



PicoMuon Detector

Setting up a

Raspberry Pi 4/5

Pico μ

<https://ukraa.com/>

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Set-up instructions

These instructions cover setting up your Raspberry Pi4 or Raspberry Pi 5 with a suitable operating system and ability to be remotely access via VNC.

It is recommended that you use a Raspberry Pi 4/5 with at least 2GB memory.

When using the Raspberry Pi Imager, remember to write down the **hostname** you use – this is used to view the web page with the results from your UKRAA PicoMuon detector.

Please keep the username as **pi** when using OS customisation within the Raspberry Pi Imager.

The instructions for accessing your Raspberry Pi heedlessly assume use of Windows PC and that the following two applications are preinstalled on that PC.

- PuTTY
- RealVNC Viewer

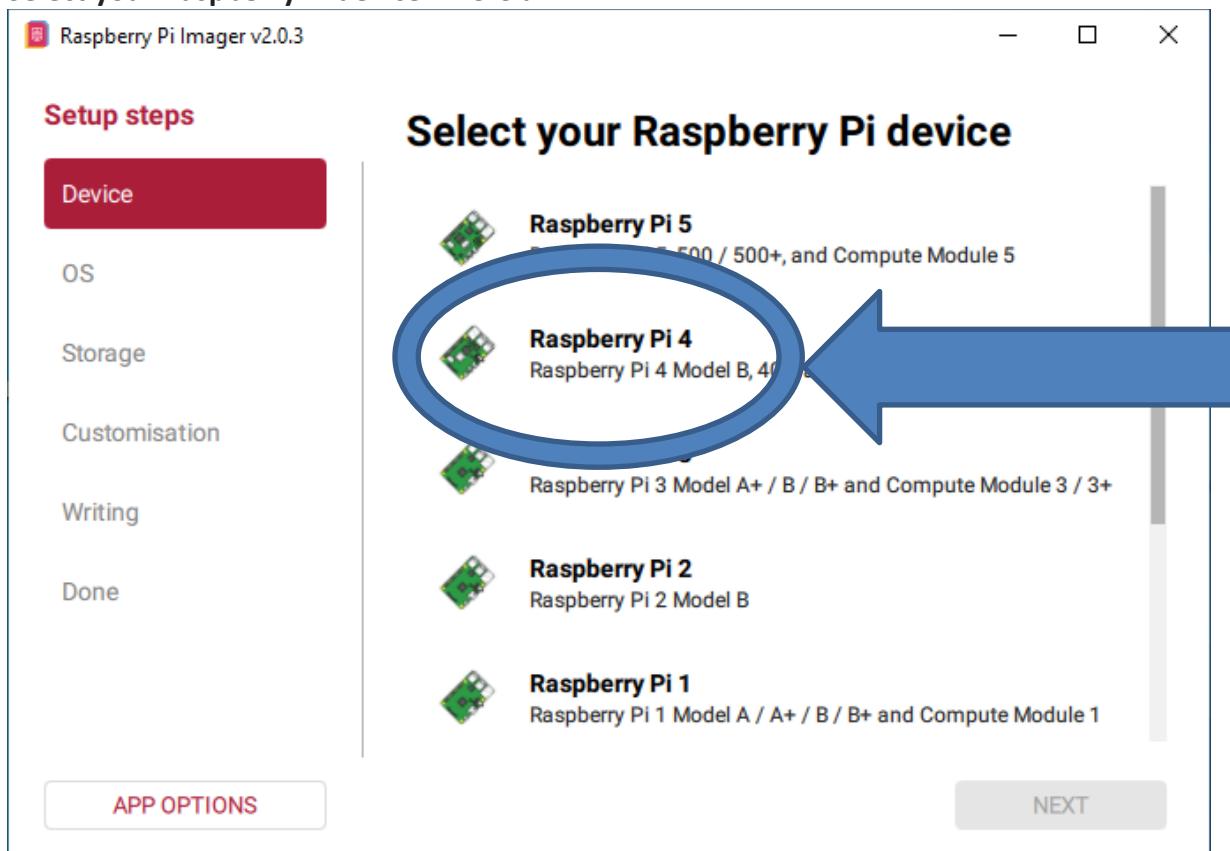
No information on installing these two applications is given in this text – there are numerous guides available on the internet.

Raspberry Pi OS

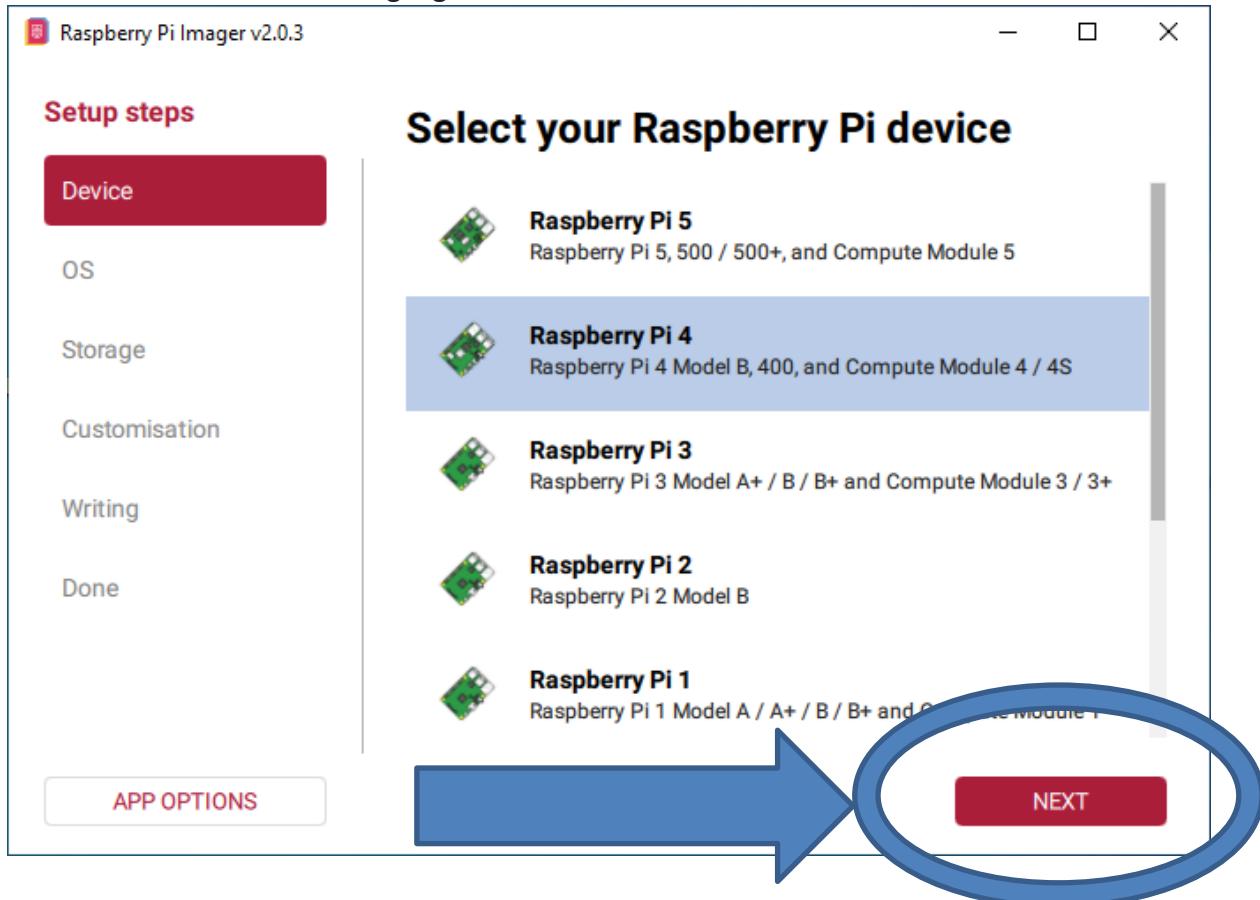
1. Download [Raspberry Pi Imager](#) for your operating system.



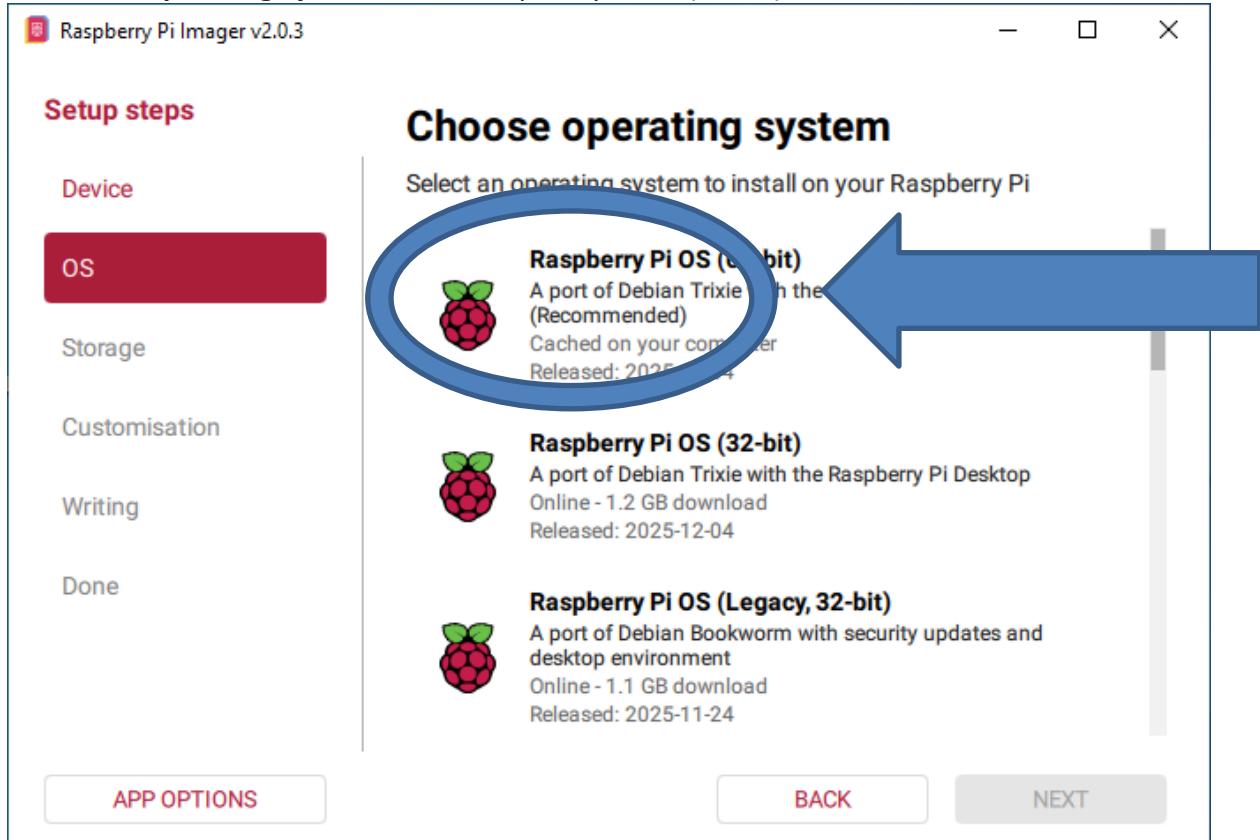
2. Run Raspberry Pi Imager.
3. These instruction are written for **Raspberry Pi Imager v2.0.3** and **Debian Trixie**
3. Select your Raspberry Pi device – here an RPi4



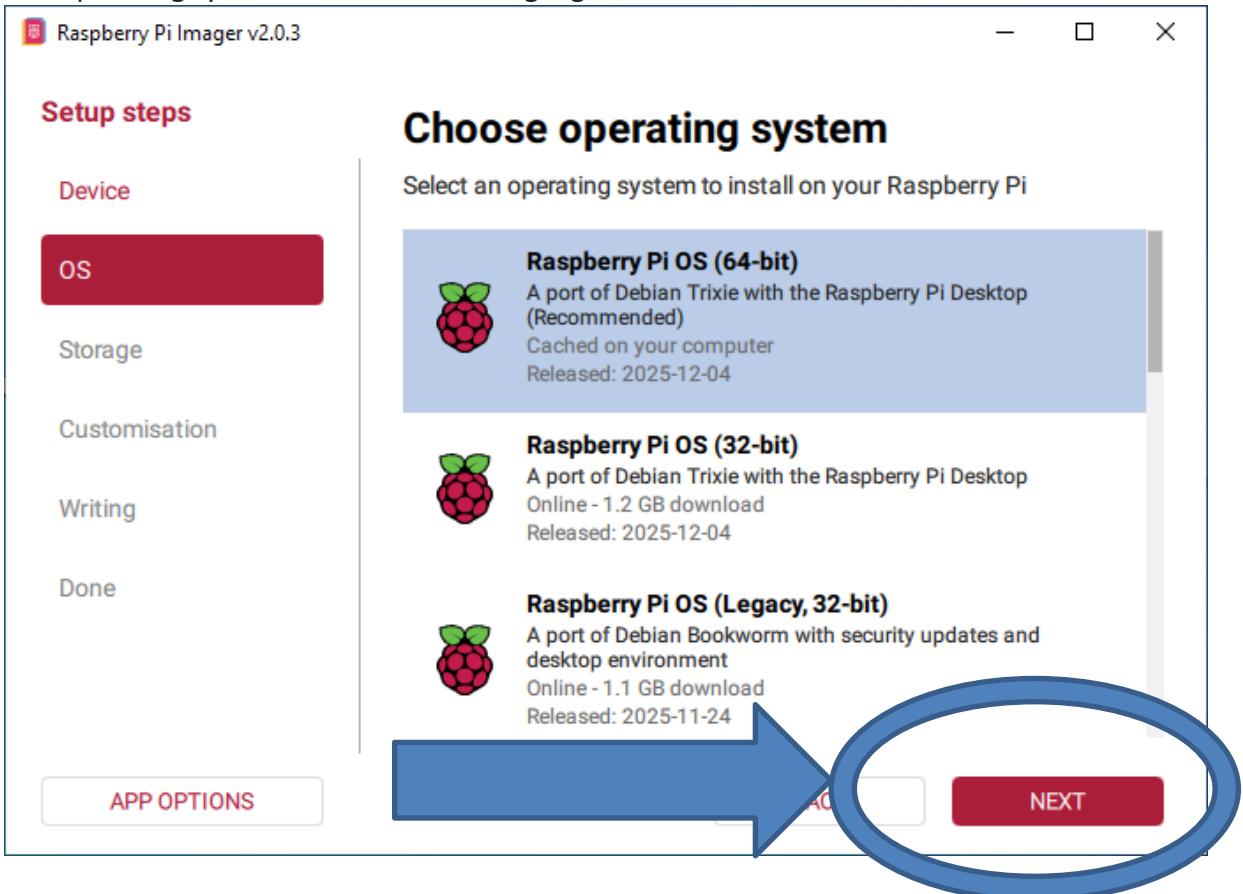
4. The device selected will be highlighter. Then select **NEXT**.



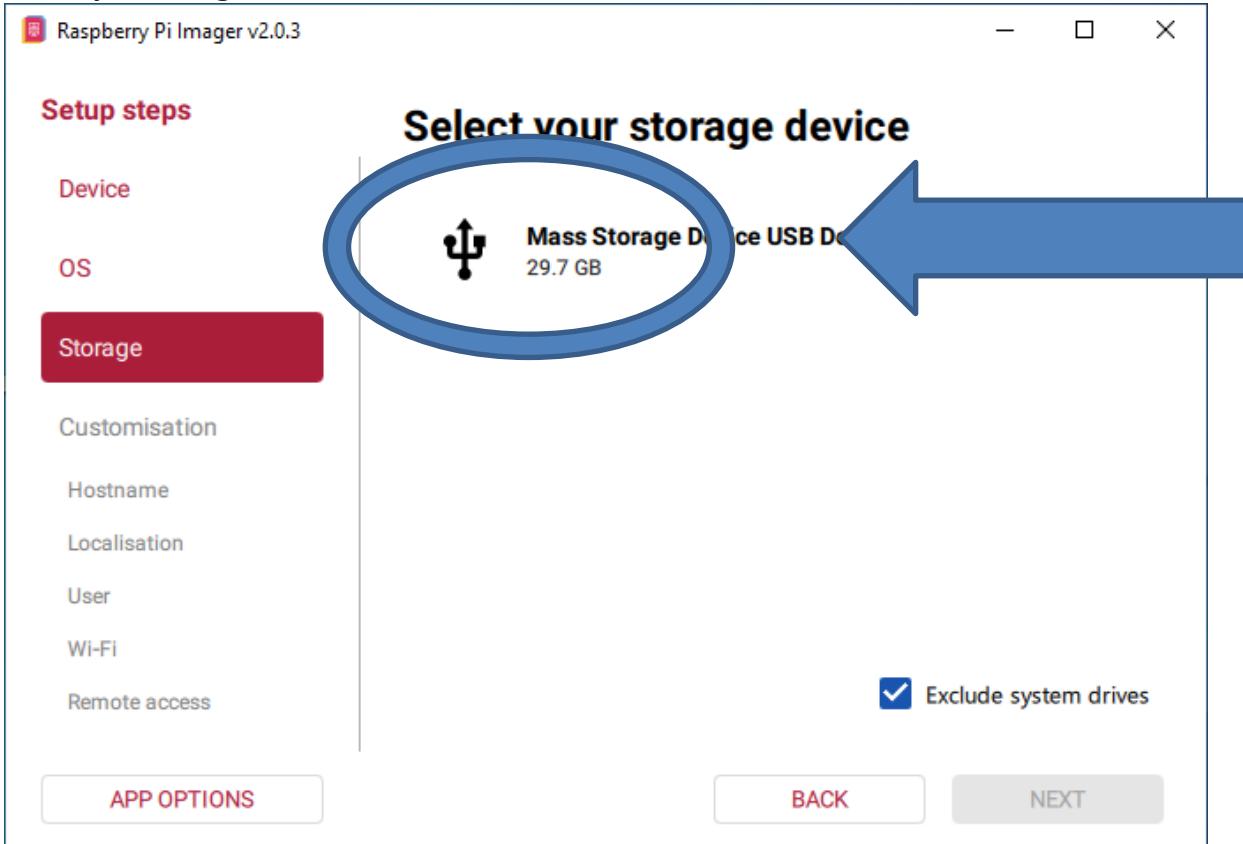
5. Select the operating system – here Raspberry Pi OS (64-bit).



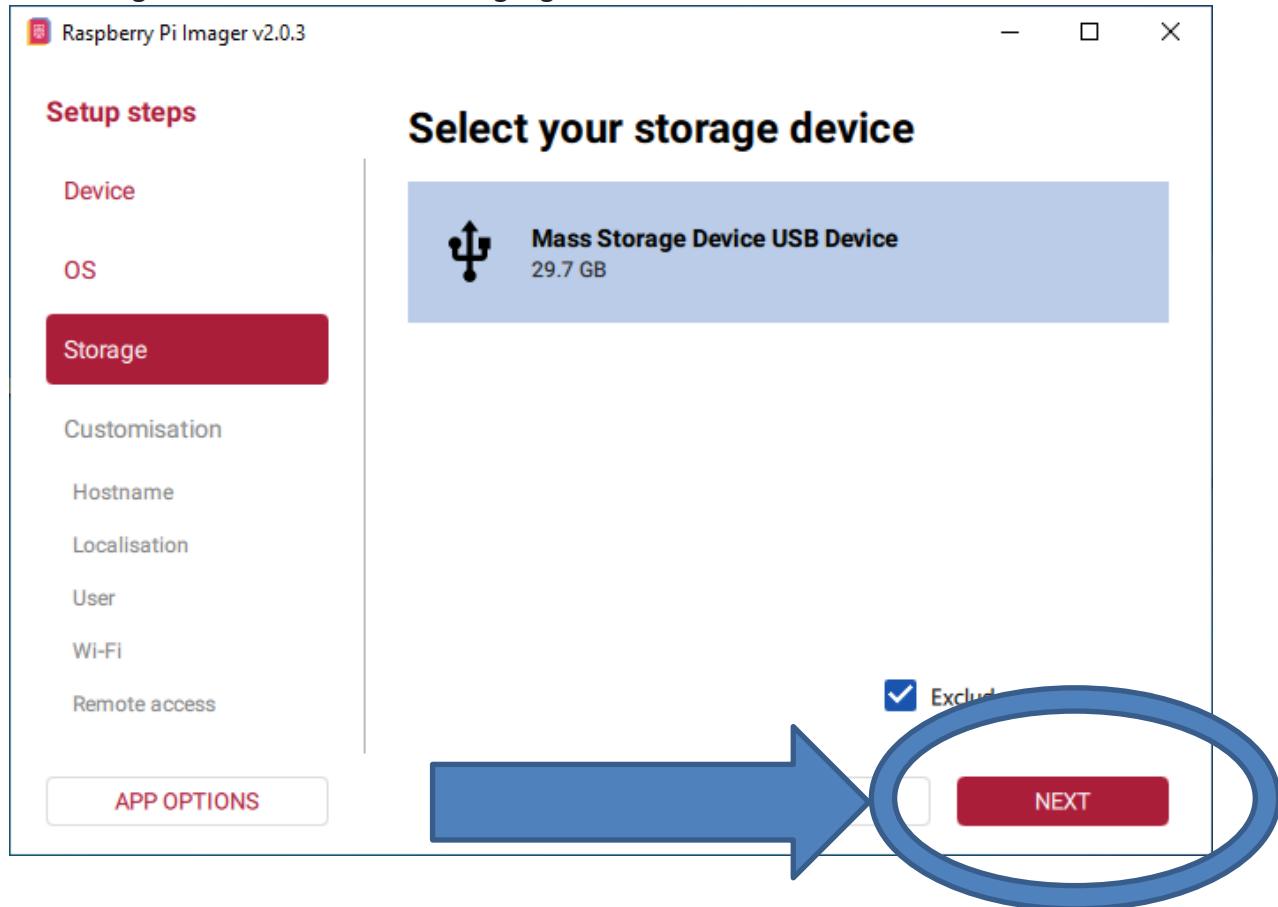
6. The operating system selected will be highlighted – then select **NEXT**.



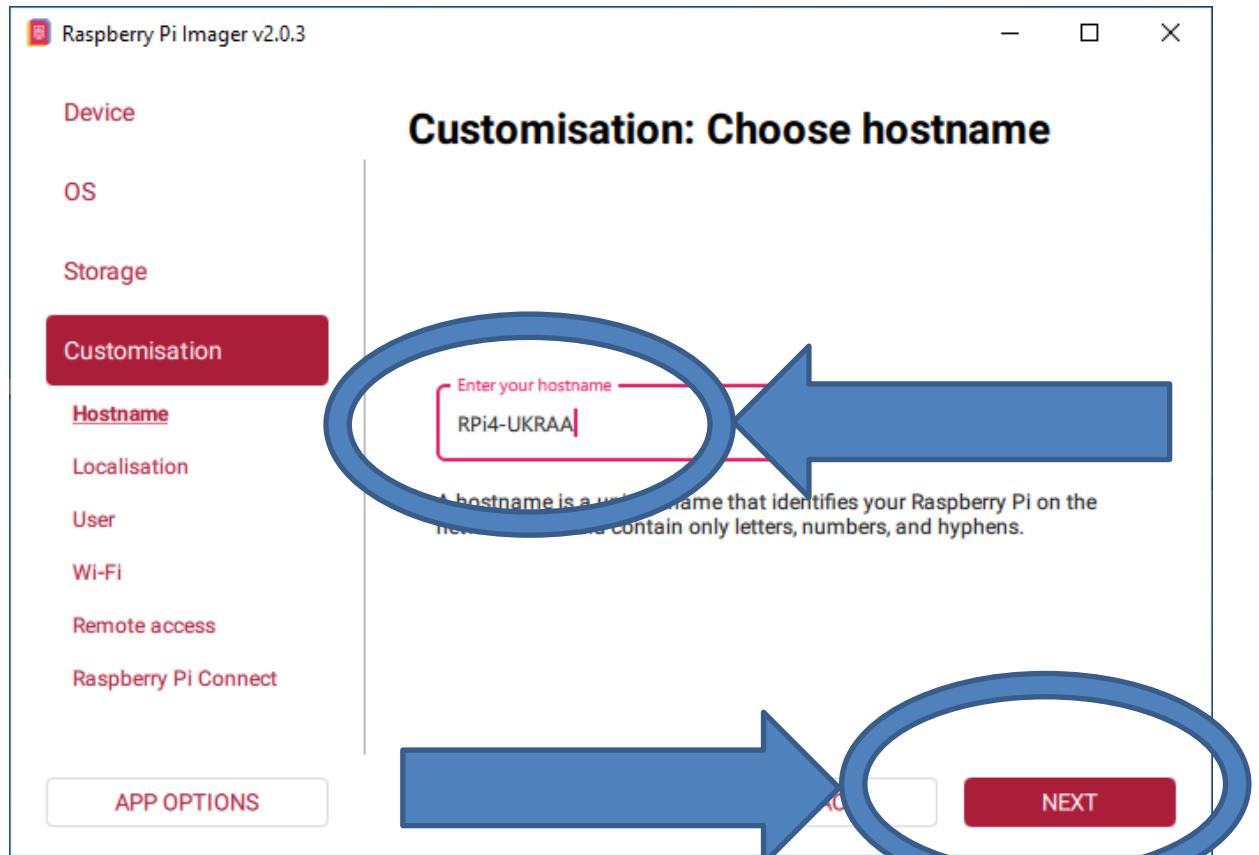
7. Select your storage device – here a 32Gb microSD card.



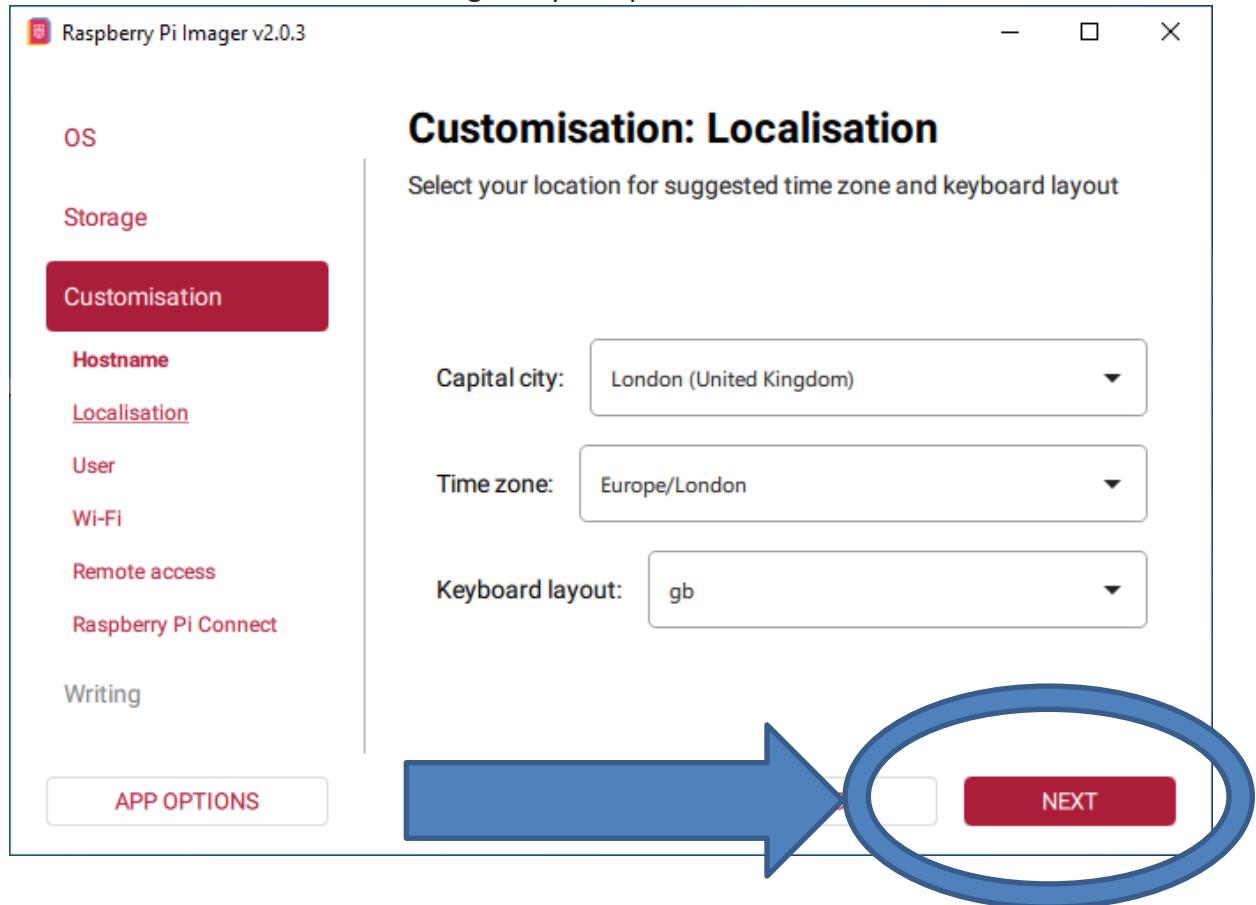
8. The storage device selected will be highlighted – then select **NEXT**.



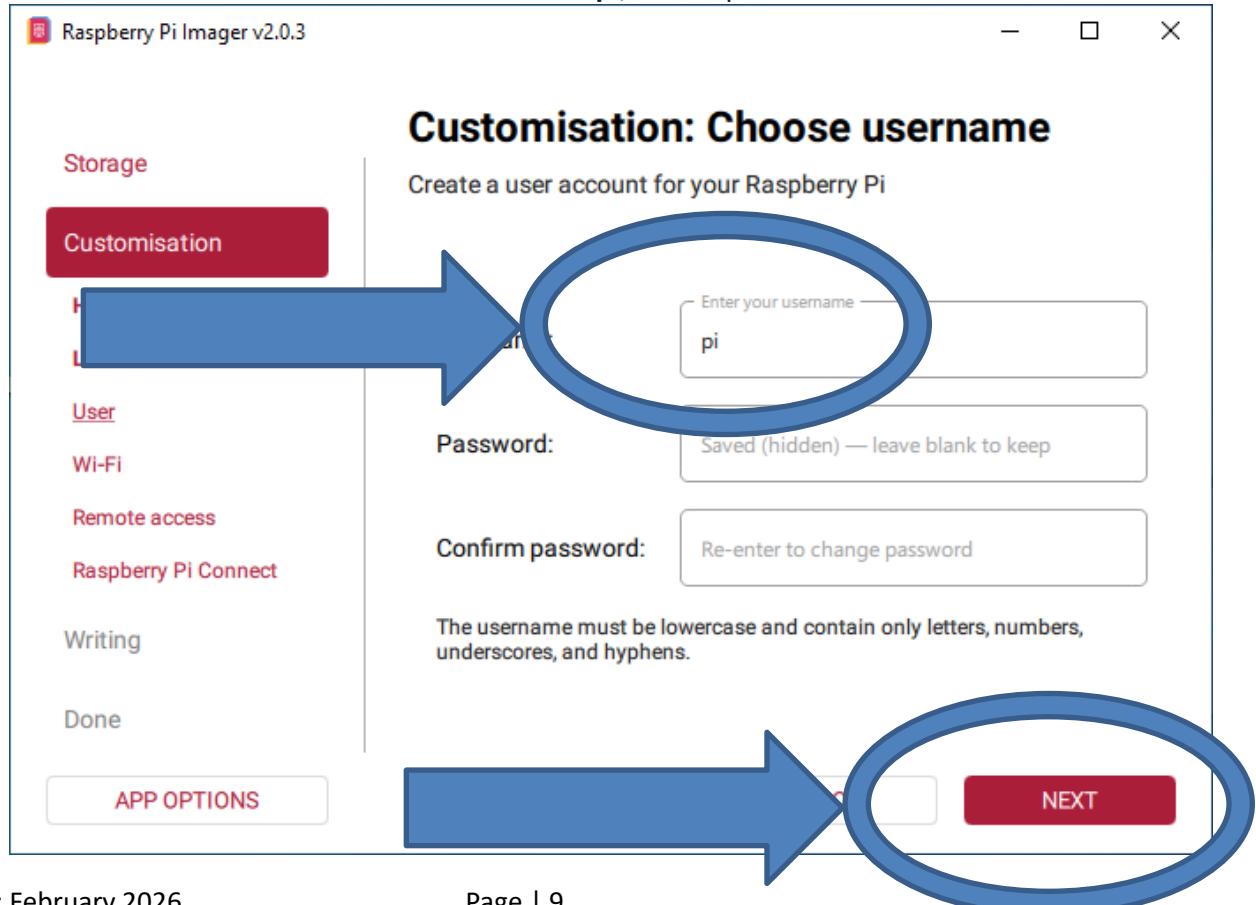
9. Customisation: Choose hostname – here *RPi4-UKRAA*. Then select **NEXT**



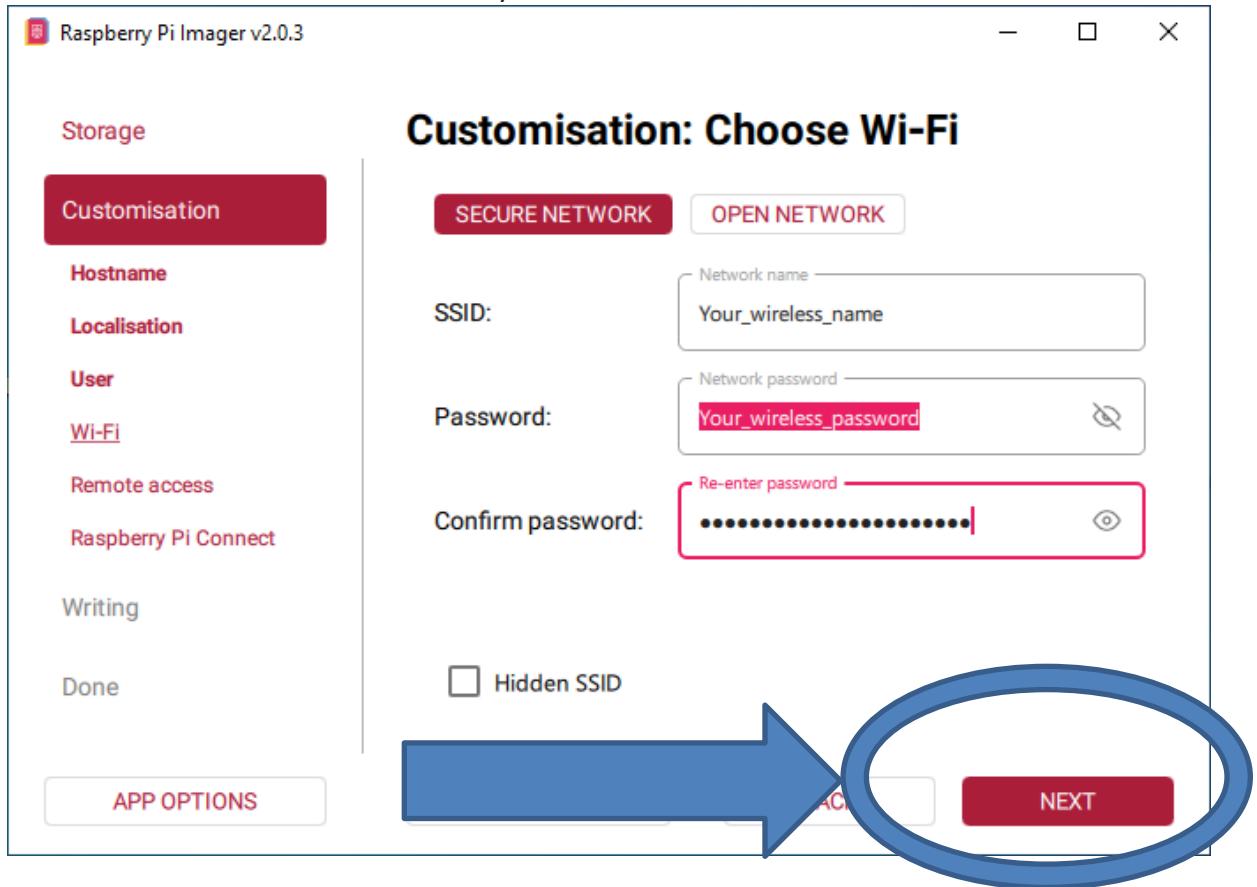
10. Customisation: Localisation – change for your specific location. Then select **NEXT**



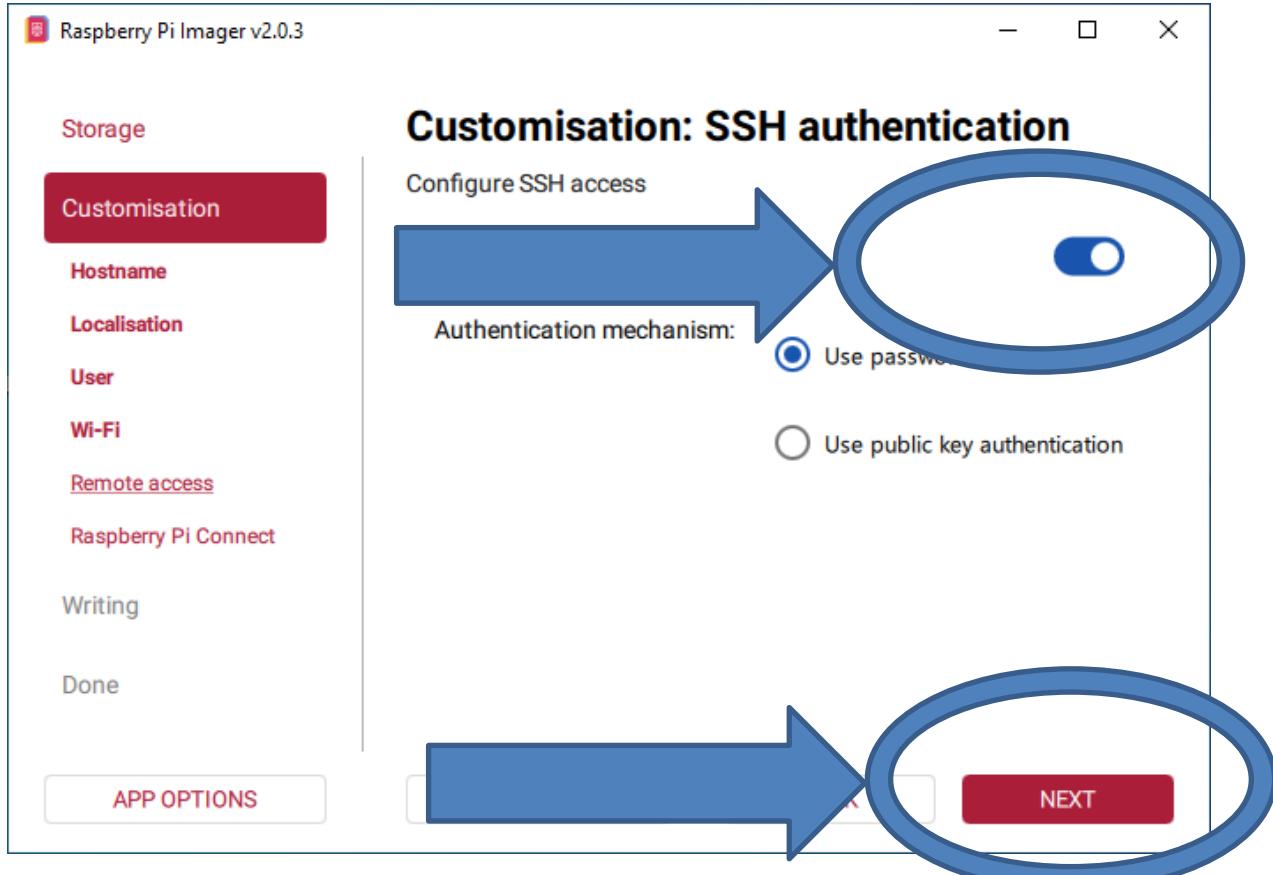
11. Customisation: Choose username – leave as pi, create password. Then select **NEXT**



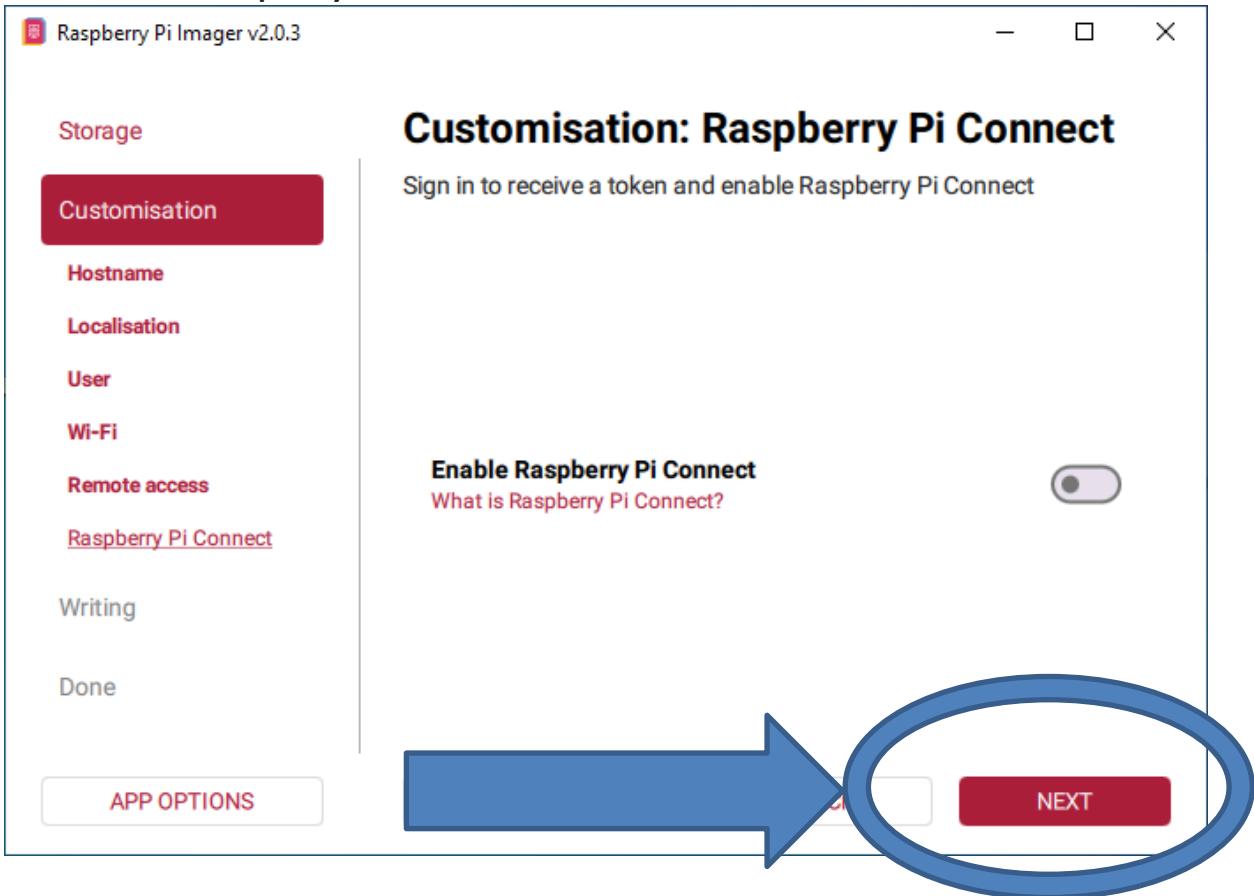
12. Customisation: Choose Wi-Fi – enter your Wi-Fi details. Then select **NEXT**.



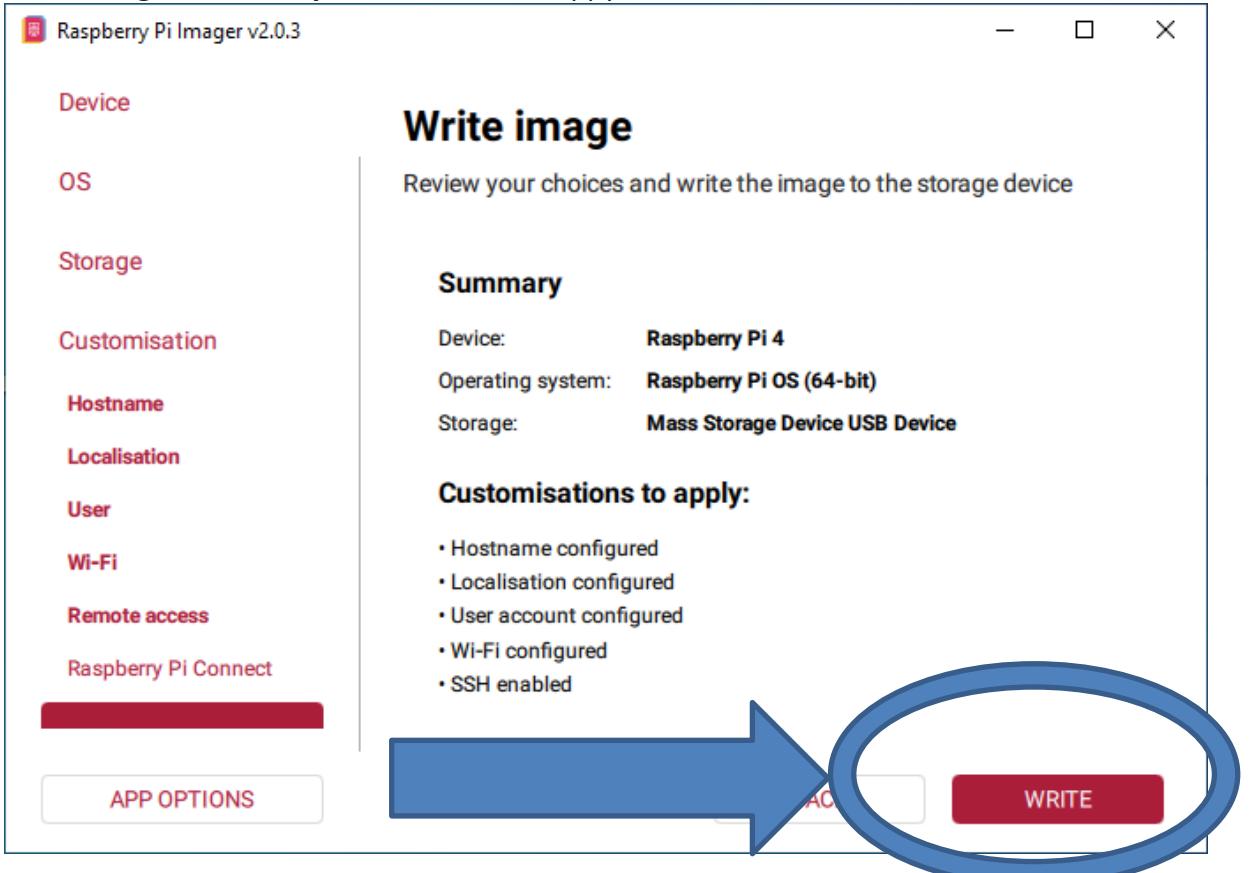
13. Customisation: SSH authentication – enable SSH. Then select **NEXT**.



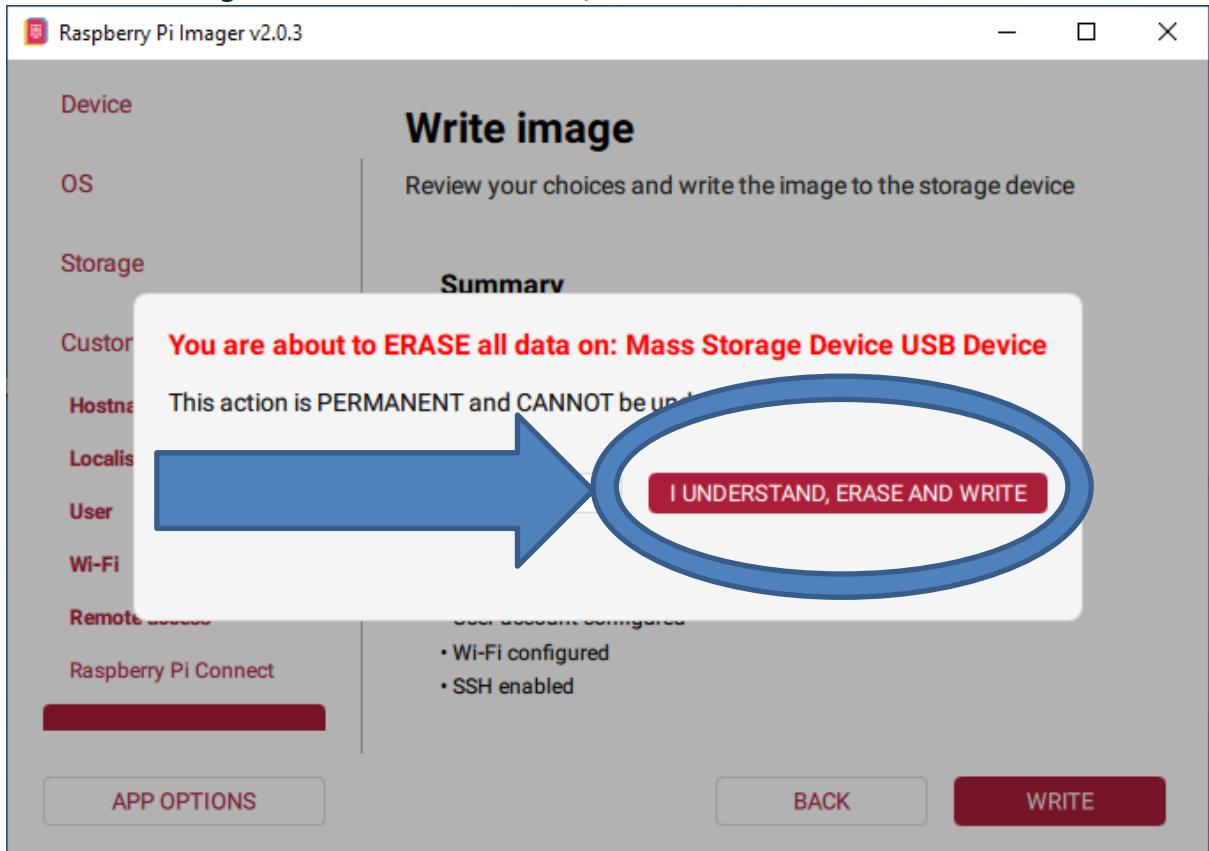
14. Customisation: Raspberry Pi Connect – enable if wanted. Then select **NEXT**.



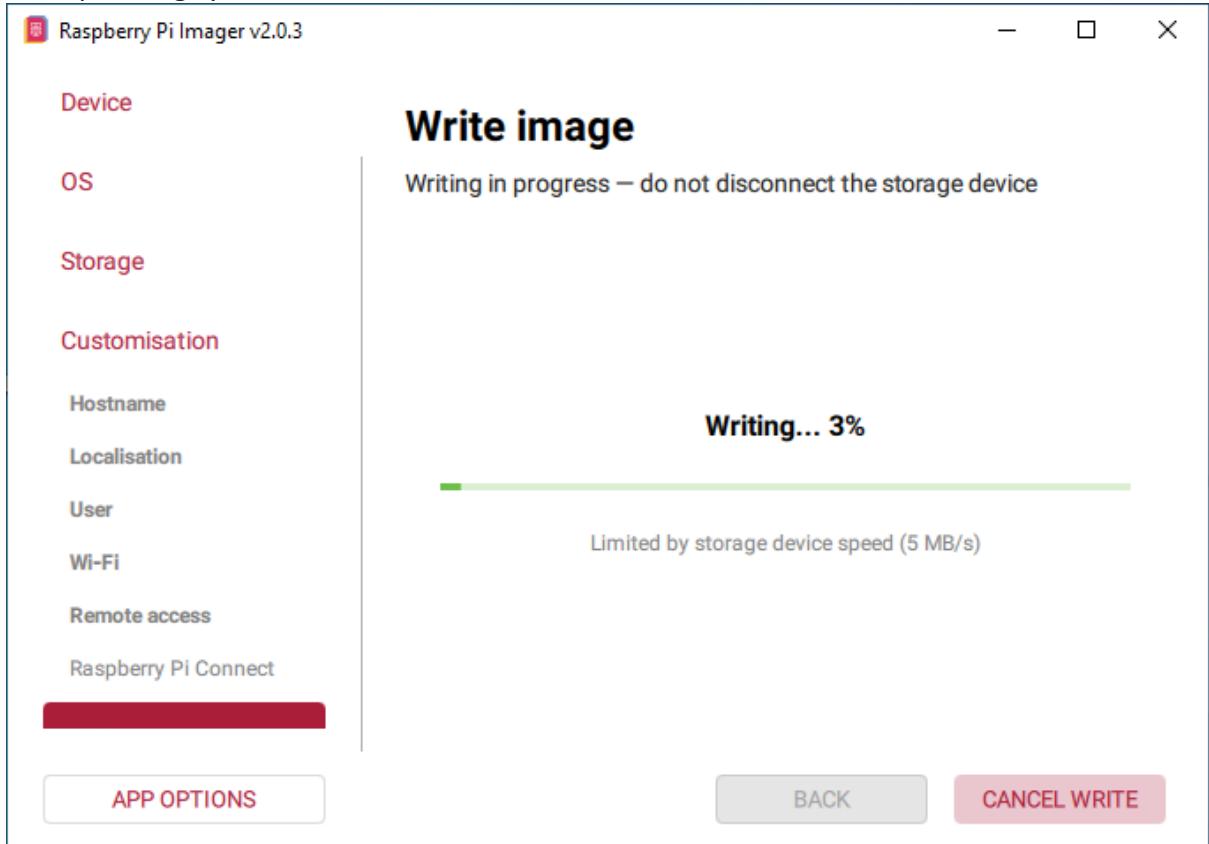
15. Write image – Summary – review, when happy select **WRITE**.



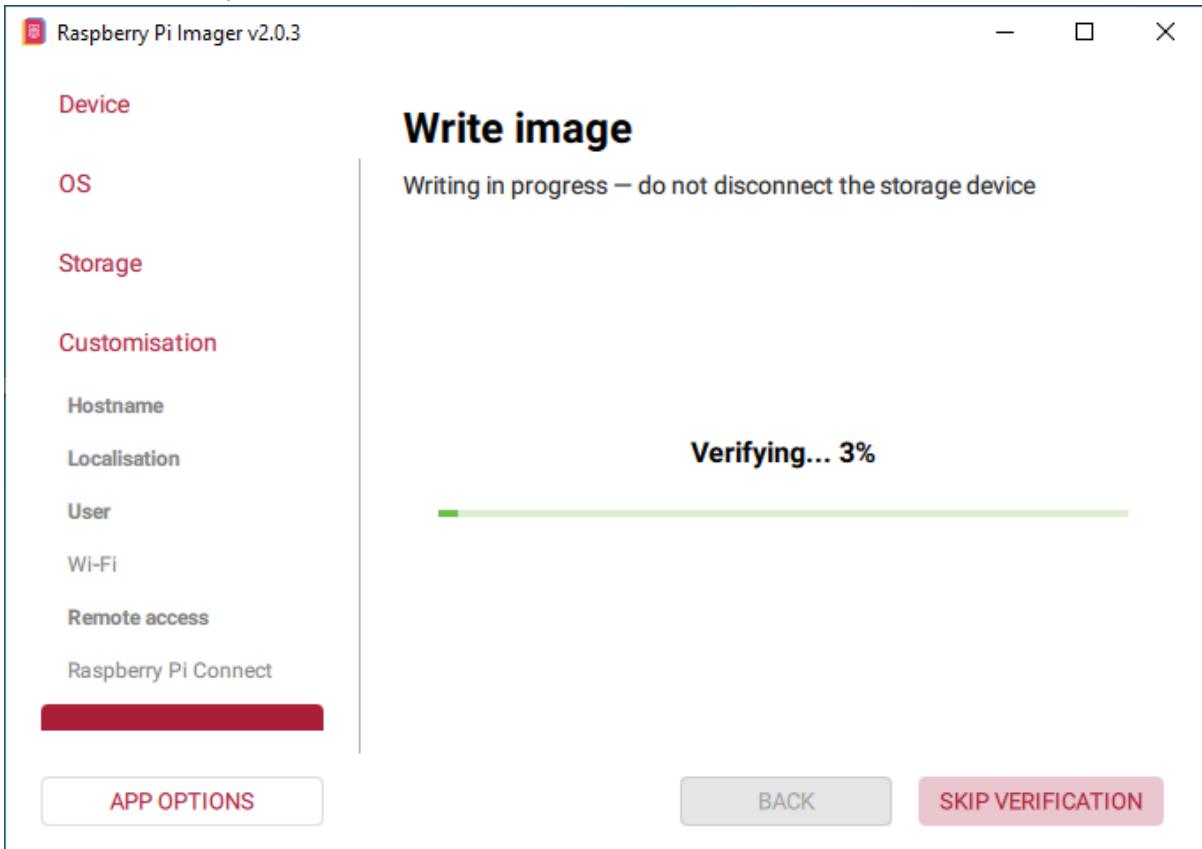
16. Read the warning and select I UNDERSTAND, ERASE AND WRITE.



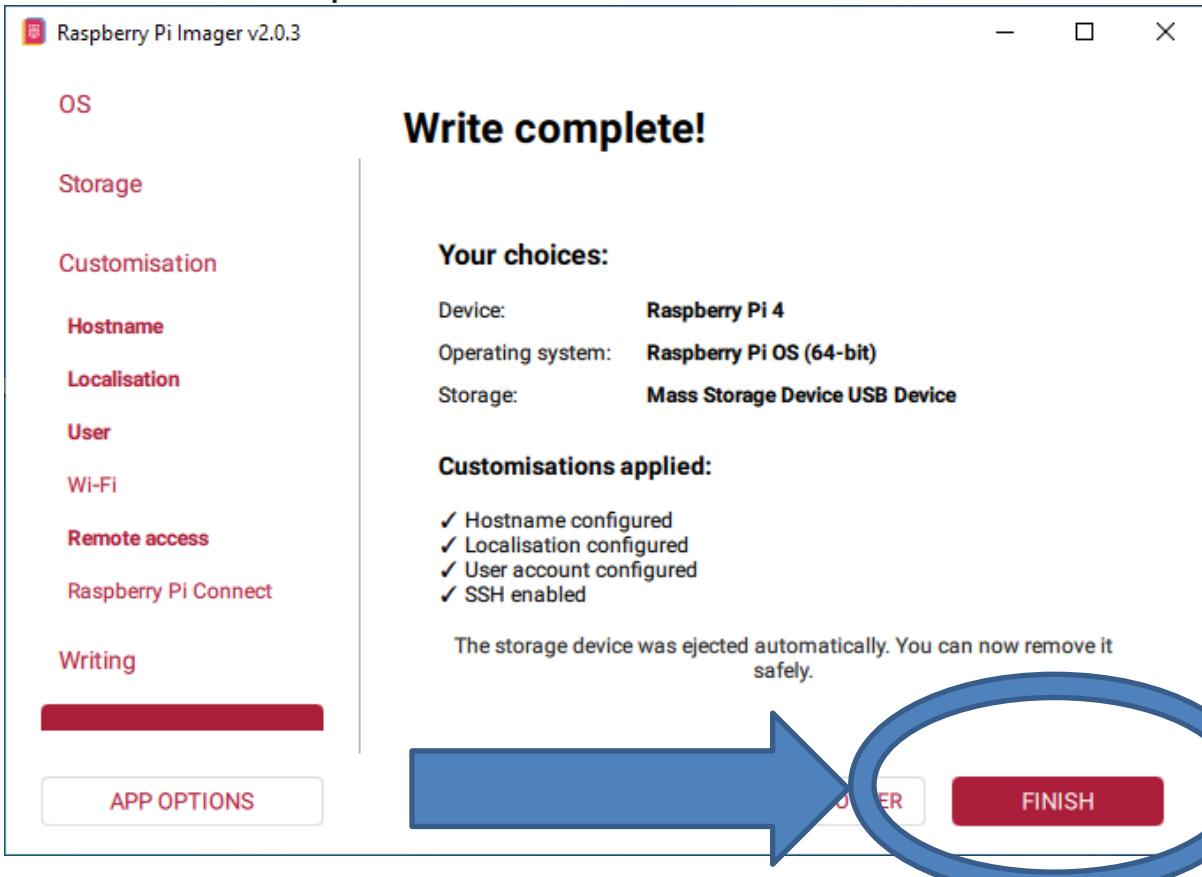
17. The operating system will now be written to the microSD card, this takes time...



18. and then verified, this take a bit more time...



19. If successful – **Write complete!** – select FINISH to close.

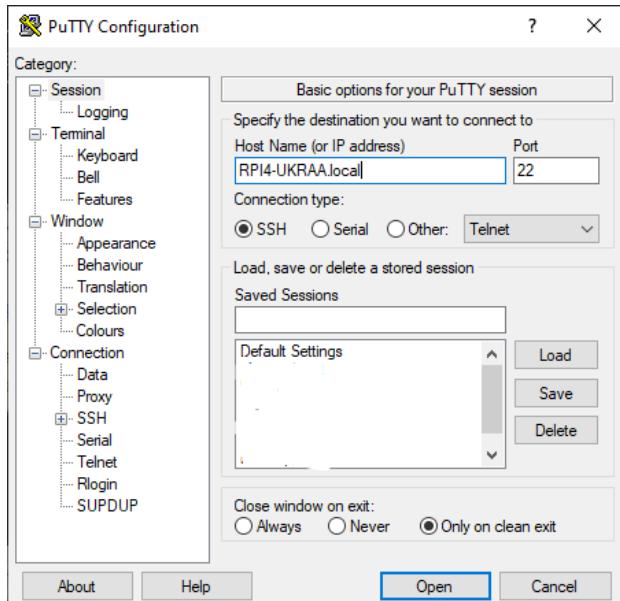


RPi4 first boot and initial configuration

Put the microSD card you have just created into your RPi4, connect the RPi to your LAN if necessary, insert the power cable and turn on.

Using PuTTY (<https://www.putty.org/>)

1. In **Host Name (or IP address)**, type the host name of your RPi that you wrote down earlier... and select **Open**



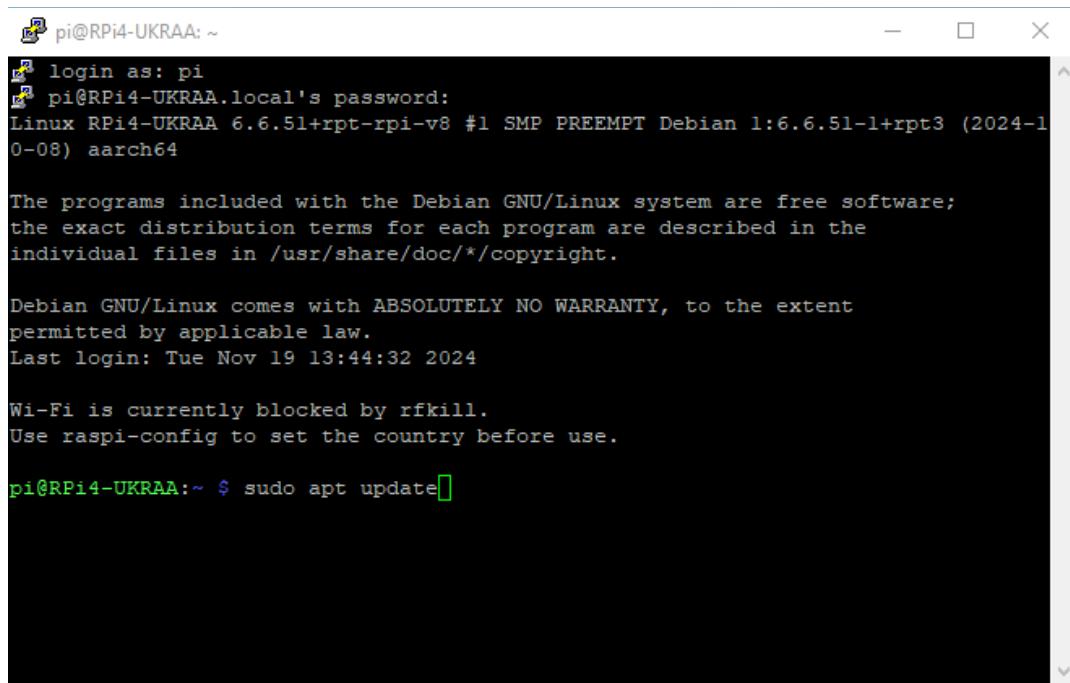
2. You will be presented with a PuTTY Security Alert - select **Accept**. You will now have a PuTTY terminal window.



3. Login as **pi** and enter your **password**

4. Now type the command below and press **enter**. This will update the RPi OS

sudo apt update



```
pi@RPi4-UKRAA: ~
[1] login as: pi
[2] pi@RPi4-UKRAA.local's password:
Linux RPi4-UKRAA 6.6.51+rpt-rpi-v8 #1 SMP PREEMPT Debian 1:6.6.51-1+rpt3 (2024-1-0-08) aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

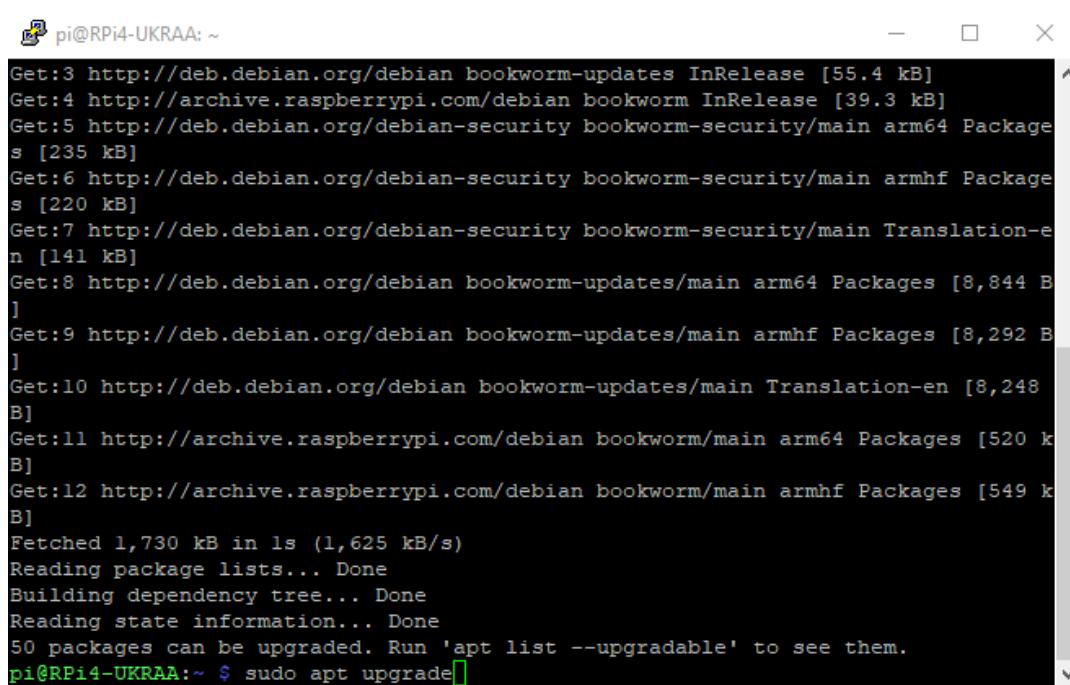
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Nov 19 13:44:32 2024

Wi-Fi is currently blocked by rfkill.
Use raspi-config to set the country before use.

pi@RPi4-UKRAA:~ $ sudo apt update[1]
```

5. Now type the command below and press **enter**. This will update any preinstalled software packages. You will be asked to type **y** and press **enter** to proceed.

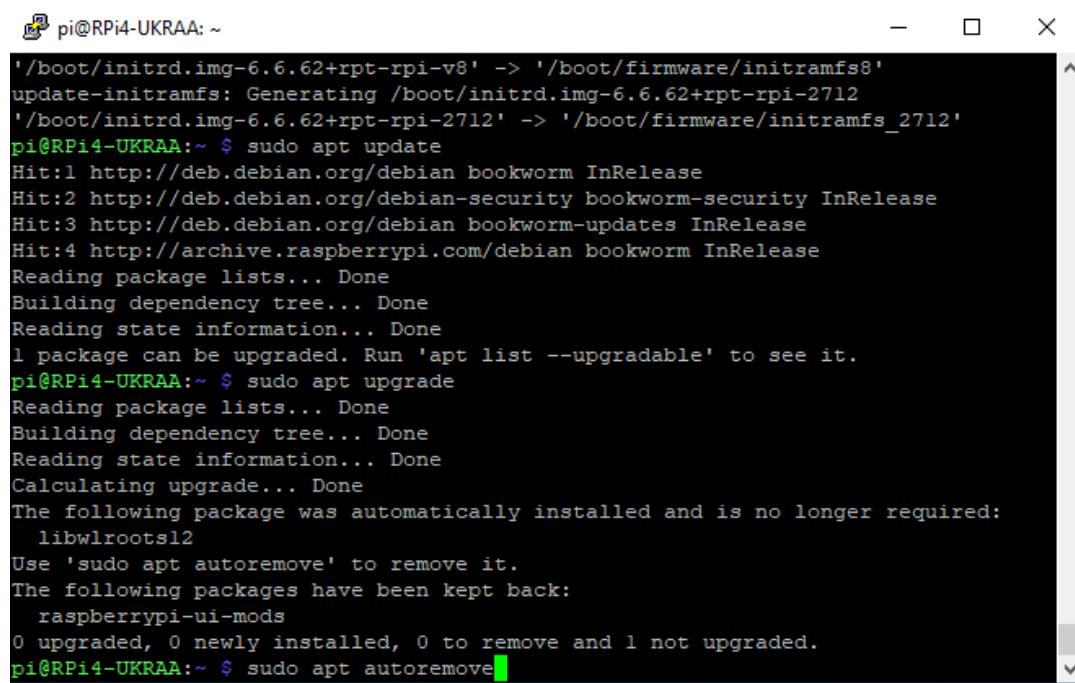
sudo apt upgrade



```
pi@RPi4-UKRAA: ~
Get:3 http://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:4 http://archive.raspberrypi.com/debian bookworm InRelease [39.3 kB]
Get:5 http://deb.debian.org/debian-security bookworm-security/main arm64 Packages [235 kB]
Get:6 http://deb.debian.org/debian-security bookworm-security/main armhf Packages [220 kB]
Get:7 http://deb.debian.org/debian-security bookworm-security/main Translation-en [141 kB]
Get:8 http://deb.debian.org/debian bookworm-updates/main arm64 Packages [8,844 B]
Get:9 http://deb.debian.org/debian bookworm-updates/main armhf Packages [8,292 B]
Get:10 http://deb.debian.org/debian bookworm-updates/main Translation-en [8,248 B]
Get:11 http://archive.raspberrypi.com/debian bookworm/main arm64 Packages [520 kB]
Get:12 http://archive.raspberrypi.com/debian bookworm/main armhf Packages [549 kB]
Fetched 1,730 kB in 1s (1,625 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
50 packages can be upgraded. Run 'apt list --upgradable' to see them.
pi@RPi4-UKRAA:~ $ sudo apt upgrade[1]
```

6. You may be advised that you can remove **no longer required** packages. You can type the command below and press **enter**. Again, you will be asked to type **y** and press **enter** to proceed.

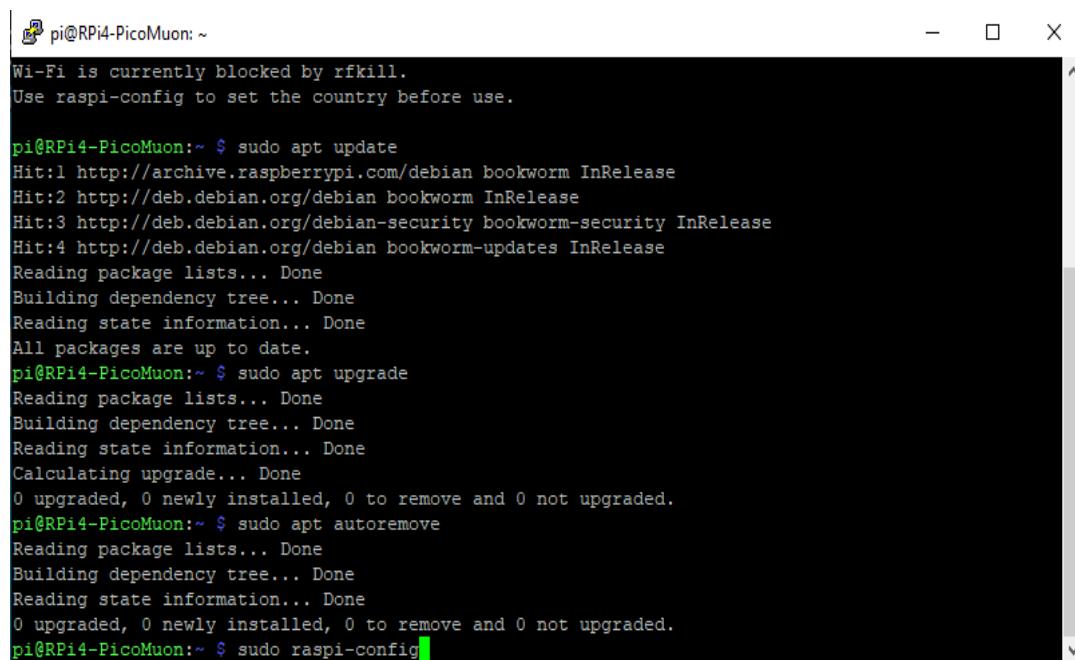
sudo apt autoremove



```
pi@RPi4-UKRAA: ~
'/boot/initrd.img-6.6.62+rpi-rpi-v8' -> '/boot/firmware/initramfs8'
update-initramfs: Generating /boot/initrd.img-6.6.62+rpi-rpi-2712
'/boot/initrd.img-6.6.62+rpi-rpi-2712' -> '/boot/firmware/initramfs_2712'
pi@RPi4-UKRAA:~ $ sudo apt update
Hit:1 http://deb.debian.org/debian bookworm InRelease
Hit:2 http://deb.debian.org/debian-security bookworm-security InRelease
Hit:3 http://deb.debian.org/debian bookworm-updates InRelease
Hit:4 http://archive.raspberrypi.com/debian bookworm InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
1 package can be upgraded. Run 'apt list --upgradable' to see it.
pi@RPi4-UKRAA:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libwlroots12
Use 'sudo apt autoremove' to remove it.
The following packages have been kept back:
  raspberrypi-ui-mods
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
pi@RPi4-UKRAA:~ $ sudo apt autoremove
```

7. We can now set up VNC to access the RPi from our desktop PC. Type the command below and press **enter**. We will be presented with the RPi configuration tool.

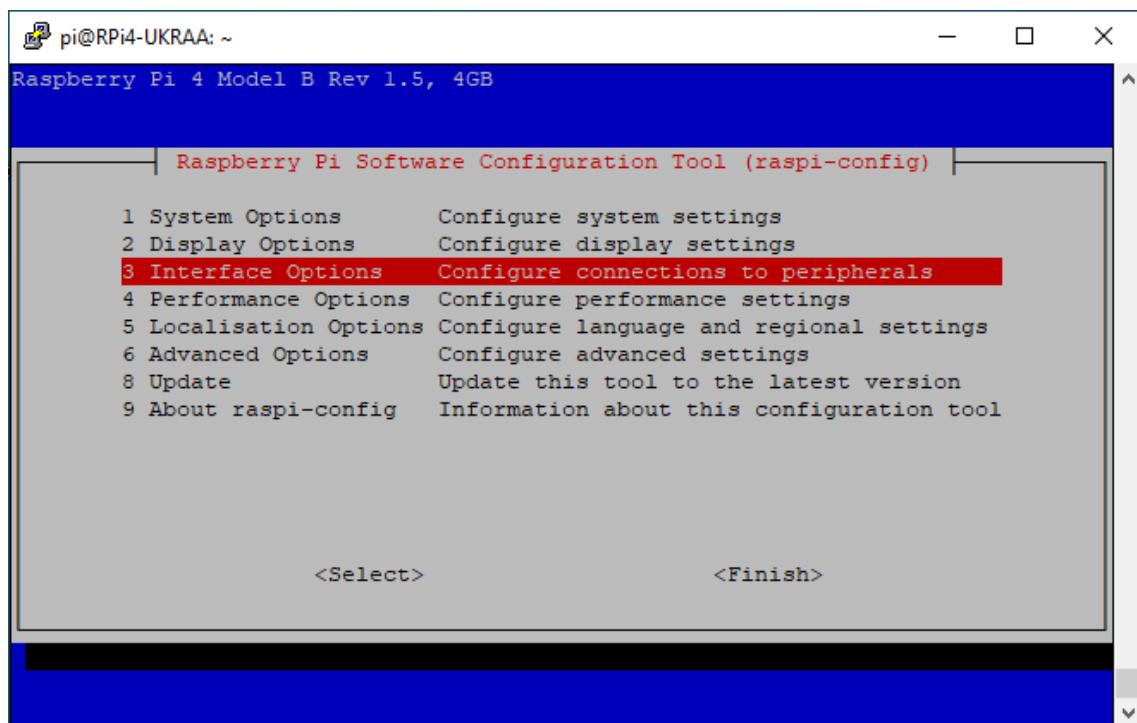
sudo raspi-config



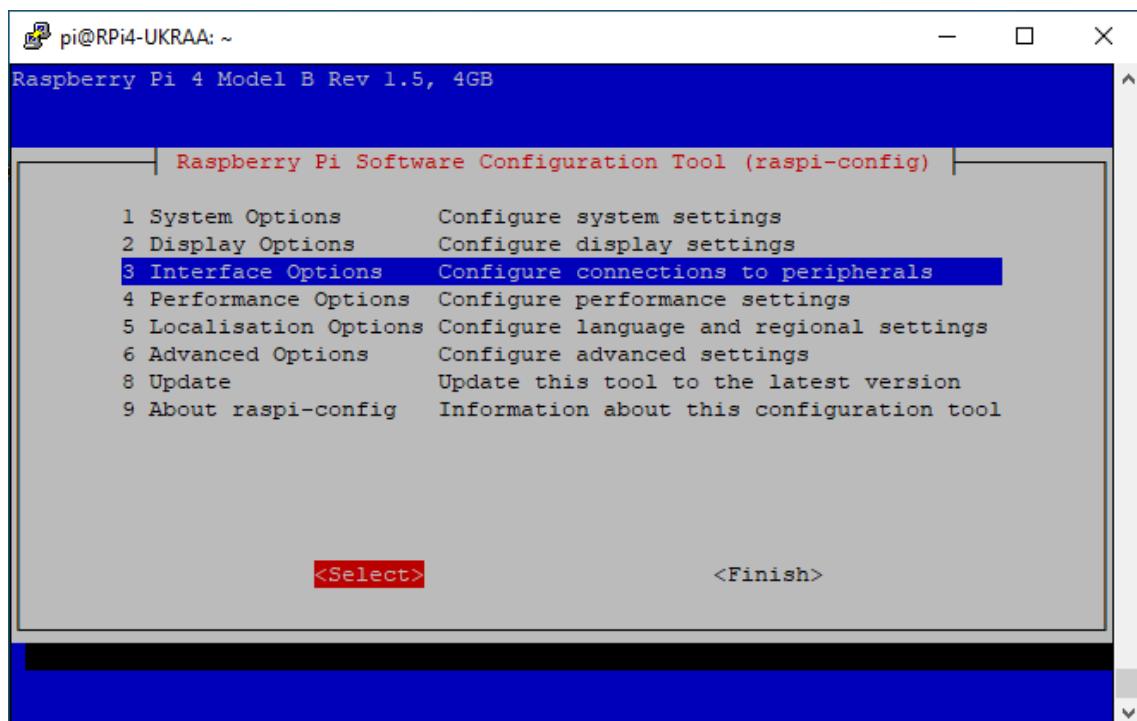
```
pi@RPi4-PicoMuon: ~
Wi-Fi is currently blocked by rfkill.
Use raspi-config to set the country before use.

pi@RPi4-PicoMuon:~ $ sudo apt update
Hit:1 http://archive.raspberrypi.com/debian bookworm InRelease
Hit:2 http://deb.debian.org/debian bookworm InRelease
Hit:3 http://deb.debian.org/debian-security bookworm-security InRelease
Hit:4 http://deb.debian.org/debian bookworm-updates InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
pi@RPi4-PicoMuon:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
pi@RPi4-PicoMuon:~ $ sudo apt autoremove
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
pi@RPi4-PicoMuon:~ $ sudo raspi-config
```

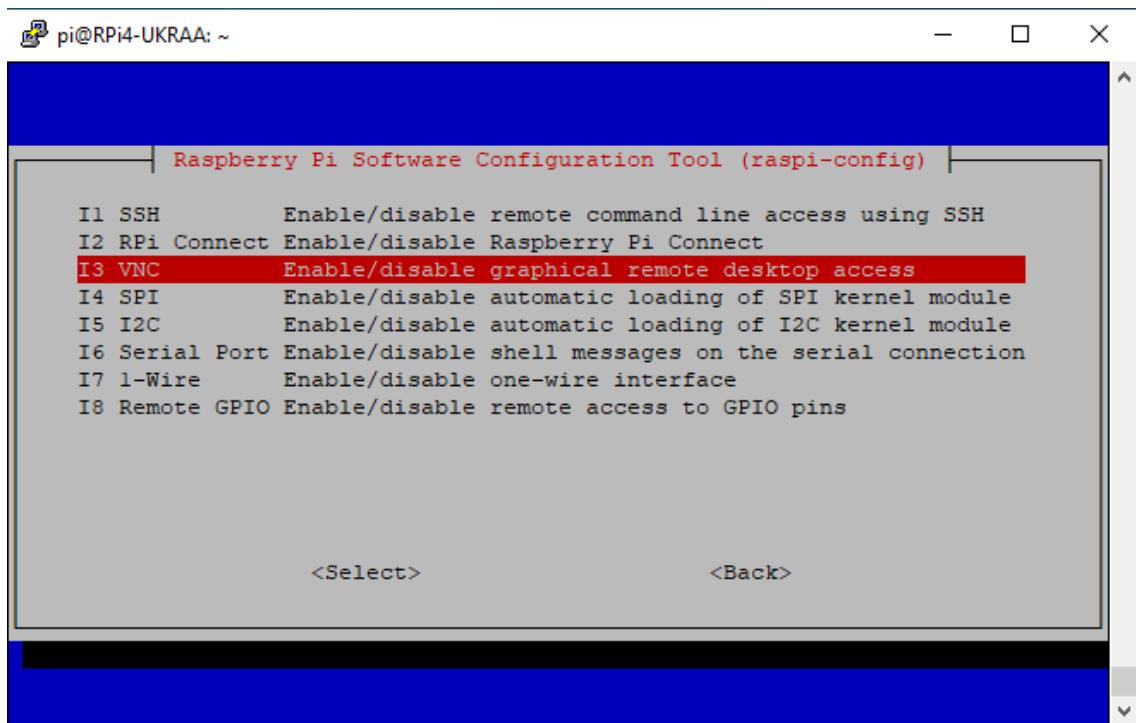
8. Select 3 Interface Options



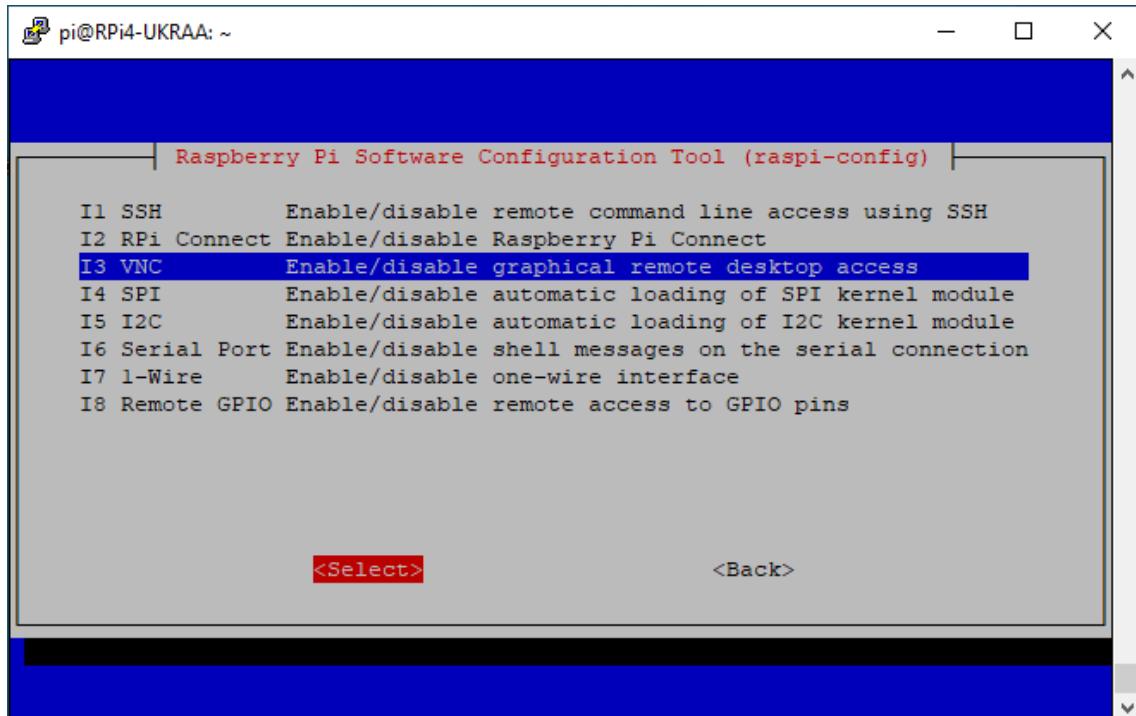
9. Navigate to **Select** and press enter.



10. Now navigate down to **I3 VNC** and selecting **Select** and press **enter**.



11. Navigate to **Select** and press **enter**.



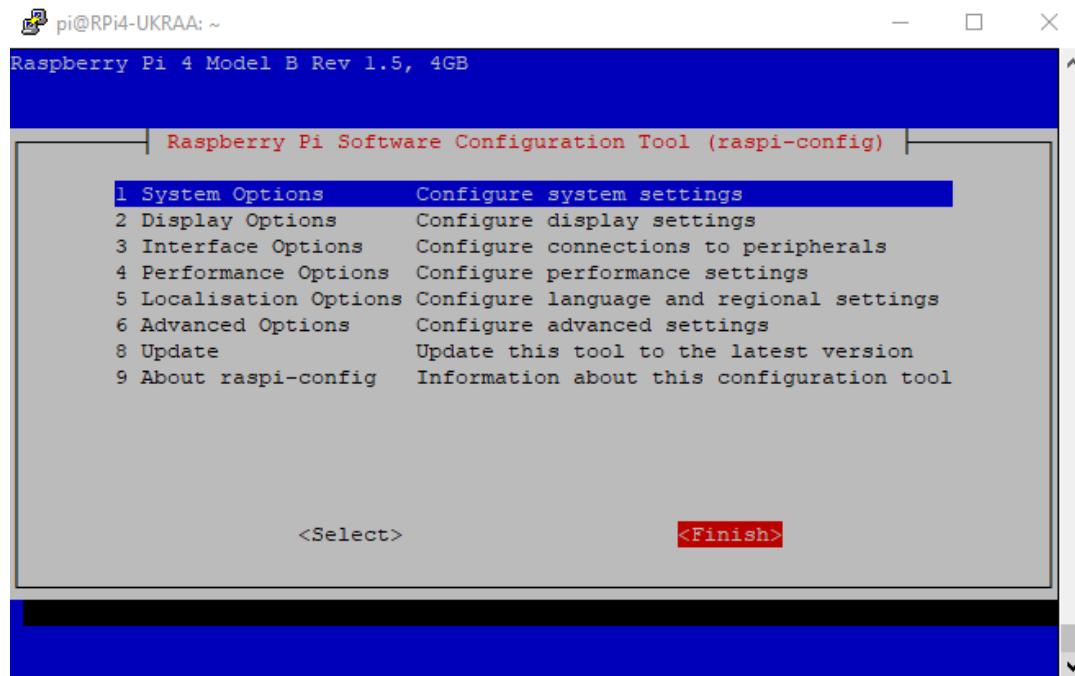
10. Select **Yes** and press **enter** to enable the VNC Server.



11. VNC server will now be enabled, press **enter**.



12. Finish with the Configuration Tool by selecting **Finish** and press **enter**.



13. Reboot the RPi, type the command below and press **enter**. This will close the PuTTY connection. You can close the Putty window.

sudo reboot

A screenshot of a PuTTY terminal window titled "PuTTY (inactive)". The session log shows the following commands being run:

```
Hit:3 http://deb.debian.org/debian-security bookworm-security InRelease
Hit:4 http://deb.debian.org/debian bookworm-updates InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
1 package can be upgraded. Run 'apt list --upgradable' to see it.
pi@RPi4-UKRAA:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  raspberrypi-ui-mods
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
pi@RPi4-UKRAA:~ $ sudo raspi-config
Created symlink /etc/systemd/system/multi-user.target.wants/wayvnc.service → /lib/systemd/system/wayvnc.service.
pi@RPi4-UKRAA:~ $ sudo reboot now

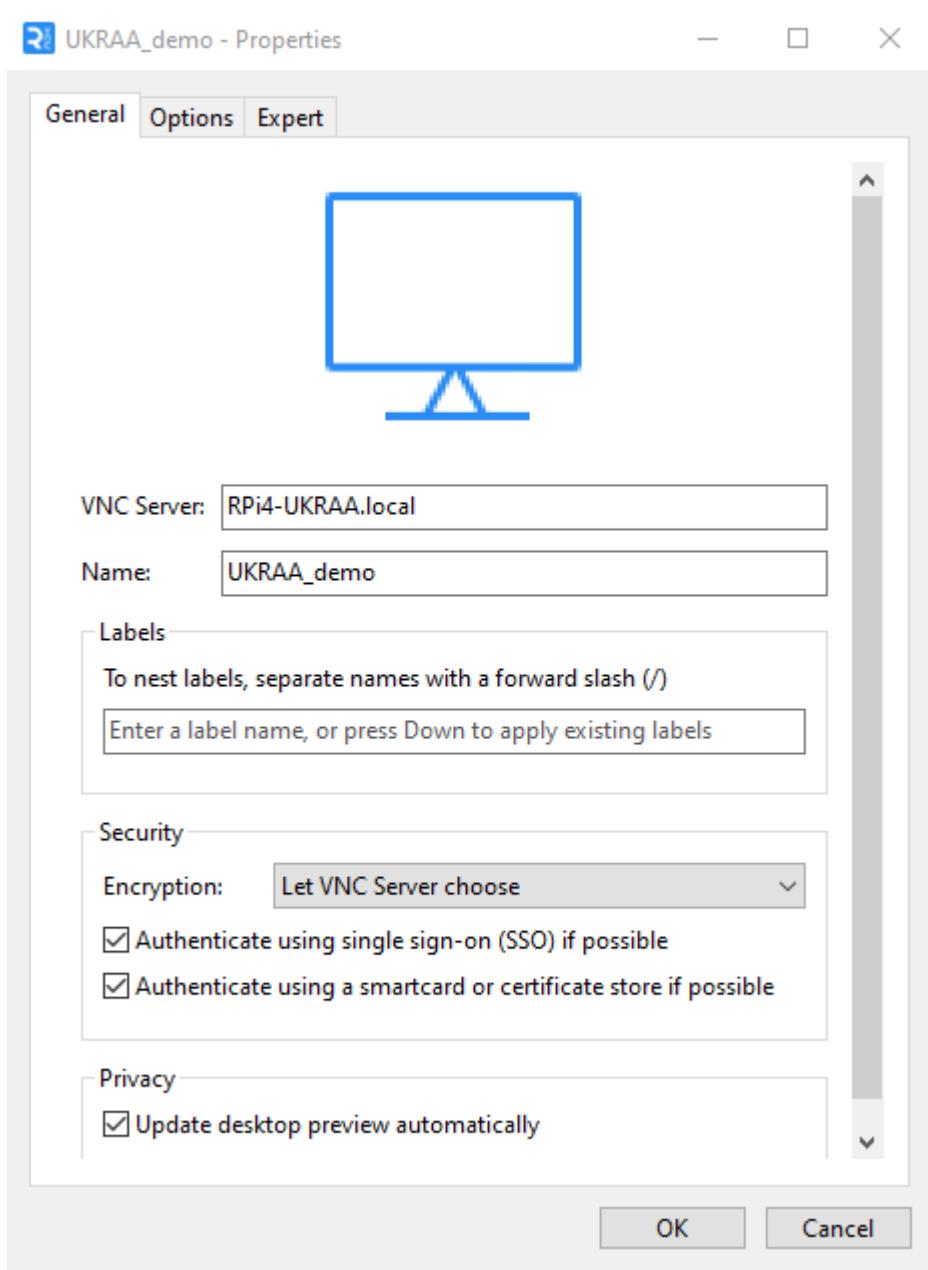
Broadcast message from root@RPi4-UKRAA on pts/1 (Sat 2024-12-28 17:55:47 GMT):

The system will reboot now!
pi@RPi4-UKRAA:~ $
```

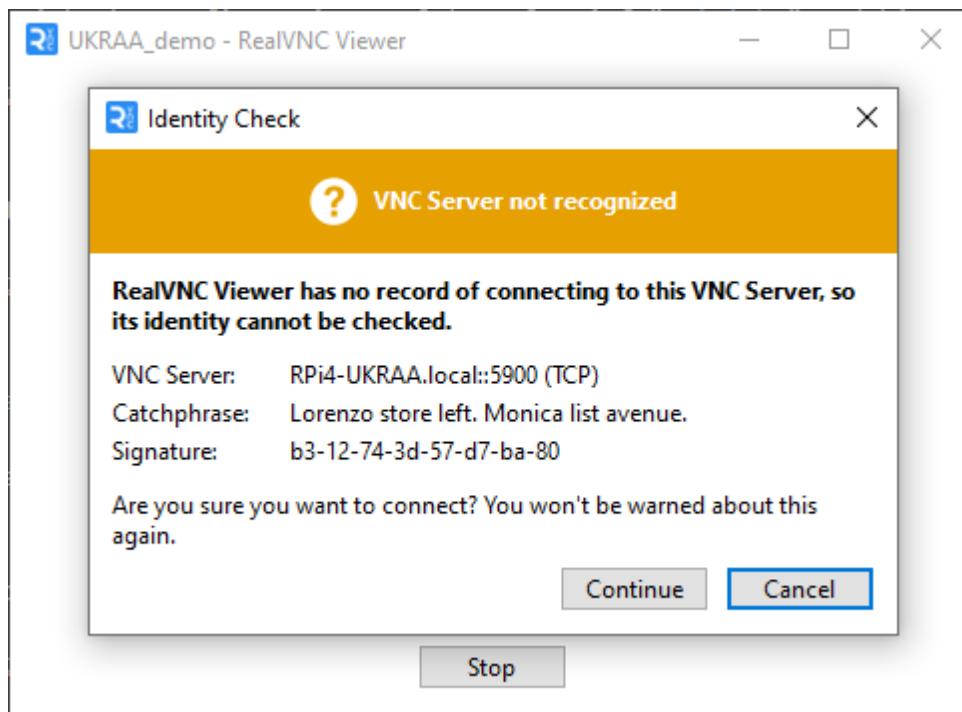
Headless access to RPi via VNC

Using a VNC program like RealVNC (<https://www.realvnc.com/en/>), connect to your RPi using your desktop PC...

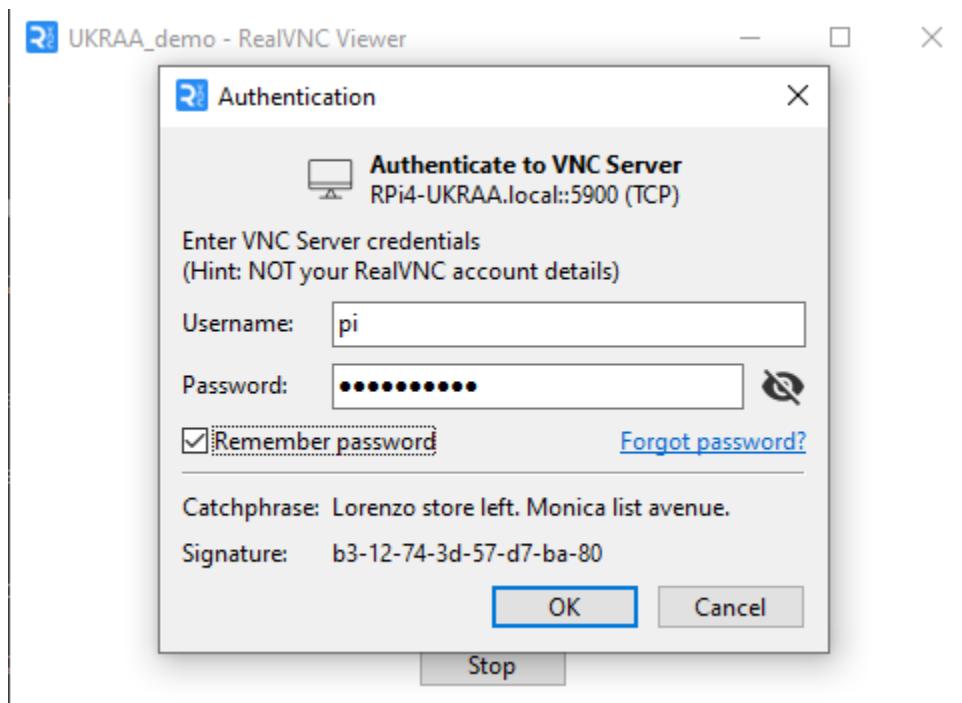
1. Create a **New connections** (CTRL-N) and enter the hostname into the **VNC Server:** box, add friendly name in the **Name** box and select **OK**.



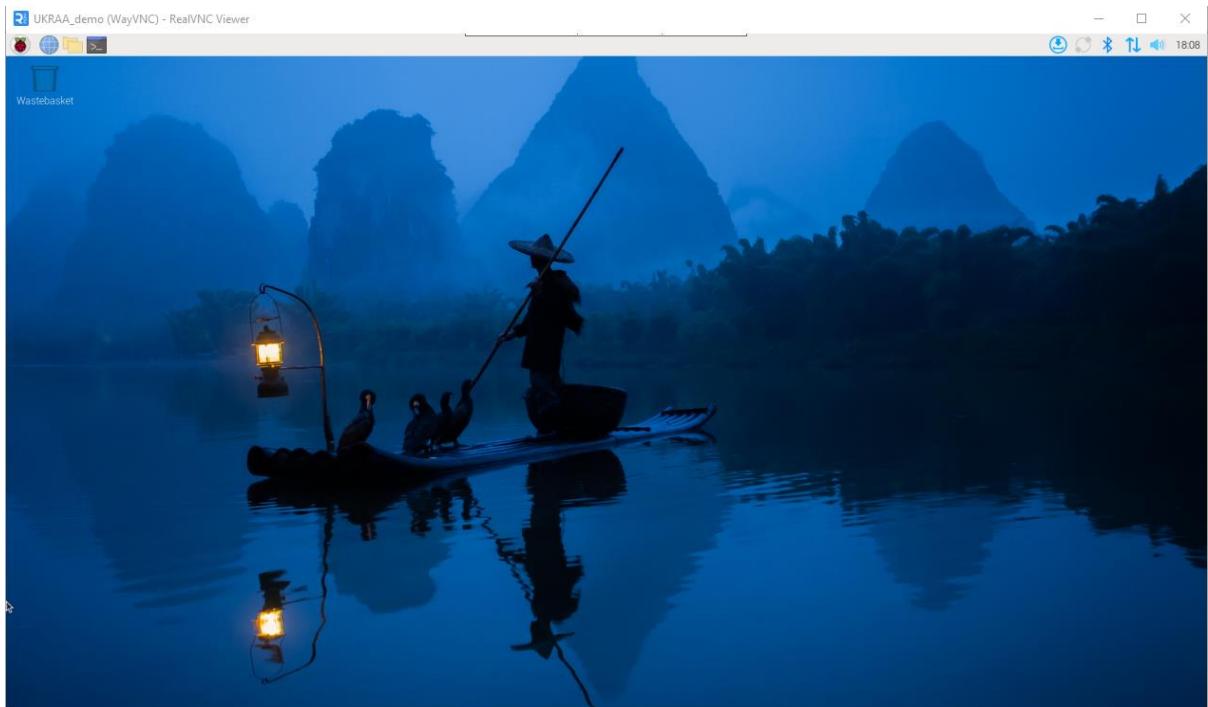
2. Open this VNC connection to your RPi; you will get a **VNC server not recognised** window from RealVNC. Select **Continue**



3. You will now get an **Authentication** window from RealVNC, enter your **Username** and **Password** details and select **Remember password** to make it easier to login in future.



4. You are now remotely accessing your RPi from your desktop PC...



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Contact us

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