JHORVYN REYES QUISPE

INSTALACION DEL RASPBERRY PI

Paso 1

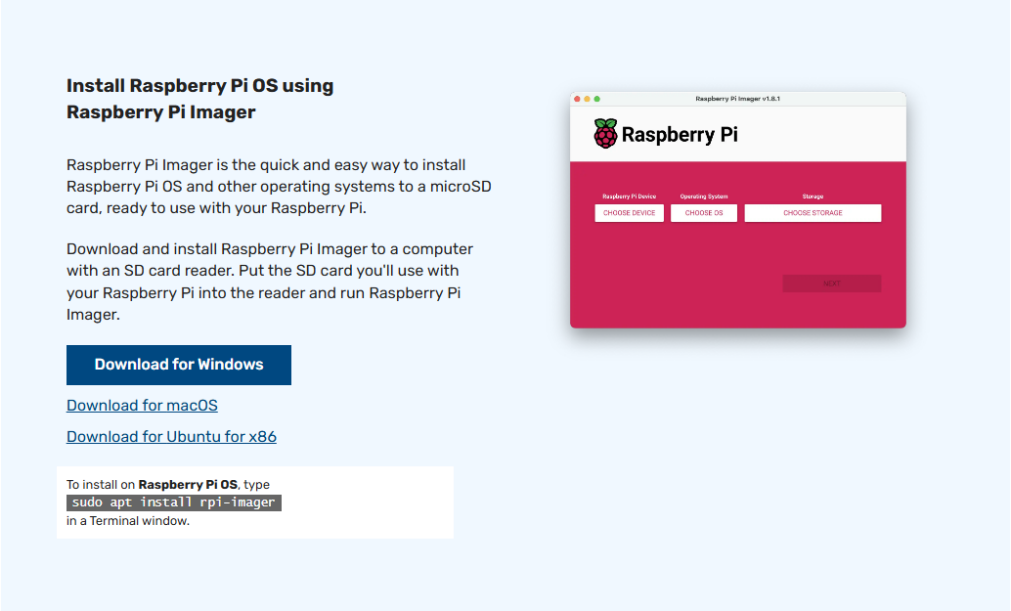
Se necesita:

- Raspberry Pi (por ejemplo, Pi 4 o 3B+).
- Tarjeta microSD (mínimo 16 GB recomendada, clase 10).
- Fuente de alimentación (5V 3A).
- Monitor (HDMI), teclado y ratón.
- Lectora de microSD o adaptador USB.

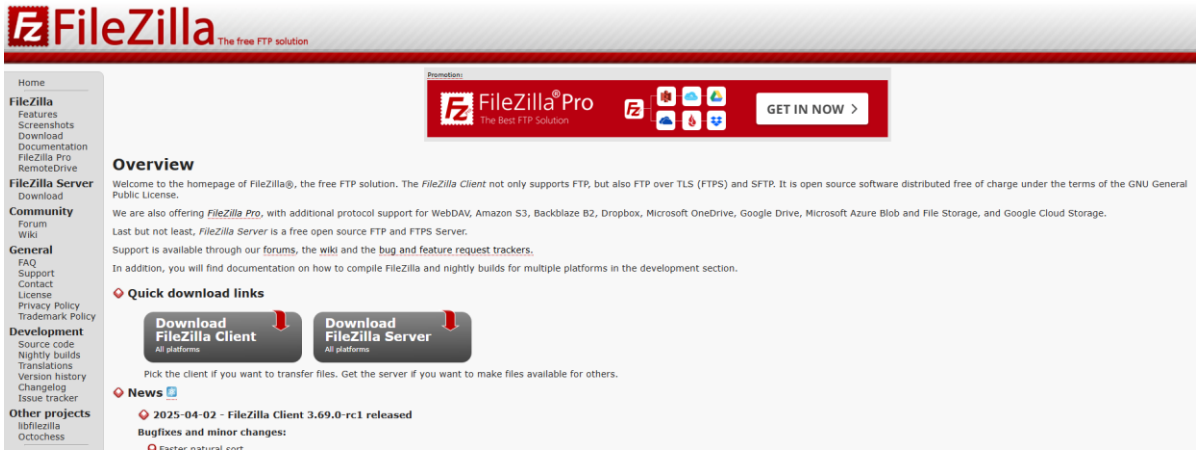
Paso 2

Lo primero es descargar 3 programas que necesitaremos

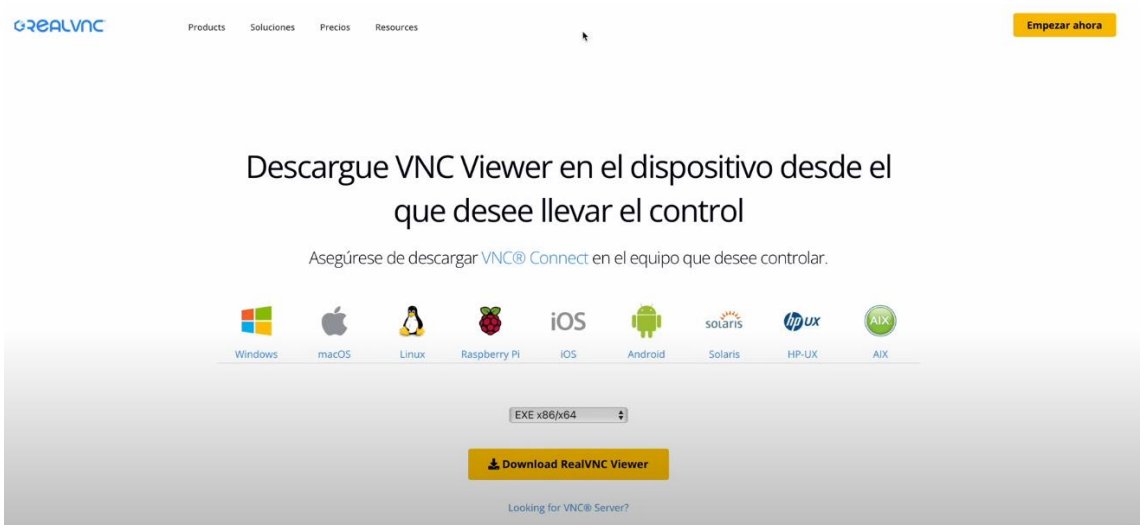
Primero descargamos RASPBERRY PI OS:



Luego descargamos el FileZilla:

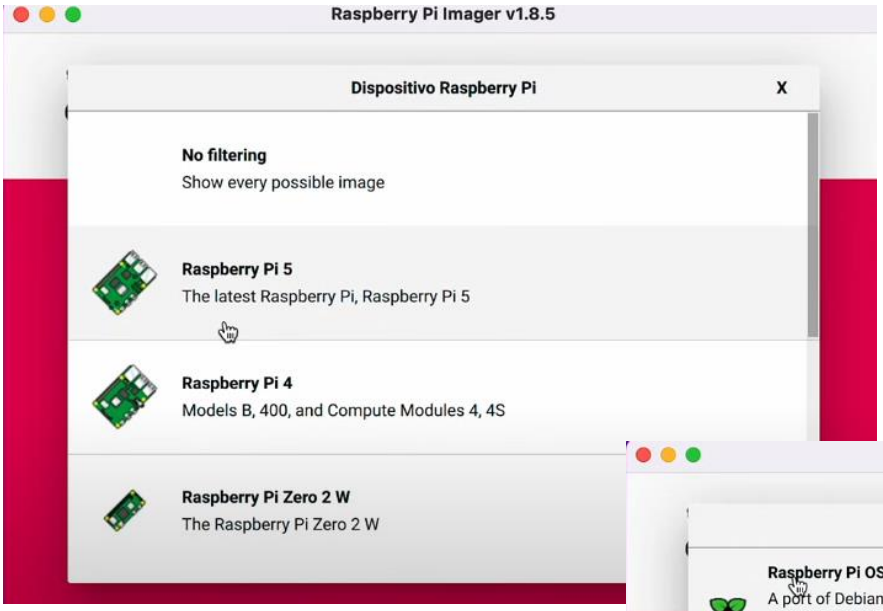


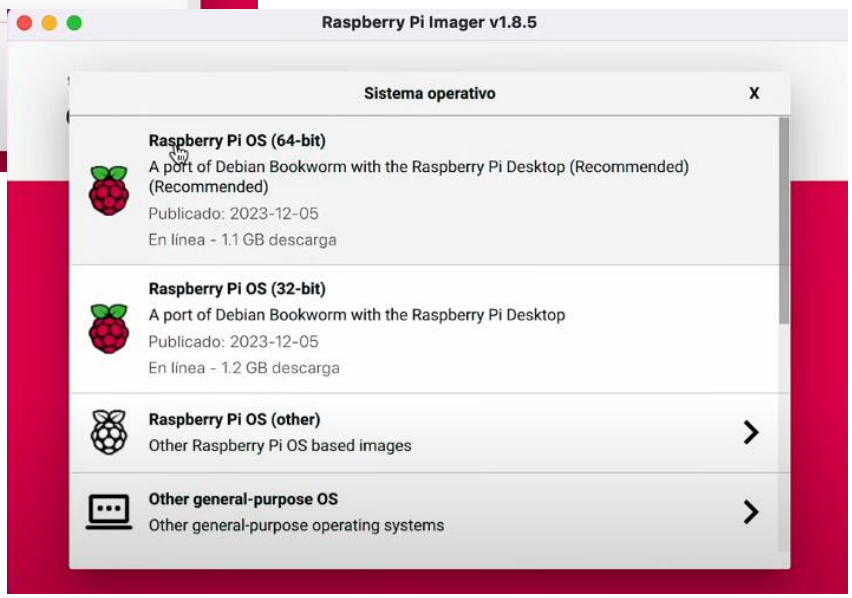
Y al final descargaremos VNC Viewer para conectarnos a Raspberry pi mediante un escritorio remoto con interfaz gráfica:



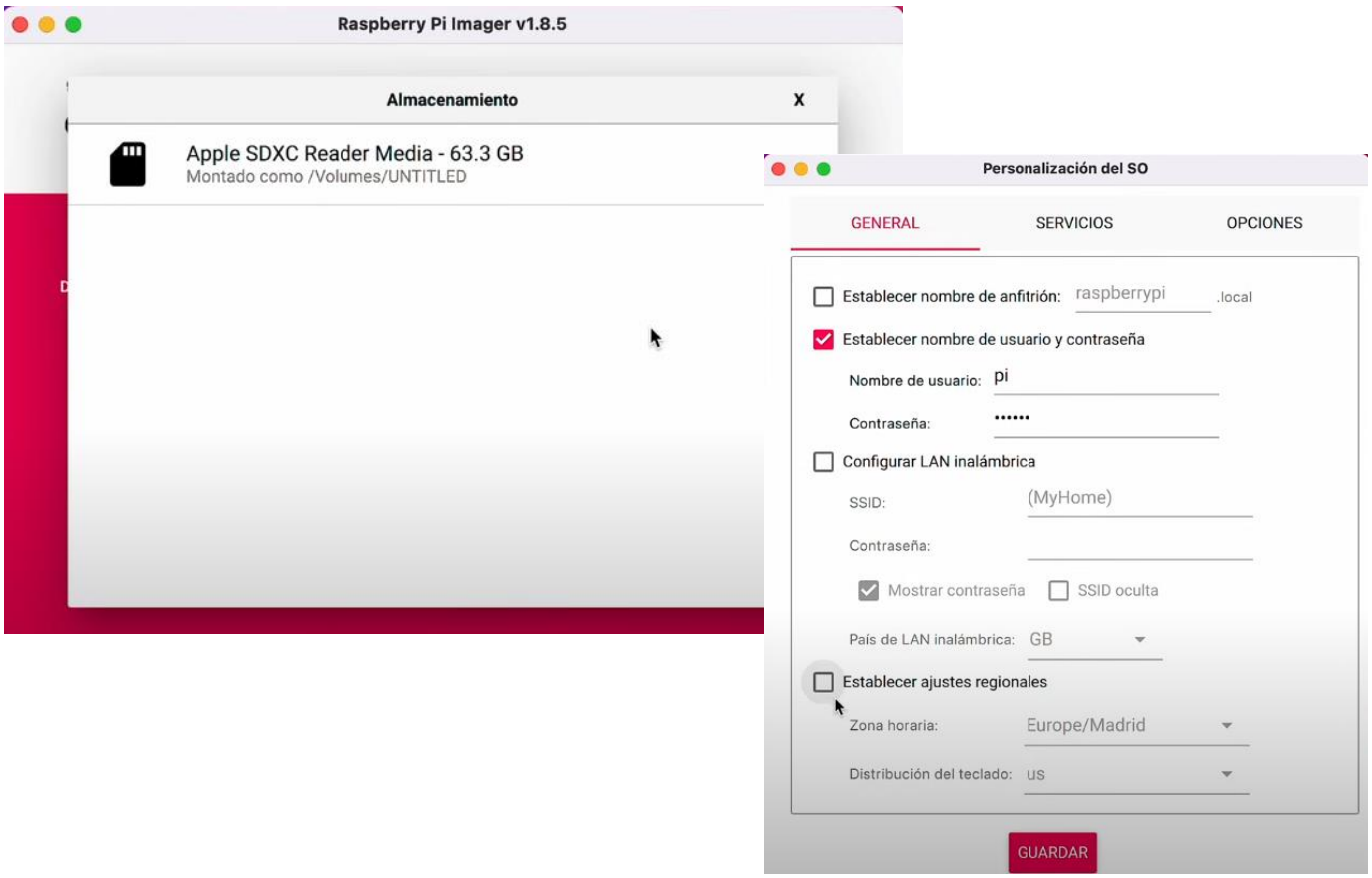
Paso 3:

Luego de haber descargado empezamos abriendo con Raspberry pi, luego introducimos nuestra tarjeta microSD y seleccionamos nuestra Raspberry pi y elegimos la versión compatible de nuestra Raspberry pi:





Luego seleccionamos nuestra tarjeta de memoria, luego personalizamos los ajustes del Sistema Operativo y guardamos y continuamos:



Luego empezará a descargar el Sistema Operativo en la microSD y al finalizar nos saldrá un mensaje que podemos retirar la tarjeta del lector y continuaremos insertando la tarjeta microSD en nuestra Raspberry pi y lo conectamos a nuestro Router, la mejor opción es conectarla por cable.

Paso 4:

Abrimos una ventana en la terminal y introducimos el comando: ping raspberrypi.local y veremos como inicia el IP con el Router asignado

```
Last login: Wed Jan 31 17:44:44 on ttys000
danielterreros@MacBook-Pro-de-Daniel ~ % ping raspberrypi.local
PING raspberrypi.local (192.168.1.10): 56 data bytes
64 bytes from 192.168.1.10: icmp_seq=0 ttl=64 time=4.336 ms
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=3.985 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=13.022 ms
64 bytes from 192.168.1.10: icmp_seq=3 ttl=64 time=31.800 ms
64 bytes from 192.168.1.10: icmp_seq=4 ttl=64 time=4.090 ms
64 bytes from 192.168.1.10: icmp_seq=5 ttl=64 time=6.146 ms
64 bytes from 192.168.1.10: icmp_seq=6 ttl=64 time=19.007 ms
64 bytes from 192.168.1.10: icmp_seq=7 ttl=64 time=262.041 ms
64 bytes from 192.168.1.10: icmp_seq=8 ttl=64 time=4.363 ms
64 bytes from 192.168.1.10: icmp_seq=9 ttl=64 time=21.768 ms
^C
--- raspberrypi.local ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 3.985/37.056/262.041/75.537 ms
danielterreros@MacBook-Pro-de-Daniel ~ %
```

Para luego pararlo con Cntrl + c, y nos conectaremos a la raspberry pi por la SSH con el siguiente comando: ssh pi@192.168.1.10 y no preguntara si queremos continuar con la conexión y le decimos que YES y introduciremos la contraseña del principio y ya estaríamos conectado a nuestra Raspberry pi y entramos a SSH con este comando

```
Last login: Wed Jan 31 17:44:44 on ttys000
danielterreros@MacBook-Pro-de-Daniel ~ % ping raspberrypi.local
PING raspberrypi.local (192.168.1.10): 56 data bytes
64 bytes from 192.168.1.10: icmp_seq=0 ttl=64 time=4.336 ms
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=3.985 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=13.022 ms
64 bytes from 192.168.1.10: icmp_seq=3 ttl=64 time=31.800 ms
64 bytes from 192.168.1.10: icmp_seq=4 ttl=64 time=4.090 ms
64 bytes from 192.168.1.10: icmp_seq=5 ttl=64 time=6.146 ms
64 bytes from 192.168.1.10: icmp_seq=6 ttl=64 time=19.007 ms
64 bytes from 192.168.1.10: icmp_seq=7 ttl=64 time=262.041 ms
64 bytes from 192.168.1.10: icmp_seq=8 ttl=64 time=4.363 ms
64 bytes from 192.168.1.10: icmp_seq=9 ttl=64 time=21.768 ms
^C
--- raspberrypi.local ping statistics ---
10 packets transmitted, 10 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 3.985/37.056/262.041/75.537 ms
danielterreros@MacBook-Pro-de-Daniel ~ % ssh pi@192.168.1.10
The authenticity of host '192.168.1.10 (192.168.1.10)' can't be established.
ED25519 key fingerprint is SHA256:NqT7IaY74i35Ex8uSfOqJx4rh1fsAWC0NKqO5zoCL6w.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.1.10' (ED25519) to the list of known hosts.
pi@192.168.1.10's password:
Linux raspberrypi 6.1.0-rpi7-rpi-2712 #1 SMP PREEMPT Debian 1:6.1.63-1+rpt1 (2023-11-24) 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: Wed Jan 31 17:40:06 2024
pi@raspberrypi:~ $
```

```
Raspberry Pi 5 Model B Rev 1.0

┤ Raspberry Pi Software Configuration Tool (raspi-config) ├

1 System Options        Configure system settings
2 Display Options       Configure display settings
3 Interface Options     Configure connections to peripherals
4 Performance Options   Configure performance settings
5 Localisation Options  Configure language and regional settings
6 Advanced Options      Configure advanced settings
8 Update                Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

        <Select>                    <Finish>
```

Ahora haremos estos pasos:

```
Raspberry Pi Software Configuration Tool (raspi-config)

1 System Options        Configure system settings
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<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

A1 Expand Filesystem        Ensures that all of the SD card is available
A2 Network Interface Names  Enable/disable predictable network i/f names
A3 Network Proxy Settings   Configure network proxy settings
A4 Boot Order               Choose network or USB device boot
A5 Bootloader Version       Select latest or default boot ROM software
A6 Wayland                  Switch between X and Wayland backends
A7 Audio Config             Set audio control system

<Select>                                <Back>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

S1 Wireless LAN       Enter SSID and passphrase
S2 Audio              Select audio out through HDMI or 3.5mm jack
S3 Password           Change password for the 'pi' user
S4 Hostname           Set name for this computer on a network
S5 Boot / Auto Login  Select boot into desktop or to command line
S6 Splash Screen      Choose graphical splash screen or text boot
S7 Power LED          Set behaviour of power LED
S8 Browser            Choose default web browser

<Select>                                <Back>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

B1 Console            Text console, requiring user to login
B2 Console Autologin  Text console, automatically logged in as 'pi' user
B3 Desktop            Desktop GUI, requiring user to login
B4 Desktop Autologin  Desktop GUI, automatically logged in as 'pi' user
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

I1 SSH        Enable/disable remote command line access using SSH
I2 VNC        Enable/disable graphical remote desktop access
I3 SPI        Enable/disable automatic loading of SPI kernel module
I4 I2C        Enable/disable automatic loading of I2C kernel module
I5 Serial Port Enable/disable shell messages on the serial connection
I6 1-Wire     Enable/disable one-wire interface
I7 Remote GPIO Enable/disable remote access to GPIO pins
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

D2 Screen Blanking  Enable/disable screen blanking
D3 VNC Resolution   Set resolution for headless use
D4 Composite        Enable/disable composite output
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

640x480
720x480
800x600
1024x768
1280x720
1280x1024
1600x1200
1920x1080
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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```

```
Raspberry Pi Software Configuration Tool (raspi-config)

L1 Locale        Configure language and regional settings
L2 Timezone      Configure time zone
L3 Keyboard      Set keyboard layout to match your keyboard
L4 WLAN Country  Set legal wireless channels for your country
```

```
Package configuration

Configuring locales

Locales are a framework to switch between multiple languages and allow users to use their language, country,
characters, collation order, etc.

Please choose which locales to generate. UTF-8 locales should be chosen by default, particularly for new
installations. Other character sets may be useful for backwards compatibility with older systems and software.

Locales to be generated:

[ ] en_SC.UTF-8 UTF-8
[ ] en_SG.UTF-8 UTF-8
[ ] en_US.UTF-8 UTF-8
[ ] en_ZA.UTF-8 UTF-8
[ ] en_ZM UTF-8
[ ] en_ZW.UTF-8 UTF-8
[ ] eo UTF-8
[ ] es_AR.UTF-8 UTF-8
[ ] es_BO.UTF-8 UTF-8
[ ] es_CL.UTF-8 UTF-8
[ ] es_CO.UTF-8 UTF-8
[ ] es_CR.UTF-8 UTF-8
[ ] es_CU UTF-8
[ ] es_DO.UTF-8 UTF-8
[ ] es_EC.UTF-8 UTF-8
[ ] es_ES.UTF-8 UTF-8
[ ] es_GT.UTF-8 UTF-8
```

```
Configuring locales

Many packages in Debian use locales to display text in the correct language for the user. You can choose a default
locale for the system from the generated locales.

This will select the default language for the entire system. If this system is a multi-user system where not all
users are able to speak the default language, they will experience difficulties.

Default locale for the system environment:

None
C.UTF-8
en_GB.UTF-8
es_ES.UTF-8

<Ok>                    <Cancel>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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<Select>                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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8 Update                Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

<Select>                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

L1 Locale        Configure language and regional settings
L2 Timezone      Configure time zone
L3 Keyboard      Set keyboard layout to match your keyboard
L4 WLAN Country  Set legal wireless channels for your country
```

```
Configuring tzdata

Please select the geographic area in which you live. Subsequent configuration questions will narrow this down by
presenting a list of cities, representing the time zones in which they are located.

Geographic area:

Africa
Americas
Antarctica
Arctic Ocean
Asia
Atlantic Ocean
Australia
Europe
Indian Ocean
Pacific Ocean
US
None of the above

<Ok>                    <Cancel>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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6 Advanced Options      Configure advanced settings
8 Update                Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

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Raspberry Pi Software Configuration Tool (raspi-config)

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Raspberry Pi Software Configuration Tool (raspi-config)

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Raspberry Pi Software Configuration Tool (raspi-config)

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5 Localisation Options  Configure language and regional settings
6 Advanced Options      Configure advanced settings
8 Update                Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

<Select>                                <Finish>
```

Empezamos a escribir el siguie nte comando para co nfigurar la ip:

```
danielterreros@MacBook-Pro-de-Daniel ~ % ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
Request timeout for icmp_seq 6
Request timeout for icmp_seq 7
Request timeout for icmp_seq 8
Request timeout for icmp_seq 9
Request timeout for icmp_seq 10
Request timeout for icmp_seq 11
Request timeout for icmp_seq 12
Request timeout for icmp_seq 13
64 bytes from 192.168.1.10: icmp_seq=14 ttl=64 time=227.203 ms
64 bytes from 192.168.1.10: icmp_seq=15 ttl=64 time=4.136 ms
64 bytes from 192.168.1.10: icmp_seq=16 ttl=64 time=3.773 ms
64 bytes from 192.168.1.10: icmp_seq=17 ttl=64 time=4.303 ms
64 bytes from 192.168.1.10: icmp_seq=18 ttl=64 time=4.204 ms
64 bytes from 192.168.1.10: icmp_seq=19 ttl=64 time=44.049 ms
^C
--- 192.168.1.10 ping statistics ---
20 packets transmitted, 6 packets received, 70.0% packet loss
round-trip min/avg/max/stddev = 3.773/47.945/227.203/81.483 ms
danielterreros@MacBook-Pro-de-Daniel ~ % ssh pi@192.168.1.10
```

```
Editar la conexión

      Nombre de perfil Conexión cableada 1
          Dispositivo eth0

= ETHERNET                                                  <Mostrar>
= 802.1X SECURITY                                           <Mostrar>

= CONFIGURACIÓN IPv4    <Automático>                        <Mostrar>
= CONFIGURACIÓN IPv6    <Automático>                        <Mostrar>

[X] Conectar de forma automática
[X] Disponible para todos los usuarios

                                                <Cancelar> <Aceptar>
```

```
Editar la conexión

      Nombre de perfil Conexión cableada 1
          Dispositivo eth0

= ETHERNET                                                  <Mostrar>
= 802.1X SECURITY                                           <Mostrar>

= CONFIGURACIÓN IPv4    <Manual>                            <Ocultar>
          Direcciones 192.168.1.10/24        <Retirar>
                      <Añadir…>
      Puerta de enlace 192.168.1.1
        Servidores DNS 8.8.8.8               <Retirar>
                       8.8.4.4               <Retirar>
                      <Añadir…>
   Búsqueda de dominios <Añadir…>

             Enrutando (No hay rutas personalizadas) <Editar…>
  [ ] Nunca utilice esta red para la ruta predeterminada
  [ ] Ignorar rutas obtenidas automáticamente
  [ ] Ignorar los parámetros DNS obtenidos automáticamente

  [ ] Solicitar la dirección IPv4 para esta conexión

= CONFIGURACIÓN IPv6    <Automático>                        <Mostrar>

[X] Conectar de forma automática
[X] Disponible para todos los usuarios

                                                <Cancelar> <Aceptar>
```

```
pi@raspberrypi:~ $ sudo nmtui
pi@raspberrypi:~ $ sudo reboot

Broadcast message from root@raspberrypi on pts/1 (Wed 2024-01-31 18:10:58 CET):

The system will reboot now!

pi@raspberrypi:~ $ Connection to 192.168.1.10 closed by remote host.
Connection to 192.168.1.10 closed.
danielterreros@MacBook-Pro-de-Daniel ~ % ping 192.168.1.10
```


```
pi@raspberrypi:~ $ sudo nmtui
pi@raspberrypi:~ $ sudo reboot

Broadcast message from root@raspberrypi on pts/1 (Wed 2024-01-31 18:10:58 CET):

The system will reboot now!

pi@raspberrypi:~ $ Connection to 192.168.1.10 closed by remote host.
Connection to 192.168.1.10 closed.
```

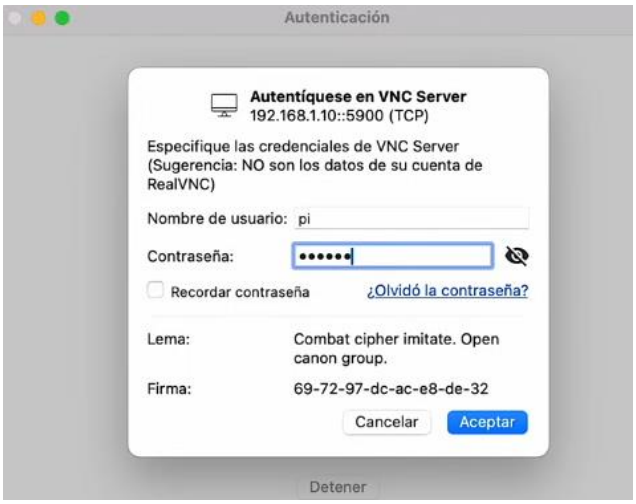

```
danielterreros@MacBook-Pro-de-Daniel ~ % ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
Request timeout for icmp_seq 6
Request timeout for icmp_seq 7
64 bytes from 192.168.1.10: icmp_seq=8 ttl=64 time=516.767 ms
64 bytes from 192.168.1.10: icmp_seq=9 ttl=64 time=162.644 ms
64 bytes from 192.168.1.10: icmp_seq=10 ttl=64 time=233.653 ms
64 bytes from 192.168.1.10: icmp_seq=11 ttl=64 time=14.327 ms
64 bytes from 192.168.1.10: icmp_seq=12 ttl=64 time=7.456 ms
^C
--- 192.168.1.10 ping statistics ---
13 packets transmitted, 5 packets received, 61.5% packet loss
round-trip min/avg/max/stddev = 7.456/186.969/516.767/186.316 ms
danielterreros@MacBook-Pro-de-Daniel ~ % ssh pi@192.168.1.10
pi@192.168.1.10's password:
```

Luego ejecutamos este código para actualizar y subir y esperemos que cargue:

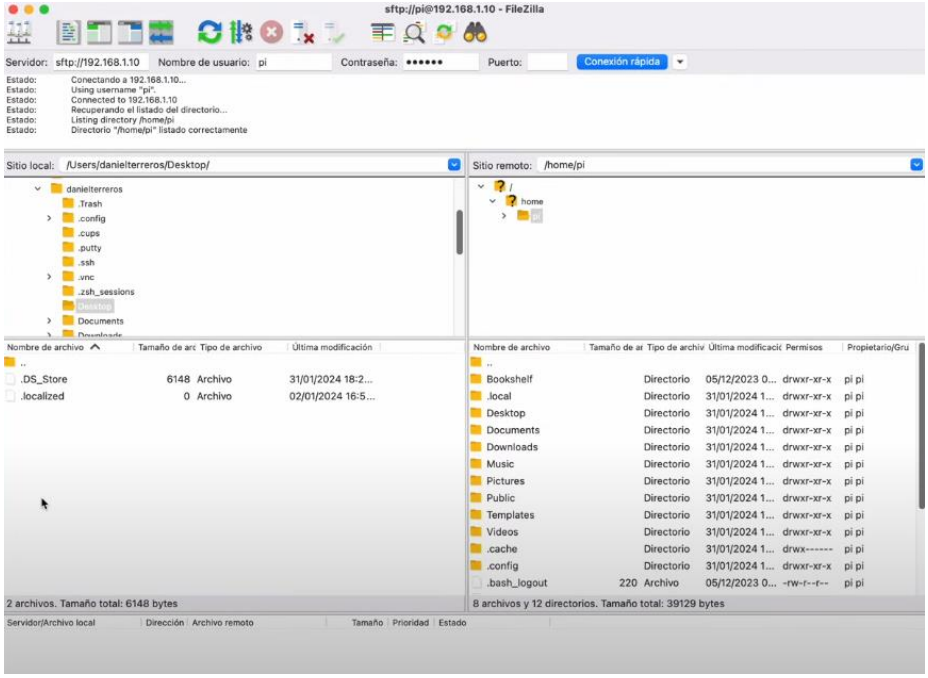
```
pi@raspberrypi:~ $ sudo apt update
Obj:1 http://deb.debian.org/debian bookworm InRelease
Obj:2 http://archive.raspberrypi.com/debian bookworm InRelease
Obj:3 http://deb.debian.org/debian-security bookworm-security InRelease
Obj:4 http://deb.debian.org/debian bookworm-updates InRelease
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se pueden actualizar 128 paquetes. Ejecute «apt list --upgradable» para verlos.
pi@raspberrypi:~ $ sudo apt full-upgrade
```

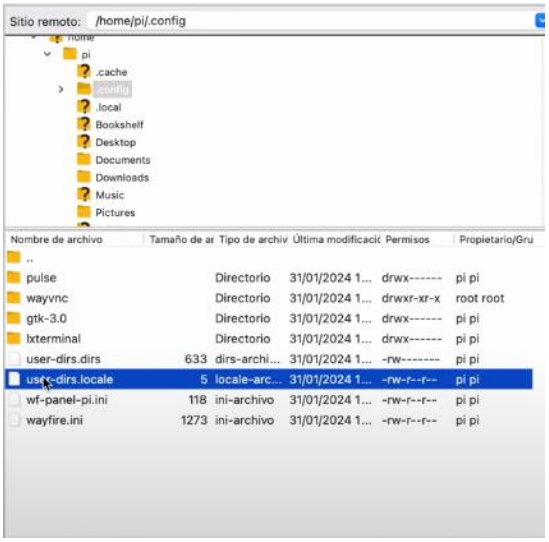
```
Desempaquetando libcups2:arm64 (2.4.2-3+deb12u5) sobre (2.4.2-3+deb12u4) ...
Preparando para desempaquetar .../01-libgtk-3-common_1%3a3.24.38-2~deb12u1+rpt3+rpi1_all.deb ...
Desempaquetando libgtk-3-common (1:3.24.38-2~deb12u1+rpt3+rpi1) sobre (1:3.24.38-2~deb12u1+rpt1+rpi1) ...
Preparando para desempaquetar .../02-libgtk-3-0_1%3a3.24.38-2~deb12u1+rpt3+rpi1_arm64.deb ...
Desempaquetando libgtk-3-0:arm64 (1:3.24.38-2~deb12u1+rpt3+rpi1) sobre (1:3.24.38-2~deb12u1+rpt1+rpi1) ...
Preparando para desempaquetar .../03-chromium-browser_120.0.6099.102-rpt1_arm64.deb ...
Desempaquetando chromium-browser (120.0.6099.102-rpt1) sobre (119.0.6045.171-rpt1) ...
Preparando para desempaquetar .../04-chromium-codecs-ffmpeg-extra_120.0.6099.102-rpt1_arm64.deb ...
Desempaquetando chromium-codecs-ffmpeg-extra (120.0.6099.102-rpt1) sobre (119.0.6045.171-rpt1) ...
Preparando para desempaquetar .../05-openssh-sftp-server_1%3a9.2p1-2+deb12u2_arm64.deb ...
Desempaquetando openssh-sftp-server (1:9.2p1-2+deb12u2) sobre (1:9.2p1-2+deb12u1) ...
Preparando para desempaquetar .../06-openssh-server_1%3a9.2p1-2+deb12u2_arm64.deb ...
Desempaquetando openssh-server (1:9.2p1-2+deb12u2) sobre (1:9.2p1-2+deb12u1) ...
Preparando para desempaquetar .../07-openssh-client_1%3a9.2p1-2+deb12u2_arm64.deb ...
Desempaquetando openssh-client (1:9.2p1-2+deb12u2) sobre (1:9.2p1-2+deb12u1) ...
Preparando para desempaquetar .../08-raspi-firmware_1%3a1.20231024+ds-1+rpt5_all.deb ...
Desempaquetando raspi-firmware (1:1.20231024+ds-1+rpt5) sobre (1:1.20231024+ds-1+rpt2) ...
Preparando para desempaquetar .../09-rpi-firefox-mods_20240110_all.deb ...
Desempaquetando rpi-firefox-mods (20240110) sobre (20231002) ...
Preparando para desempaquetar .../10-tzdata_2023c-5+deb12u1_all.deb ...
Desempaquetando tzdata (2023c-5+deb12u1) sobre (2023c-5) ...
Preparando para desempaquetar .../11-curl_7.88.1-10+deb12u5_arm64.deb ...
Desempaquetando curl (7.88.1-10+deb12u5) sobre (7.88.1-10+deb12u4) ...
Preparando para desempaquetar .../12-libcurl4_7.88.1-10+deb12u5_arm64.deb ...
Desempaquetando libcurl4:arm64 (7.88.1-10+deb12u5) sobre (7.88.1-10+deb12u4) ...
Preparando para desempaquetar .../13-distro-info-data_0.58+deb12u1_all.deb ...
Desempaquetando distro-info-data (0.58+deb12u1) sobre (0.58) ...
Preparando para desempaquetar .../14-exfatprogs_1.2.0-1+deb12u1_arm64.deb ...
Desempaquetando exfatprogs (1.2.0-1+deb12u1) sobre (1.2.0-1) ...
Preparando para desempaquetar .../15-firefox_122.0-1+rpt4_arm64.deb ...
Desempaquetando firefox (122.0-1+rpt4) sobre (120.0-2+rpt3) ...
Preparando para desempaquetar .../16-firmware-atheros_1%3a20230210-5+rpt3_all.deb ...
Desempaquetando firmware-atheros (1:20230210-5+rpt3) sobre (1:20230210-5+rpt2) ...

Progreso: [ 21%] [####################.....................................................]
```

Ahora conectaremos con el escritorio remoto:

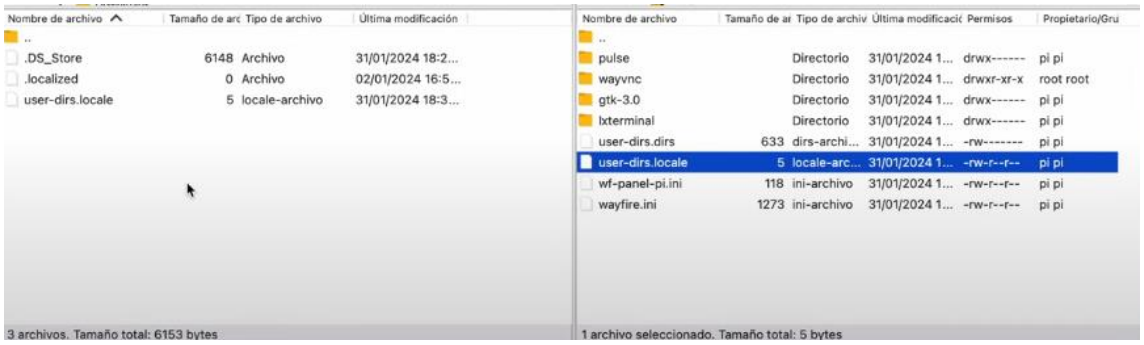


Ahora haremos la gestión de archivos FTP:





Y lo movemos aquí:



Hasta aquí acabaríamos con la Instalación

COMO USAR LOS PROTOCOLOS DE RED

¿Cómo usar los protocolos de red en proyectos IoT?

Una vez tu Raspberry Pi esté conectada a internet (por WiFi o cable), puedes usar distintos **protocolos de red** según el tipo de comunicación que necesitas en tu proyecto:

✅ HTTP

- Lo puedes usar si quieres enviar datos a una página web o API.
- Ejemplo: Tu sensor de temperatura sube datos a una plataforma web cada 10 minutos.
- Lo usas con lenguajes como Python (usando requests) o con servidores como Flask.

✅ TCP/IP

- Es la base de toda la comunicación de red. No tienes que configurarlo directamente.
- Lo usas al navegar, enviar datos o conectar con otros dispositivos.

✅ MQTT

- Ideal para enviar datos entre muchos dispositivos de forma eficiente.
- Funciona con un servidor central llamado **broker** (por ejemplo, Mosquitto).
- Puedes instalarlo en la Raspberry o usar uno en la nube.

Ejemplo:

1. Instalas el cliente con: sudo apt install mosquitto mosquitto-clients
2. Publicas un mensaje:
   mosquitto_pub -h localhost -t "sensor/temperatura" -m "22.5"
3. Otro dispositivo se suscribe para recibir los datos:
   mosquitto_sub -h localhost -t "sensor/temperatura"

✅ **LoRaWAN y CoAP**

- **LoRaWAN**: Necesitas un módulo LoRa externo (no viene con la Raspberry).
- **CoAP**: Puedes usarlo con Python instalando librerías como aiocoap para dispositivos que no pueden usar HTTP.