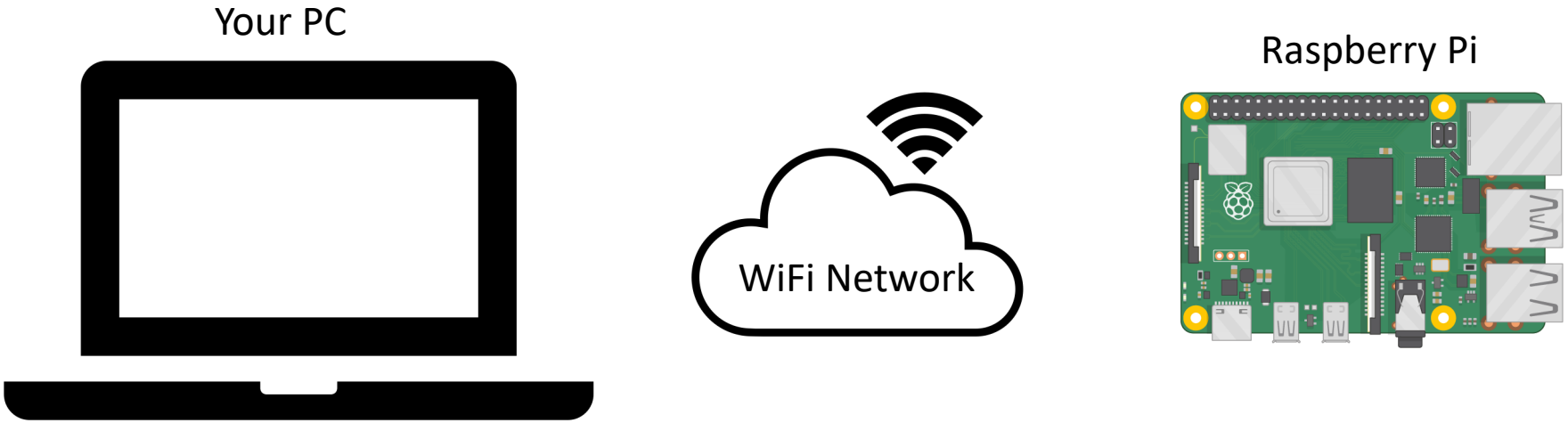
Raspberry Pi - Remote Access Alternatives

Hans-Petter Halvorsen

Remote Access to Raspberry Pi



You can use your Raspberry Pi in the same way as a desktop computer by connecting it to an external Monitor, Keyboard and Mouse, but very often you want to connect to your Raspberry Pi remotely where your Raspberry Pi acts like a server and performing some tasks without the need of monitor, keyboard and mouse. This Tutorial will go through some alternative approaches for remote access to the Raspberry Pi from your PC.

Remote Access Alternatives

In this Tutorial we will explore different alternatives to remotely connect to our Raspberry Pi:

- Secure shell (**SSH**) network protocol
- Virtual Network Computing (**VNC**)
- Remote Desktop Protocol (**RDP**)
- TeamViewer

I guess there are other alternatives as well

Prepare your Raspberry Pi

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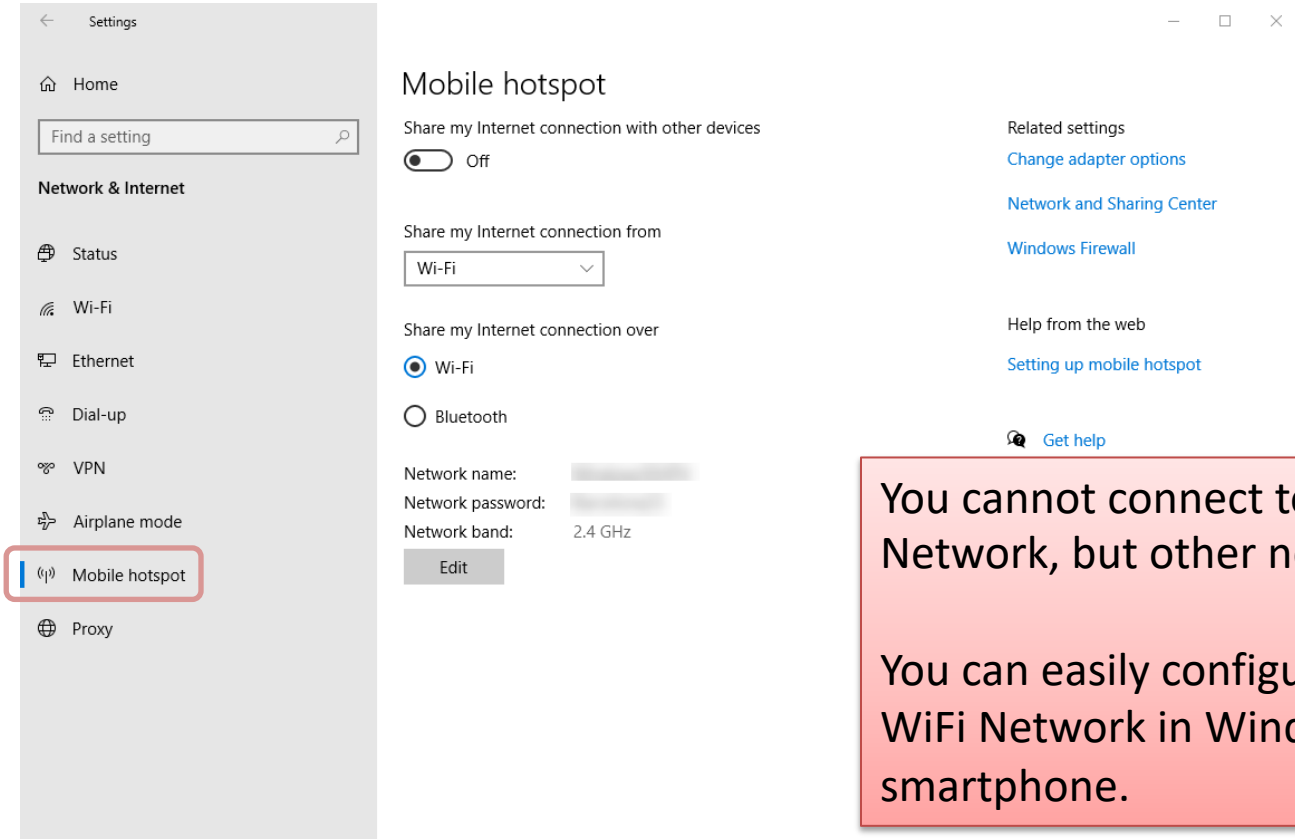
Table of Contents

Setting up a Mobile Hotspot WiFi Network



You cannot connect to your Eduroam Network, but other networks may work fine.

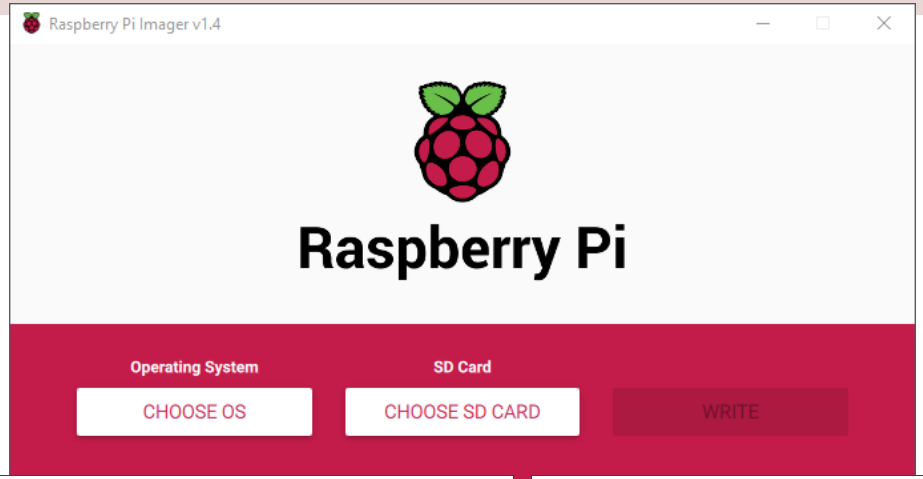
You can easily configure a Mobile Hotspot WiFi Network in Windows 10/11 or on your smartphone.

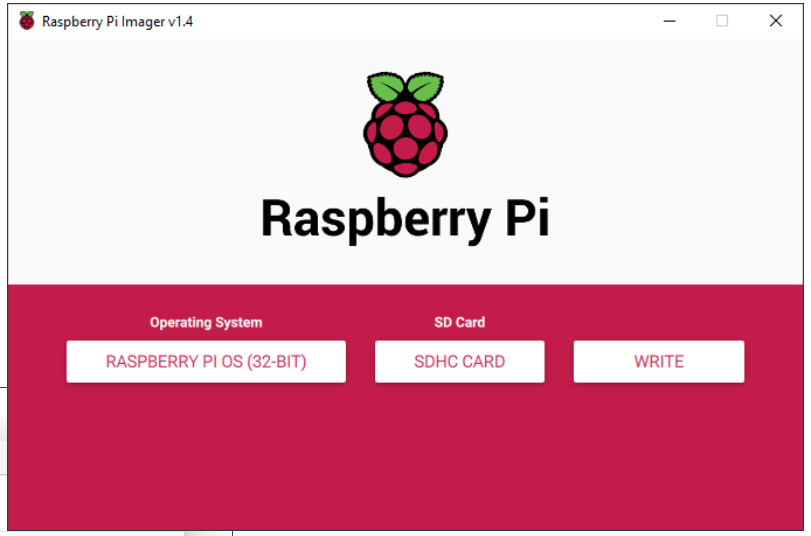
Raspberry Pi OS

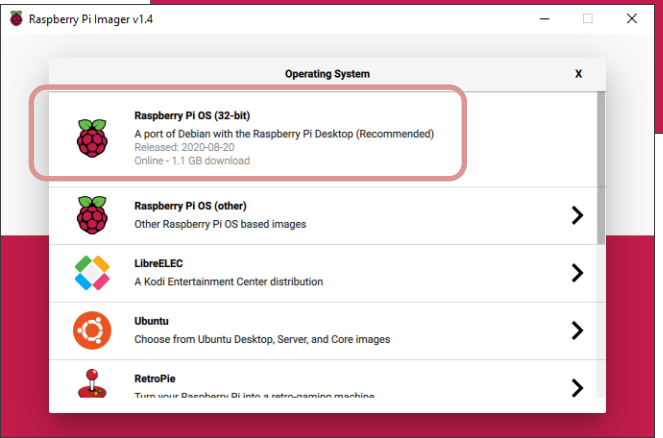
- In order make your Raspberry Pi up and running you need to install an Operating System (OS)
- The OS for Raspberry Pi is called Raspberry Pi OS
- Raspberry Pi runs a version of an operating system called Linux (Windows and macOS are other operating systems).
- To install the necessary OS, you need a microSD card
- Then you use the Raspberry Pi Imager in order to download the OS to the microSD card from your PC

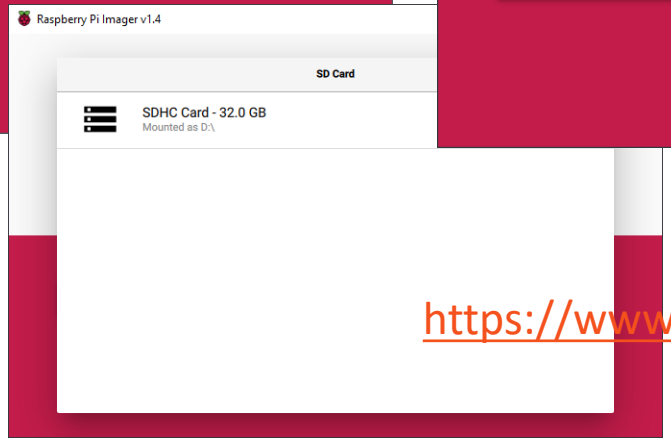
https://www.raspberrypi.org/software/

Raspberry Pi Imager









https://www.raspberrypi.org/software/

Alternative 1

Secure shell (**SSH**) network protocol

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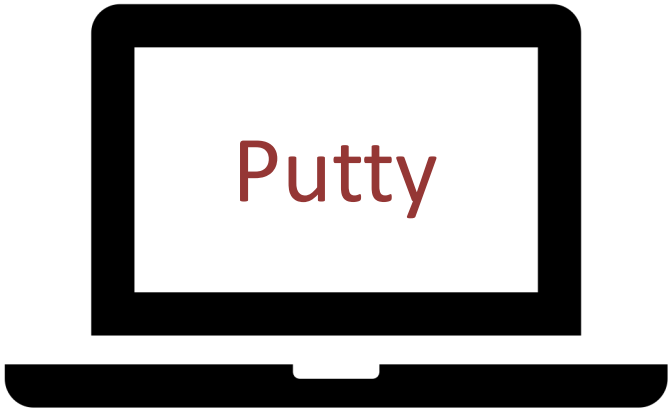
Table of Contents

Alternative 1: SSH + Putty

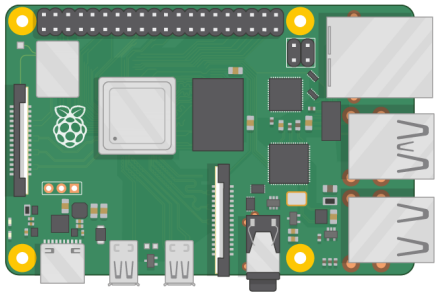
- **Secure shell (SSH)** is a network protocol that is used when you want to get access to the Command Line/Shell/Terminal on another Computer (Raspberry Pi in this case).
- Raspberry Pi supports the SSH protocol.
  - You need to enable it (see next page) due to security reasons.
- **PuTTY** is a free and open-source terminal software that supports the SSH protocol.
  - You need to install the Putty software on your PC.
- The “drawback” with this alternative is that you don’t interact using a graphical user interface, only text-based commands

Remote Access using SSH

Your PC



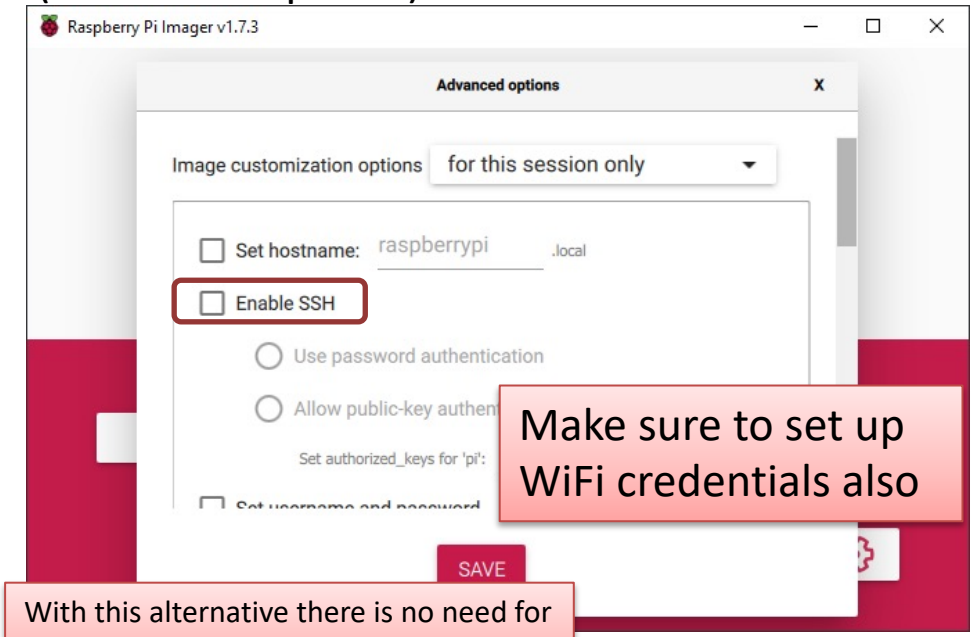
Raspberry Pi



Enable SSH

Enabling SSH on Raspberry Pi

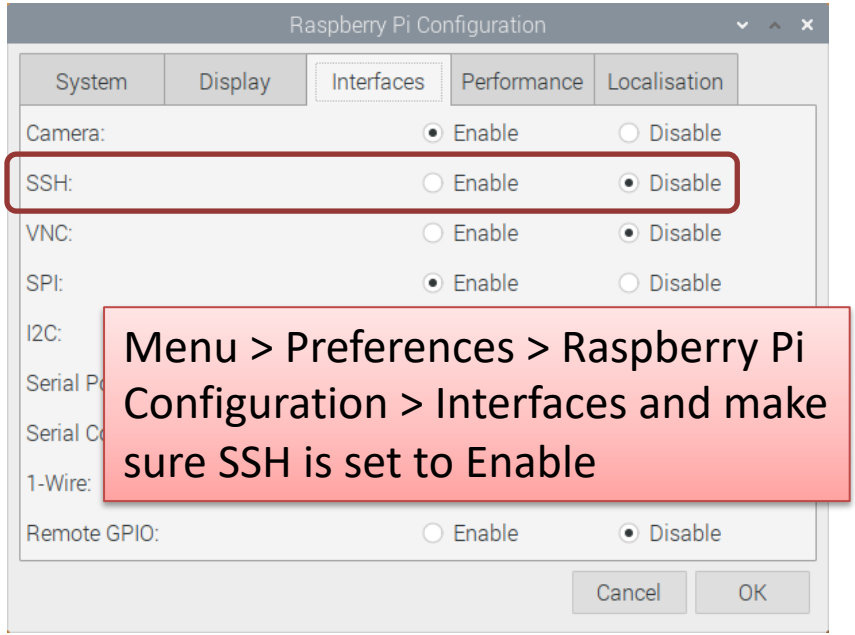
Alternative 1: Before you start installing the Raspberry Pi OS using the Raspberry Pi Imager (Advanced Options)



Make sure to set up WiFi credentials also

With this alternative there is no need for external Monitor, Keyboard and Mouse

Alternative 2: After you have installed the Raspberry Pi OS and starting it up by connection a Monitor, Keyboard and Mouse

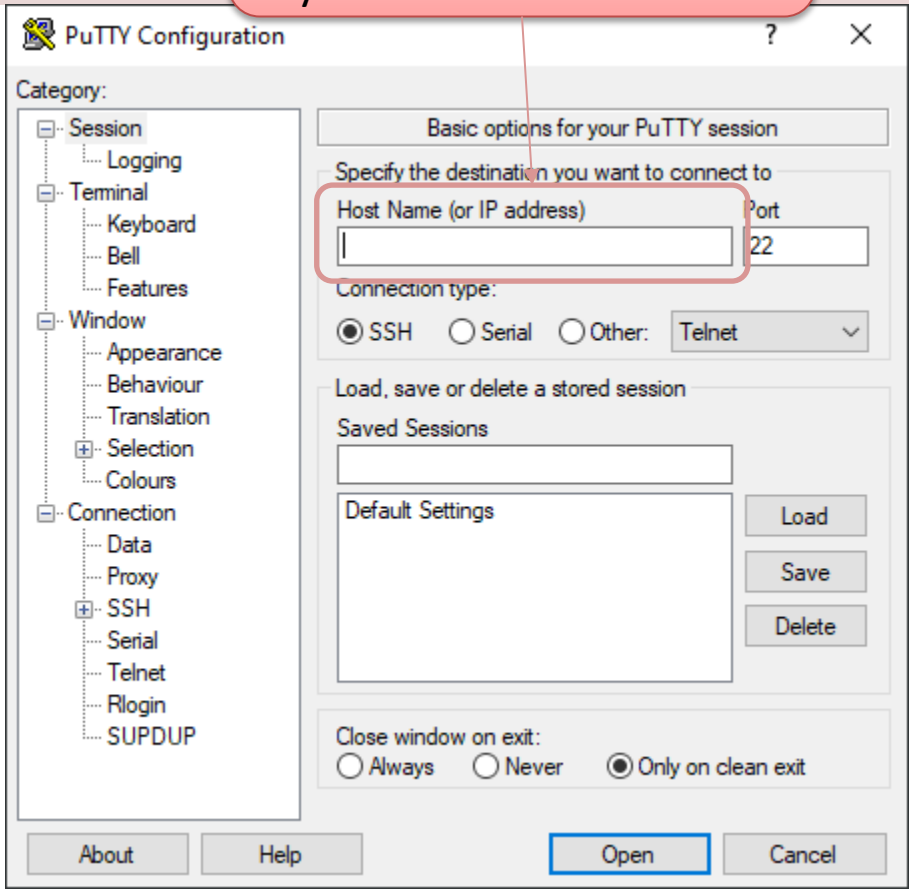


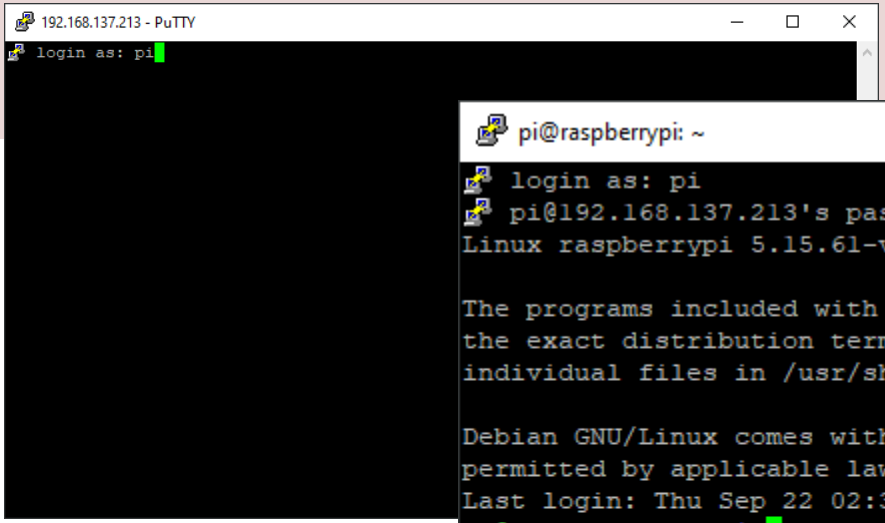
Menu > Preferences > Raspberry Pi Configuration > Interfaces and make sure SSH is set to Enable

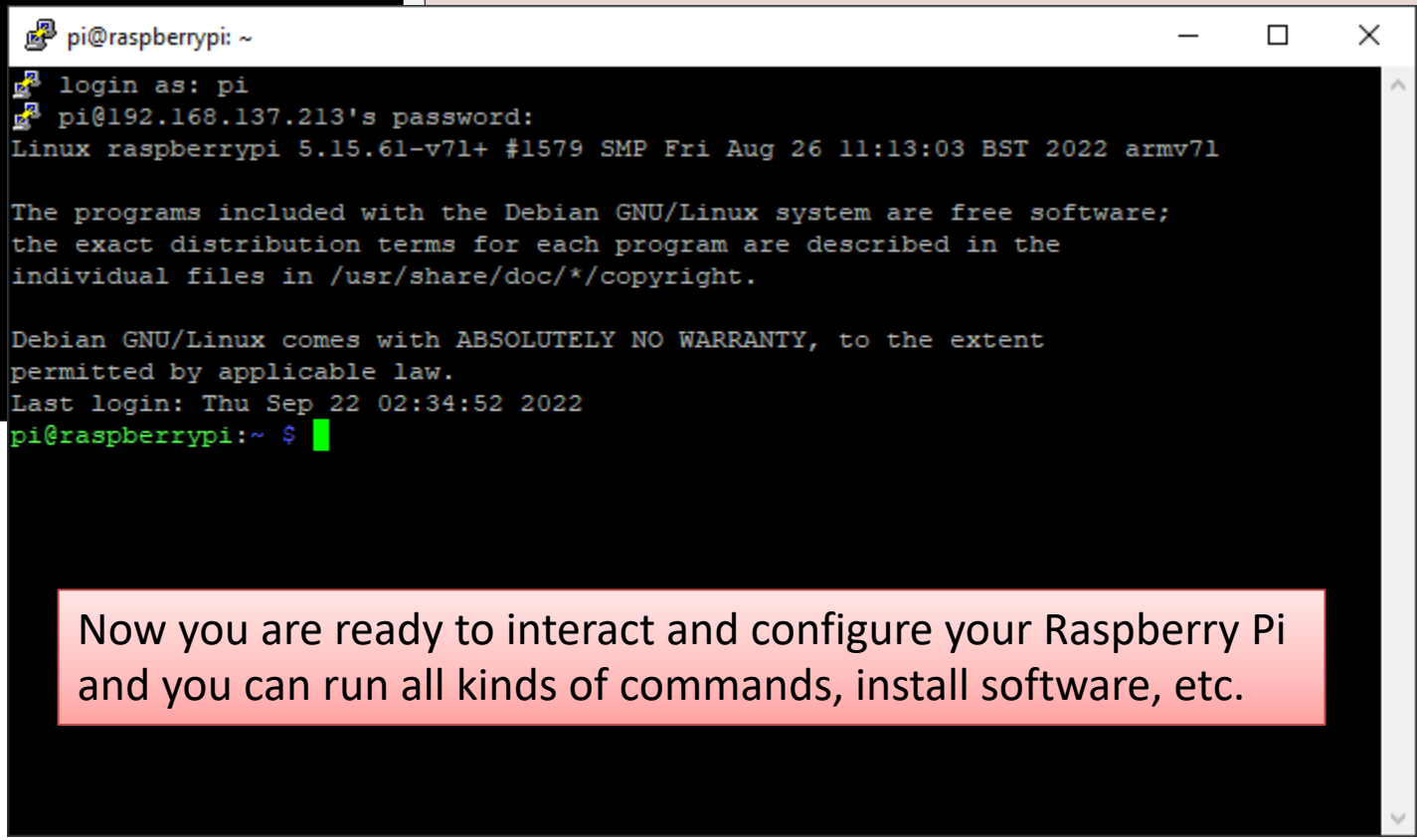
PuTTy

- PuTTY is a free and open-source terminal software.
- It supports several network protocols, including SSH.
- We install it on our PC to get remotely access to the Terminal window on Raspberry Pi

https://www.putty.org/







Now you are ready to interact and configure your Raspberry Pi and you can run all kinds of commands, install software, etc.

Type **exit** in order to close the PuTTy window

Alternative 2

Virtual Network Computing (**VNC**)

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Table of Contents

Alternative 2: VNC

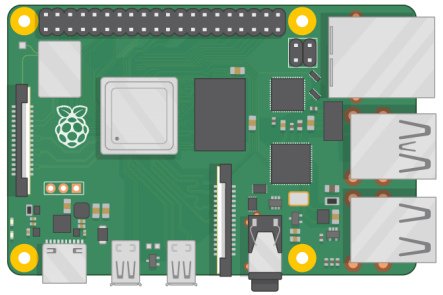
- **Virtual Network Computing (VNC)** is a Graphical Desktop-sharing System
- RealVNC Server is included with Raspberry Pi OS. It's completely free for non-commercial use; it just needs to be enabled.
- Then you need to install a VNC client on your PC.
- RealVNC is a free VNC Client
  - https://www.realvnc.com/en/connect/download/viewer/

Remote Access using VNC

Your PC

Enable VNC

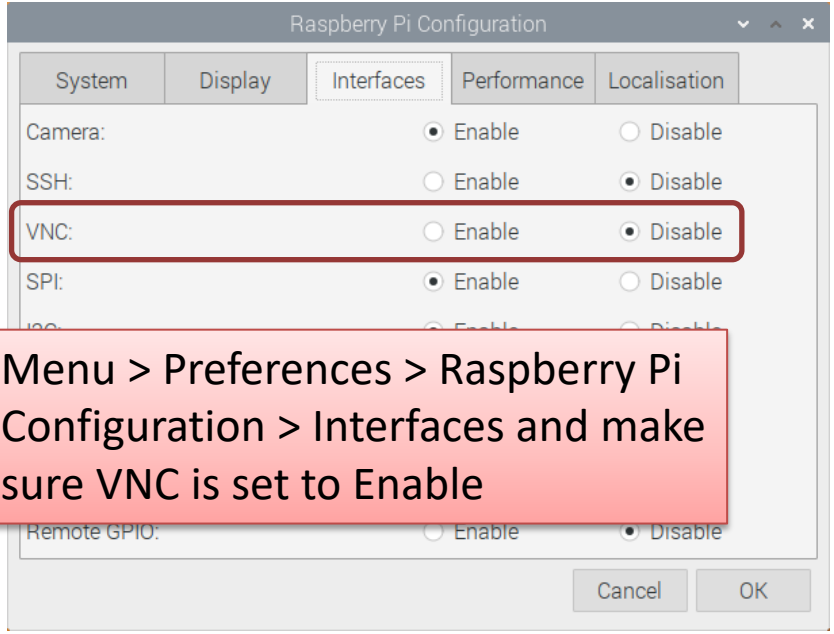
Raspberry Pi



VNC Server is already installed, but you need to enable it (“turn it on”)

Enabling VNC on Raspberry Pi

Alternative 1: <u>After</u> you have installed the Raspberry Pi OS and starting it up by connection a Monitor, Keyboard and Mouse

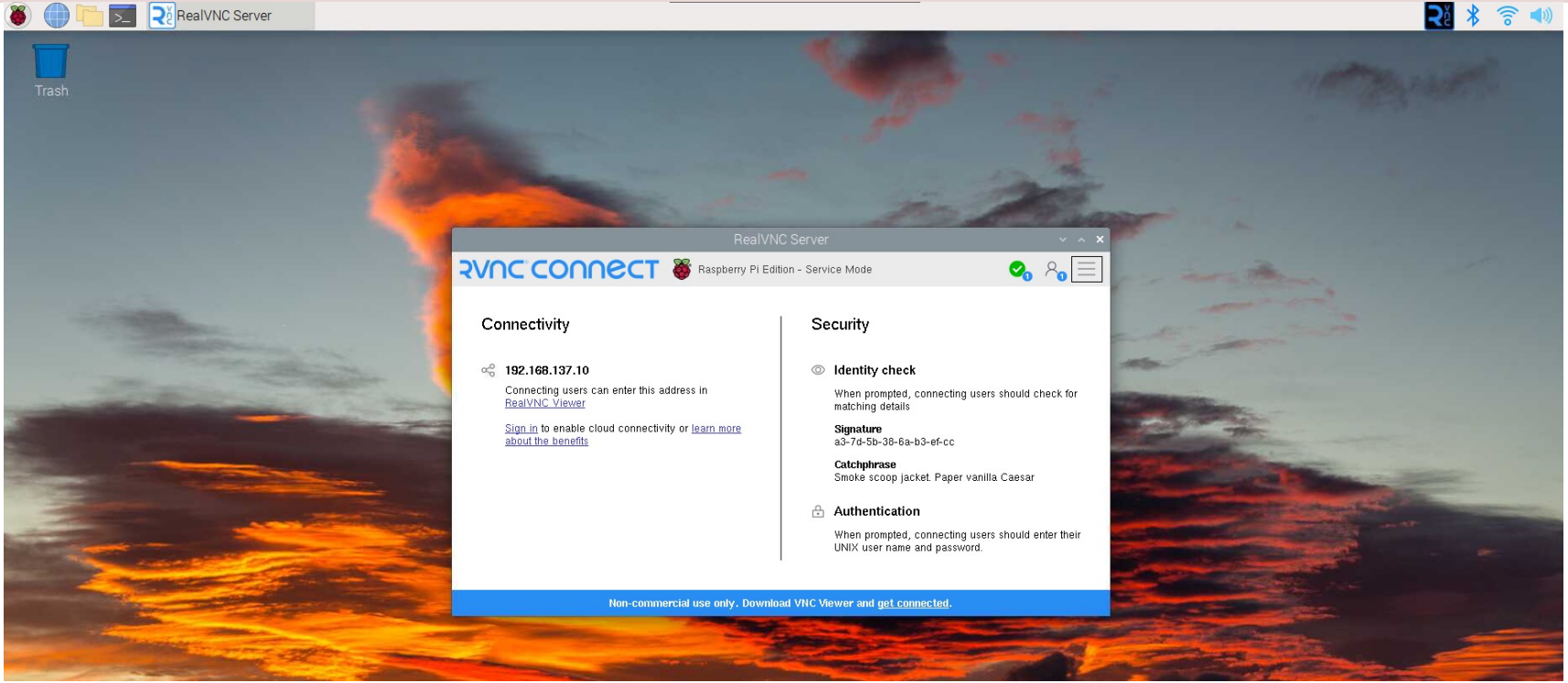


Menu > Preferences > Raspberry Pi Configuration > Interfaces and make sure VNC is set to Enable

Alternative 2: Open a terminal on your Raspberry Pi or use PuTTy

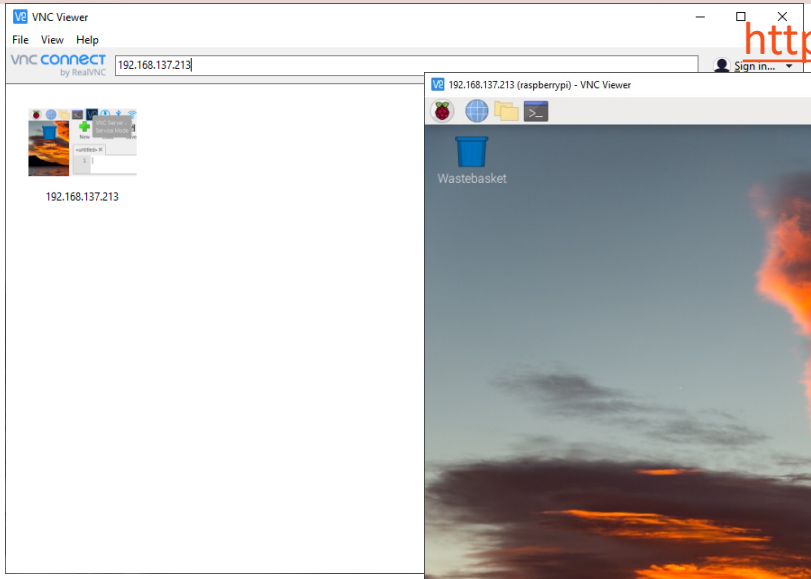
- Enter the command **sudo raspi-config**
- Use the arrow keys to select **Interfacing Options** and press Enter
- Use the arrow keys to select **VNC** and press Enter.
- You will be prompted to enable VNC Server.

VNC Server

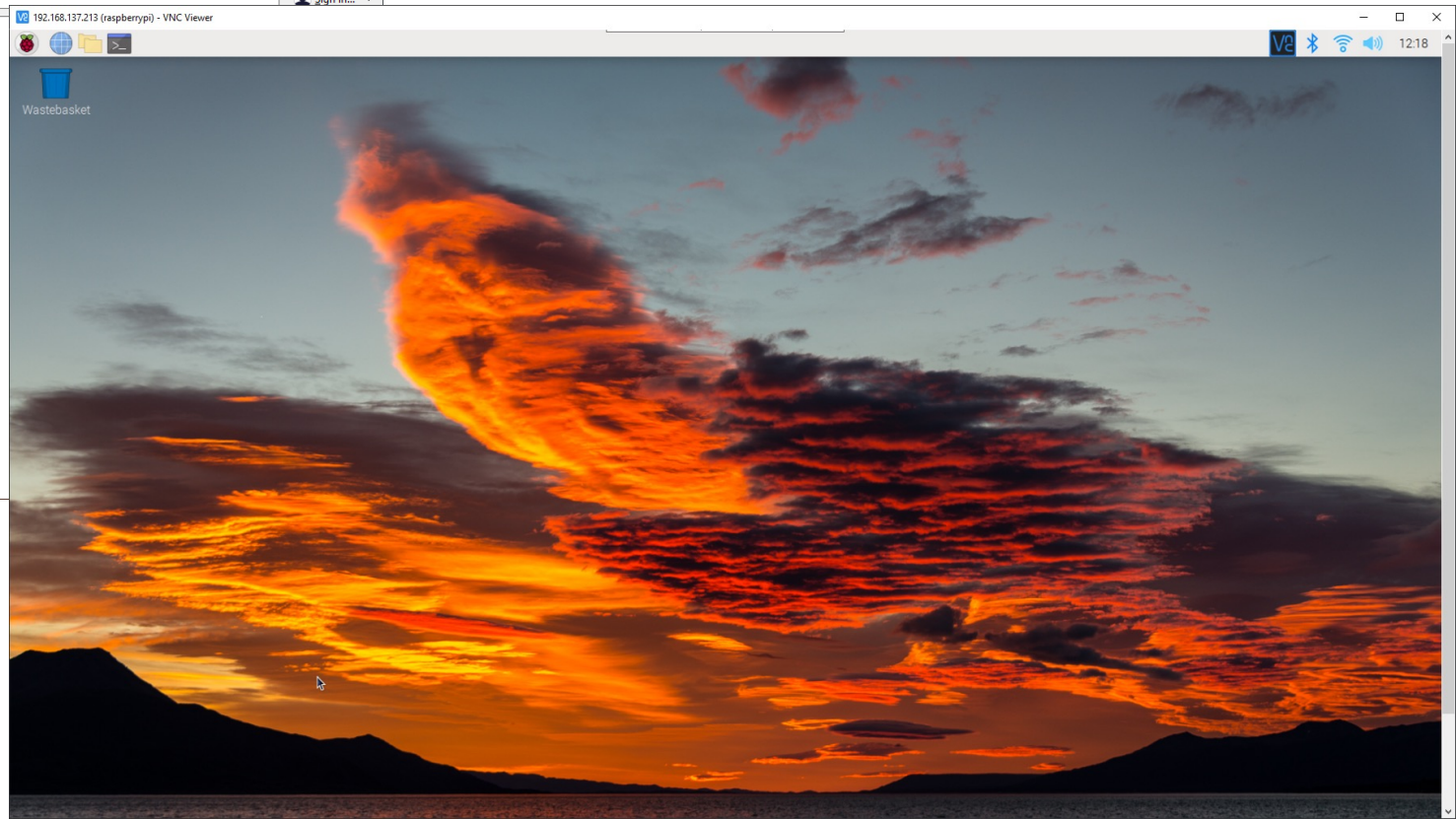


RealVNC Server is included with Raspberry Pi OS It is free for non-commercial use. You just need to enable it

VNC Viewer on your PC



https://www.realvnc.com/en/connect/download/viewer/



Install VNC Viewer on your PC and connect to your Raspberry Pi

Alternative 3

Remote Desktop Protocol (**RDP**)

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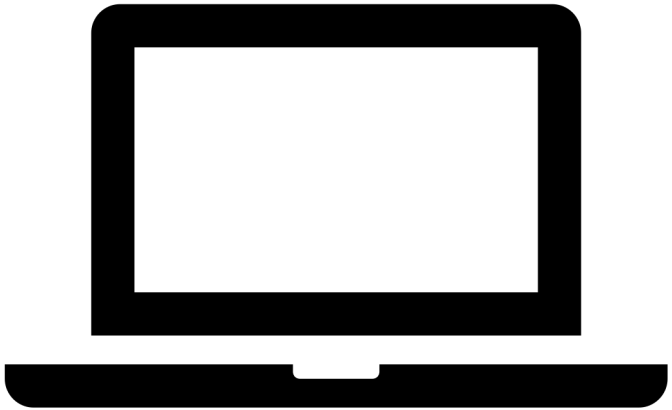
Table of Contents

Alternative 3: RDP

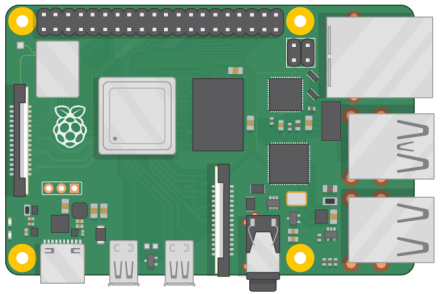
- **Remote Desktop Protocol (RDP)** is a network protocol developed by Microsoft that allows users to remotely access and interact with the graphical user interface of a remote Windows server
- You need to have an **RDP server** is installed on the remote server and an **RDP client** is installed on a local machine. Those are preinstalled on Windows Server and Windows clients (Windows 10/11).
- **XRDP** is a free and open-source implementation of Microsoft RDP (Remote Desktop Protocol) server. This Software can be installed on the Raspberry Pi (which is our “server”)

Remote Access using RDP

Your PC



Raspberry Pi



XRDP

https://en.wikipedia.org/wiki/Xrdp

https://www.xrdp.org

XRDP is a free and open-source implementation of Microsoft RDP (Remote Desktop Protocol) server

Install XRDP:

```
sudo apt-get install xrdp
```

Add New User

- You can no longer use the default account to connect via RDP (for security reasons probably).
- In order to use RDC we need to create a new user on the Raspberry Pi.
- Create New User for RDP connection

  `sudo adduser <username>`

  - If user needs sudo rights: `sudo adduser <username> sudo`
  - If user needs access to GPIO: `sudo adduser <username> gpio`
  - If user needs access to SPI: `sudo adduser <username> spi`
  - If user needs access to i2c: `sudo adduser <username> i2c`
  - etc.

Give All kind of access to the New User

The name of new user you have created

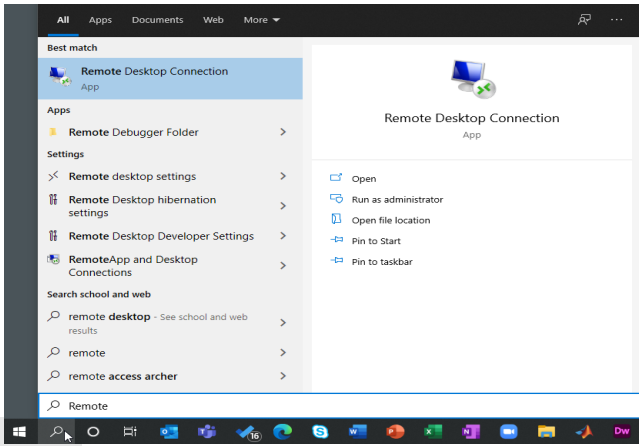
```
sudo usermod <username> -a -G pi,adm,dialout,cdrom,sudo,audio,video,plugdev,games,users,input,netdev,spi,i2c,gpio
```

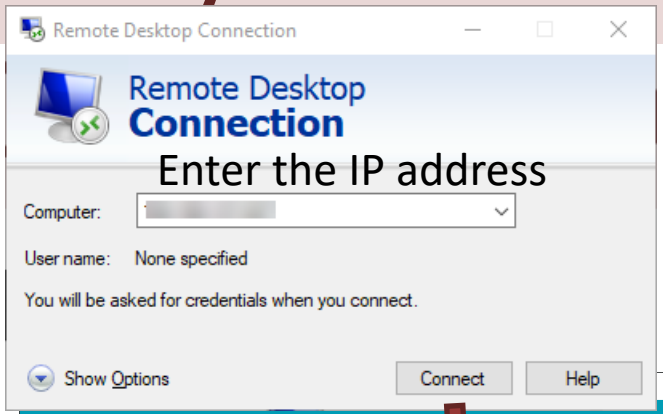
The name of the original/default user created, which may be something else than “pi”

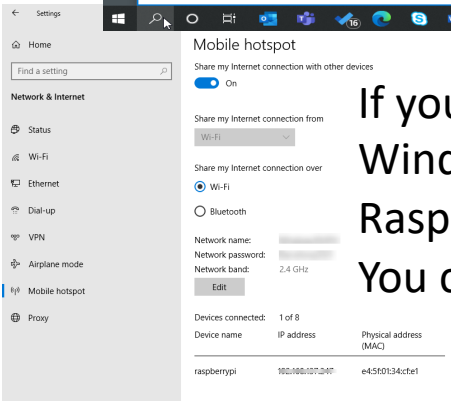
https://forums.raspberrypi.com/viewtopic.php?t=169079&sid=2dd732a5f43a8ded3bf1f837b36f8c91

Connect to Raspberry Pi from PC

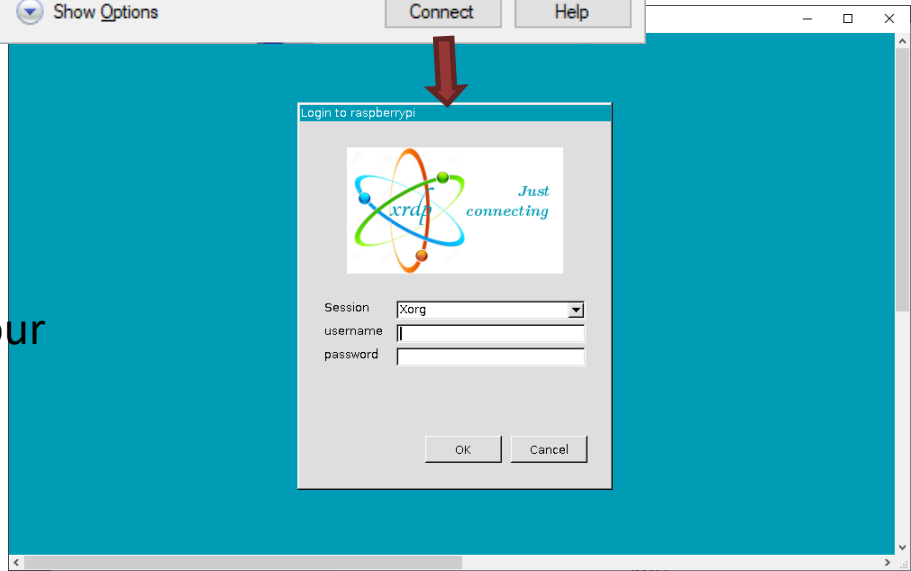
Open **Remote Desktop Connection (RDC)** on your Windows Computer:







If you use a Mobile hotspot in Windows 10/11, you can see if your Raspberry Pi is up and running. You can also see the IP address



Alternative 4

TeamViewer

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Table of Contents

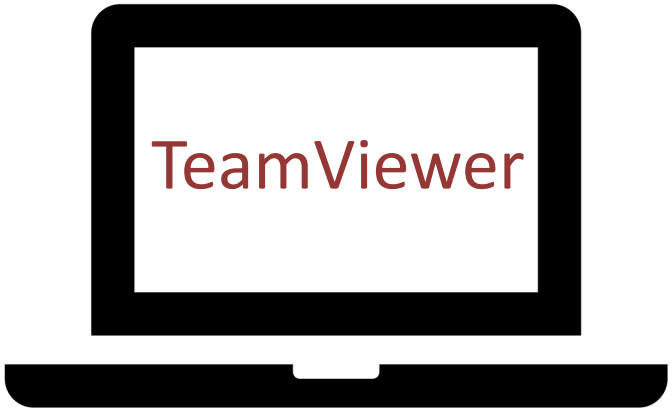
Alternative 4: TeamViewer

- TeamViewer is another software for Remote access to the Raspberry Pi and the User interface
- TeamViewer is propriety software (not open source). You can use it for free for non-commercial use
- You need to install TeamViewer software on both the Raspberry Pi and on your PC

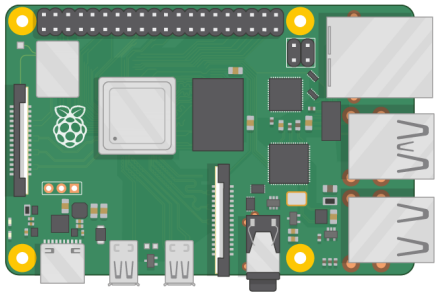
Remote Access using TeamViewer

You need to install TeamViewer software both on your PC and your Raspberry Pi

Your PC

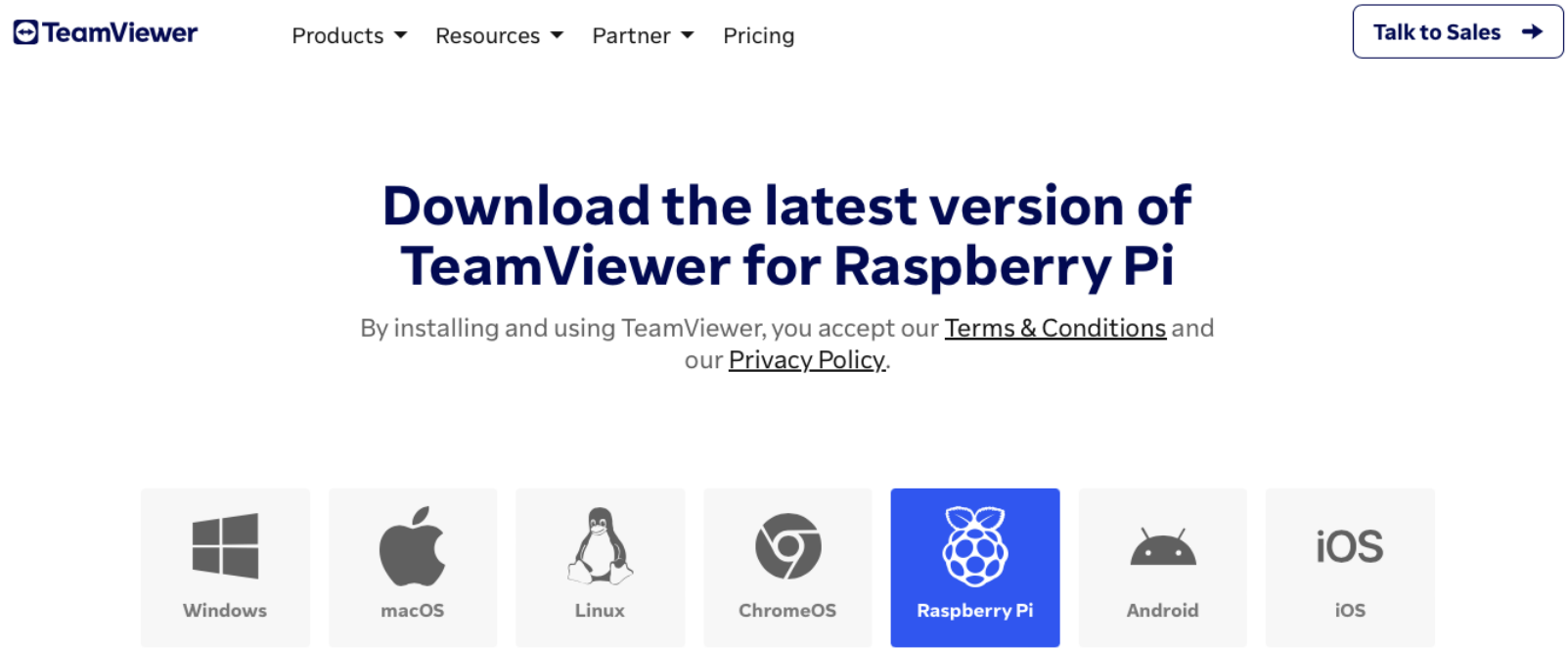


Raspberry Pi



TeamViewer

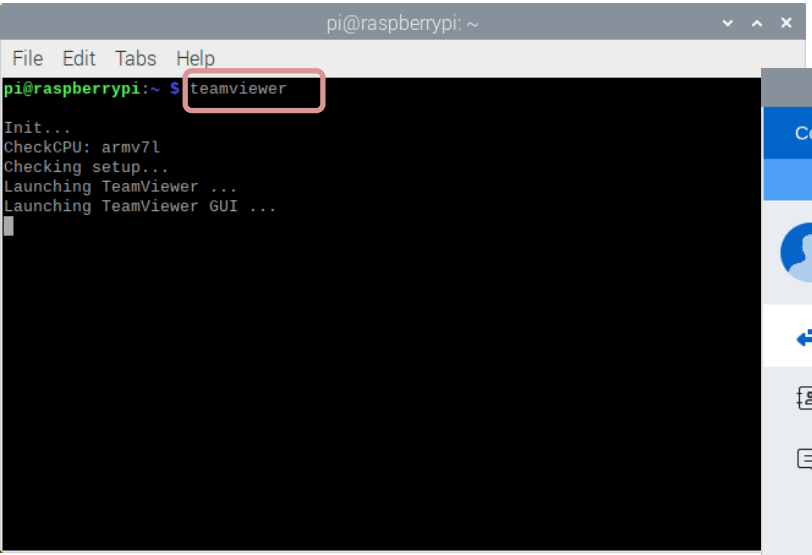
Install TeamViewer on Raspberry Pi



If trouble, follow this Tutorial: https://pimylifeup.com/raspberry-pi-teamviewer/

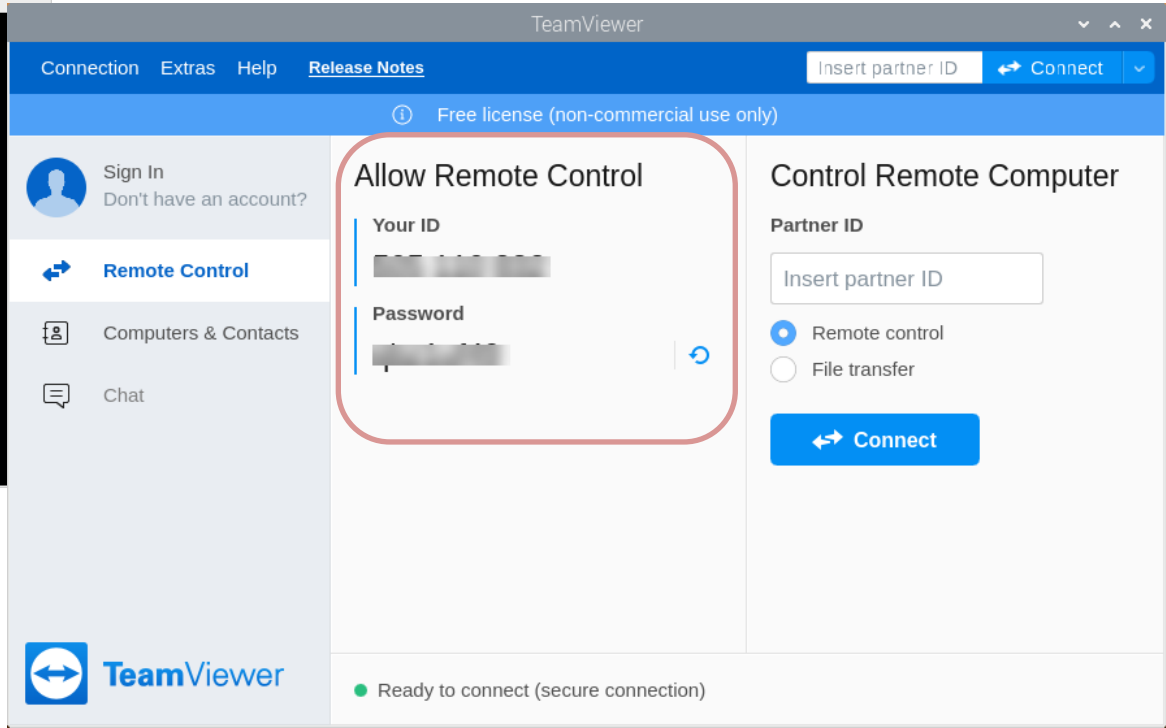
Start TeamViewer on Raspberry Pi

Start TeamViewer on your Raspberry Pi:



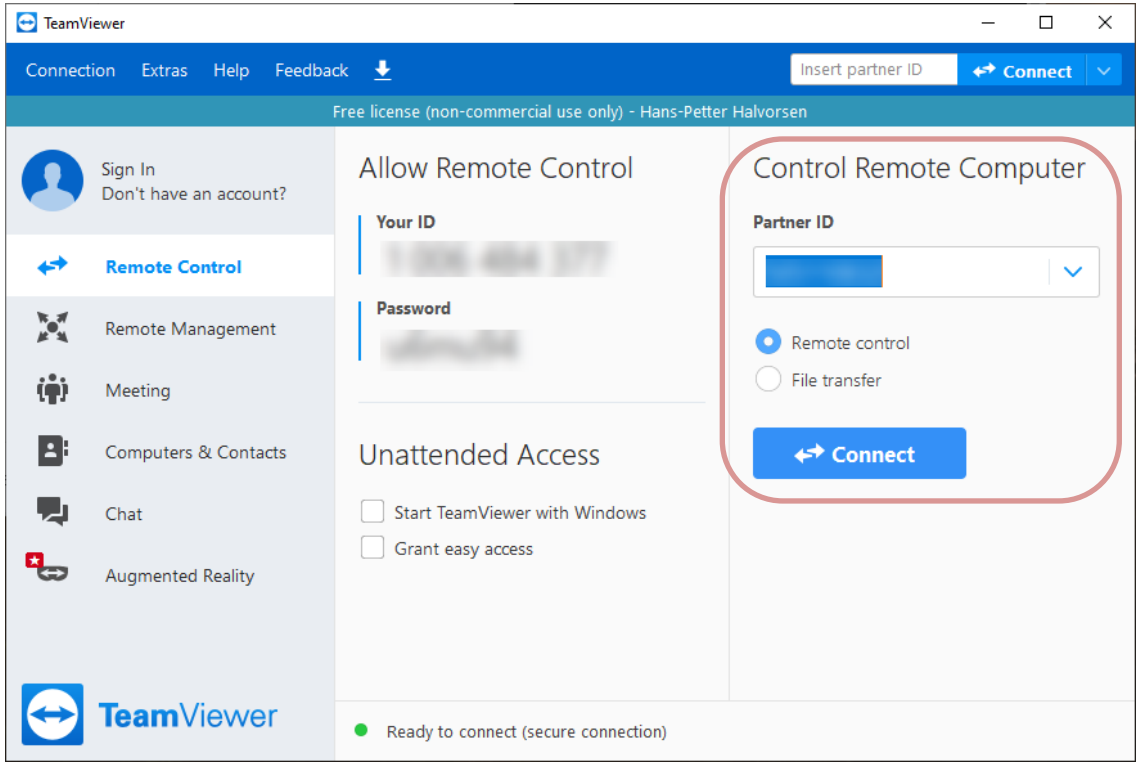
Open TeamViewer by enter “teamviewer” in the Terminal

Here you see TeamViewer on your Raspberry Pi:



Install TeamViewer on PC

Install TeamViewer on your PC as well. Then use TeamViewer to connect to your Raspberry Pi:



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