking on the first icon on the right of the Menu bar:
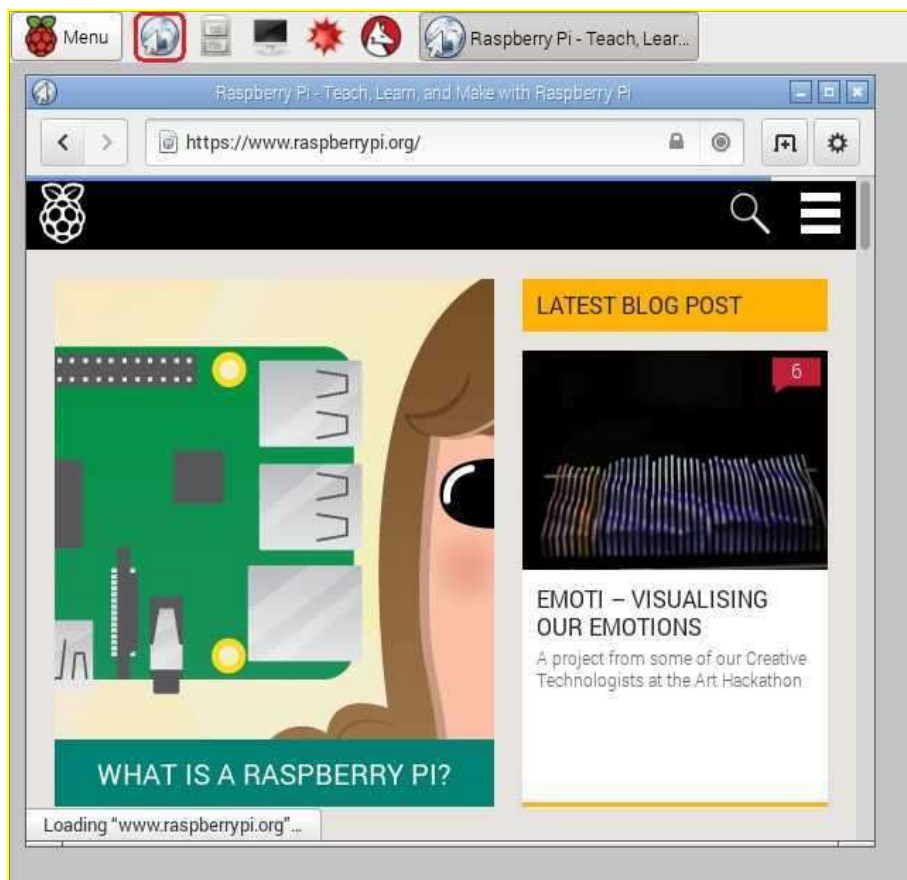
Raspbian features a terminal called LXTerminal where you can issue text commands to the system. It can be accessed by clicking on the third icon on the right of the Menu bar:
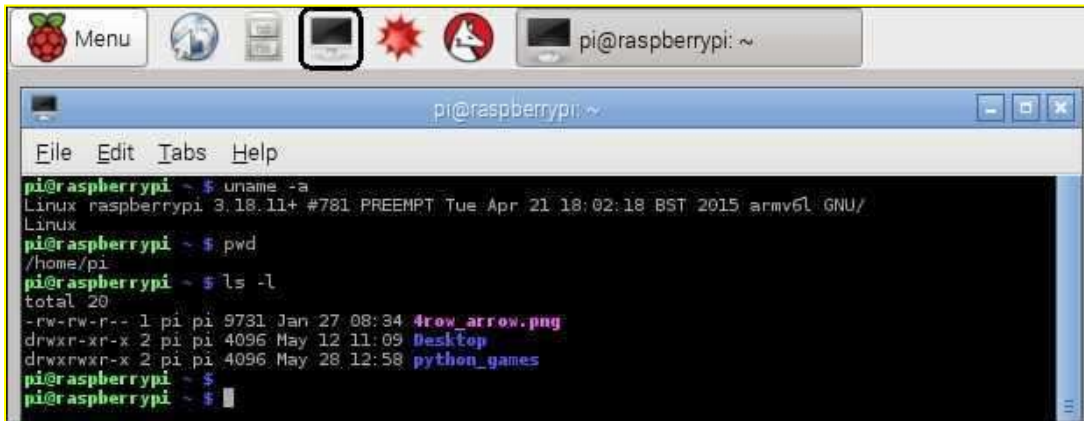
Connecting to the Internet

The Raspberry Pi models B and B+ both come with a standard 10/100 Mbit/s Ethernet port that can be used to connect the device to the Internet. Simply plug an Ethernet cable to the Rasbperry Pi and connect it to your Internet router. Internet routers usually serve as DHCP servers, and your Raspberry Pi should automatically obtain network parameters, such as the IP address and subnet mask.

If your router is too far away from your Raspberry Pi or you own a model that doesn't have an Ethernet port, you might think about buying a Wi-Fi dongle, like this one (Edimax EW-7811Un):

Of course, before buying a Wi-Fi dongle, make sure that your router supports wireless networks!

Once you connect your device to the Internet router, run the ip addr command from the terminal to display network settings:

```
pi@raspberrypi ~ $ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
      valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether b8:27:eb:3a:49:84 brd ff:ff:ff:ff:ff:ff
    inet 192.168.5.11/24 brd 192.168.5.255 scope global eth0
      valid_lft forever preferred_lft forever
```

In the picture above you can see that our device has an IP address of 192.168.5.11.

To verify that your device can access the Internet, enter the ping google.com command:

```
pi@raspberrypi ~ $ ping google.com
PING google.com (213.202.89.159) 56(84) bytes of data.
64 bytes from cache.google.com (213.202.89.159): icmp_req=1 ttl=60 time=6.75 ms
64 bytes from cache.google.com (213.202.89.159): icmp_req=2 ttl=60 time=6.69 ms
64 bytes from cache.google.com (213.202.89.159): icmp_req=3 ttl=60 time=6.72 ms
64 bytes from cache.google.com (213.202.89.159): icmp_req=4 ttl=60 time=6.33 ms
64 bytes from cache.google.com (213.202.89.159): icmp_req=5 ttl=60 time=6.79 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 6.337/6.662/6.794/0.165 ms
```

If you receive responses from google.com, the Raspberry Pi is able to access the Internet. Now you can start the browser and begin surfing the Internet.

The Raspberry Pi Store

The Raspberry Pi Store was launched in 2012 to make it easier for developers to share their applications with the rest of the Raspberry Pi community. It also makes the process of finding and downloading applications much easier for total beginners.

The Pi Store can be accessed via http://store.raspberrypi.com or by using the dedicated Pi app. To access the Pi Store from Raspbian, go to Menu > Internet > Pi Store:
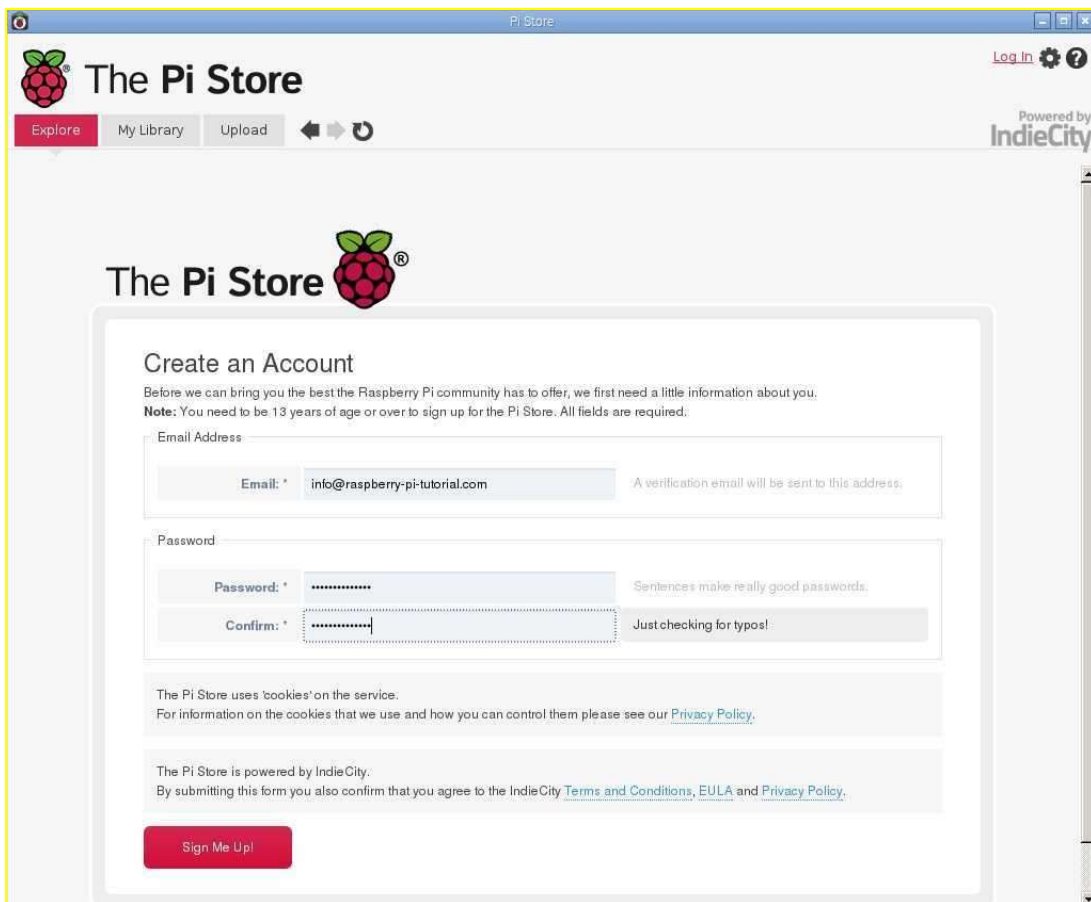
Most of the applications available in the Pi Store are either free or low-priced.

The Pi Store enables you to browse and download content, and even to upload your own application. To do all that, you will need to register. Click on the Log In link in the upper right corner and click the Register button:
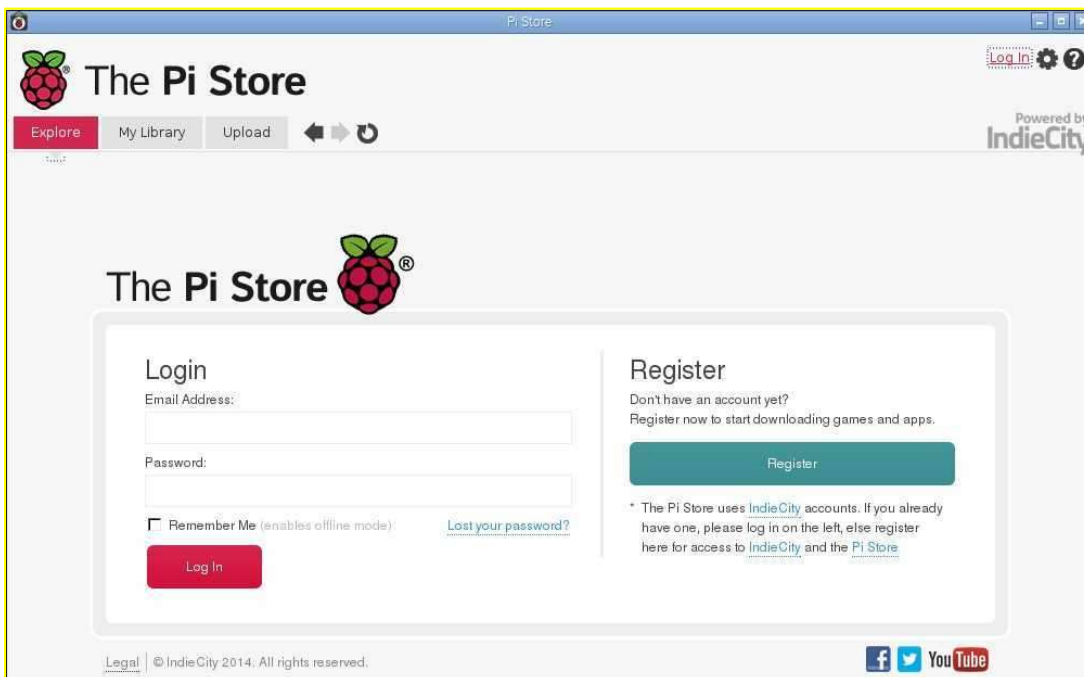
Enter your email address and password and click the Sign Me Up! button:

After you've logged in, you can browse and download applications and even upload your own works. To browse applications, select the Explore tab. Applications are divided into five sections:

- Games
- Apps
- Tutorials
- Dev Tools
- Media
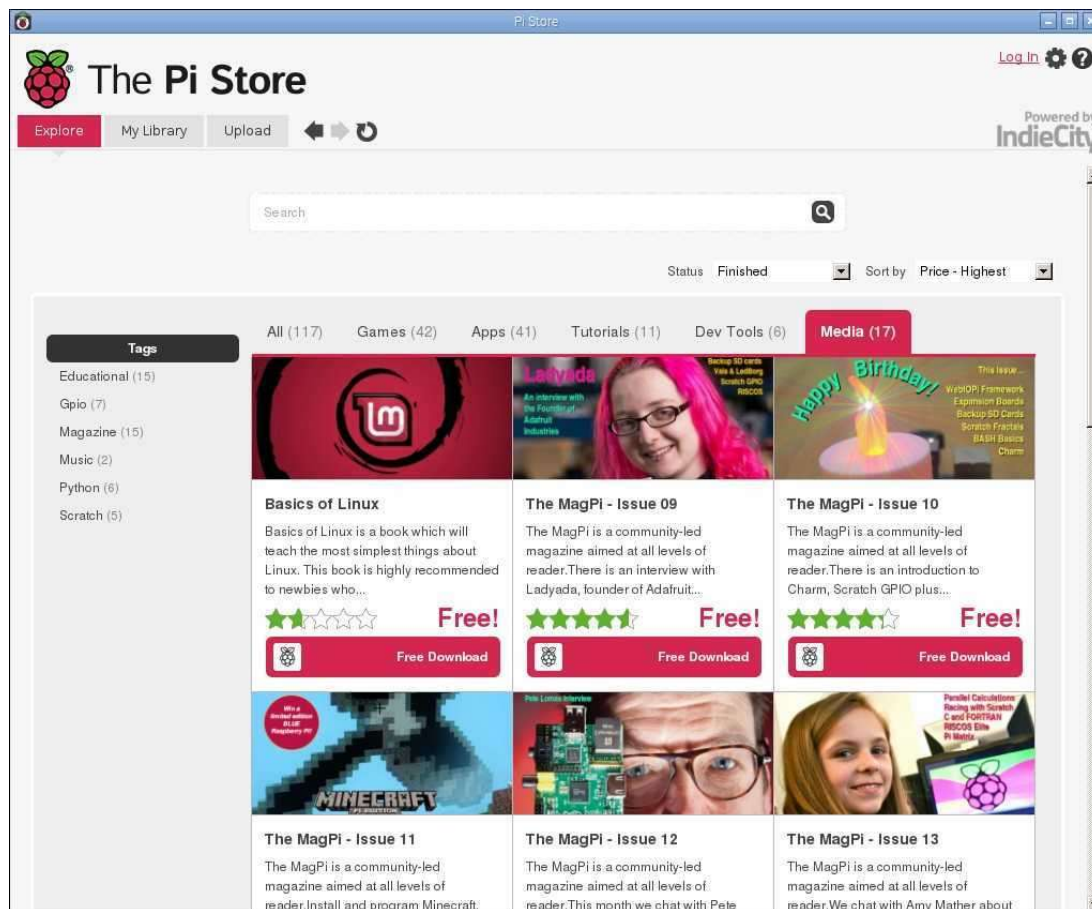
The Games and Apps sections offer you a number of applications and games you can download and use. The Tutorials section contains useful books and videos that can help you get started with the Raspberry Pi. The Dev Tools section contains tools to help developers, and the Media section contains magazines and other Raspberry Pi related resources.

Install an application from the Pi Store

To download and install application from the Pi Store you will need to install the Pi Store application. If you're using the official operating system image, the Pi Store application will already be installed on your device. If you don't have it installed, you can install it by opening the terminal and running the following command:

sudo apt-get update && sudo apt-get install pistore

Next, if the Pi Store application isn't already running, start it (Menu > Internet > Pi Store):

Installing applications in the Raspberry Pi Store is pretty much straightforward. Go to the Explore tab and browse for the application or game you would like to install. You can sort the applications by popularity, ranking, price, etc. You can also search for an application. Let's install Libre Office, a free suite of applications similar to the ones found in Microsoft Office.

First, search for the application by typing libre in the search box and clicking the search icon:
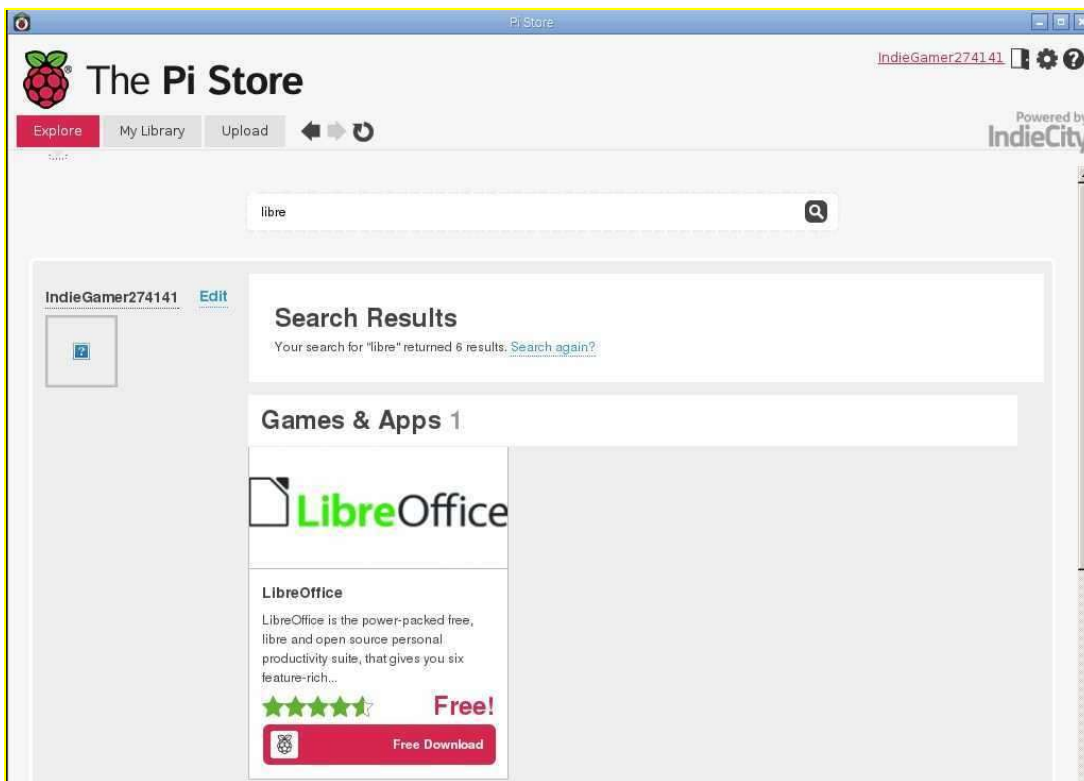
Click on the Libre Office logo and click on the Download link:
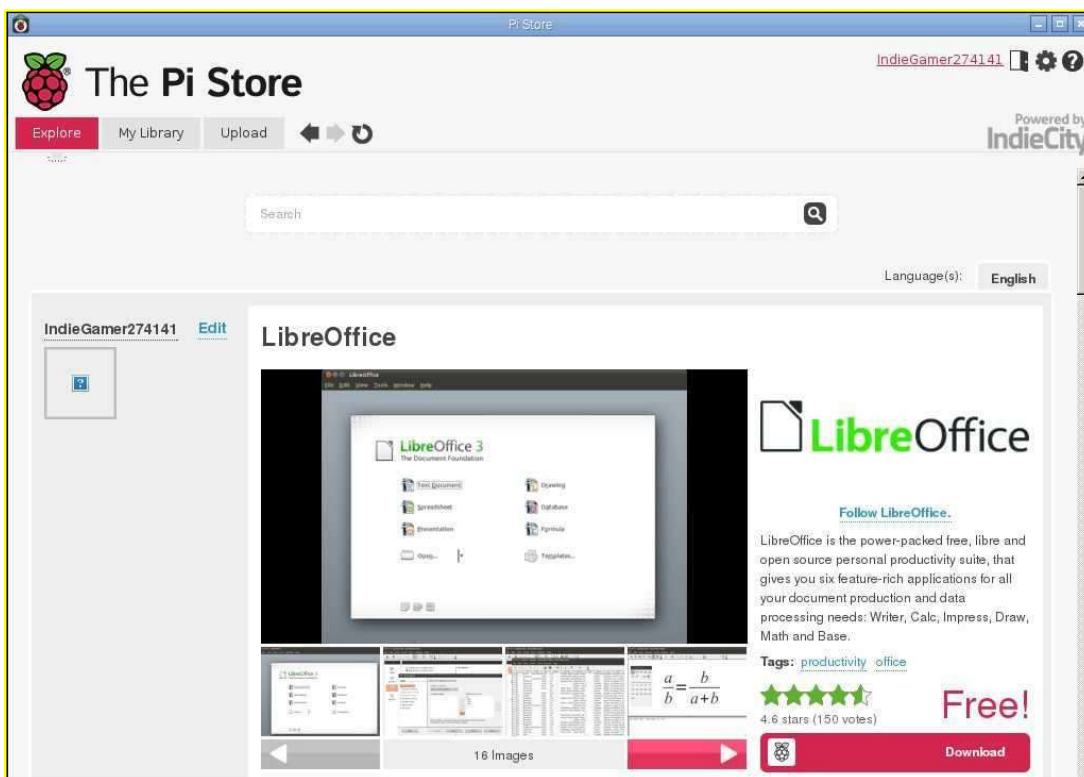
After all the necessary files have been downloaded, the installation should start:

After the installation is completed, go to the My Library tab in the Pi Store application. This tab lists all application you've downloaded and installed. Select the Libre Office application and click Launch:

Libre Office should start:
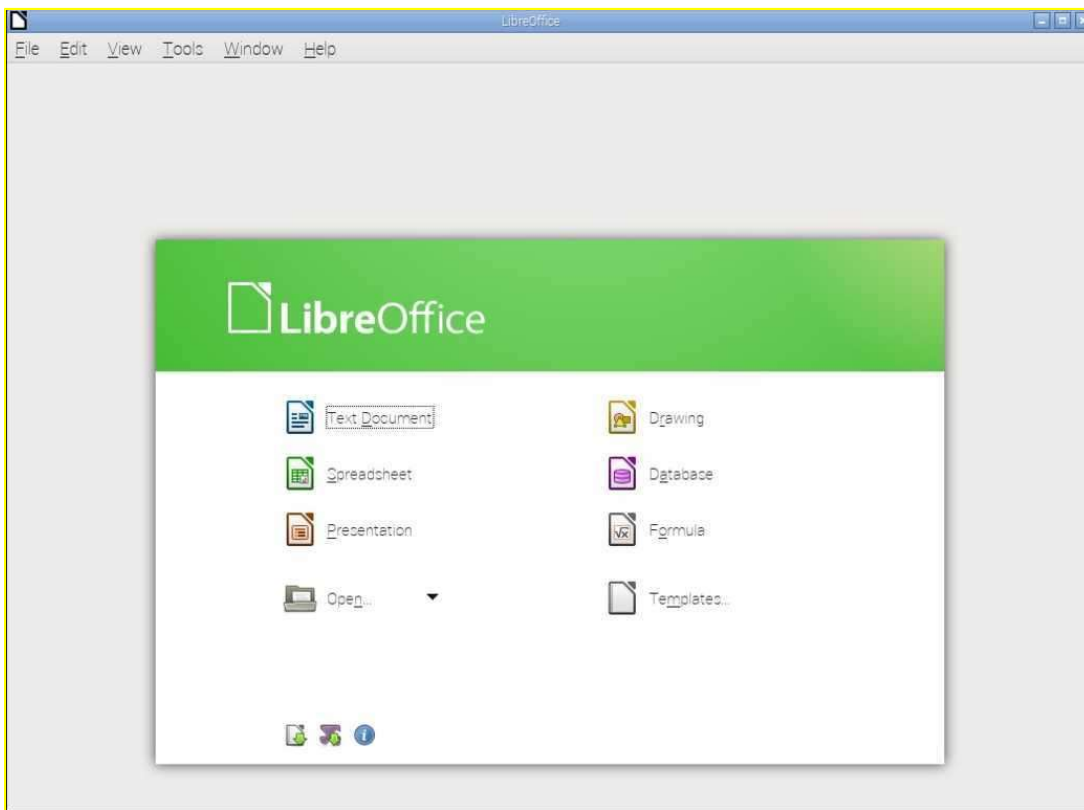
Raspbian repository

You can download additional software for your Raspberry Pi from the Raspbian repository. This repository, located at http://archive.raspbian.org, can be used in conjunction with the apt command to install thousands of additional applications on your device. You can install web browsers, text editors, games, web servers, etc. Since Raspbian is Debian-based, a huge number of Debian applications have been ported to Raspbian - more than 35,000 packages (applications) are available in the repository!

To install an application from the repository, a package manager called Advanced Packaging Tool (APT) is used. Two of the most commonly used tools included with this program are:

- apt-cache – used to search for a package
- apt-get – used to install, upgrade or remove packages

apt-cache

The apt-cache tool is used to search for an application. For example, let's say that we want to install a chess game on our Raspberry Pi. We would use the apt-cache search chess command to search for such application:

```
pi@raspberrypi ~ $ apt-cache search chess
3dchess - Play chess across 3 boards!
brutalchess - 3D chess game with reflection of the chessmen
cgoban - complete Go board
convert-pgn - chess book format converter
dreamchess - 3D chess game
dreamchess-data - data files for dreamchess
eboard - GTK+ chessboard program
eleeye - Chinese chess (Xiangqi) engine
emacs-chess - a client and library for playing Chess from Emacs
fairymax - xboard compatible chess and chess-variant engine
fruit - chess engine, to calculate chess moves
gamazons - Amazons boardgame for GNOME
gameclock - simple chess clock to track time in real life games
glaurung - free UCI chess engine, to calculate chess moves
glchess - chess game with 3D graphics
gmchess - Chinese chess game (Xiangqi)
gnuchess - Plays a game of chess, either against the user or against itself
gnuchess-book - Opening book for gnuchess
gnugo - play the game of Go
gnuminishogi - program to play minishogi, a shogi variant on a 5x5 board
gnushogi - program to play shogi, the Japanese version of chess
gtkboard - many board games in one program
hoichess - xboard compatible chess engine to play chess with
```

We got a huge list of packages with the word chess in their name or description. One of the packages found is called dreamchess. To get additional information about that package, we can use the apt-cache show dreamchess command:

```
pi@raspberrypi ~ $ apt-cache show dreamchess
Package: dreamchess
Version: 0.2.0-3
Architecture: armhf
Maintainer: Debian Games Team <pkg-games-devel@lists.alioth.debian.org>
Installed-Size: 483
Depends: libc6 (>= 2.13-28), libgl1-mesa-glx | libgl1, libglu1-mesa | libglu1, l
ibmxml1, libsdl-image1.2 (>= 1.2.10), libsdl-mixer1.2, libsdl1.2debian (>= 1.2.1
1), dreamchess-data (= 0.2.0-3)
Homepage: http://www.dreamchess.org/
Priority: optional
Section: games
Filename: pool/main/d/dreamchess/dreamchess_0.2.0-3_armhf.deb
Size: 143176
SHA256: 48284c6afee3039bc18385ee36ca707aa90e47dc0d20b70790f962a1e8fcf8ee
SHA1: 0899b884553d11612e9a4ac925f9df503663391d
MD5sum: ece5ae8132108b408b0d6c163b23b40b
Description: 3D chess game
 DreamChess features 3D OpenGL graphics and provides various chess board sets,
 ranging from classic wooden to flat.

 A moderately strong chess engine is included: Dreamer. However, should this
 engine be too weak for you, then you can use any other XBoard-compatible chess
 engine, including the popular Crafty and GNU Chess.

 Other features include on-screen move lists using SAN notation, undo
 functionality, and savegames in PGN format.
```

The apt-cache show dreamchess command show us a lot of useful information about the package, such as the current version, architecture, homepage, size, and a brief description.

apt-get

Now that we've found the application, we can install it using the sudo apt-get install dreamchess command:

The sudo command allowed us to run the command as root. The apt-get command must be preceded with the sudo keyword.

The apt-get tool can also be used to remove installed packages. The syntax of the command is sudo apt-get remove PACKAGE NAME. For example. to remove an application we've installed previously, we would run the following command:

Updating Raspbian

It is a good practice to occasionaly update your Raspbian operating system. This can be done with these two apt-get commands:

sudo apt-get update - updates your system's package list:

```
pi@raspberrypi ~ $ sudo apt-get update
Get:1 http://mirrordirector.raspbian.org wheezy Release.gpg [490 B]
Hit http://archive.raspberrypi.org wheezy Release.gpg
Hit http://raspberrypi.collabora.com wheezy Release.gpg
Hit http://archive.raspberrypi.org wheezy Release
Get:2 http://mirrordirector.raspbian.org wheezy Release [14.4 kB]
Hit http://raspberrypi.collabora.com wheezy Release
Hit http://archive.raspberrypi.org wheezy/main armhf Packages
Get:3 http://mirrordirector.raspbian.org wheezy/main armhf Packages [6,903 kB]
Hit http://raspberrypi.collabora.com wheezy/rpi armhf Packages
Ign http://archive.raspberrypi.org wheezy/main Translation-en_GB
Ign http://archive.raspberrypi.org wheezy/main Translation-en
Ign http://raspberrypi.collabora.com wheezy/rpi Translation-en_GB
Ign http://raspberrypi.collabora.com wheezy/rpi Translation-en
Get:4 http://mirrordirector.raspbian.org wheezy/contrib armhf Packages [23.6 kB]
Get:5 http://mirrordirector.raspbian.org wheezy/non-free armhf Packages [49.3 kB
]
Get:6 http://mirrordirector.raspbian.org wheezy/rpi armhf Packages [592 B]
Ign http://mirrordirector.raspbian.org wheezy/contrib Translation-en_GB
Ign http://mirrordirector.raspbian.org wheezy/contrib Translation-en
Ign http://mirrordirector.raspbian.org wheezy/main Translation-en_GB
Ign http://mirrordirector.raspbian.org wheezy/main Translation-en
Ign http://mirrordirector.raspbian.org wheezy/non-free Translation-en_GB
Ign http://mirrordirector.raspbian.org wheezy/non-free Translation-en
Ign http://mirrordirector.raspbian.org wheezy/rpi Translation-en_GB
Ign http://mirrordirector.raspbian.org wheezy/rpi Translation-en
Fetched 6,992 kB in 42s (165 kB/s)
Reading package lists... Done
```

sudo apt-get upgrade - upgrades all installed packages to the newest version. Before running this command, make sure that you have enough disk space (you can check the available disk space with the df -h command). The sudo apt-get upgrade command will display how much space is needed to perform the upgrade.

```
pi@raspberrypi ~ $ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages have been kept back:
  lxpanel lxpanel-data minecraft-pi raspberrypi-ui-mods
The following packages will be upgraded:
  fuse libfuse2 raspi-config
3 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
Need to get 216 kB of archives.
After this operation, 96.3 kB disk space will be freed.
Do you want to continue [Y/n]? Y
Get:1 http://archive.raspberrypi.org/debian/ wheezy/main raspi-config all 201501
31-4 [13.2 kB]
Get:2 http://mirrordirector.raspbian.org/raspbian/ wheezy/main fuse armhf 2.9.0-
2+deb7u2 [70.8 kB]
Get:3 http://mirrordirector.raspbian.org/raspbian/ wheezy/main libfuse2 armhf 2.
9.0-2+deb7u2 [132 kB]
Fetched 216 kB in 1s (119 kB/s)
(Reading database ... 81993 files and directories currently installed.)
Preparing to replace fuse 2.9.0-2+deb7u1 (using .../fuse_2.9.0-2+deb7u2_armhf.de
b) ...
Unpacking replacement fuse ...
Preparing to replace libfuse2:armhf 2.9.0-2+deb7u1 (using .../libfuse2_2.9.0-2+d
eb7u2_armhf.deb) ...
Unpacking replacement libfuse2:armhf ...
Preparing to replace raspi-config 20150131-3 (using .../raspi-config_20150131-4_
all.deb) ...
Unpacking replacement raspi-config ...
Processing triggers for initramfs-tools ...
Processing triggers for man-db ...
Setting up libfuse2:armhf (2.9.0-2+deb7u2) ...
Setting up fuse (2.9.0-2+deb7u2) ...
udev active, skipping device node creation.
update-initramfs: deferring update (trigger activated)
Setting up raspi-config (20150131-4) ...
update-rc.d: warning: default start runlevel arguments (2 3 4 5) do not match ra
spi-config Default-Start values (S)
update-rc.d: warning: default stop runlevel arguments (0 1 6) do not match raspi
-config Default-Stop values (none)
Processing triggers for initramfs-tools ...
```

Synaptic Package Manager

If you are new to Linux and the command line, you can install several graphical front-ends to Advanced Packaging Tool (APT) to install and manage your applications. One of them is Synaptic Package Manager, a package manager program with a nice and intuitive GUI. To install it, start the terminal (the third icon on the right of the Menu bar) and enter the sudo apt-get install synaptic command:

```
pi@raspberrypi ~ $ sudo apt-get install synaptic
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  aptdaemon aptdaemon-data docbook-xml girl.2-atk-1.0 girl.2-freedesktop
  girl.2-gdkpixbuf-2.0 girl.2-gtk-3.0 girl.2-pango-1.0 girl.2-vte-2.90
  libcairo-perl libglib-perl libgtk2-perl libpango-perl librarian0
  libvte-2.90-9 libvte-2.90-common lsb-release python-apt python-apt-common
  python-aptdaemon python-aptdaemon.gtk3widgets python-chardet python-debian
  python-defer python-gnupginterface python-pkg-resources python-pycurl
  python-software-properties rarian-compat sgml-data
  software-properties-common software-properties-gtk unattended-upgrades
Suggested packages:
  docbook docbook-dsssl docbook-xsl docbook-defguide libfont-freetype-perl
  libgtk2-perl-doc lsb python-apt-dbg python-gtk2 python-vte python-apt-doc
  python-distribute python-distribute-doc libcurl4-gnutls-dev
  python-pycurl-dbg perlsgml w3-recs opensp libxml2-utils dwww deborphan
  apt-xapian-index bsd-mailx mail-transport-agent
The following NEW packages will be installed:
  aptdaemon aptdaemon-data docbook-xml girl.2-atk-1.0 girl.2-freedesktop
  girl.2-gdkpixbuf-2.0 girl.2-gtk-3.0 girl.2-pango-1.0 girl.2-vte-2.90
  libcairo-perl libglib-perl libgtk2-perl libpango-perl librarian0
  libvte-2.90-9 libvte-2.90-common lsb-release python-apt python-apt-common
  python-aptdaemon python-aptdaemon.gtk3widgets python-chardet python-debian
  python-defer python-gnupginterface python-pkg-resources python-pycurl
  python-software-properties rarian-compat sgml-data
  software-properties-common software-properties-gtk synaptic
  unattended-upgrades
0 upgraded, 34 newly installed, 0 to remove and 4 not upgraded.
Need to get 8,825 kB of archives.
After this operation, 26.9 MB of additional disk space will be used.
Do you want to continue [Y/n]? Y
Get:1 http://archive.raspberrypi.org/debian/ wheezy/main girl.2-atk-1.0 armhf 2.
8.0-2rpi2 [61.2 kB]
Get:2 http://archive.raspberrypi.org/debian/ wheezy/main girl.2-freedesktop armh
f 1.36.0-2rpi2 [20.8 kB]
```

After the installation finishes, start Synaptic by running the sudo synaptic command:
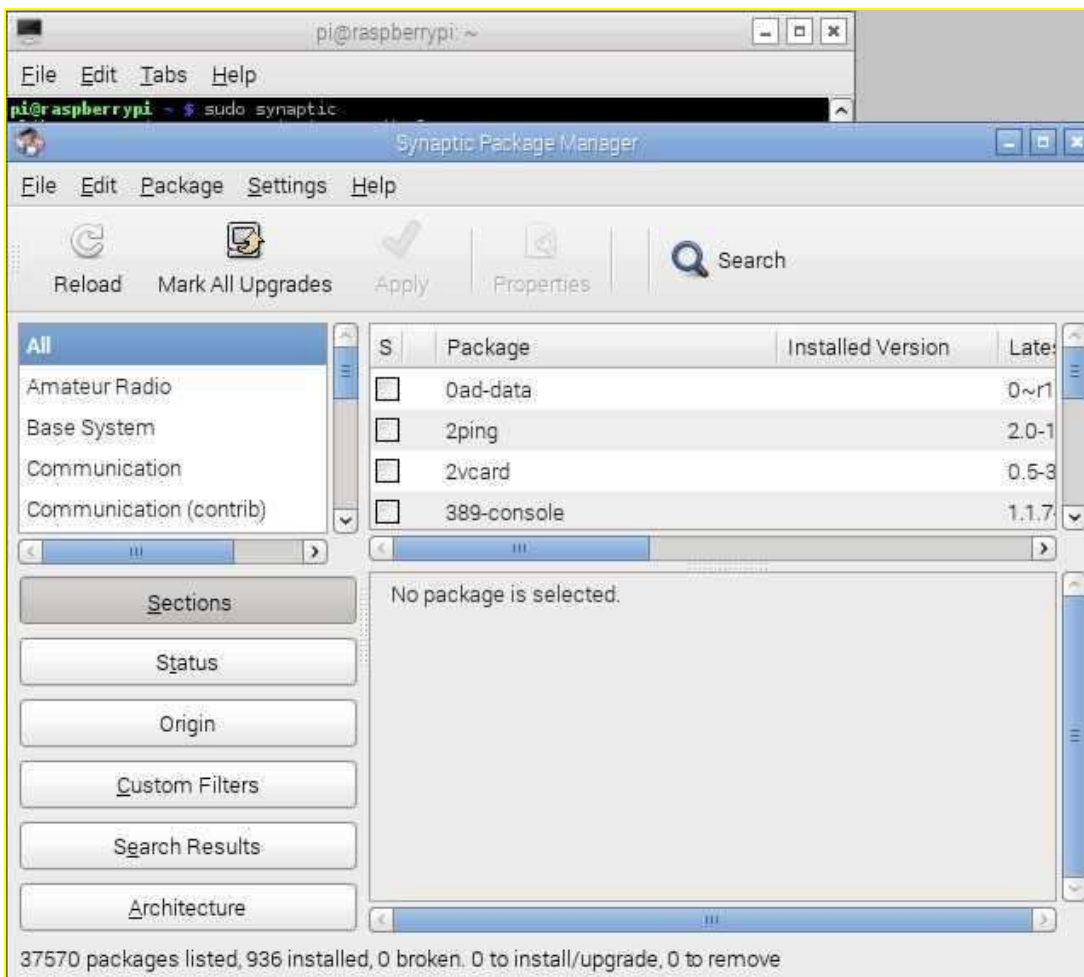
You can search for a package by clicking the search icon and typing keywords in the search box. For example, if you want to install a text editor, enter the text editor keywords in the box and click Search:

Select the application you would like to install and choose Mark for installation:
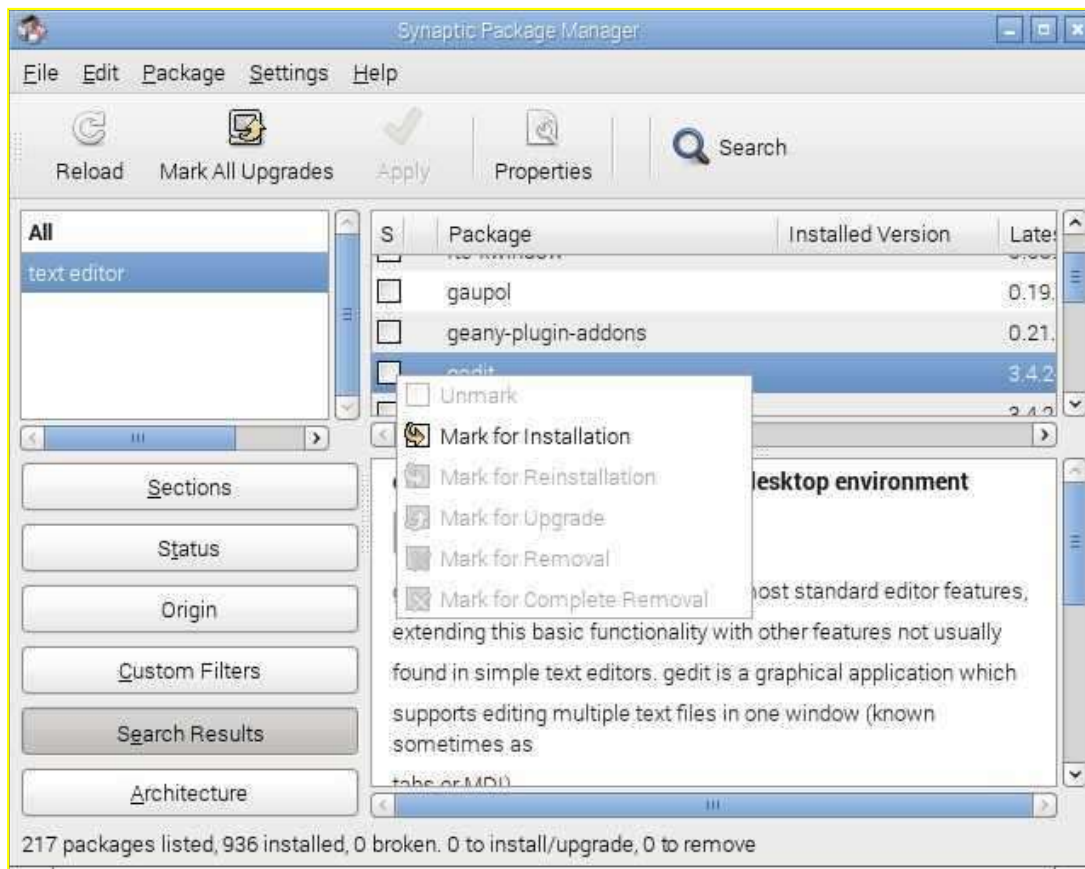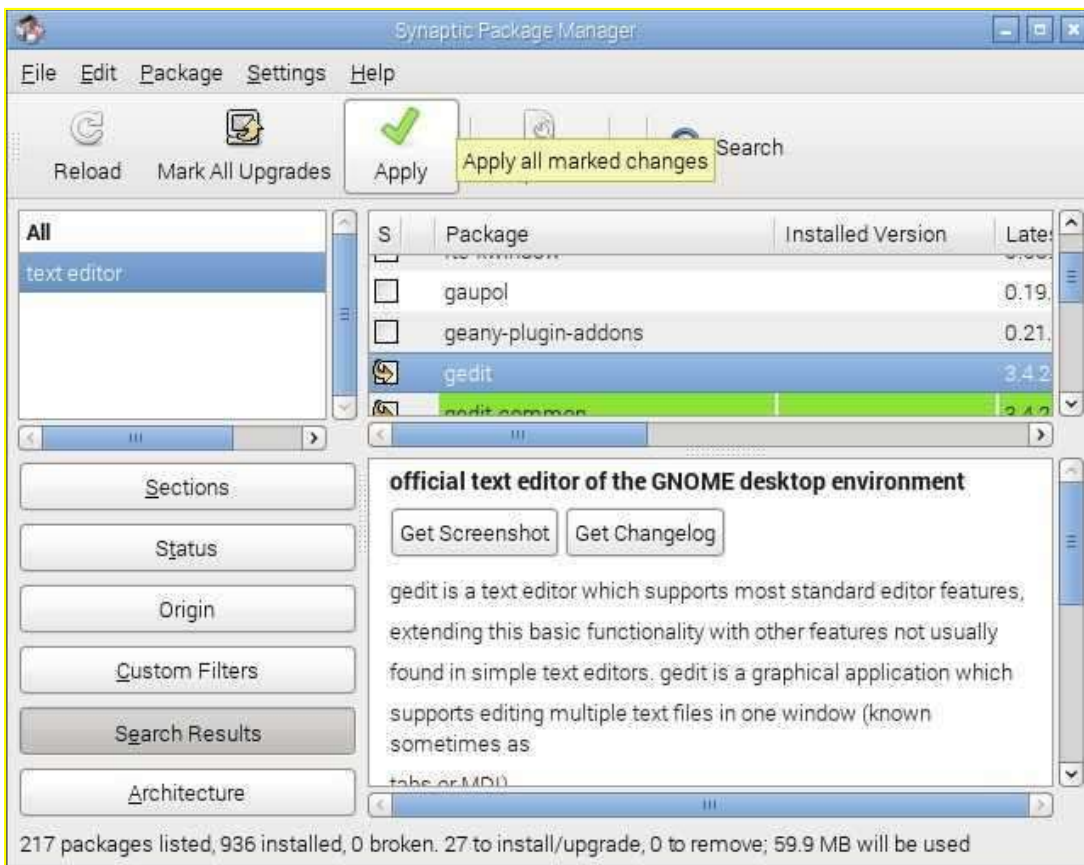
If additional changes are required in order to proceed, click the Mark button:

To apply changes, click the Apply icon:

In the Summary window, click the Apply button to apply changes:

We can also use Synaptic to remove an application. Just select the installed application and click Mark for Removal: