Setting up your Raspberry Pi 3 Model B

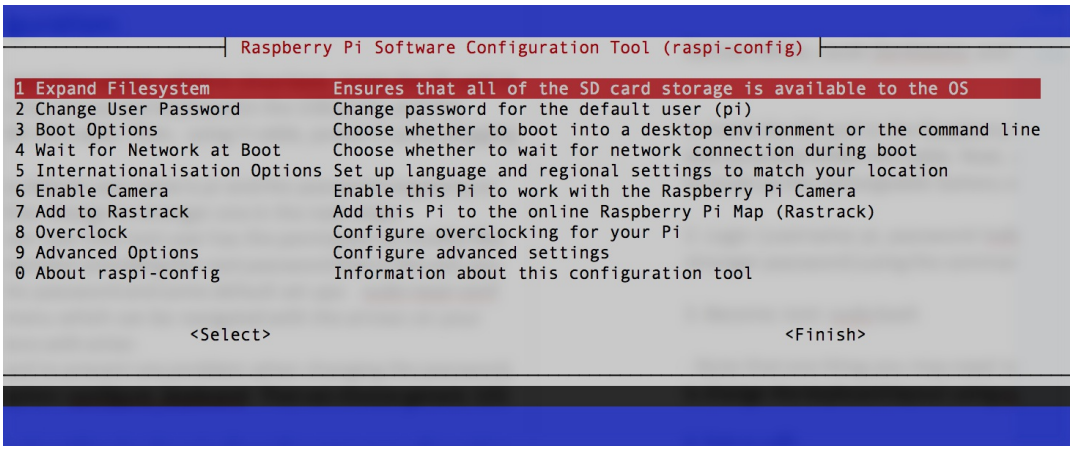
Starting Set up

- Each team should get a monitor, keyboard and mouse.
- Insert the mini SD card in the Raspberry Pi , connect the mouse and keyboard in the USB ports, and the display with provided HDMI-DVI cable. Then, using Y-cable, power it up by plugging in the charger.
- The operative system starts. Then, click on the **terminal** icon next to the menu to open it.
- Then you need to run some commands on it as root user to configure the Raspberry Pi (RPi). The **root user** has the permission to modify files or default settings as administrator providing the root password. The **root user** is **pi** and the default **root password** is **raspberry**. First we will make stronger the password, but first we will change some default set ups:

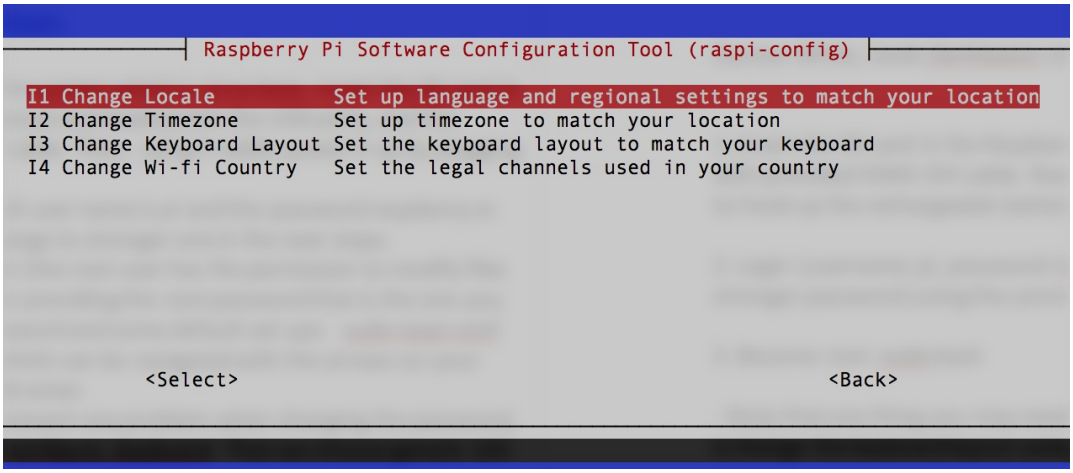
```
$ sudo raspi-config
```

Note: To execute any Linux command as root user, the *sudo* command presides the Linux command.

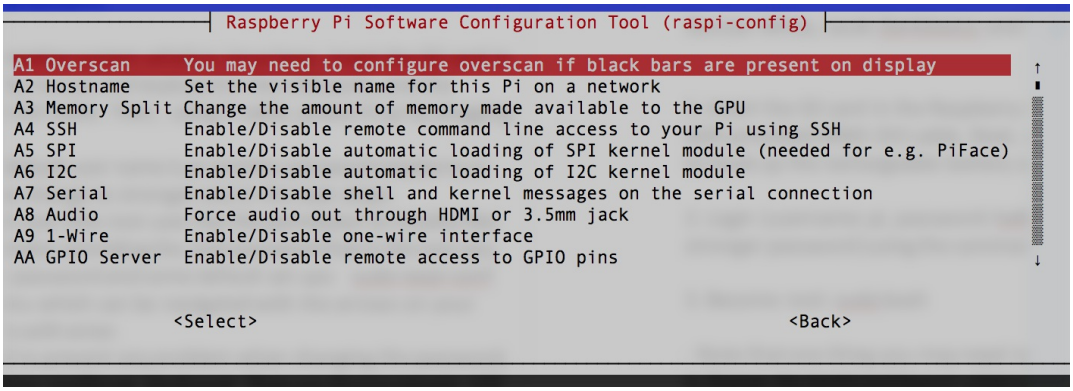
- The terminal will show a menu which can be navigated with the arrows on your keyboard and accept options with enter.



- Then we set up the keyboard to prevent any problem when changing the password, therefore we access the option: **Internationalisation Options** → **Change the Keyboard Layout**. Then we choose generic 105 key, and then UK.
- Also we have option to change the timezone from this menu.



- To change the password, we return to the main menu and choose the second option. We have to set the new password and do not reboot the RPi yet.
- We check that the ssh for remote network communications is enabled (security shell cryptographic network protocol). We access to the **Advance Options** → **SSH**.



- An optional step is to change the hostname in the same advance menu.
- Then we restart the RPi.

Setting WiFi from Imperial College network

- First we can use a command to check the different internet connections available on our system: *ifconfig* or *ifconfig -a*. This command allow us also to see the IP addresses assigned to our RPi. The *wlan0*, indicates the status of the WiFi, and *eth0* shows the status of the Ethernet (wired) connection).
- You will see there is no IP assigned to our PRI, therefore to set up the WiFi we need to modify a configuration file, but first we need to back it up:

```
$ sudo cp /etc/wpa_supplicant/wpa_supplicant.conf
/etc/wpa_supplicant/wpa_supplicant.conf_backup
```

Then we add to the content of wpa_supplicant.conf:

```
# IC
network={
        ssid="Imperial-WPA"
        proto=RSN
        key_mgmt=WPA-EAP
        pairwise=CCMP
```

```
        auth_alg=OPEN
        eap=PEAP
        identity="ic\COLLEGE_USERNAME"
        password="YOUR_PASSWORD"
}
```

This is the Imperial College configuration in which you have to replace "COLLEGE_USERNAME" with a valid college username, please do not store your password in plain text, but we will change it after verifying that the WiFi is working. Reboot the system if it is necessary.

Note: In case the file changes after the setting it up, we need to change its permissions in order it could just be read but not overwritten: `sudo chmod a-w /etc/wpa_supplicant/wpa_supplicant.conf`. You can see more about permission in the link.

In order to not store the password in a plain text we **encrypt** our password with an **MD4 hash generated** from the corresponding college password. You can generate the hash like this with the next Linux command:

```
$ echo -n 'YOUR_PASSWORD' | iconv -t utf16le | openssl md4 > hash.txt
$ cat hash.txt
$ (stdin)= a6c71eedc2eacbca84003336a4a62a1c
```

Then we copy the string : a6c71eedc2eacbca84003336a4a62a1c, and open the wpa_supplicant.conf.

```
$ nano /etc/wpa_supplicant/wpa_supplicant.conf
```

The default text editor installed in the RPi is *nano*. We can install also *vim* or *vi* to have another option of a text editor.

In the line where with your "YOUR_PASSWORD" we replaced with the string we generated as hexadecimal characters, and we add the 'hash:'-prefix), e.g.

```
# IC
network={
        ssid="Imperial-WPA"
        proto=RSN
        key_mgmt=WPA-EAP
        pairwise=CCMP
        auth_alg=OPEN
        eap=PEAP
        identity="ic\COLLEGE_USERNAME"
        password=hash:a6c71eedc2eacbca84003336a4a62a1c
}
```

A last security step to do is to remove the bash history, with all the commands we had typed on the terminal. Therefore, we do it like:

```
$ history -w
$ history -c
```

Then we reboot again the RPi to check that the password was properly set up.

Installing Python

To install Linux packages in our system we must use the command: `sudo apt-get install name_of_package`. The

installation could take some minutes.

Installing C lib needed by Python:

```
sudo apt-get -y install libffi-dev
sudo apt-get -y install libssl-dev
```

Installing Python:

```
sudo apt-get -y install build-essential python-dev python-openssl
sudo apt-get -y install python-setuptools
sudo apt-get -y remove --purge python-pip
sudo apt-get -y install python-pip
sudo pip install --upgrade pip
```

Installing other text editor:

```
sudo apt-get -y install vim
```

Installing screen: The screen program allows you to use multiple windows (virtual VT100 terminals) in Unix. If your local computer crashes, or you are connected remotely and lose the connection, the processes or login sessions you establish through screen don't get lost.

```
sudo apt-get -y install screen
```

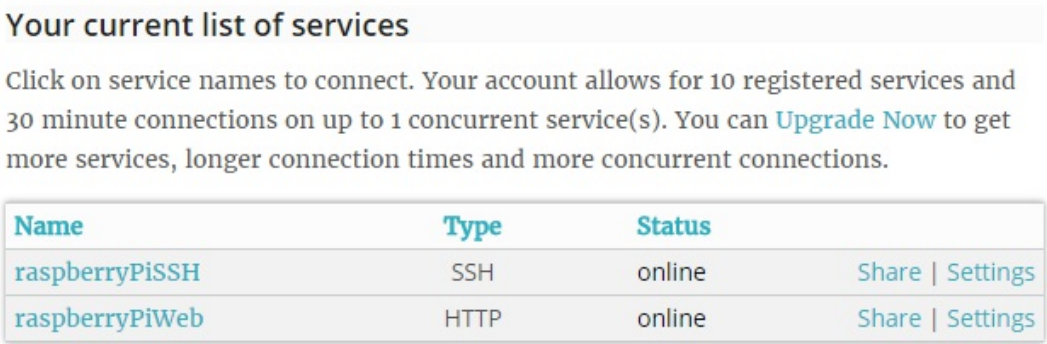
Installing weaved: Manage network devices remotely using weaved service. To install:

```
sudo apt-get -y install weavedconnectd
```

To configure weaved in our RPi, first we need to open an account in weaved. Then, we have to link the device to our weaved account:

```
sudo weavedinstaller
```

Follow the instructions. Then we can access using our laptop or any other desktop from any terminal. We will get a list of the devices linked to weaved:

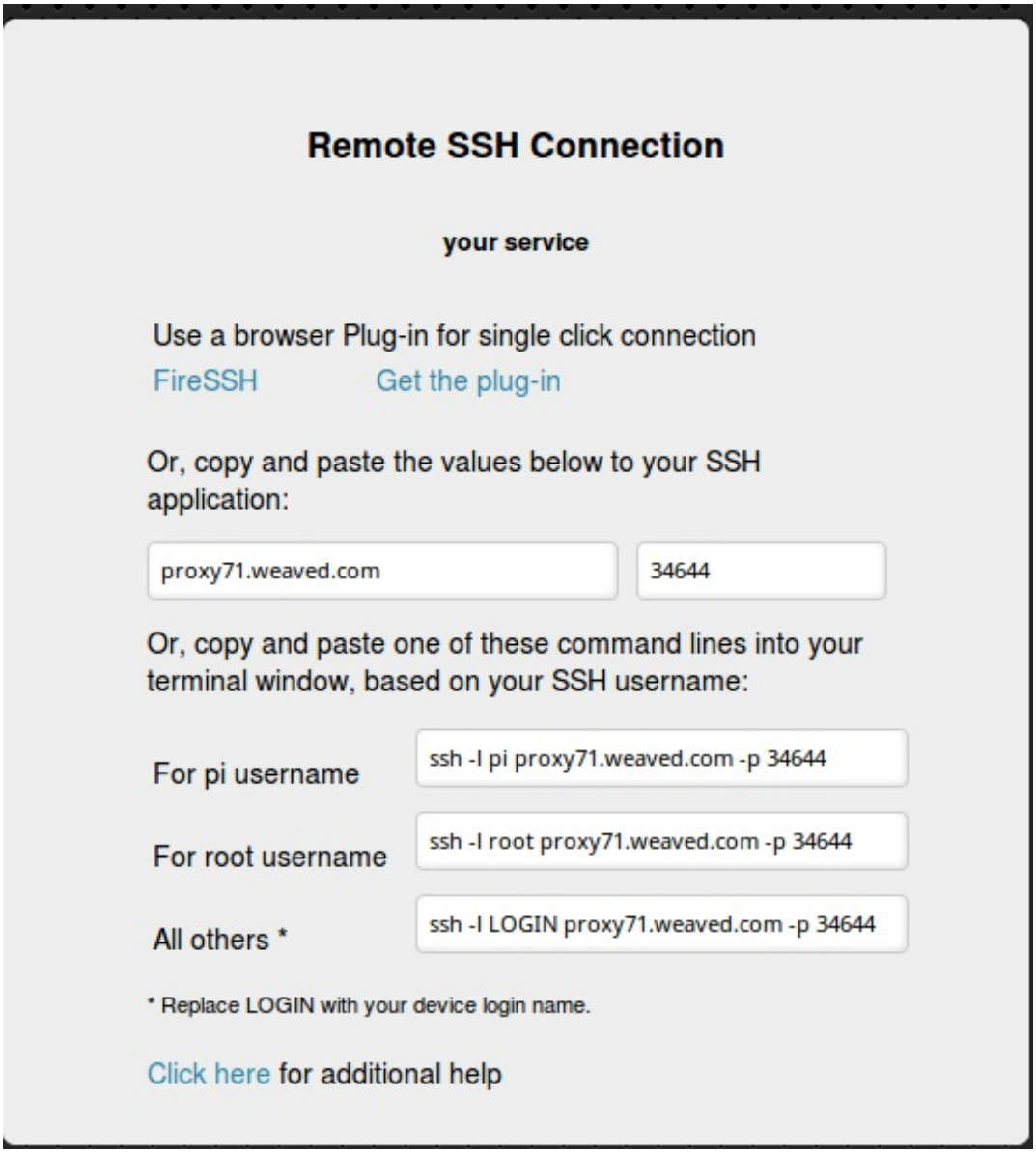


Your current list of services

Click on service names to connect. Your account allows for 10 registered services and 30 minute connections on up to 1 concurrent service(s). You can Upgrade Now to get more services, longer connection times and more concurrent connections.

Name	Type	Status	
raspberryPiSSH	SSH	online	Share | Settings
raspberryPiWeb	HTTP	online	Share | Settings

Then we click to one of the devices:



Then we copy the command to our laptop or desktop terminal to access to our RPi terminal:

```
ssh -l pi proxy71.weaved.com -p 34644
```

The weaved service is free and the duration of the connection is 30 min long. If we need to work longer, once we are connected we can execute:

```
ifconfig
```

This one will give us the IP address. Then, we can login to the RPi as:

```
ssh pi@192.31.123.122
```

Note: The next command is for updating and upgrading the Linux packages in the operative system, but it won't be executed during the workshop since it can take a while. It is always good to keep the system up to date: `sudo apt-get -y update && sudo apt-get -y upgrade`.