Workshop 12 Extension: Raspbian Lite

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Start with a command-line version of Raspbian, and learn how to install a GUI of your choice.

Follows on from Workshop 12.

Contents

0 Installing

If you attended Workshop 12 on the Linux command line, and would like to have a go at a hands-on activity, this exercise will teach you to create your own personalised version of Raspbian.

This exercise is designed to be completed mostly on your own, but do ask if you get stuck at any point!

The contents of this booklet are an edited version of a guide written on the Raspberry Pi forums by Jimmy Ochoa, used with permission. The original post can be found at https://www.raspberrypi.org/forums/viewtopic.php?f=66&t=133691.

Raspbian Lite

If you visit the Raspberry Pi downloads sections, you'll find that there are two different versions of Raspbian available to download.

Raspbian Lite is a version of the Raspbian operating system, with much of the typically included software left out. This includes some obvious candidates like Minecraft and Scratch, but even goes as far as to include no graphical desktop at all!

How to use these Booklets

When you need to type a command in the command line interface, they will be listed like the following example. Copy everything *after* the dollar sign. Lines without dollar signs are example outputs, and do not need to be copied.

```
1 $ echo Hello, World!
2 Hello, World!
```

All of our workshop resources are available to download from a Google Drive at http://bit.ly/mcrraspjam. There, you can find a PDF copy of this booklet, as well as template and completed program files for each workshop.

These booklets were created using LaTeX, an advanced typesetting system used for several sorts of books, academic reports and letters. Source files are available at http://github.com/McrRaspJam/booklet-workshops

What you'll need

A Raspberry Pi, and a MicroSD card flashed with Raspbian Lite. If you're attending the February 2017 Jam, we'll have some of these for you to borrow.

Questions?

If you get stuck, find errors or have feedback about these booklets, email: jam@jackjkelly.com

1 Setup

Firstly, connect the Pi to the Internet using an Ethernet cable. If you want to use Wi-Fi instead, you will have to read on how to configure your wireless receiver using the command line after your Pi has finished booting.

Boot your Pi with the Raspbian Lite SD card. The credentials to log in are as follows:

username: pi
password: raspberry

Once you're logged in, it'll be a good idea to check you're connected to the internet. Type:

```
$ ping www.google.com
PING www.google.com (216.58.213.100) ...
```

Ping will repeatedly try to contact a server (in this case, the Google webpage), and the server will notice this and send a response. Press **Ctrl + C** to stop pinging.

apt-get

From the previous command line workshop, you may recall we use a program called 'apt-get' to install software from within the command line.

Apt-get stores a list of available software, which we can then choose to install from. To get an up-to-date list of available software, you'll **update** this list using

```
$ sudo apt-get update
```

After a few moments, the $ prompt will reappear, telling us the command has completed.

You can take the opportunity now to update the software on the Pi, you do this using an **upgrade** command.

```
$ sudo apt-get upgrade
```

On Raspbian, this command would take quite a while. Luckily on Raspbian Lite, there's not a lot of software to be upgraded!

That's it, the foundation has been built! The Pi is up to date and ready to be used now. Well, obviously without the GUI, we have built the house but there's no furniture inside.

2 Installing a GUI

This next part focuses on installing a GUI on top of Raspbian Lite. In order to have a GUI, we need these 4 things:

1. Display Server
2. Desktop Environment
3. Window Manager
4. Login Manager (Optional)

2.1 Display Server

The display server is like the software glue that allows the other 3 components to co-operate, it manages all of these components, input devices (keyboards and mice), output devices (monitors), and allows us to swap out each of these components and replace them with alternates.

Most Linux distributions use the X Window System, and that is what you'll be installing. You can do this by installing the package **xserver-xorg**:

```
1 $ sudo apt-get install --no-install-recommends xserver-xorg
```

apt-get is quite clever, it not only installs the software you asked for, but also any 'dependencies' that this piece of software needs.

In the spirit of creating a custom and lean operating system, you should add the flag *'--no-install-recommends'*, to dissuade apt-get from installing anything that it thinks is useful, but isn't absolutely necessary.

If you only install xserver-xorg, you will not have the ability to launch X from the command line, using the typical *'startx'* command. This would be a problem if you are not planning on installing a login manager. You should therefore the package **xinit**:

```
1 $ sudo apt-get install --no-install-recommends xinit
```

2.2 Desktop Environment and Window Manager

The desktop environment and window manager together form what we think of as the desktop for our system, however, they are two separate components, that can often be mixed and matched.

The desktop environment determines things like taskbars and system menus, and often additional software such as terminal emulators.

The window manager determines how window borders are drawn, what buttons appear on them and how they behave. We need these borders to be able to move and resize windows.

For this exercise, you can now pick a Desktop environment to install, below is an outline of each choice. Choose **one**, then follow the instructions under the corresponding section.

- **PIXEL** is the default Raspbian desktop environment.

  For the purposes of trying something new in this exercise, we recommend picking another option first.

- **LXDE** is a desktop environment you may recognise from the older versions of Raspbian (a modified version is still used in PIXEL).

  It's designed as a lightweight desktop environment for lower performance computers, so we recommend this if you're using a Pi Gen1 or B+.

  Website: lxde.org

- **XFCE** is a highly customisable desktop environment similar to LXDE.

  It is slightly more performance heavy than LXDE, but arguably has some visual and software improvements.

  Website: xfce.org

- **MATE** is the desktop used by Ubuntu MATE, one of the third party Raspberry Pi operating systems.

  It is a modernised GNOME 2 desktop environment, and is more performance heavy that the other choices, so more suited to Pi Gen2 or 3 computers.

  Website: mate-desktop.org

PIXEL

Your reading this part because you want to install PIXEL right? Let's continue.

For this desktop environment, we will install the whole PIXEL desktop environment. This is to ensure that you get the same experience as if you are using the regular Raspbian distribution, but without preinstalled applications. Essentials such as settings, task manager, terminal and file manager are included.

To install PIXEL:

```
1 $ sudo apt-get install raspberrypi-ui-mods
```

The Openbox window manager is installed by default when you install PIXEL, so you do not need to install one manually.

LXDE

Your reading this part because you want to install LXDE right? Let's continue.

We will be installing the LXDE core. When you install LXDE, some essentials such as settings, terminal and file manager are included.

LXAppearance is used to change the look of applications such as panels, icons, progress bars, cursors, and so on. This is optional to install but I recommend installing it in order to give yourself more customization abilities.

To install LXDE with LXAppearance:

```
$ sudo apt-get install lxde-core lxappearance
```

The Openbox window manager is installed by default when you install PIXEL, so you do not need to install one manually.

You can customize the look of the titlebar using the Openbox settings which is also installed by default. By using LXAppearance and Openbox settings together, you chose what LXDE looks like!

XFCE

Your reading this part because you want to install XFCE right? Let's continue.

We will be installing the XFCE core. When you install XFCE, some essentials such as settings and file manager are included. By default, XFCE uses XFCE4 Terminal.

To install XFCE with XFCE4 Terminal:

```
$ sudo apt-get install xfce4 xfce4-terminal
```

The XFWM window manager is installed by default when you install xfce4, so you do not need to install one manually.

MATE

Your reading this part because you want to install MATE right? Let's continue.

We will be installing the MATE core. When you install MATE, some essentials such as settings, terminal, and file manager are included. To install MATE:

```
$ sudo apt-get install mate-desktop-environment-core
```

The Marco window manager is installed by default when you install MATE, so you do not need to install one manually.

2.3 Login Manager

If you just want to start the desktop by running the 'startx' command after launch, you don't need to install a login manager.

If you want to boot to the desktop, you should install a login manager, such as lightdm:

```
$ sudo apt-get install lightdm
```

Everything we need to have Raspbian Lite with a GUI is ready! Fortunately, we don't have to do anything else but reboot! Reboot your Pi. When it finishes booting, you will see the LightDM login screen.

From here, log in and you should now see either PIXEL, LXDE, XFCE, or MATE desktop!

Otherwise, if no login manager was installed, then just login via the command line. Then, at any time, you can launch the X Server with:

```
$ startx
```

3 What to do Next?

Installing Applications

Once you've reached your desktop, take a look at your application menu. It should look familiar to regular Raspbian, especially on PIXEL, LXDE or XFCE, but is missing much of the software we usually make use of.

It's up to you which software you wish to install. For example, at the Jam we usually use a program called IDLE, which is an IDE for Python. To install IDLE, we install the package named **idle3**:

```
1 $ sudo apt-get install idle3
```

Python 3 is automatically installed as a dependency.

If we also wanted to install the older python2 version of IDLE that is included in Raspbian, we could install the package **idle**, however, we probably don't need to.

In fact, we don't even need IDLE to program in python. If you prefer editing Python files in another editor, we just need the Python Interpreter itself, which you can install with the **python3** package:

```
1 $ sudo apt-get install python3
```

Finding package names

Time for you to try installing some software yourself. Try and install the following programs.

- Minecraft: Pi Edition
- A web browser, such as Chromium
- The font 'Roboto'

It's not always clear what exact package names will be, but we can use some tricks to find them.

Firstly, remember that the tab key attempts an auto-complete on your current command. Try typing the following, then pressing tab

```
1 $ sudo apt-get install minecr
```

We can also look for online listings of Raspbian software. A web view of the actual software list apt-get uses can be found at archive.raspbian.org, but it's a bit confusing to navigate.

The website Raspberry Connect maintains a more readable package list at raspberryconnect.com/raspbi

Customise the Desktop Environment

All of the desktop environments listed are customizable, especially PIXEL, LXDE and XFCE.

You can play around with wallpapers, window themes, panel settings, and perhaps even setting the system font to the one you just installed. You get to make sure everything is just the way you like it.

For further details on customising each desktop environment, take a look at the original post mentioned in section 0, at https://www.raspberrypi.org/forums/viewtopic.php?f=66&t=133691