PiCloud

Building ownCloud
on a
Raspberry PI

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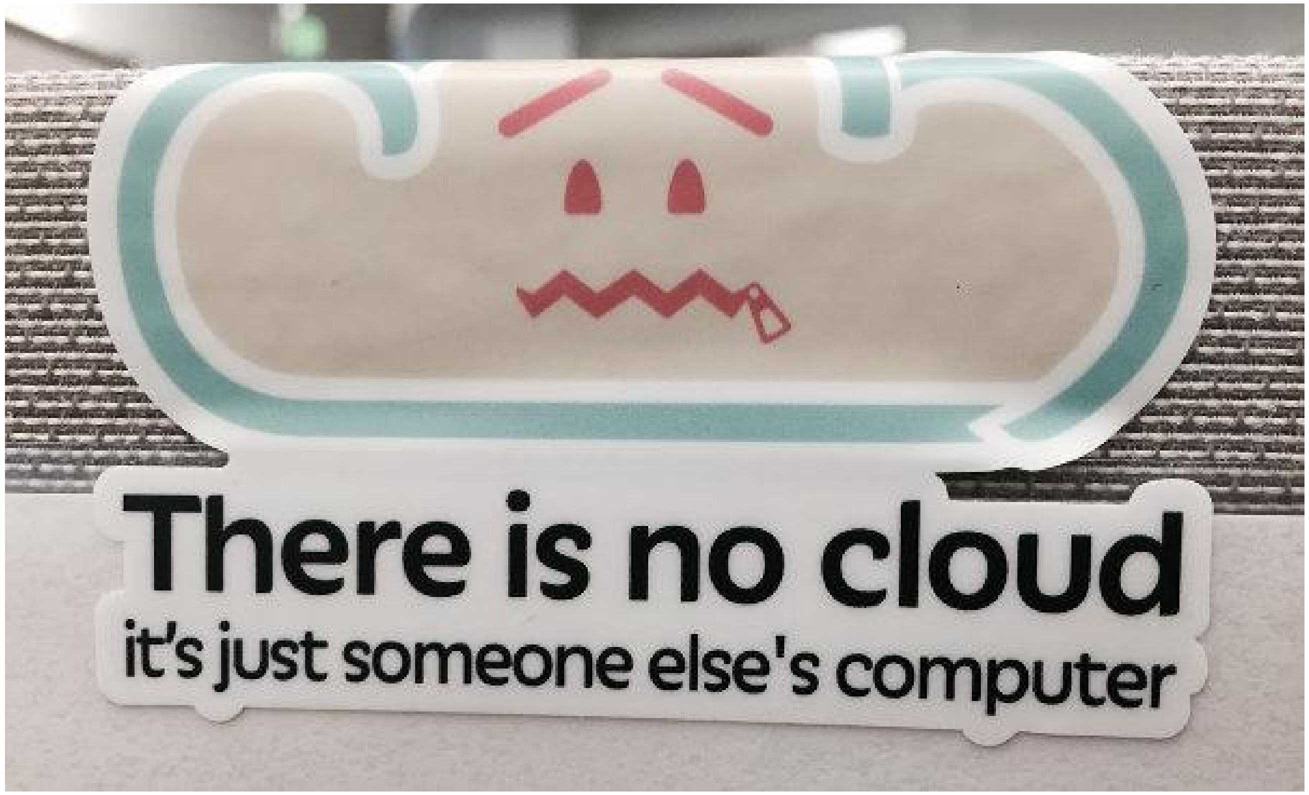
What's the idea?

- Have our own cloud instead of somebody else's.
- Have fun with the Raspberry Pi.
- Have fun with Linux.



What we will need

- 1 x Raspberry PI
- 1 x Power supply (1A, 5W)
- 1 x Monitor
- cable (HDMI) to Monitor
- Ethernet cable
- USB keyboard
- USB mouse
- SD card 8GB, either with preloaded Raspberry Pi software

  or empty card, writing your own card (in which case you need a SD card reader/writer, either in laptop or external)
- internet access
- your laptop (optionally)

About this guide

This side describes what we do.

This side lists

GNU/Linux things

that we

meet & explore

along the way.

Preparation – SD card

We can either buy an SD card,

ready to use, with the Pi software on it

(that s what we have here today)

or we can burn our own:

Download and install NOOBS / Raspbian

Go to http://www.raspberrypi.org/downloads/

and download NOOBS (current version, May 2014, 1.4.1)

Unzip and write to SD card, following the instructions, contained in the file

INSTRUCTIONS-README.txt

The exact steps are depending on your operating system.

(We will format the SD card to FAT16, with a maximum size of 4 GB).

Preparation - Hardware

Unpack PI,

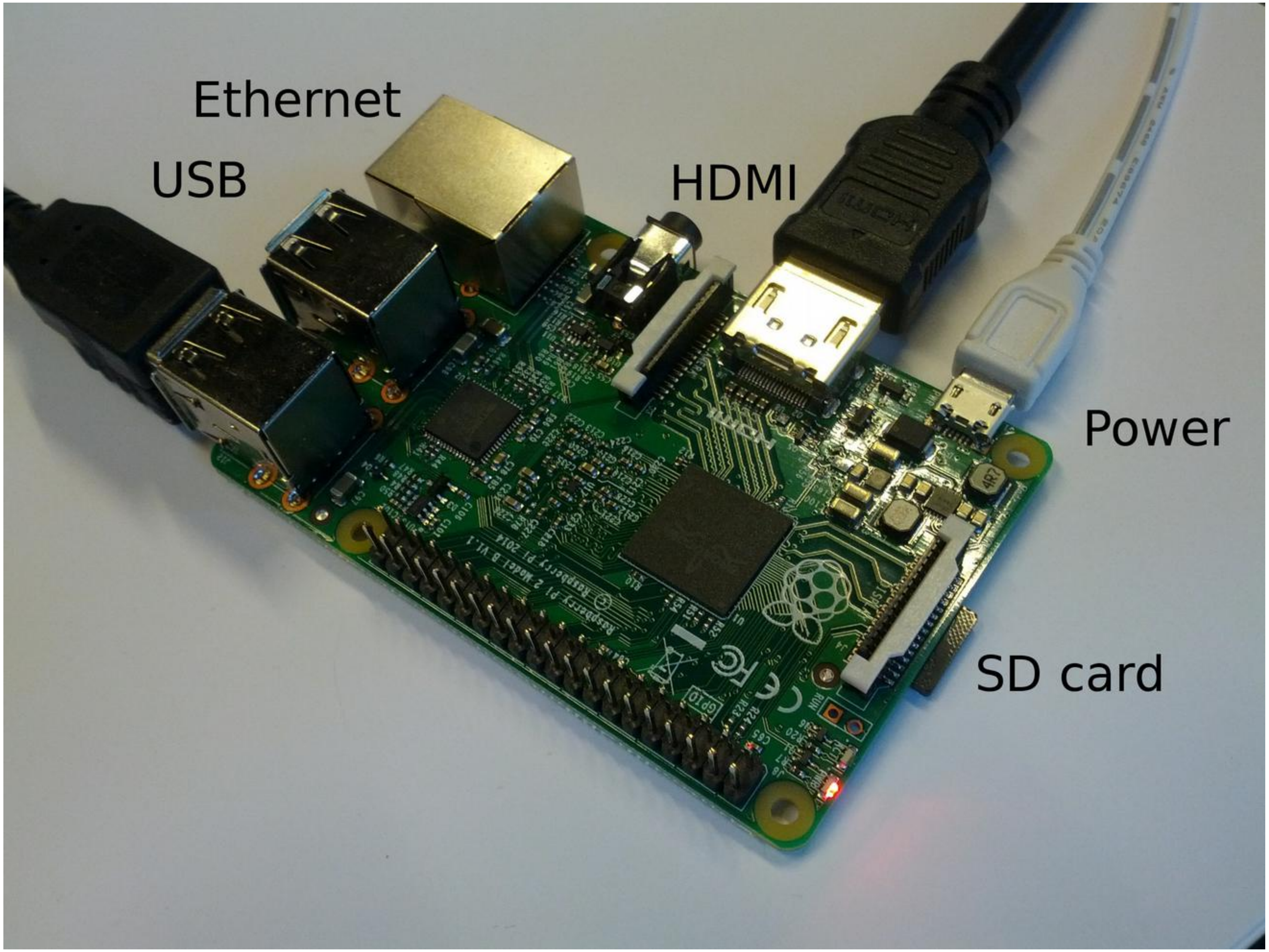
put SD card in slot on backside,

Connect keyboard, mouse & screen

And power up,

Via power supply with
USB micro connector.

Preparation - Hardware



Installation & Configuration

We already have Raspbian on our SD cards.

However, if starting with **NOOBS**
(a start platform that offers different OSs):

Choose which OS to install:

Raspbian is recommended.

Writing the OS will take 10-20 minutes, so be patient and prepare next steps.

When the installation of the OS is complete, confirm by clicking “OK”. This will restart the Pi.

Raspbian is a free operating system based on Debian **GNU/Linux** and optimised for the Raspberry Pi

Installation & Configuration

Starting with **Raspbian:**

On first startup,

Raspbian will come up with the Software Configuration Tool.

Click through all settings and check.

You should definitely

2. **change the default user's password.**

You might like to

3. Enable boot to desktop

if you prefer having a graphical desktop
(though you will not necessarily need it! We will use it for some things, but once we are done, it is better to run without it).

When done, reboot.

Note:
We can run Raspbian

(like most other Linux distros)

in

GUI/Desktop mode

(X server)

or as pure

command line.

First steps on the command line: users

Log on

User: pi

Default password: raspberry

Let us get familiar with a few first things:

ps -ef

Users

Change your own password!

Change the root password!

Then become root.

Then exit and be user **pi** again.

```
$sudo
```

Lets you perform actions with root rights

```
$su <username>
```

Changes to a user

```
$su
```

Changes to root user

The prompt sign then is a

```
#
```

Instead of a

```
$
```

```
$passwd <user>
```

Changes a user's password.

```
$exit
```

Ends a users session.

Root and sudo

When configuring a system or a service, many commands have to be run as **root.**

For a command to be executed by a normal user, we write

```
$<command>
```

When root is definitely needed, we write

```
#<command>
```

It is safer to execute commands that require root rights as

```
$sudo <command>
```

because it forces you to say “i really want to do this as root” for each and every command.
It is easier to make fatal mistakes when you are root.

When you try a command as normal user, and you get a “permission denied”, then consider whether you might need root rights for this.

```
$sudo
```

Lets you perform actions with root rights

```
$su <username>
```

Changes to a user

```
#su
```

Changes to root user

The prompt then is a

```
#
```

```
#passwd <user>
```

Changes a user's password.

```
#exit
```

Ends a users session.

Adjust keyboard

Run

```
$ sudo dpkg-reconfigure
keyboard-configuration
```

and choose your layout.

Then reboot:

```
$ sudo shutdown -r now
```

Commands & filenames can be very long …

Try using the **Tab** key as you type

It's the **autocomplete.**

It's your best friend,

Alongside the

up/down arrows,

that go through your **command history.**

Directories & files

Check what directory (dir) you are in,

And what's in it.

Then change to the filesystem's

uppermost directory, the fs root:

/

Check what's in there.

Then look at

/etc	where all the setting and config live
/home	where all user files are
/var	where e.g. the logs are

```
$pwd
```

Print working directory, shows you where you are

```
$ls
```

Lists dir contents

```
$cd
```

Changes directories

Two crucial in order to learn about commands:

```
$man <command>
```

Gives you the manual page.

```
$<command> --help
```

Shows you quick help.

Directories & files

Go to

/var/log

Look at all logs,

Show all info in list,

And sort by time,

with the newest one last.

Then go back to your own home dir.

```
$ls --help
```

Will show you help for the ls command

```
$cd ..
```

Brings you one directory up.

Text commands

Look at what's inside the file

.bashrc

In your home dir.

Then write a little test file.

Call it test.txt

The **vi** text editor takes some getting used to, but once you got it, it **rocks.**

Open your browser (if you have a GUI) and find a vi **cheat sheet.**

```
$cat
```

Outputs a text file

```
$less
```

is nicer – you can scroll down, one screen at a time.

```
$grep
```

finds text in files, e.g.

```
$grep error /var/log/*
```

```
$vi
```

Opens the **vi text editor**.

```
$nano
```

is another text editor. Meh.

.

vi in 60 seconds

In vi:

Letters bring you into *edit* mode,
ESC brings you back.

i = insert

o = new line

x = delete characters

dd = delete line

shift-zz saves

q:! exits without saving

And so forth

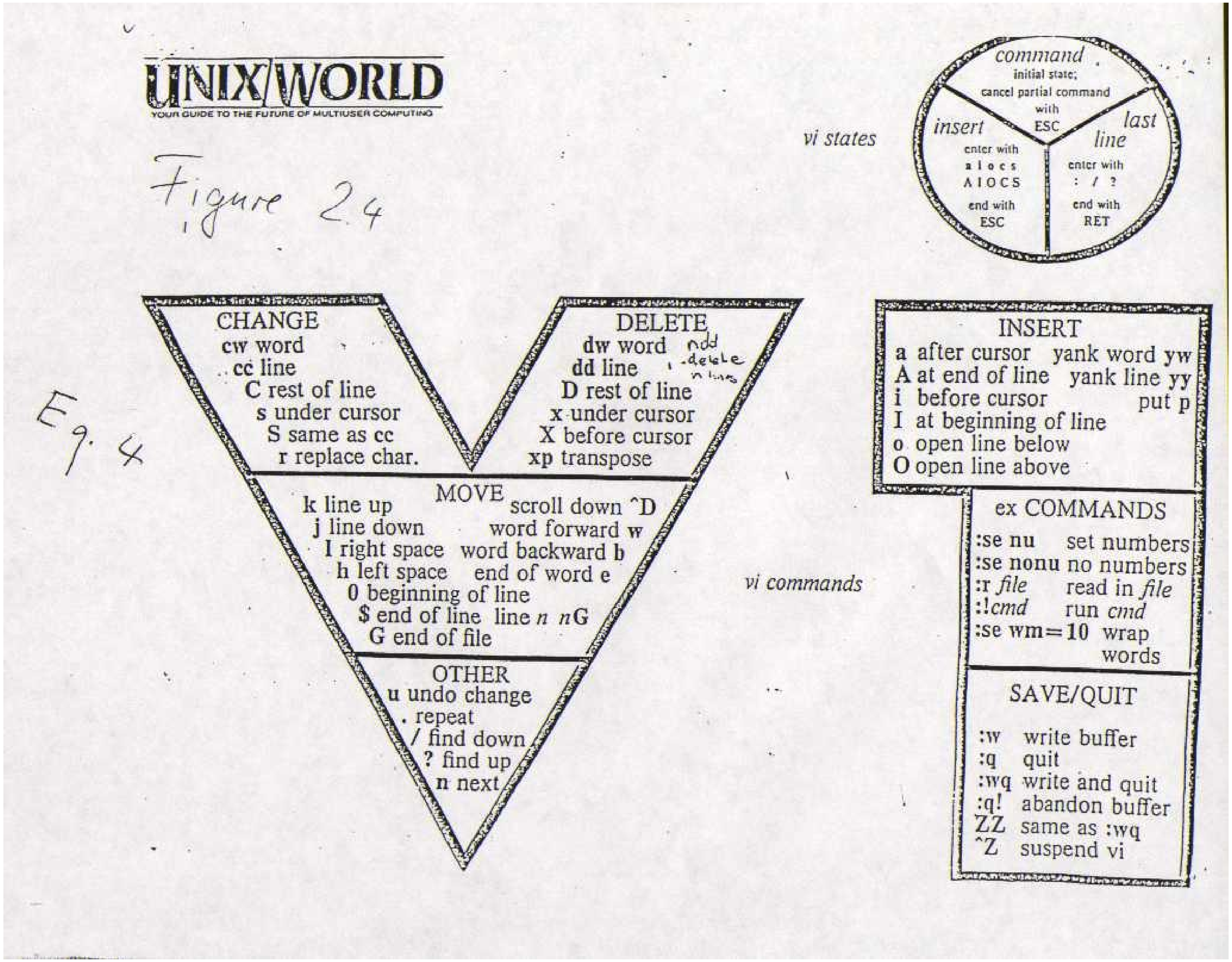
```
$vi <filename>
```

Opens a text file

If the file doesn't exist,

it creates the file.

vi in 60 seconds



UNIX/WORLD
YOUR GUIDE TO THE FUTURE OF MULTIUSER COMPUTING

Figure 2.4

Eg. 4

vi states

command
initial state;
cancel partial command
with
ESC

insert
enter with
a i o c s
A I O C S
end with
ESC

last line
enter with
: / ?
end with
RET

vi commands

CHANGE
cw word
cc line
C rest of line
s under cursor
S same as cc
r replace char.

DELETE
dw word
dd line
D rest of line
x under cursor
X before cursor
xp transpose

ndd - delete n lines

MOVE

k line up	scroll down ^D
j line down	word forward w
l right space	word backward b
h left space	end of word e
0 beginning of line	
$ end of line	line *n* *n*G
G end of file	

OTHER
u undo change
. repeat
/ find down
? find up
n next

INSERT

a after cursor	yank word yw
A at end of line	yank line yy
i before cursor	put p
I at beginning of line	
o open line below	
O open line above	

ex COMMANDS

:se nu	set numbers
:se nonu	no numbers
:r *file*	read in *file*
:!*cmd*	run *cmd*
:se wm=10	wrap words

SAVE/QUIT

:w	write buffer
:q	quit
:wq	write and quit
:q!	abandon buffer
ZZ	same as :wq
^Z	suspend vi

... back to work – package management

Debian type Linux uses

Advanced Packaging Tool,

apt,

To maintain software packages.

Use **apt-get** to update and then

upgrade your system.

It will take a moment.

While we wait, we have time for Q&A.

Also, install a package named aptitude.

It s a nice-to-have extension of apt-get.

```
#apt-get update
```

gets an update about whats new in the repository.*

```
#apt-get upgrade
```

Upgrades, based on what the update found.

```
#apt-get install
<package>
```

Installs a package.

* go to /etc/apt and find what sources (repositories) we are getting our files from.

Installing owncloud packages

Use apt-get again, to install the following:

mysql-server owncloud

mysql will have a few questions when it installs,

such as a password for the mysql root user.

Remember your answers!

It might also be nice to have

phpmyadmin

for database administration via browser.

gparted

for partitioning.

apt-get finds out about dependencies on its own, and installs these too.

```
#apt-get install
<a long list of
things>
```

Installs a lot of things.

Installing the newest owncloud

We have just installed owncloud from the distribution's standard repository.

However, if you would like to have the latest release, follow the guide on

https://software.opensuse.org/download/package?project=isv:ownCloud:community&package=owncloud

Add the repository key to apt. Keep in mind that the owner of the key may distribute updates, packages and repositories that your system will trust (more information).

To add the key, run:

```
wget
http://download.opensuse.org/repositories/isv:ownCloud:community/Debian_7.0/Releas
e.key
apt-key add - < Release.key
```

Then add the repo to your list of sources

```
echo 'deb
http://download.opensuse.org/repositories/isv:/ownCloud:/community/Debian_7.0/ /'
>> /etc/apt/sources.list.d/owncloud.list
```

and do

```
apt-get update
apt-get install owncloud
```

`#apt-key add`

adds a trusted repository's key to your package manager

Find and mount the USB drive

Plug in a USB stick and see what device name it shows up as.

typically it is

/dev/sda1

in what follows, we assume it is.

Make a directory

/media/usbstick

and mount it:

```
#mount -t vfat -o rw /dev/sda1 /media/usbstick/
```

If this worked, your USB stick is recognized.

`$watch ls /dev/sd*`

“watches” the result of `$ls /dev/sd*`

(every 2 seconds)

`$mkdir`

Make a directory

`#mount`

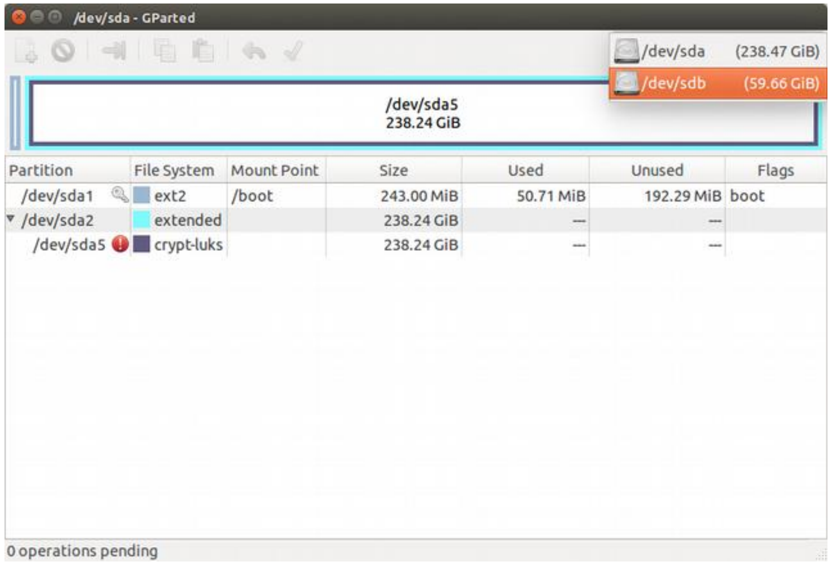
Mount a device to a mountpoint (a directory)

Format USB drive

We will prefer a better filesystem for our datastore, and we need to make the mount permanent, so that we dont have to remount each time we start our PI.

Use GUI tool gparted to format your USB stick to type **ext4**.

You can also use command line tools.



Partition	File System	Mount Point	Size	Used	Unused	Flags
/dev/sda1	ext2	/boot	243.00 MiB	50.71 MiB	192.29 MiB	boot
/dev/sda2	extended		238.24 GiB	---	---	
/dev/sda5	crypt-luks		238.24 GiB	---	---	

0 operations pending

`#gparted`

GUI format tool

`#fdisk`

`#mkfs.ext4`

Command line tools for formatting and fs creation

Make mount permanent

Find your USB stick's UUID via blkid.

Then edit your /etc/fstab, add a line:

```
UUID=<yourUUID> /media/usbstick
ext4 rw,defaults 0 0
```

e.g

```
UUID=86d9ad0d-5911-4a74-9ea0-ff380e3a9221 /media/usbstick ext4 rw,defaults 0 0
```

Test by rebooting – is the USB stick there?

`/etc/fstab`

File that keeps mount information

`$blkid`

utility to locate/print block device attributes

Make data directories

There's two ways we can make a data directory for ownCloud:

1. We make a directory

/media/usbstick/data

And tell owncloud to use that.

2. We empty and remove ownclouds standard data directory

And make it a symlink to ours instead:

```
#cd /var/lib/owncloud
```

```
#mv /var/lib/owncloud/data/*
/media/usbstick/data
#rmdir data
```

```
#ln -s /media/usbstick/data ./data
```

`$mkdir`	Make a dir
`$ln -s`	Creates a symbolic link
`$mv`	Move file
`$cp`	Copy file
`$rm`	Remove file
`$rmdir`	Remove dir

(* is the wildcard)

Configure owncloud

Now we will use a browser,

locally on the PI

or from another computer.

We d need to know the PI's IP number in that case.

Point your browser at

`http://localhost/owncloud`

Or the IP you found.

```
$ifconfig
```

Lists interface configurations

Configure owncloud

Complete the web GUI configuration -

We might get a few complaints about

Permissions. In case we do:

Owncloud keeps its configurations in

/etc/owncloud

And its data where we tell it to keep them -

So the webserver user (www-data) needs permissions to write there.

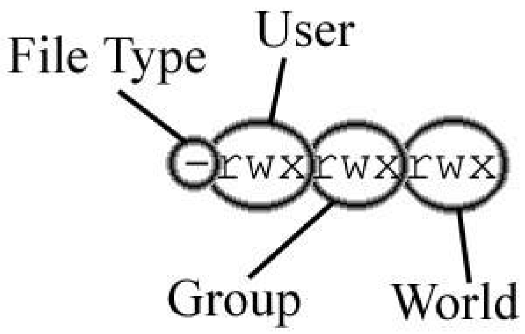
```
$ls –al
```

Lists directories including premissions

Linux permissions

Each file or directory has an owner

and permissions like this:



This means,

Read, write and execute,

For

Owner, group and world.

```
$ls –al
```

Lists directories including permissions

Linux permissions, numeric

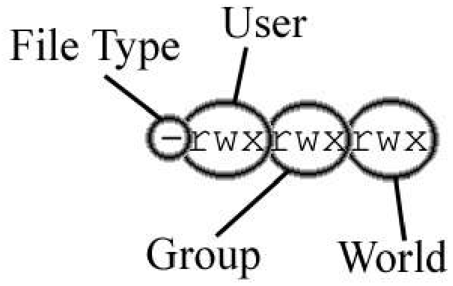
The easiest (!) is to express these as numbers

Each rwx becomes a

2^2 2^1 2^0 = 4 2 1

So

rwx --- ---	= 700
rwx r-x r-x	= 755
rw- r-- r--	= 644



`#chown`

Sets an owner

`#chmod`

Sets permissions

Setting permissions for our data directory

We want our data directory to be

Owned by user www-data

With all rights to that user,

And no rights to anybody else!

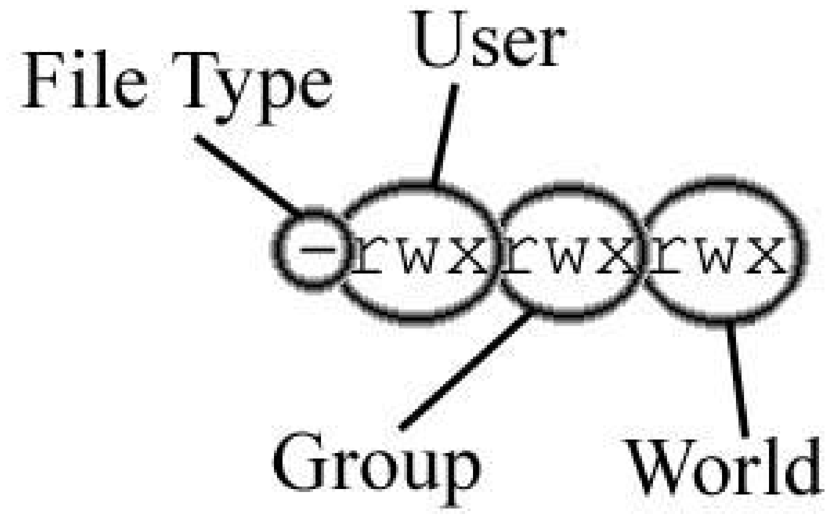
This means ...<quiztime>

`#chown`

Sets an owner

`#chmod`

Sets permissions



Setting permissions for our data directory

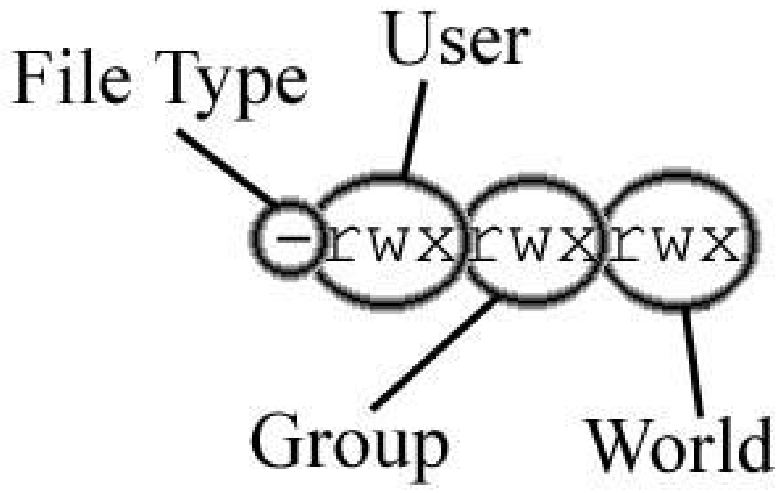
```
#chown www-data:www-data <our data dir>

#chmod 700  <our data dir>
```

`#chown`

Sets an owner:group

`#chmod`

Sets permissions



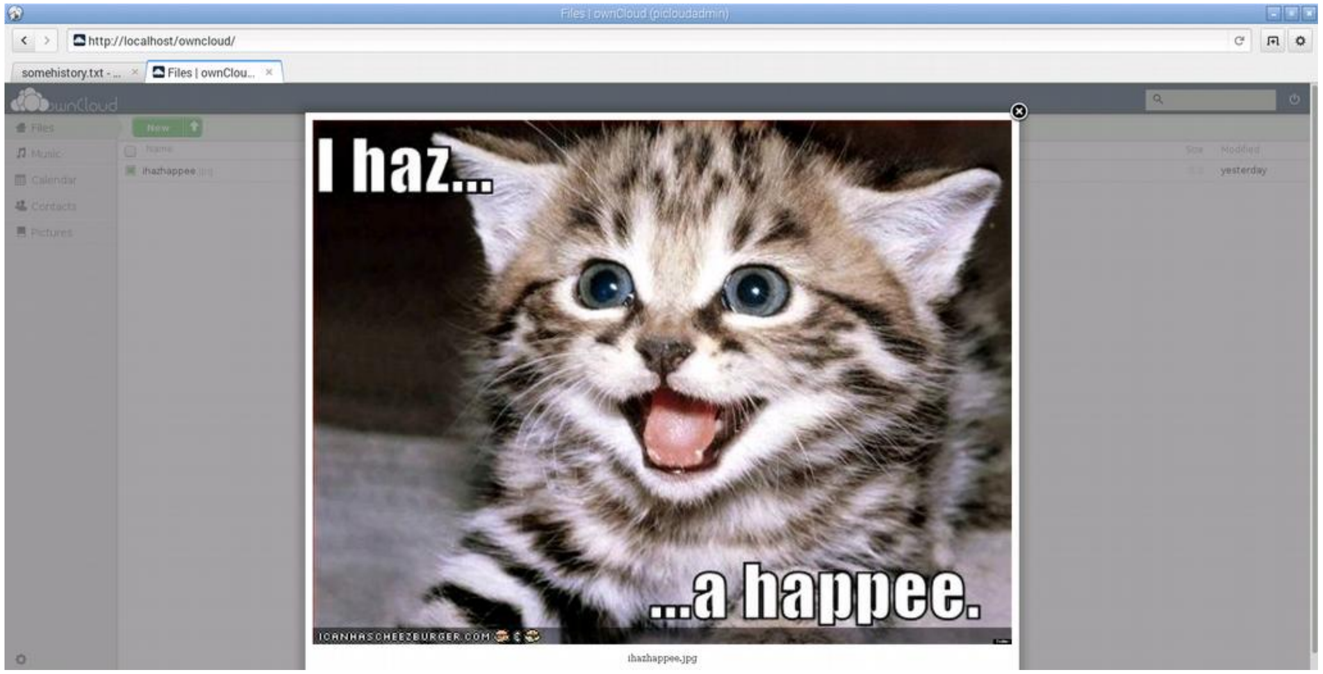
Test it!

In your browser,

Go to

http://<ip>/owncloud

And take a look around!



What's left to do? A lot!

There is a number of important things that are out of the scope of this workshop – however they are very important,

And we will give a few hints in the Appendix:

1. Put the PI in a network place

where we can reach it, via public IP.

For example,

On the DMZ of your home router.

2. You can't do that without looking at

Security.

1. & 2. ==> Workshop part 2.

3. Download owncloud clients to all our devices.

4. Share with friends, neighbours, family, ...

`/etc/network/interfaces`

contains network interface configurations.

Example:

```
auto eth0

iface eth0 inet static

address 130.226.142.200

network 130.226.142.192

netmask 255.255.255.224

broadcast 130.226.142.223

gateway 130.226.142.193

iface eth0 inet6 auto
```

Space for everything we have forgotten to talk about

....

#

Thanks!

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Appendix: Minimal Security

Running a cloud file server requires strict security.
Here's a few absolutely essential, minimal things you need to do:

1. ownCloud uses a webserver for all communications. If you run normal http, all your usernames, passwords and communications are sent in the open.
Therefore, run your **webserver (apache) on SSL only**:

https://httpd.apache.org/docs/current/ssl/ssl_howto.html

2. Make sure your **logon via ssh** is secured – learn how to configure sshd_config.
It is a good idea to only allow logon from trusted networks, and only via ss key – not by username and password.

3. **No telnet, no ftp** allowed!

4. Consider using **denyhosts** and **fail2ban**

5. Keep server updated and users managed.

`/etc/apache2`

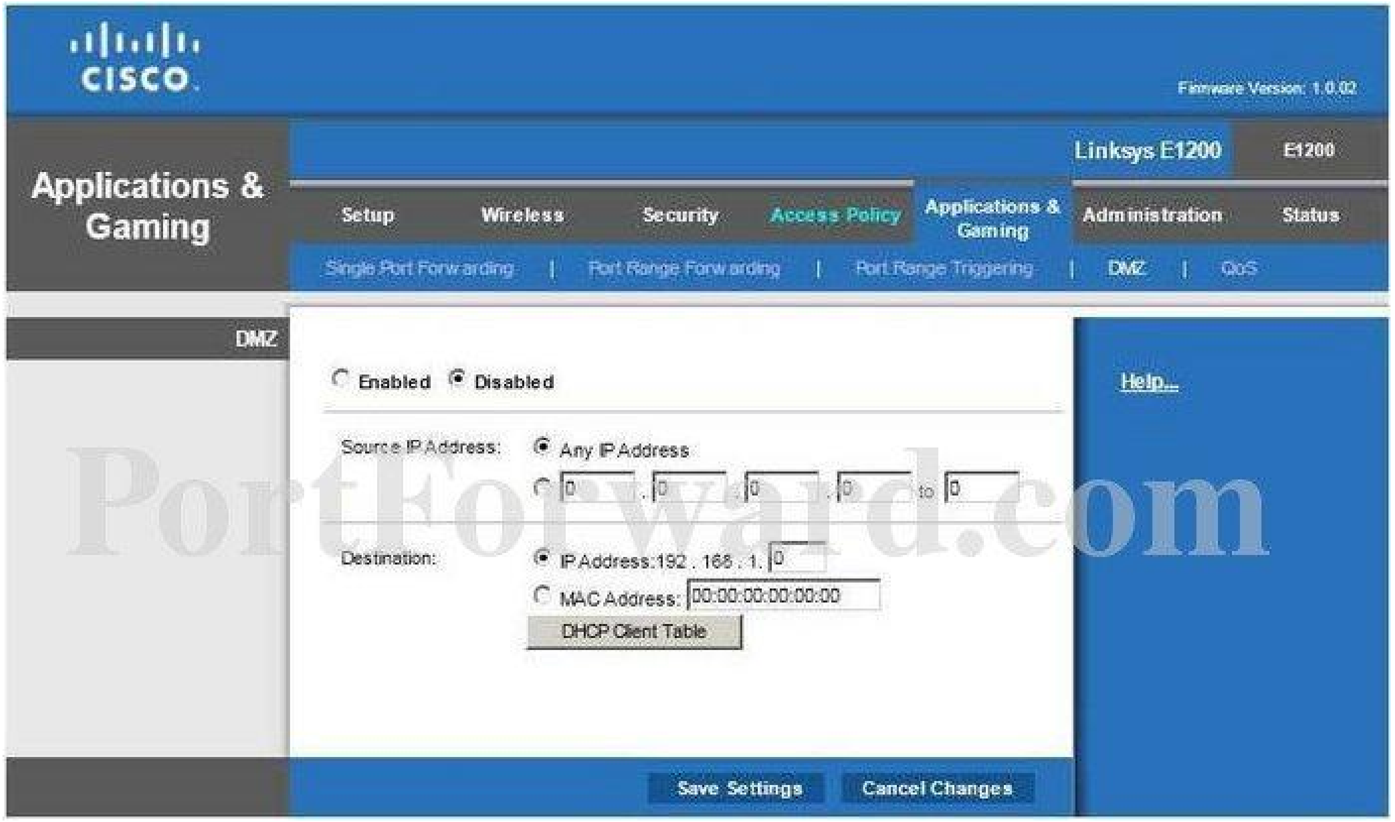
contains web server configurations.

`/etc/ssh`

contains ssh configurations.

Appendix: Router DMZ

Most routers for home use allow for the exposure of a certain IP in the so called DMZ – this means, they will be visible from the outside world, or defined networks. This screenshot shows a Cisco example:



( ) Enabled (●) Disabled

Source IP Address: (●) Any IP Address ( ) 0 . 0 . 0 . 0 to 0

Destination: (●) IP Address: 192 . 168 . 1. 0 ( ) MAC Address: 00:00:00:00:00:00