
SunFounder Pironman 5 NAS

www.sunfounder.com

Nov 21, 2025

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Pironman 5 NAS Overview

Pironman 5 NAS is the latest addition to our Pironman Raspberry Pi case series, designed exclusively for the new Raspberry Pi 5. It's not only a powerful local network storage (NAS) system, but also a versatile personal server capable of hosting multimedia applications, game emulators, ad-blocking services, and more.

As a high-performance NAS solution, Pironman 5 NAS features:

- **Dual Network Ports:** Built-in 2.5G Ethernet port and the Raspberry Pi's native Gigabit Ethernet, offering high-speed data transfer and better network performance.
- **Dual Drive Bays with RAID Support:** Supports two 3.5" or 2.5" SATA drives and allows software RAID 0 or RAID 1 configuration for flexible storage capacity and data redundancy.
- **Dual NVMe Slots:** Equipped with two M.2 NVMe slots for fast and efficient storage, ideal for booting and running applications.
- **Efficient Cooling System:** Equipped with a large 90mm fan for effective, quiet cooling of the entire system.
- **OLED Status Display:** Integrated OLED screen displays essential system stats and drive information in real-time, helping you monitor device health at a glance.
- **User-Friendly Interface Design:** Converts the micro HDMI port to a standard HDMI connector, and adds a front-access USB port for convenient device interaction.

Pironman 5 NAS is a professional-grade solution tailored for users building their own private cloud, home media center, or edge computing node.

If you have any questions, please send an email to service@sunfounder.com and we will respond as soon as possible.

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1. WHAT ELSE SHOULD WE PREPARE?

Essential Components

- Raspberry Pi 5

The Pironman 5 is fully compatible with the Raspberry Pi 5.

- Micro SD Card

It is recommended to use an SD card with a minimum of 16GB of storage for Raspberry Pi OS. For Raspberry Pi OS Lite, a minimum of 4GB is advised.

Optional Components

- 3.5-inch and 2.5-inch SATA Drives

The Pironman 5 NAS supports optional storage expansion through one or two 3.5-inch SATA or 2.5-inch drives. This flexible configuration allows users to enhance their storage capacity using standard hard drives or SSDs, making it ideal for data-heavy applications or media storage setups.

- SSD Drives

The Pironman 5 NAS supports optional storage expansion through one or two SSD drives. This flexible configuration allows users to enhance their storage capacity using high-speed SSDs, making it ideal for data-intensive applications or media storage setups.

- Screen

To access the Raspberry Pi's desktop environment, a screen such as a TV or a computer monitor is required.

- HDMI Cable

The Raspberry Pi 5's HDMI ports have been adapted to standard HDMI Type A interfaces via a USB HDMI adapter. Therefore, a standard HDMI to HDMI cable is needed to connect the Pironman 5 to a display.

- Mouse & Keyboard

Any USB port on the Pironman 5 can be used to connect a wired keyboard and mouse, or a USB Bluetooth receiver for wireless peripherals.

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2. ASSEMBLY INSTRUCTIONS

Before assembling the Pironman, please first verify that all parts and components have been included. If there are any missing or damaged components, please contact SunFounder immediately at service@sunfounder.com to resolve the issue as soon as possible.

Tips

- It is recommended to follow the paper installation instructions step by step.
- Before installation, sort and stack the components to find them more quickly.
- Repeatedly check the connections of FFC and FPC cables to avoid poor contact.
- [\[PDF\]Component List and Assembly of Pironman 5 NAS](#)

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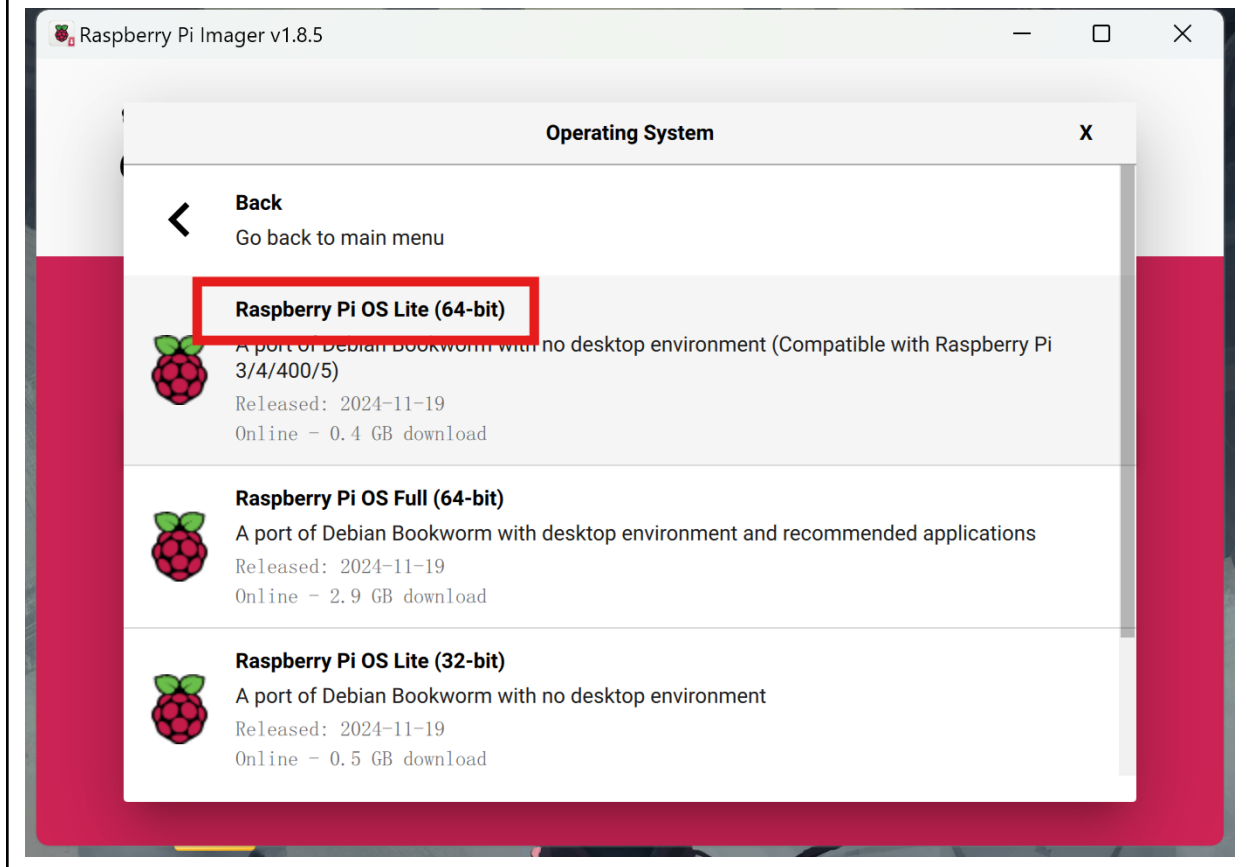
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3. INSTALLING THE OPERATING SYSTEM

Warning: OpenMediaVault **does not** support installation on the Raspberry Pi OS desktop or Home Assistant OS. Please make sure you have installed the correct operating system and configured the network. The procedure here is consistent with *Installing the OS on a Micro SD Card*, but when selecting an image, please choose Raspberry Pi OS Lite from Raspberry Pi OS (other).



In this chapter, you will learn how to install the operating systems. All the installation steps depend on the , which you need to install first.

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3.1 Install the Raspberry Pi OS

You can choose the installation method based on whether you have a Micro SD or an NVMe SSD at hand.

- Installing directly onto the NVMe SSD involves an additional step compared to installing on the Micro SD; you must update the Raspberry Pi's bootloader because it defaults to boot from the Micro SD card. Update the bootloader to prioritize booting from the NVMe SSD.

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3.1.1 Installing the OS on a Micro SD Card

If you are using a Micro SD card, you can follow the tutorial below to install the system onto your Micro SD card.

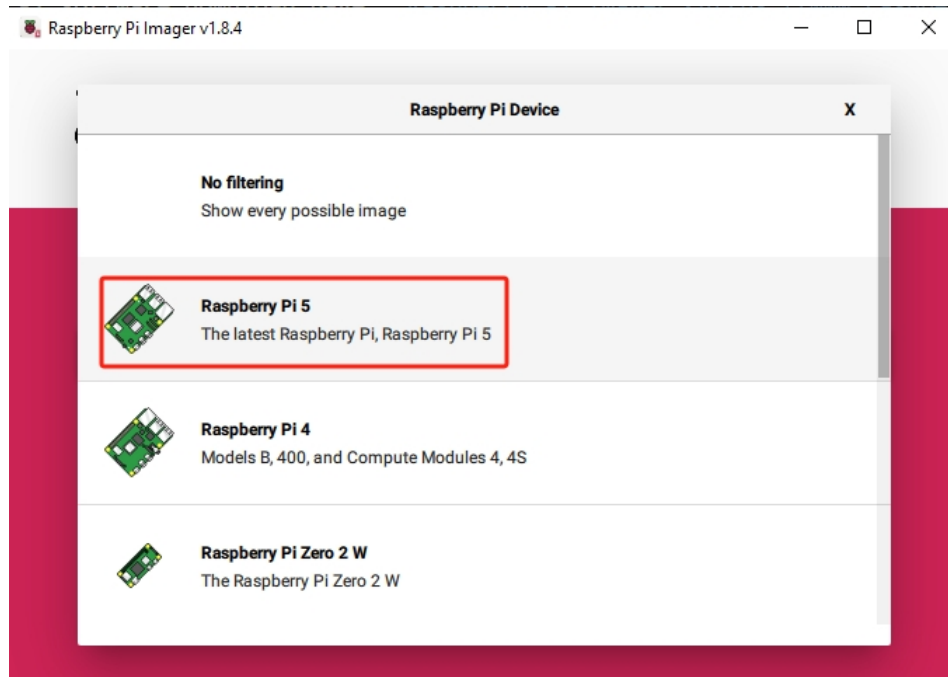
Required Components

- A Personal Computer
- A Micro SD card and Reader

Steps

1. Insert your SD card into your computer or laptop using a Reader.

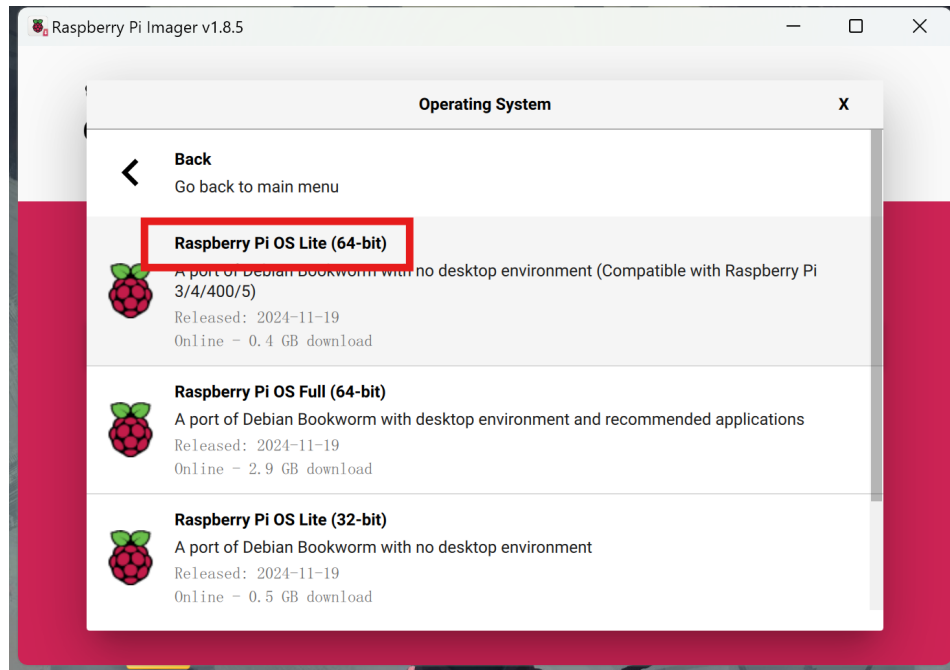
2. Within the , click **Raspberry Pi Device** and select the **Raspberry Pi 5** model from the dropdown list.



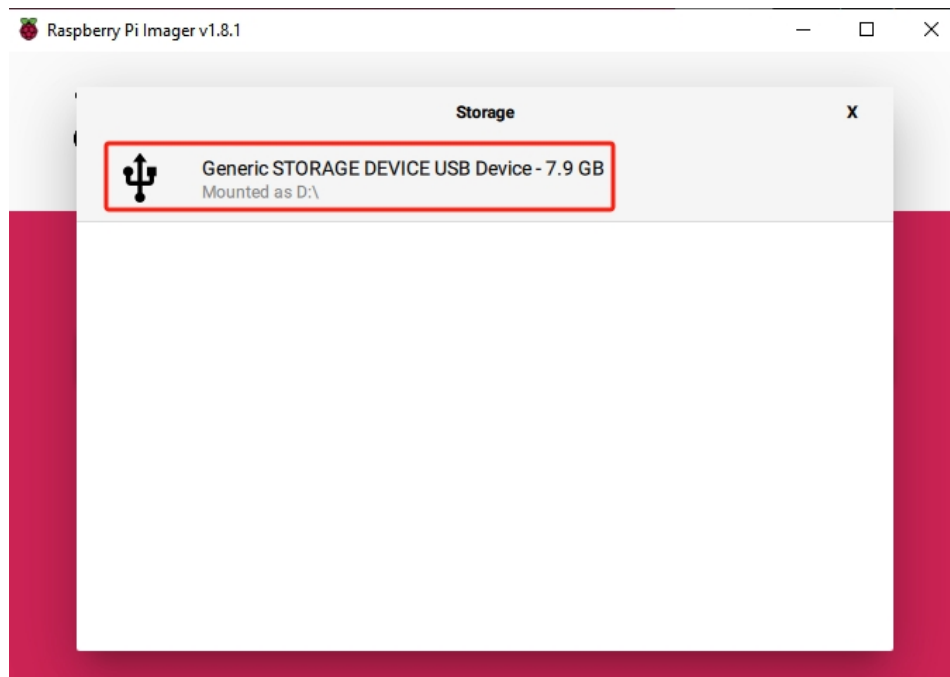
3. Select **Operating System** and opt for the recommended operating system version.



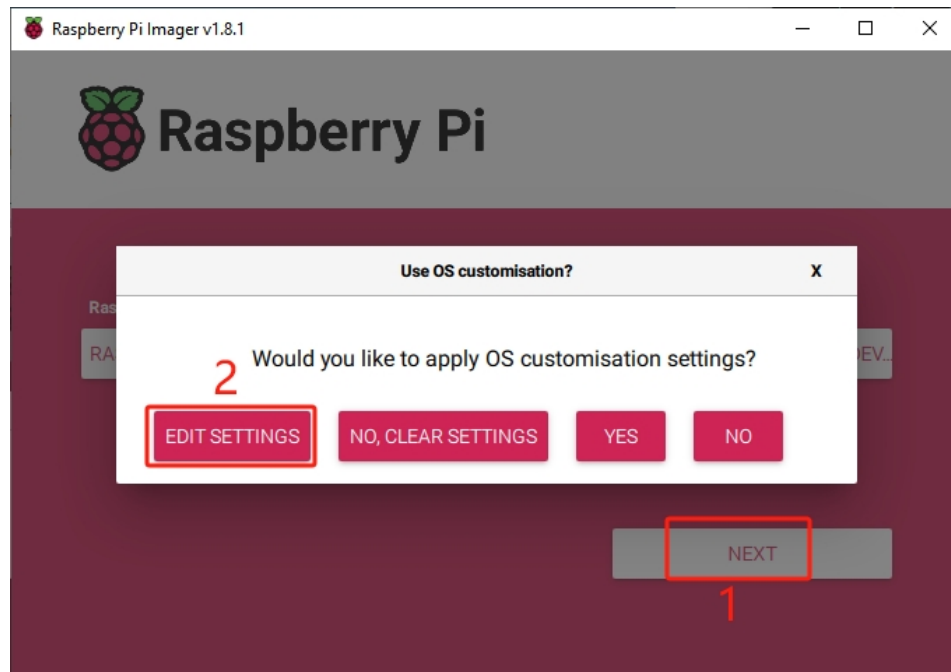
4. Since OpenMediaVault only supports a non-desktop version of the system, choose the **Raspberry Pi OS Lite** version.



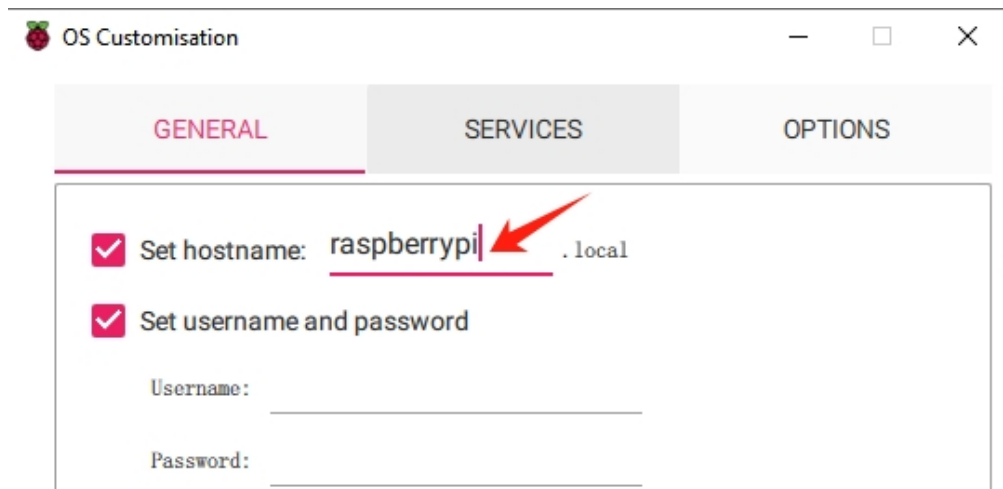
5. Click **Choose Storage** and select the appropriate storage device for the installation.



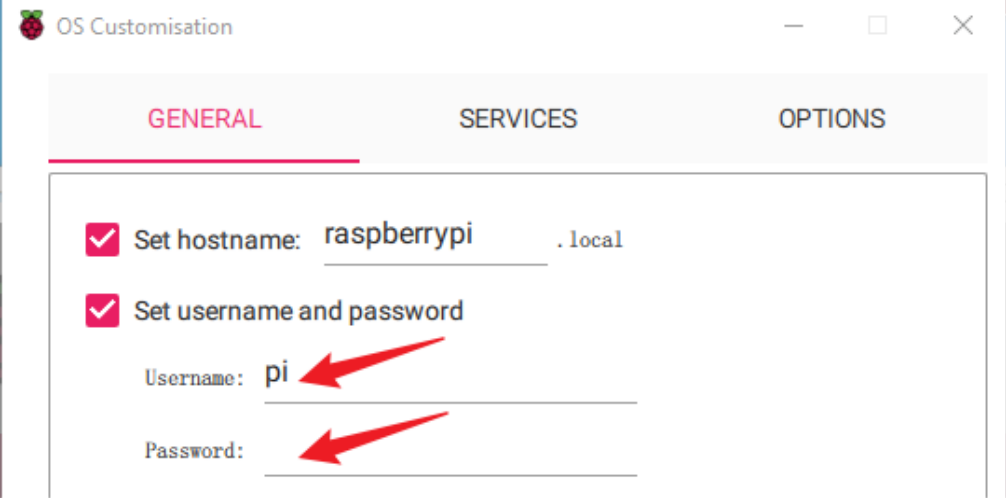
6. Click **NEXT** and then **EDIT SETTINGS** to tailor your OS settings.



- Define a **hostname** for your Raspberry Pi. The hostname is your Raspberry Pi's network identifier. You can access your Pi using `<hostname>.local` or `<hostname>.lan`.



- Create a **Username** and **Password** for the Raspberry Pi's administrator account. Establishing a unique username and password is vital for securing your Raspberry Pi, which lacks a default password.



The screenshot shows the 'OS Customisation' window with the 'GENERAL' tab selected. It contains three main sections: 'Set hostname', 'Set username and password', and 'Set wireless LAN'. The 'Set hostname' section has a checked checkbox and a text field with 'raspberrypi.local'. The 'Set username and password' section has a checked checkbox, a 'Username' field with 'pi', and a 'Password' field. Red arrows point to the 'pi' username and the password field.

OS Customisation

GENERAL SERVICES OPTIONS

☒ Set hostname: raspberrypi.local

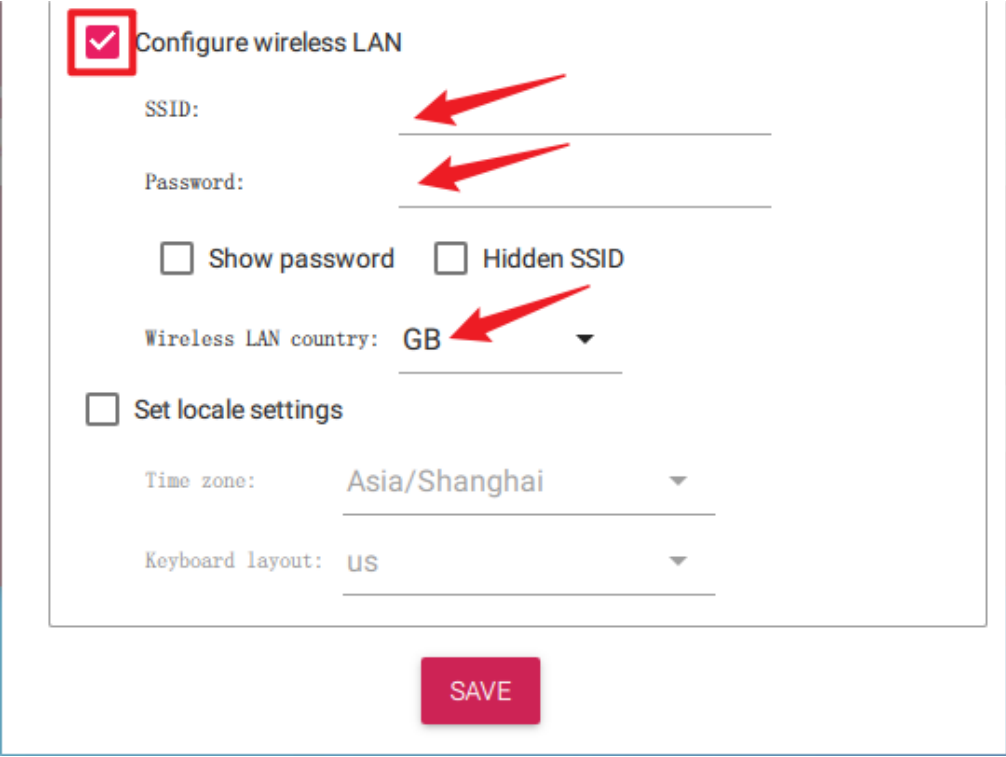
☒ Set username and password

Username: pi

Password: _____

- Configure the wireless LAN by providing your network's **SSID** and **Password**.

Note: Set the Wireless LAN country to the two-letter [ISO/IEC alpha2 code](#) corresponding to your location.



The screenshot shows the 'OS Customisation' window with the 'SERVICES' tab selected. It contains a 'Configure wireless LAN' section with a checked checkbox, 'SSID' and 'Password' fields, 'Show password' and 'Hidden SSID' checkboxes, and a 'Wireless LAN country' dropdown menu set to 'GB'. Below this is a 'Set locale settings' section with 'Time zone' set to 'Asia/Shanghai' and 'Keyboard layout' set to 'US'. A red arrow points to the 'GB' country selection. At the bottom is a 'SAVE' button.

☒ Configure wireless LAN

SSID: _____

Password: _____

☐ Show password ☐ Hidden SSID

Wireless LAN country: GB

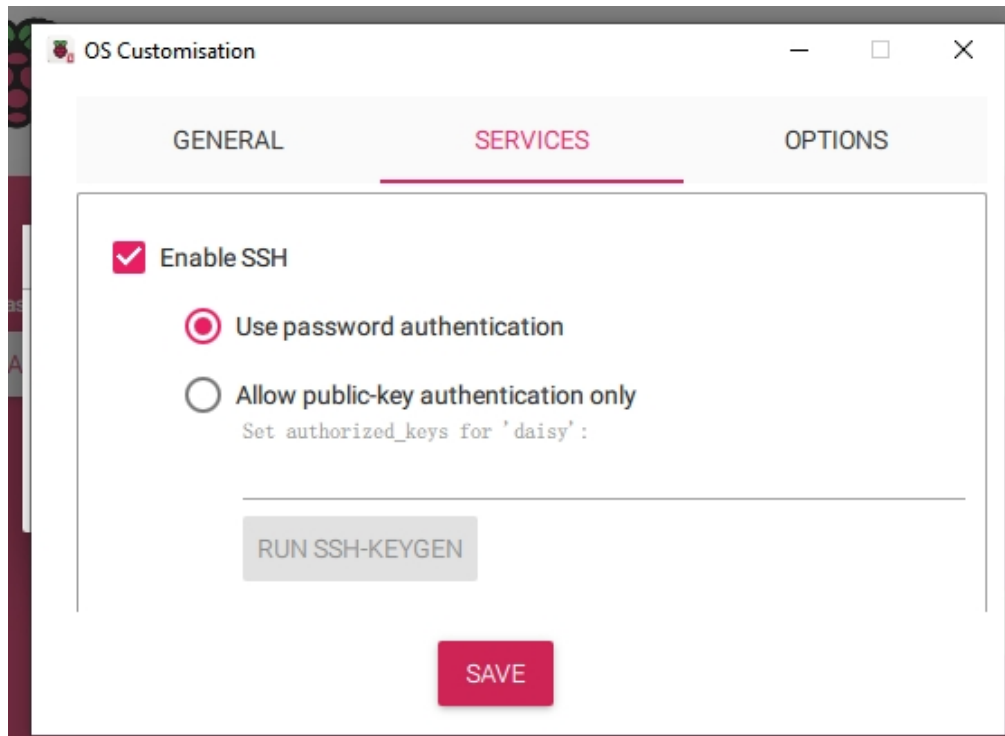
☐ Set locale settings

Time zone: Asia/Shanghai

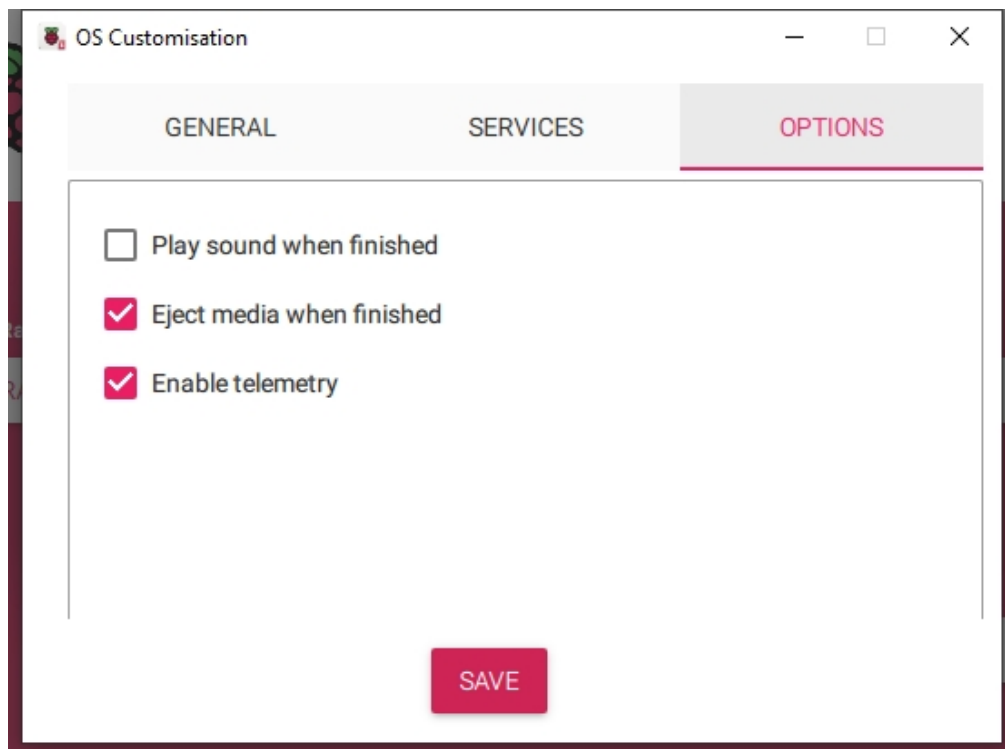
Keyboard layout: US

SAVE

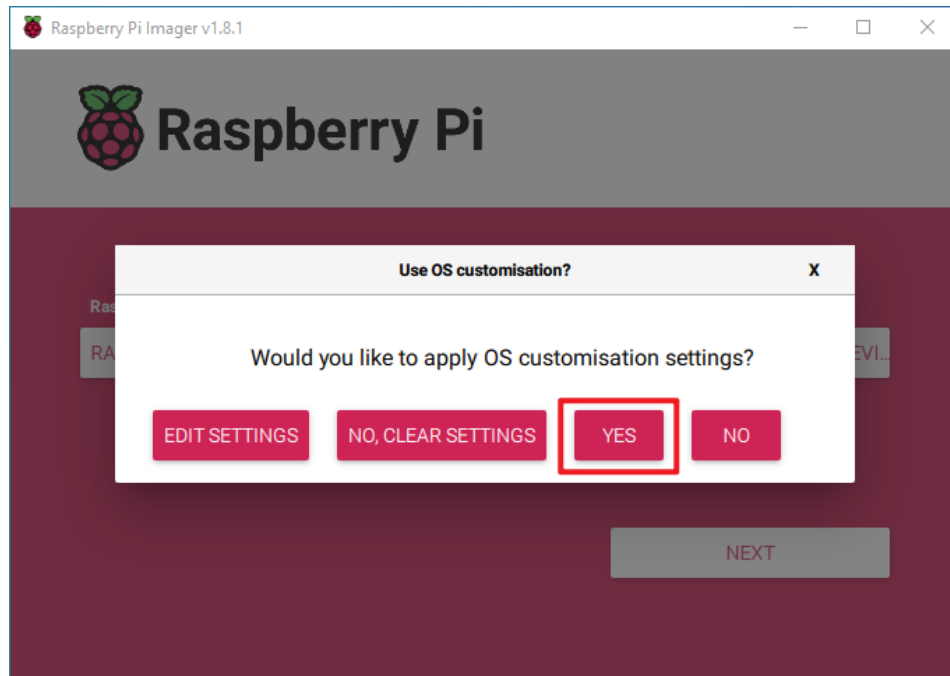
- To remotely connect to your Raspberry Pi, enable SSH in the Services tab.
 - For **password authentication**, use the username and password from the General tab.
 - For public-key authentication, choose “Allow public-key authentication only”. If you have an RSA key, it will be used. If not, click “Run SSH-keygen” to generate a new key pair.



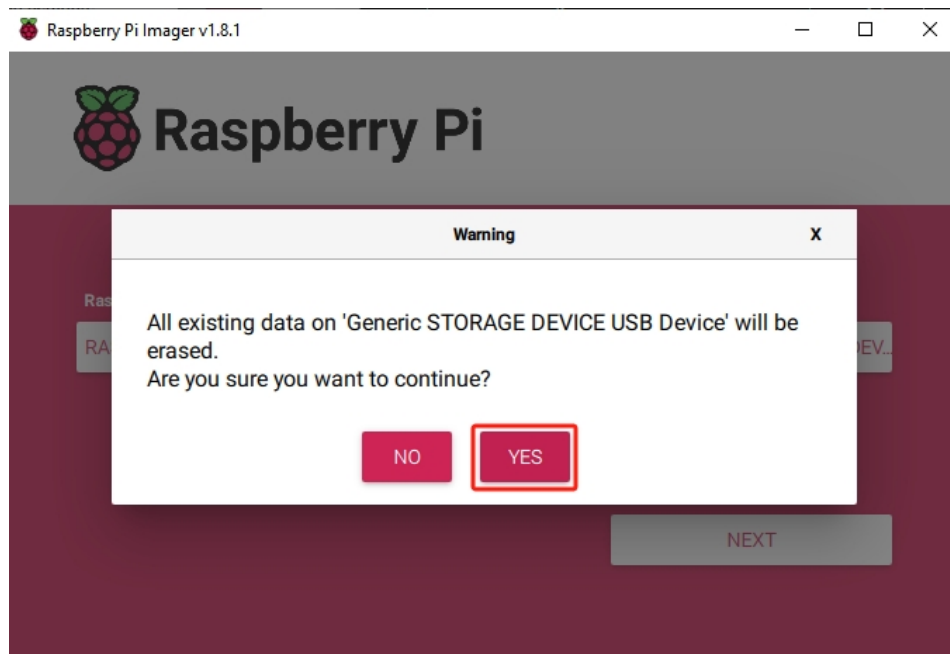
- The **Options** menu lets you configure Imager's behavior during a write, including playing sound when finished, ejecting media when finished, and enabling telemetry.



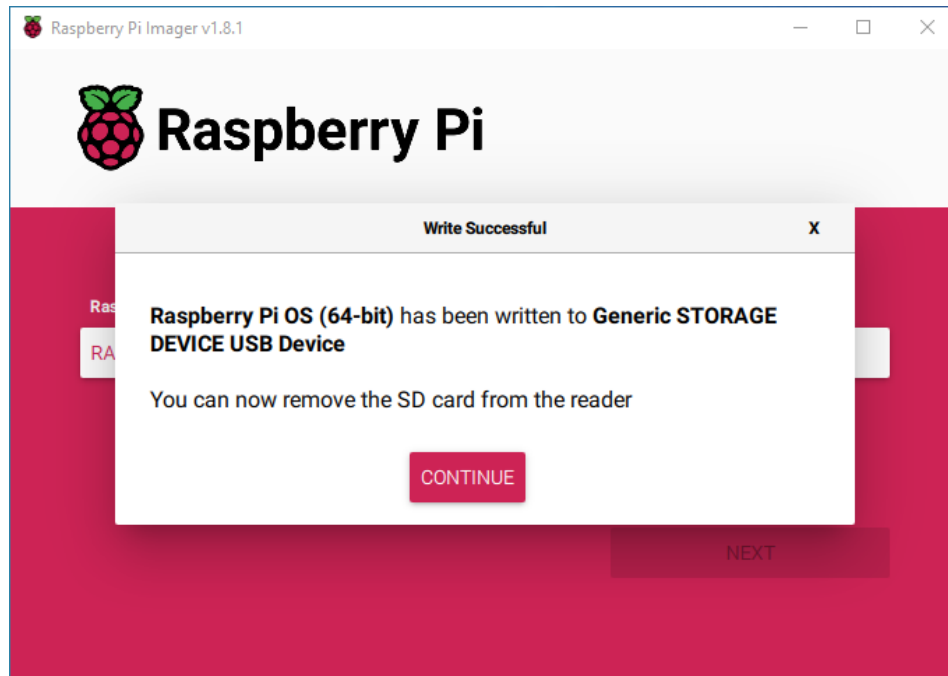
7. When you've finished entering OS customisation settings, click **Save** to save your customisation. Then, click **Yes** to apply them when writing the image.



8. If the SD card contains existing data, ensure you back it up to prevent data loss. Proceed by clicking **Yes** if no backup is needed.



9. When you see the “Write Successful” popup, your image has been completely written and verified. You’re now ready to boot a Raspberry Pi from the Micro SD Card!



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3.1.2 Installing the OS on an NVMe SSD

If you are using an NVMe SSD and have an adapter to connect the NVMe SSD to your computer for system installation, you can use the following tutorial for a quick installation.

Required Components

- A Personal Computer
- A NVMe SSD
- A NVMe to USB Adapter
- Micro SD Card and Reader

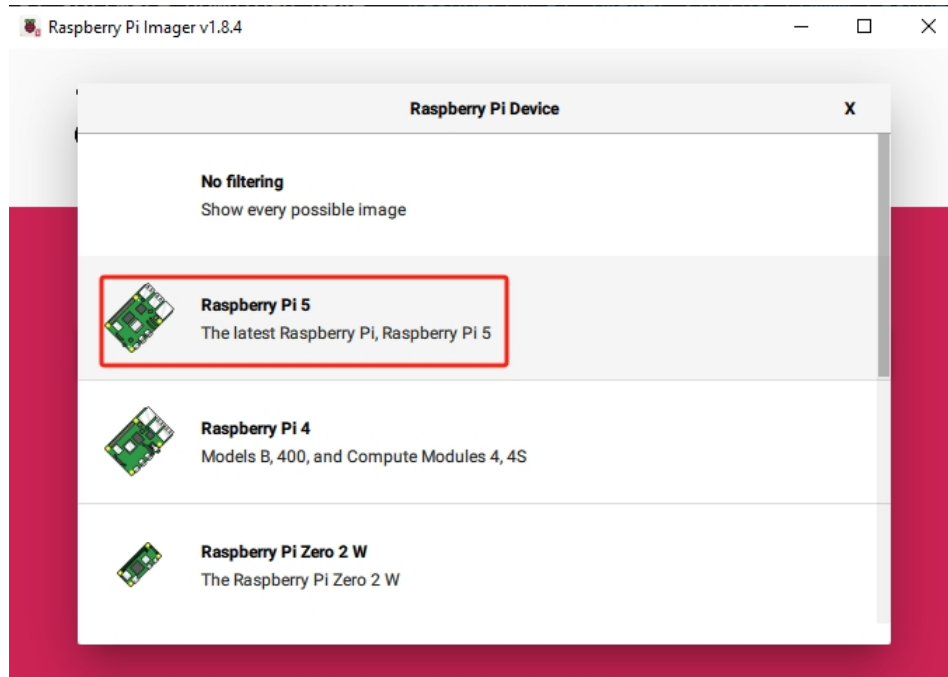
1. Update the Bootloader

First, you need to update the Raspberry Pi 5 bootloader to boot from NVMe before trying USB and then SD Card.

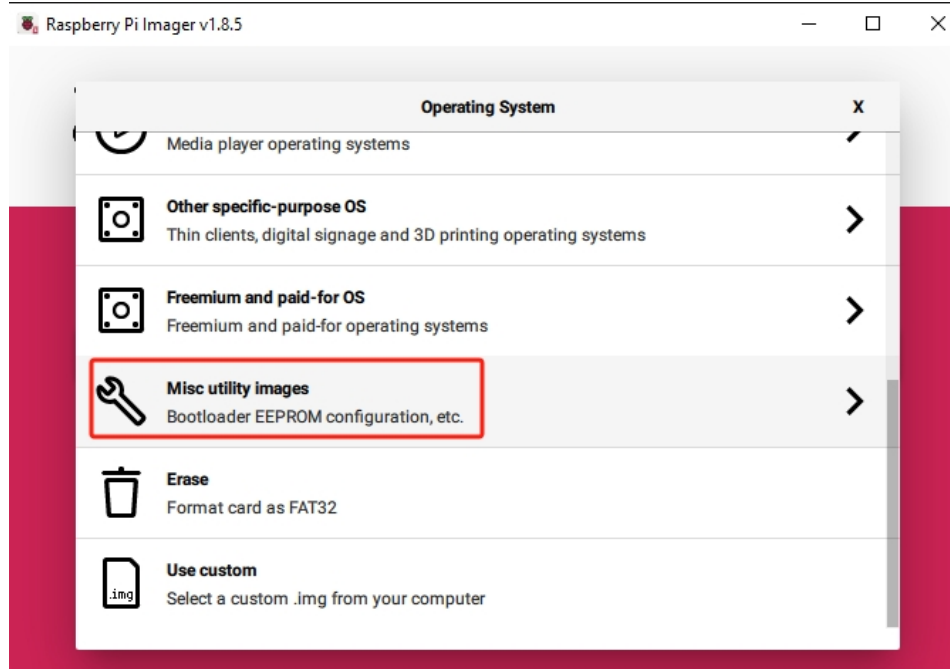
Note: At this step, it is recommended to use a spare Micro SD card. First, write the bootloader to this Micro SD card and then immediately insert it into the Raspberry Pi to enable booting from an NVMe device.

Alternatively, you can write the bootloader directly to your NVMe device first, then insert it into the Raspberry Pi to change its boot method. Afterwards, connect the NVMe SSD to a computer to install the operating system, and once the installation is complete, reinsert it back into the Raspberry Pi.

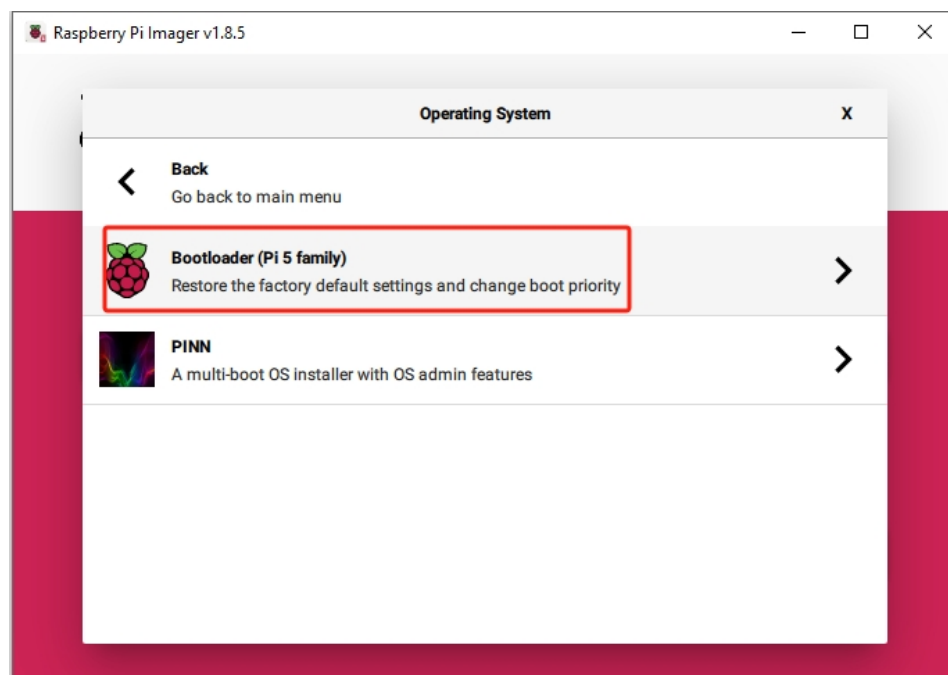
1. Insert your spare Micro SD card or NVMe SSD into your computer or laptop using a Reader.
2. Within the , click **Raspberry Pi Device** and select the **Raspberry Pi 5** model from the dropdown list.



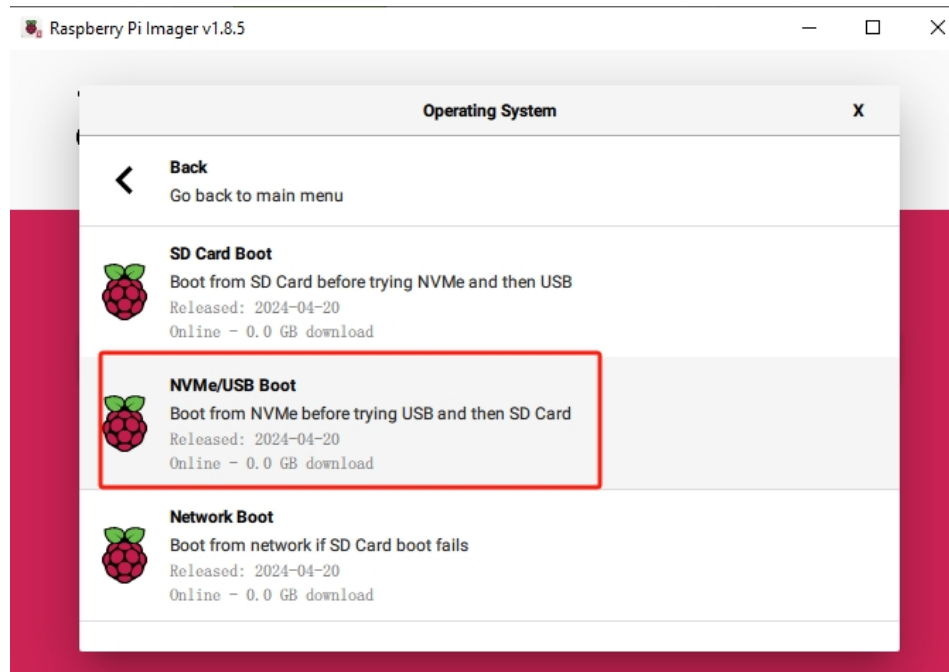
3. On the **Operating System** tab, scroll down and select **Misc utility images**.



4. Select **Bootloader (Pi 5 family)**.

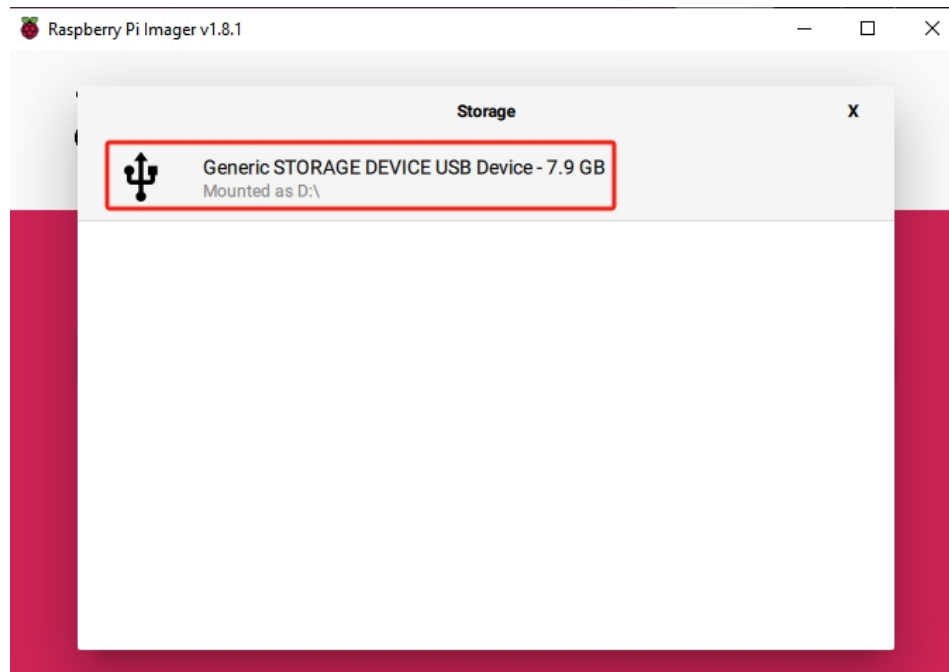


5. Select **NVMe/USB Boot** to enable Raspberry Pi 5 to boot from NVMe before trying USB and then SD Card.

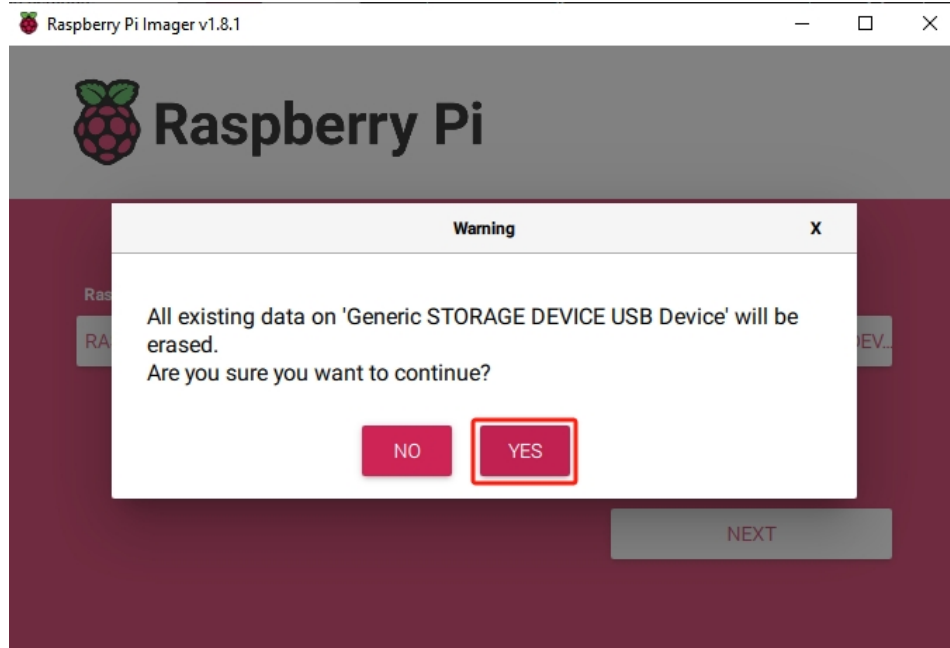


6. In the **Storage** option, select the appropriate storage device for the installation.

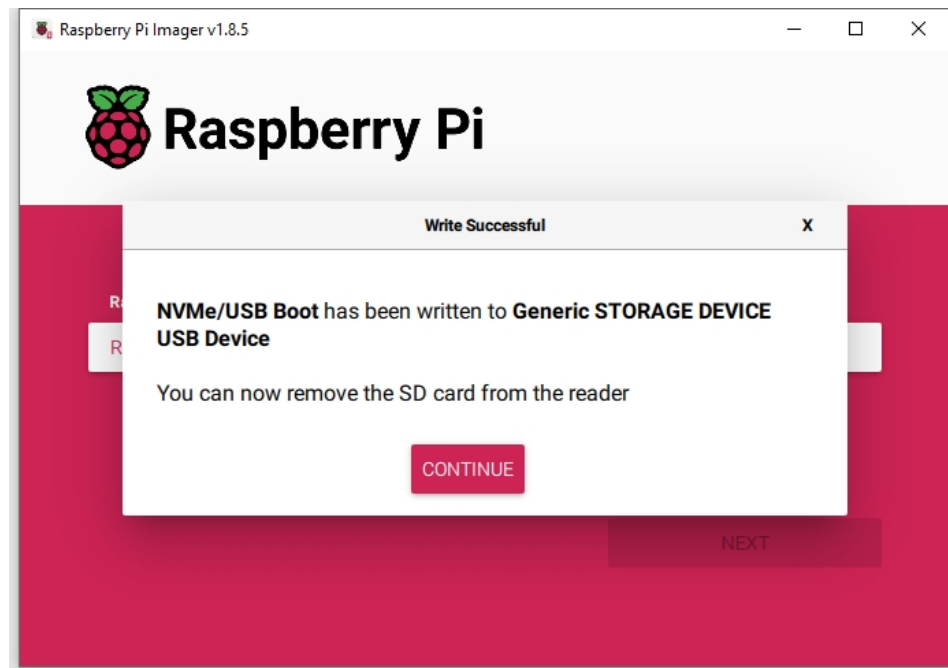
Note: Ensure you select the correct storage device. To avoid confusion, disconnect any additional storage devices if multiple ones are connected.



7. Now you can click **NEXT**. If the storage device contains existing data, ensure you back it up to prevent data loss. Proceed by clicking **Yes** if no backup is needed.



8. Soon, you will be prompted that **NVMe/USB Boot** has been written to your storage device.



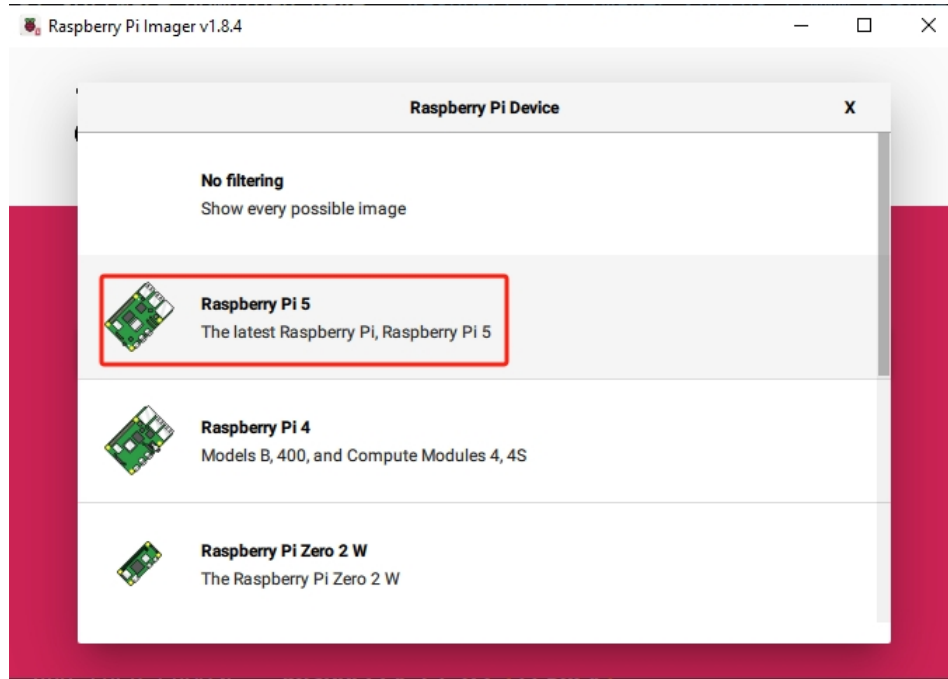
9. Now, you can insert your Micro SD card or NVMe SSD into the Raspberry Pi. After powering the Raspberry Pi with a Type C adapter, the bootloader from the Micro SD card or NVMe SSD will be written to the Raspberry Pi's EEPROM.

Note: Afterward, the Raspberry Pi will boot from NVMe before trying USB and then the SD Card. Power off the Raspberry Pi and remove the Micro SD card or NVMe SSD.

2. Install OS to NVMe SSD

Now you can install the operating system on your NVMe SSD.

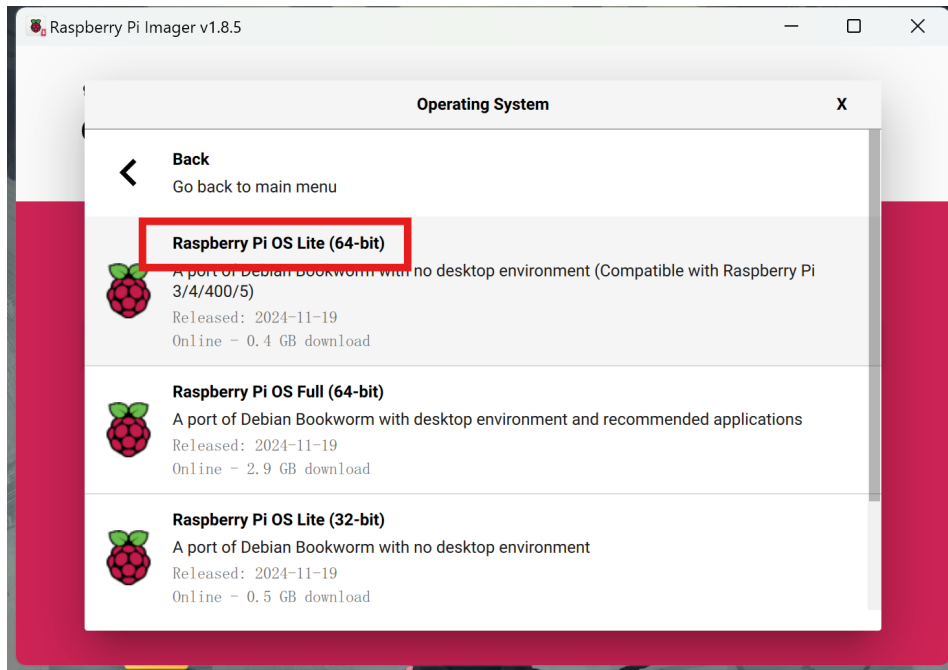
1. Within the , click **Raspberry Pi Device** and select the **Raspberry Pi 5** model from the dropdown list.



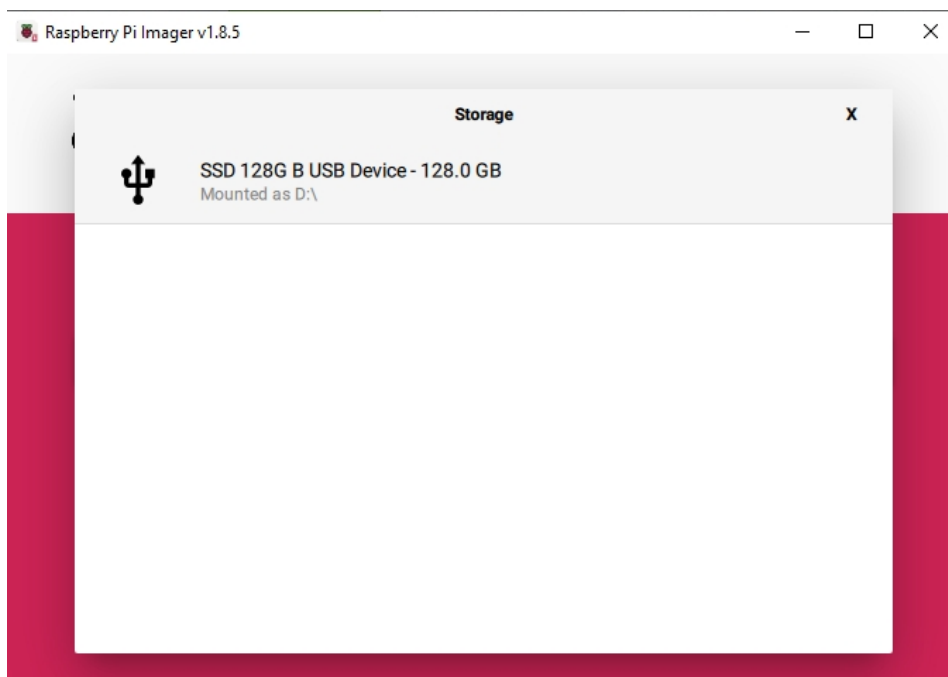
2. Select **Operating System** and opt for the recommended operating system version.



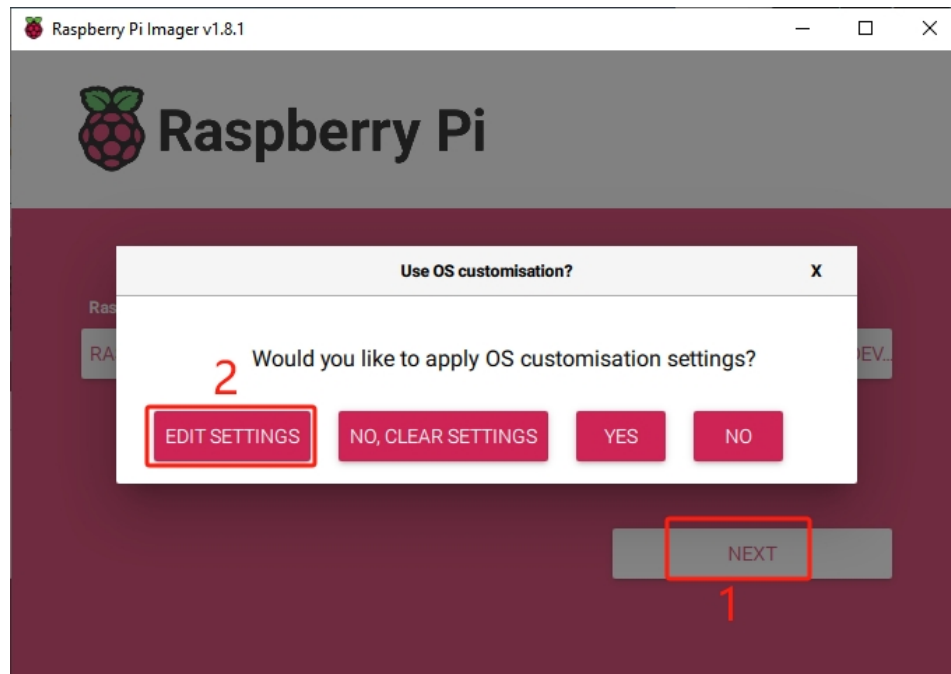
3. Since OpenMediaVault only supports a non-desktop version of the system, choose the **Raspberry Pi OS Lite** version.



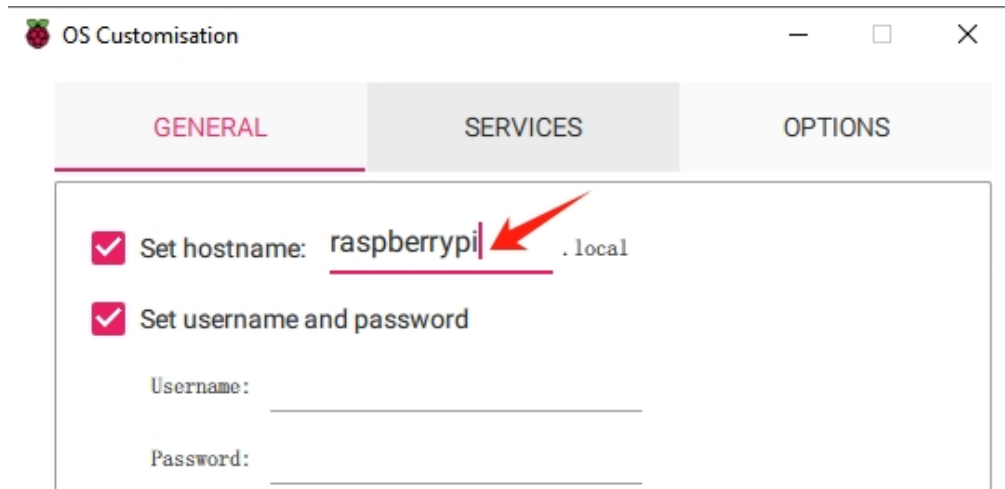
4. In the **Storage** option, select the appropriate storage device for the installation.



5. Click **NEXT** and then **EDIT SETTINGS** to tailor your OS settings.



- Define a **hostname** for your Raspberry Pi. The hostname is your Raspberry Pi's network identifier. You can access your Pi using `<hostname>.local` or `<hostname>.lan`.



- Create a **Username** and **Password** for the Raspberry Pi's administrator account. Establishing a unique username and password is vital for securing your Raspberry Pi, which lacks a default password.

OS Customisation

GENERAL SERVICES OPTIONS

☒ Set hostname: raspberrypi.local

☒ Set username and password

Username: pi

Password:

- Configure the wireless LAN by providing your network's **SSID** and **Password**.

Note: Set the Wireless LAN country to the two-letter [ISO/IEC alpha2 code](#) corresponding to your location.

☒ Configure wireless LAN

SSID:

Password:

☐ Show password ☐ Hidden SSID

Wireless LAN country: GB

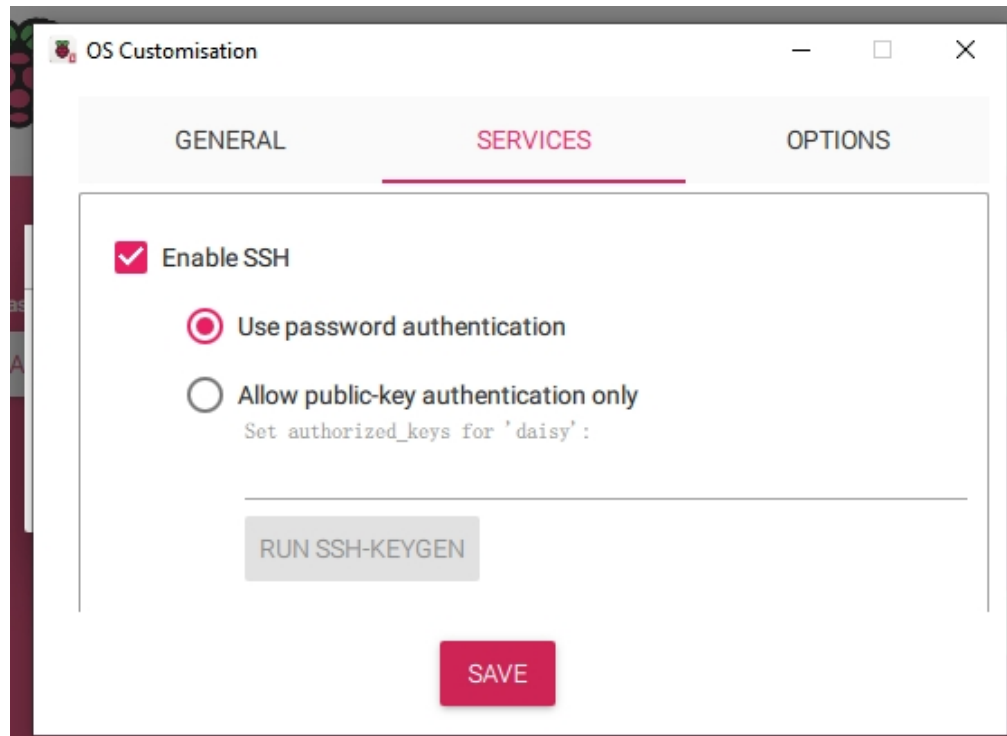
☐ Set locale settings

Time zone: Asia/Shanghai

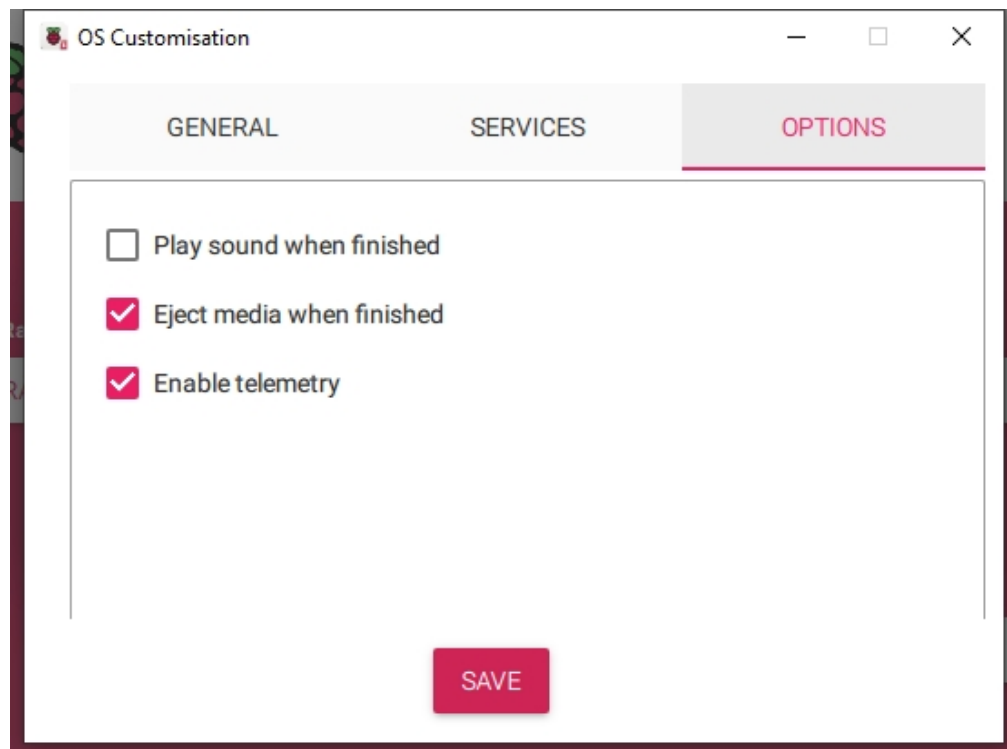
Keyboard layout: US

SAVE

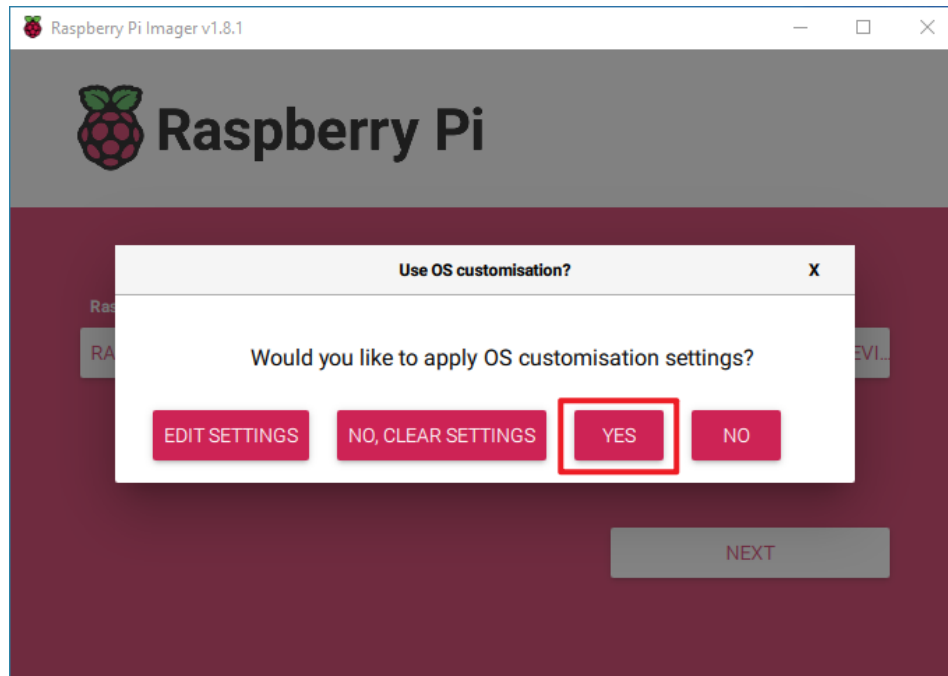
- To remotely connect to your Raspberry Pi, enable SSH in the Services tab.
 - For **password authentication**, use the username and password from the General tab.
 - For public-key authentication, choose “Allow public-key authentication only”. If you have an RSA key, it will be used. If not, click “Run SSH-keygen” to generate a new key pair.



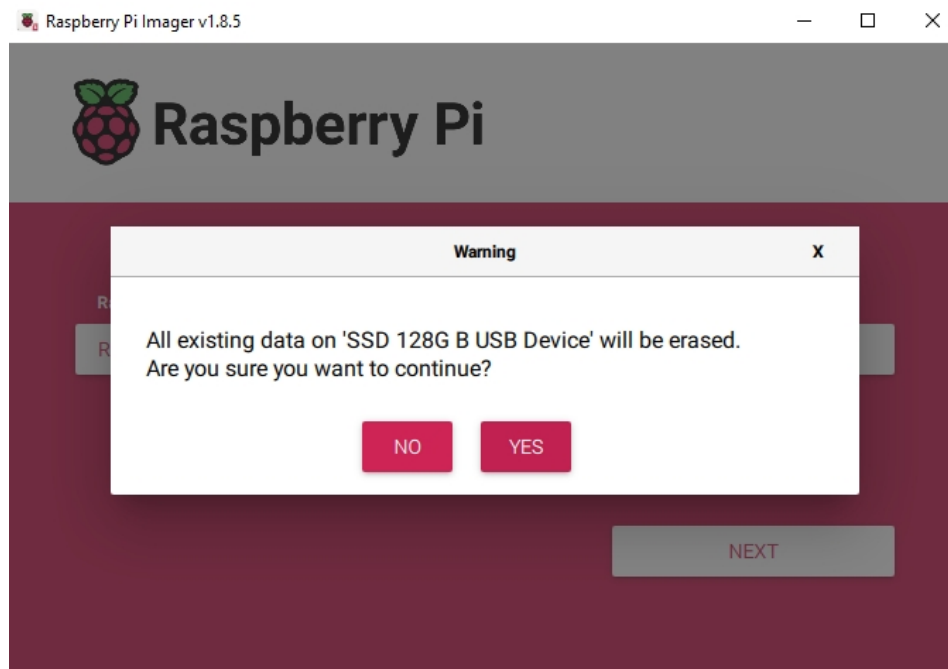
- The **Options** menu lets you configure Imager's behavior during a write, including playing sound when finished, ejecting media when finished, and enabling telemetry.



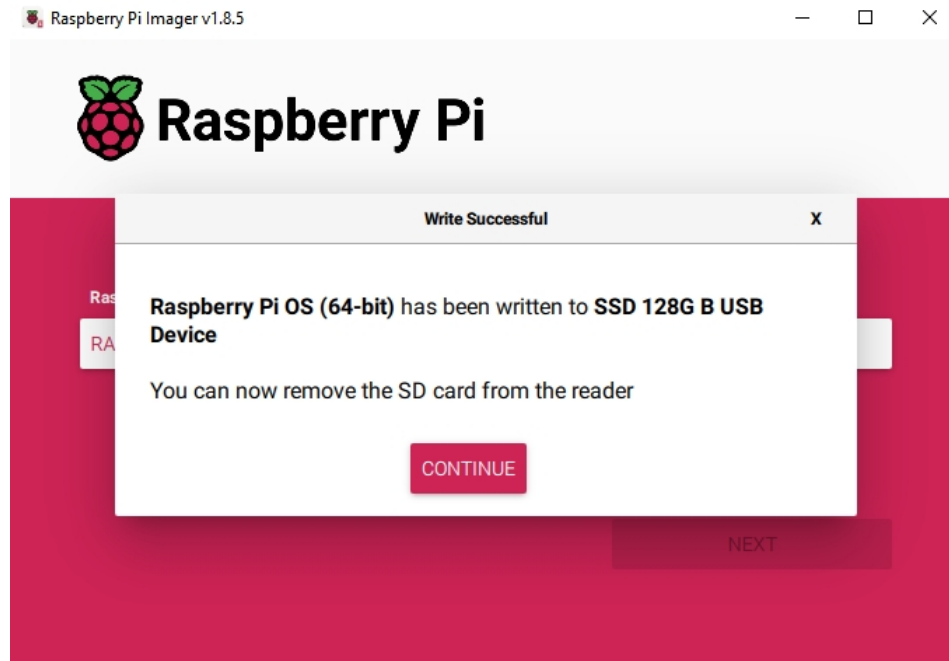
6. When you've finished entering OS customisation settings, click **Save** to save your customisation. Then, click **Yes** to apply them when writing the image.



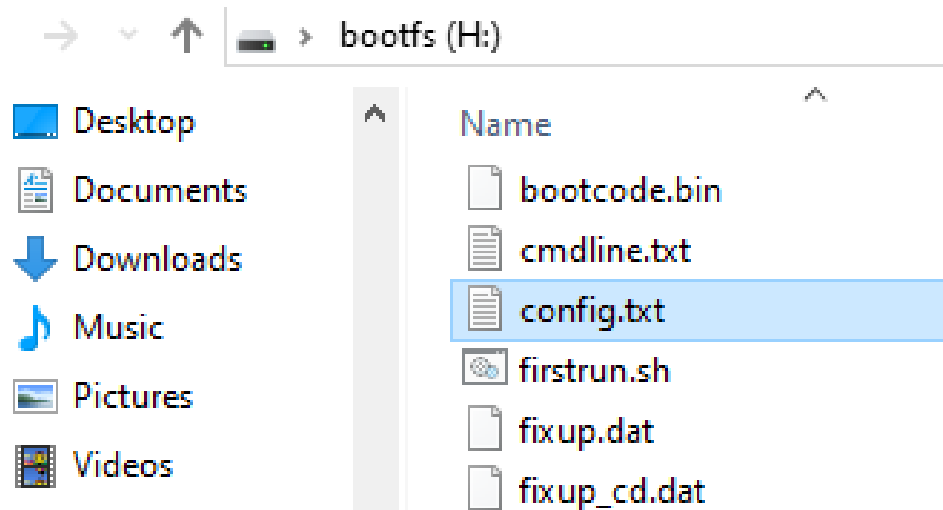
7. If the NVMe SSD contains existing data, ensure you back it up to prevent data loss. Proceed by clicking **Yes** if no backup is needed.



8. When you see the “Write Successful” popup, your image has been completely written and verified. You’re now ready to boot a Raspberry Pi from the NVMe SSD!



9. After installing the operating system on the SD card or NVMe drive, you will need to reinsert it into your computer. At this point, you will see a newly added volume named `bootfs`.



Locate the `config.txt` file inside this volume and add the following line at the end:

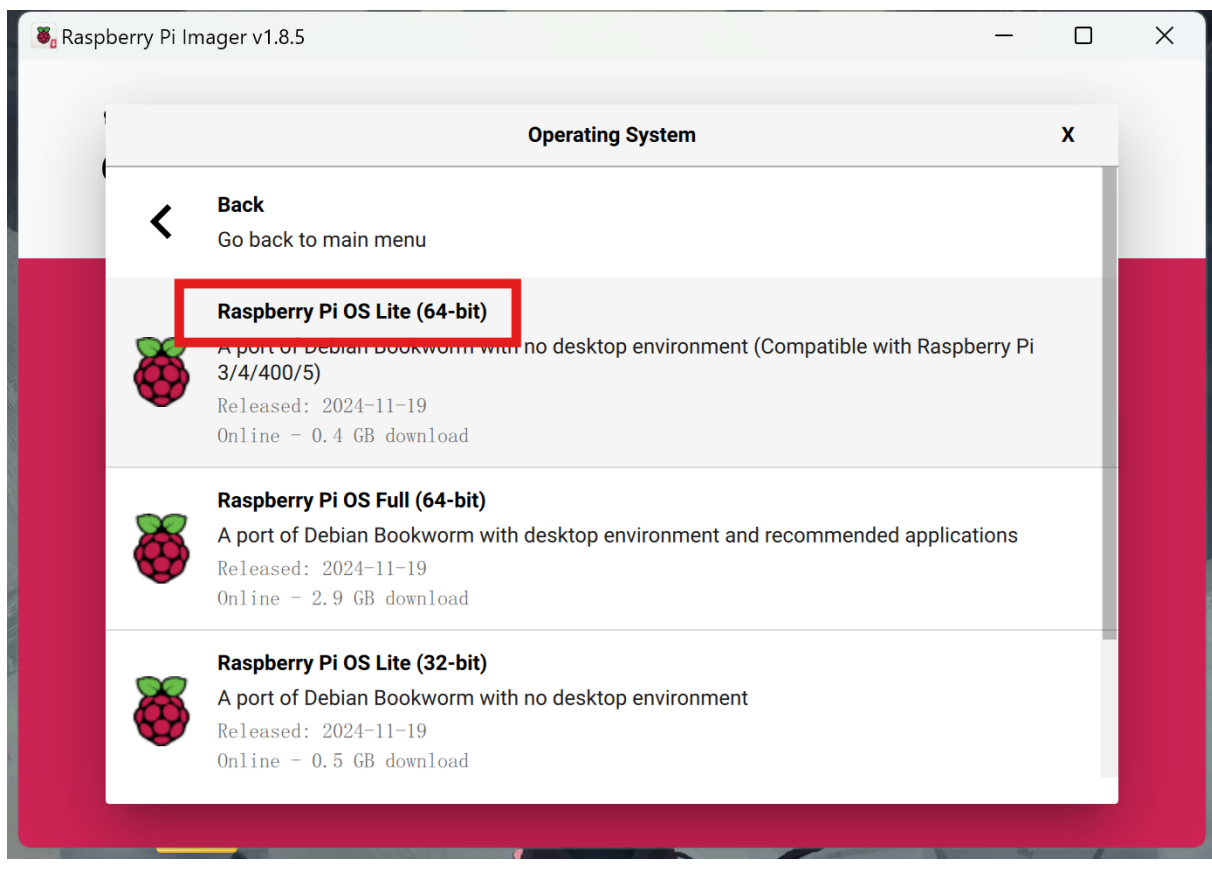
```
dtoverlay=pciex1_no_10s=on
```

Save the file and exit.

This step disables the PCIe boot delay, allowing the Raspberry Pi to detect the NVMe drive connected behind the PCIe switch during startup.

4. SETTING UP OPENMEDIAVAULT

Warning: OpenMediaVault **does not** support installation on the Raspberry Pi OS desktop or Home Assistant OS. Please make sure you have installed the correct operating system and configured the network. The procedure here is consistent with *Installing the OS on a Micro SD Card*, but when selecting an image, please choose Raspberry Pi OS Lite from Raspberry Pi OS (other).



OpenMediaVault (abbreviated as OMV) is an open-source Network Attached Storage (NAS) operating system based on Debian Linux, designed for home users and small office environments, aiming to simplify storage management and provide rich network service features.

Please follow these steps to install OpenMediaVault on your Raspberry Pi:

4.1 1. Connect to Your Raspberry Pi Using SSH

Enter the following command in the terminal:

```
ssh pi@raspberrypi.local
```

If you are using Windows, use PuTTY or another SSH client to connect to your Raspberry Pi.

4.2 2. Install OpenMediaVault

Enter the following command in the terminal:

```
wget https://github.com/OpenMediaVault-Plugin-Developers/installScript/raw/  
master/install  
chmod +x install  
sudo ./install -n
```

This will download and run the installation script for OpenMediaVault. Do not restart your Raspberry Pi after installation.

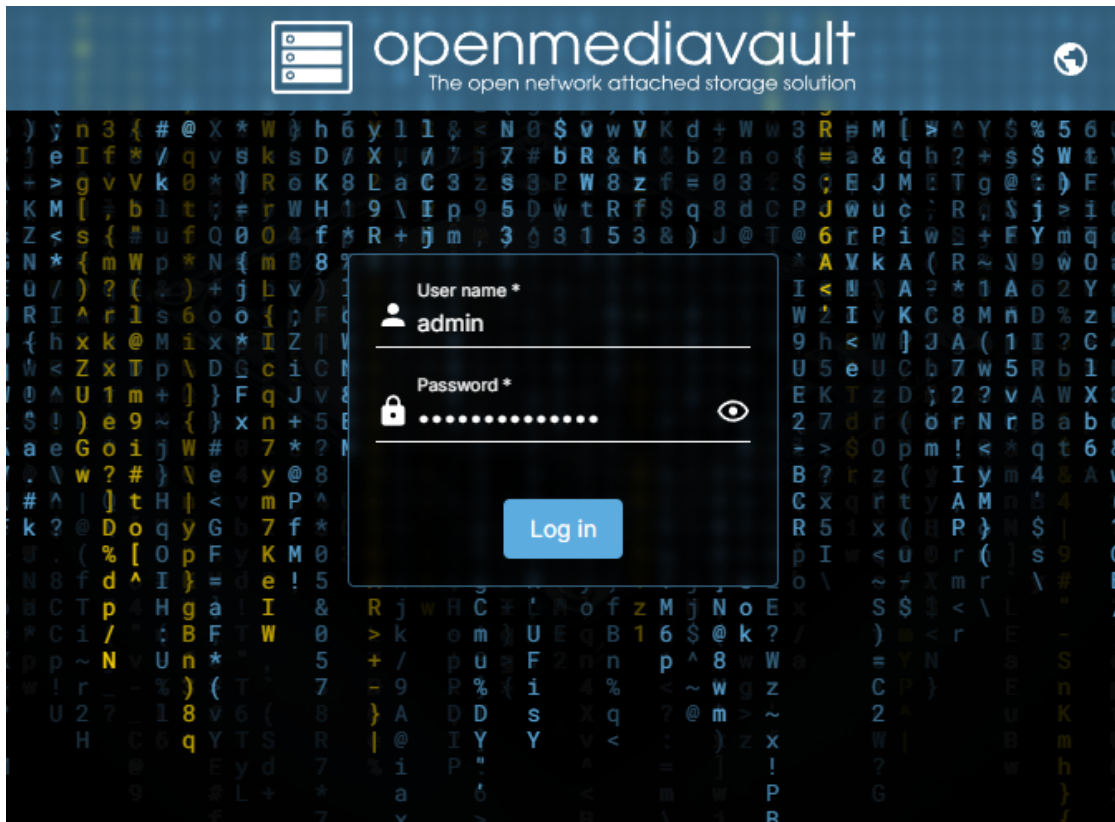
4.3 3. Access OpenMediaVault

Enter the following URL in your browser to access OpenMediaVault:

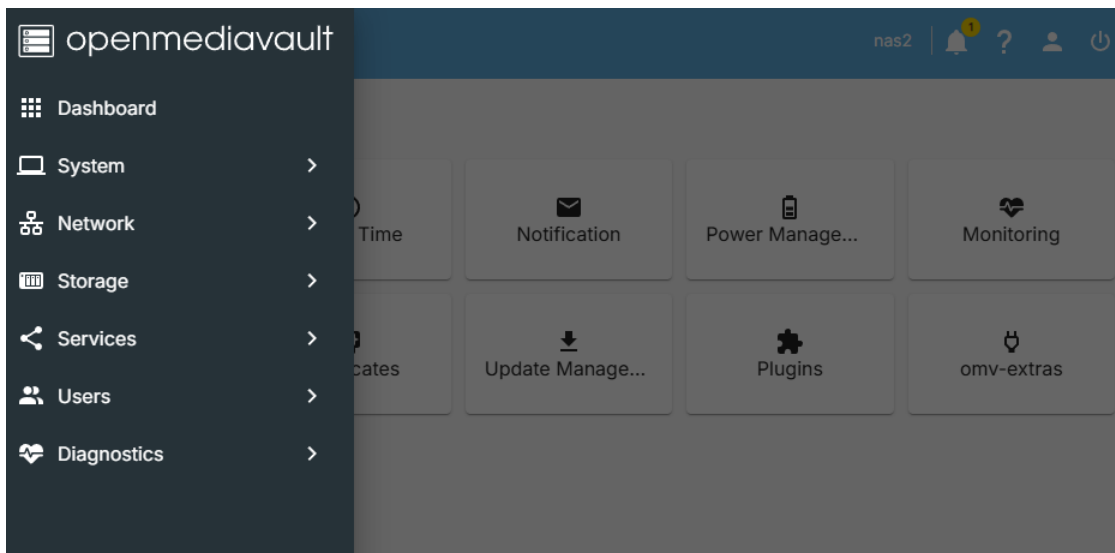
```
http://raspberrypi.local
```

Note: If you cannot access the above URL, try using the IP address instead, for example, <http://192.168.1.100>.

You will see a login page, log in using the default username and password. The default username is `admin`, and the password is `openmediavault`.



After logging in, you will see the main interface of OpenMediaVault.



Now that you have successfully installed and accessed OpenMediaVault, you can start configuring and managing your storage.

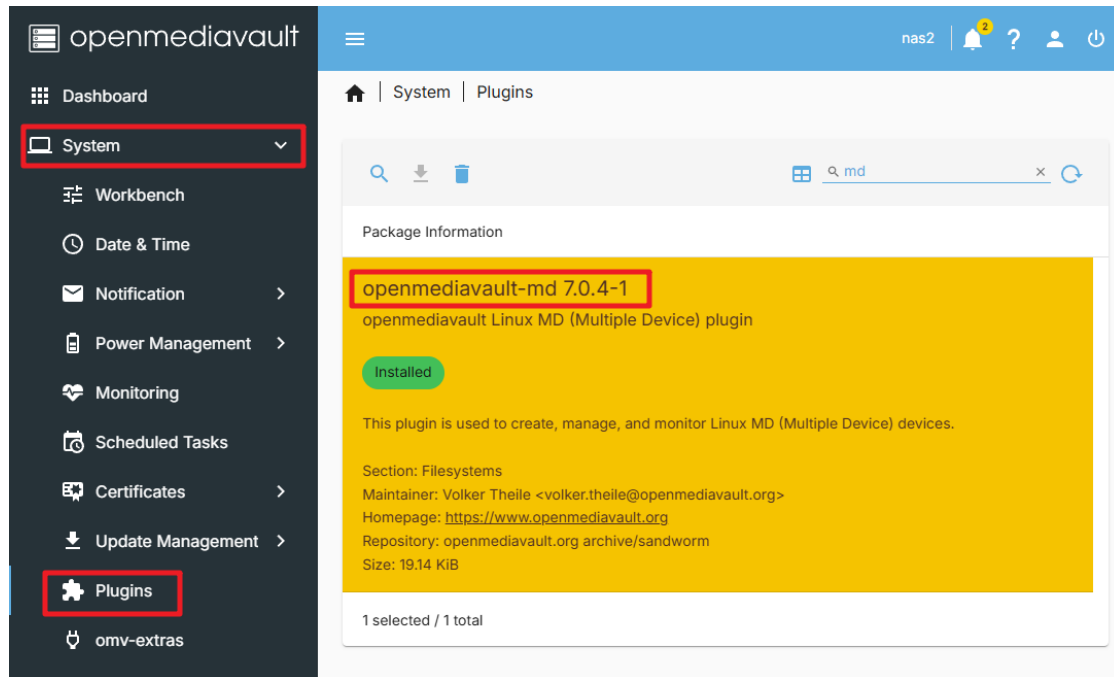
4.4 4. Set Up RAID (Optional)

NVMe RAID is a storage solution that combines multiple NVMe Solid State Drives (SSDs) using RAID technology, aimed at maximizing the high-speed performance of the NVMe protocol and the redundancy/performance enhancement features of RAID. Common modes include RAID 0, 1, 5, 10, etc. For dual NVMe SSDs, RAID 0 and RAID 1 are the most commonly used modes.

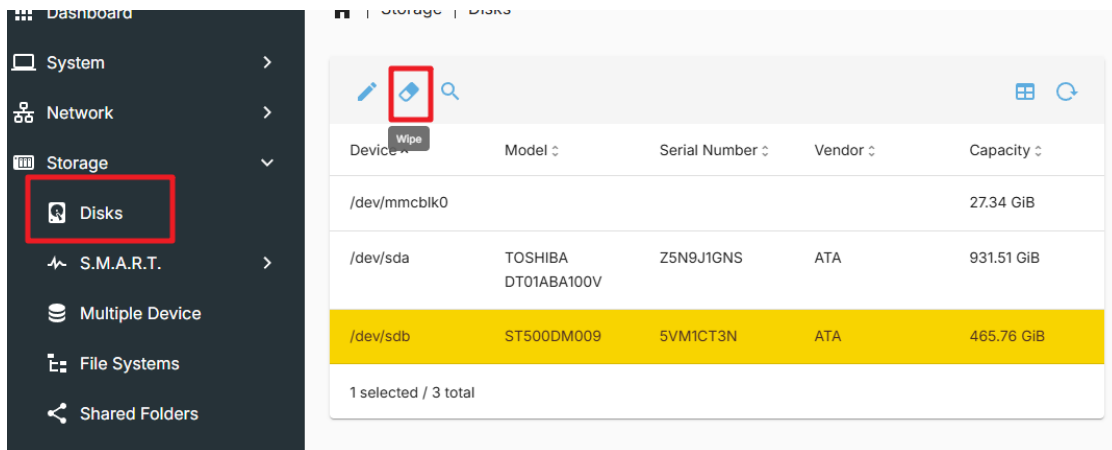
- RAID 0 is a striping technology that divides data into multiple stripes and distributes these stripes across multiple hard drives, thus achieving higher read/write speeds. RAID 0 does not provide redundancy protection, so if any one of the hard drives fails, all data will be lost.
- RAID 1 is a mirroring technology that copies data across multiple hard drives, thus providing redundancy protection. The read/write speeds of RAID 1 depend on the speed of a single hard drive, as data needs to be read from multiple hard drives. If any one of the hard drives fails, the others can continue to provide data.

Note: At least mount 2 disks for RAID 0 or RAID 1. In RAID 0, the capacity of the RAID volume will be the sum of the capacities of all disks. In RAID 1, the capacity of the RAID volume will be the same as the capacity of the smallest disk.

1. In the System menu click on the Plugins option, search for the `openmediavault-md` plugin, and install it.



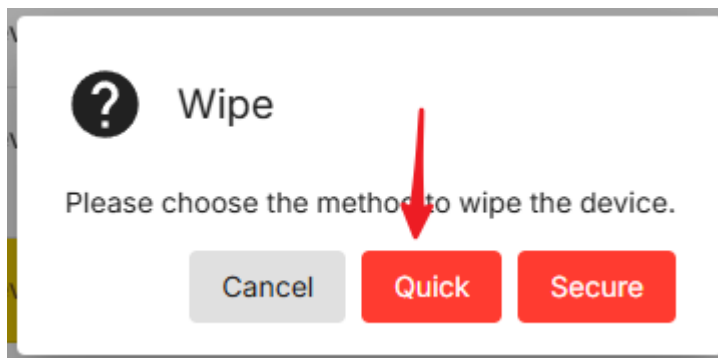
2. In the Storage menu click on the Disks option, erase two SSDs.



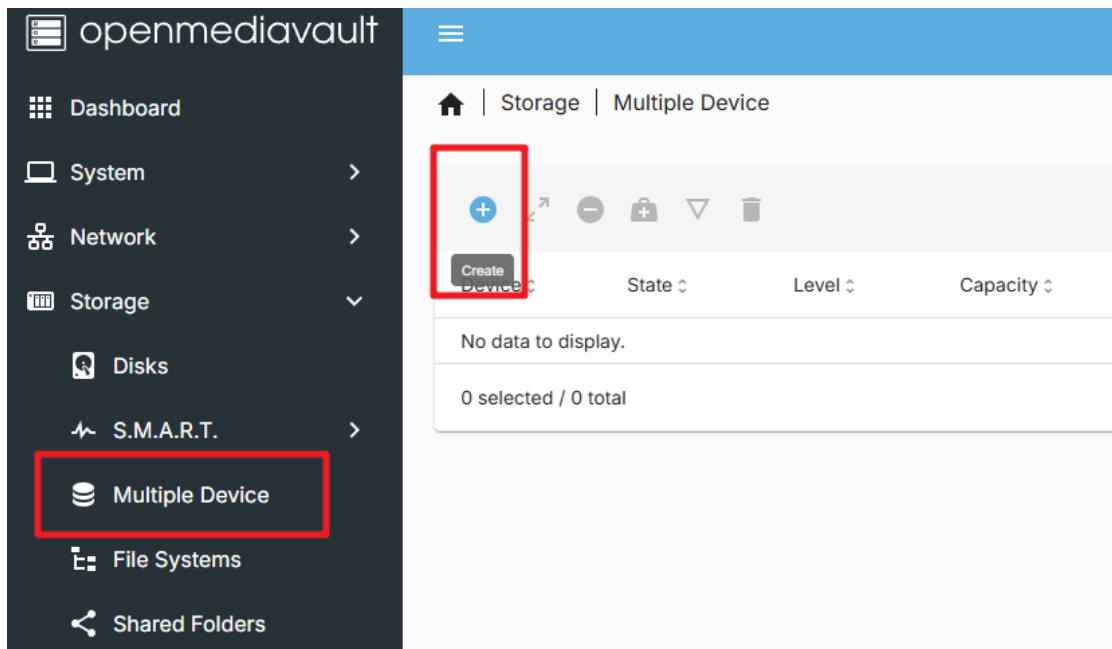
3. Please note that this action will erase all data on the hard drives, make sure you have backed up all important data.



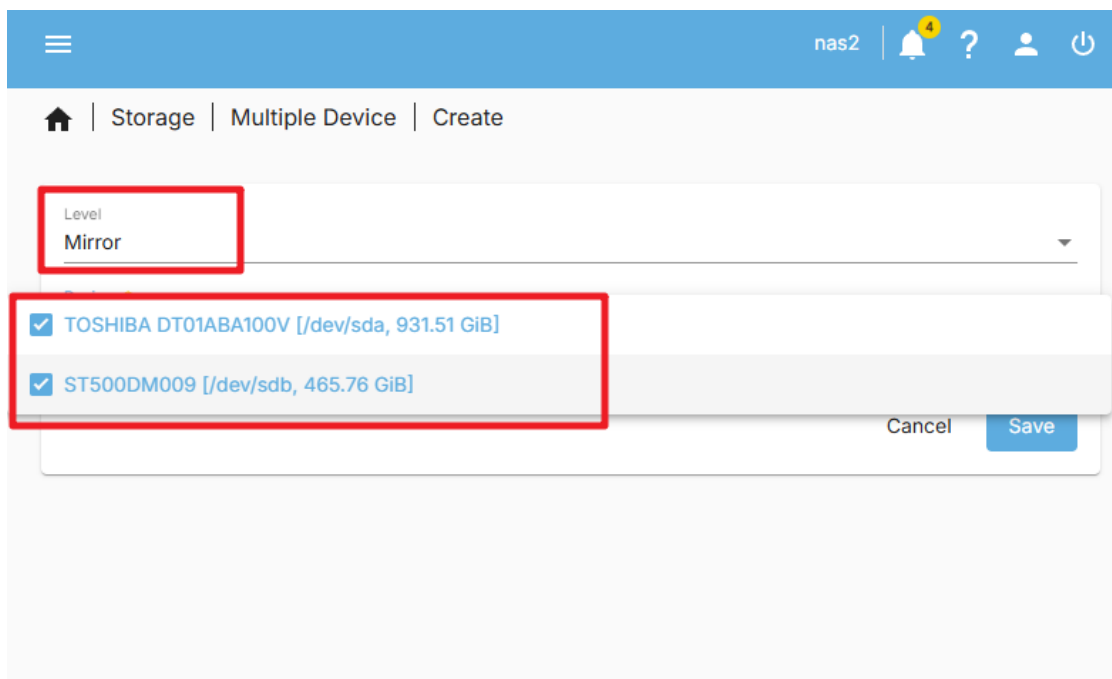
4. Erase mode select QUICK is sufficient.



5. Enter the Multiple Device tab, click Create.



6. In the Level option, you can choose Stripe (RAID 0) or Mirror (RAID 1). In the Devices option, select the hard drives you just erased. Click Save and wait for the RAID configuration to complete.



Note: If an error report (500 - Internal Server Error) pops up, try restarting the OMV system.

7. Apply the configuration by clicking on the Apply button.

Pending configuration changes
You must apply these changes in order for them to take effect.

Storage | Multiple Device

Device	State	Level	Capacity	Devices
/dev/md0	clean, resyncing (0.0%) (29120/488254. finish=279.2min speed=29120K/	Mirror	465.64 GiB	/dev/sda /dev/sdb

1 selected / 1 total

8. After the RAID configuration is complete, you have to wait the state of the RAID to be 100%.

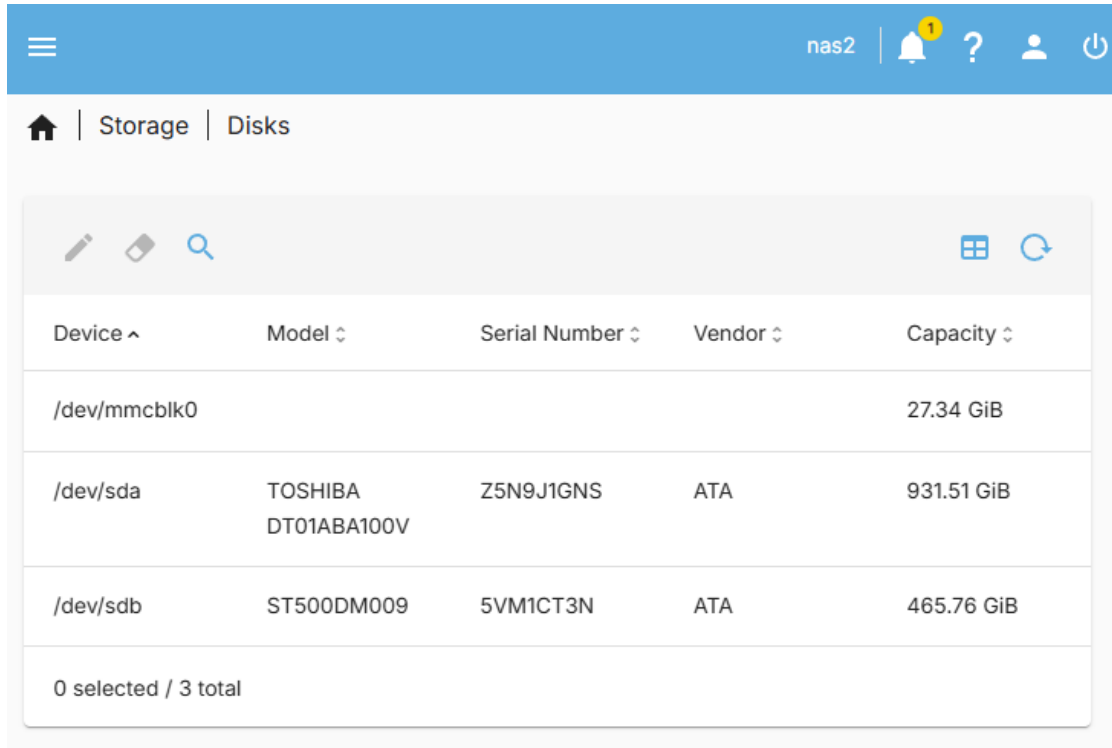
Device	State	Level	Capacity	Devices
/dev/md0	clean, resyncing (0.7%) (3607252/4882 finish=63.6min speed=126907K	Mirror	465.64 GiB	/dev/sda /dev/sdb

0 selected / 1 total

9. After the RAID configuration is complete, your hard drives are now in a RAID 0 or RAID 1 configuration, and you can use them as a single storage device.

4.5 5. Configure Storage

In the main interface of OpenMediaVault, click on the **Storage** option in the left-side menu. In the **Storage** page, click on the **Disks** tab. On the **Disks** page, you will see all the disks on your Raspberry Pi. Ensure your NVMe PIP has a connected hard drive.

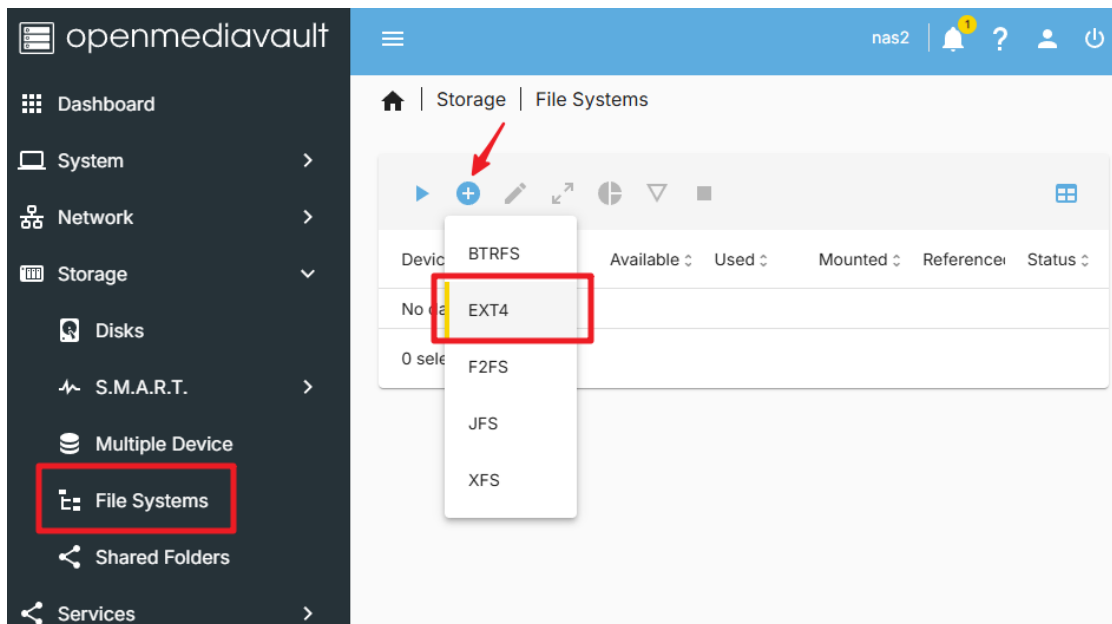


The screenshot shows the OpenMediaVault interface with the 'Storage' | 'Disks' path selected. A table lists the following disks:

Device ^	Model ^	Serial Number ^	Vendor ^	Capacity ^
/dev/mmcblk0				27.34 GiB
/dev/sda	TOSHIBA DT01ABA100V	Z5N9J1GNS	ATA	931.51 GiB
/dev/sdb	ST500DM009	5VM1CT3N	ATA	465.76 GiB

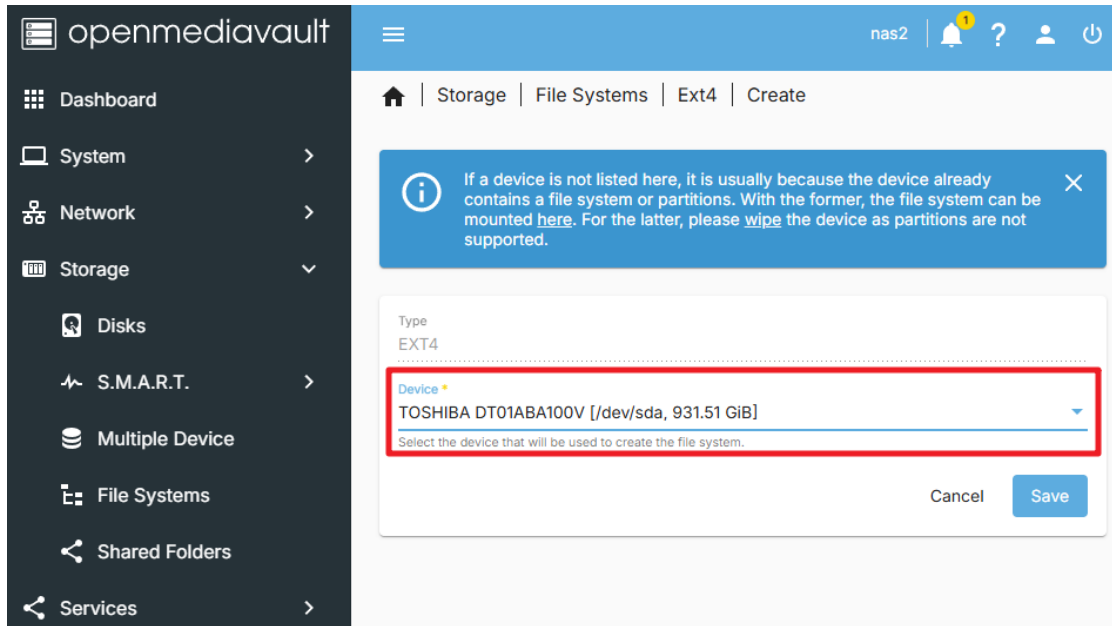
0 selected / 3 total

1. In the sidebar, click the **File System** option. Then create and mount a file system. Choose **ext4** as the file system type.

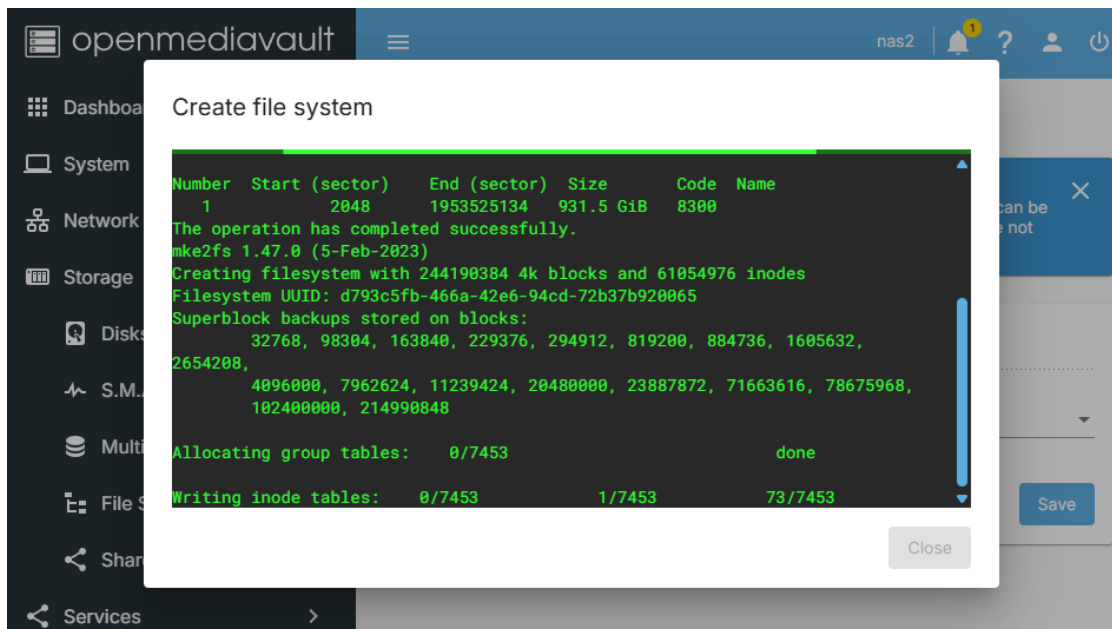


2. Select **Device**, and save.

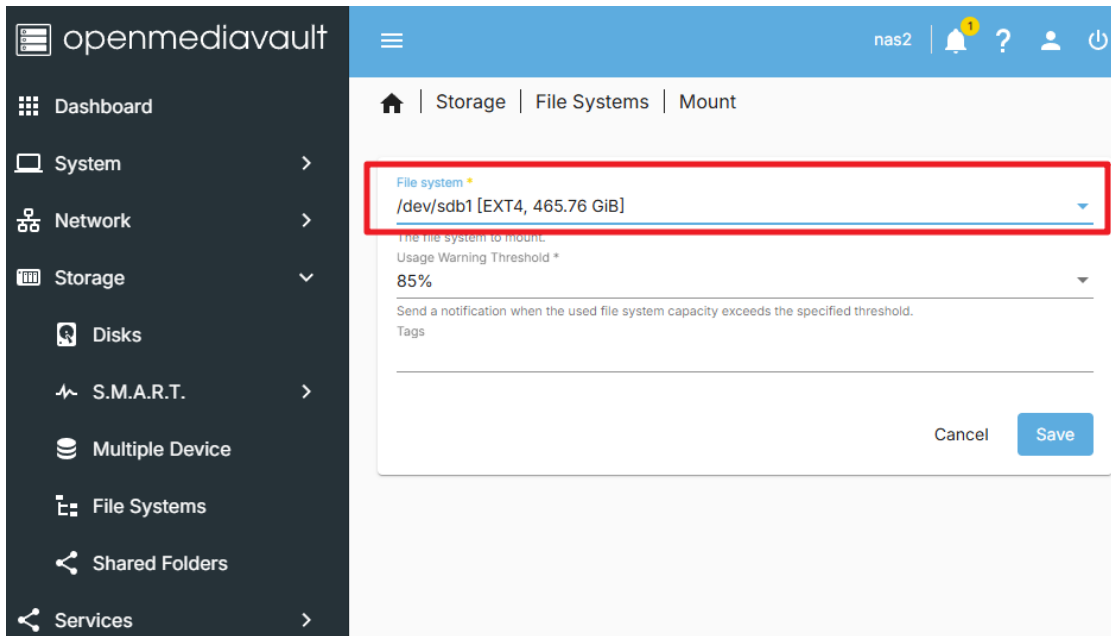
Note: If you have set up the RAID, you will see the RAID device in the list. Just select it and save.



3. A window will appear, informing you that the file system is being created, please wait a moment.

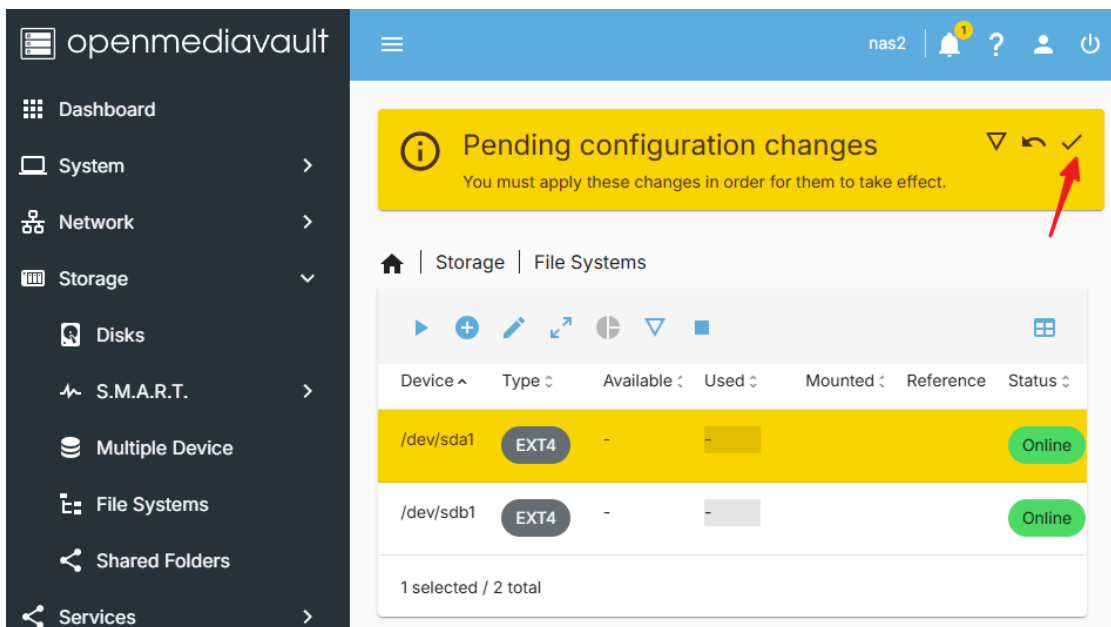


4. Once done, you will enter the Mount interface, select the file system you just created, and mount it to your Raspberry Pi.



Note: If you are using dual hard drives (and not RAID), you should repeat the above steps to also mount the second hard drive to your Raspberry Pi.

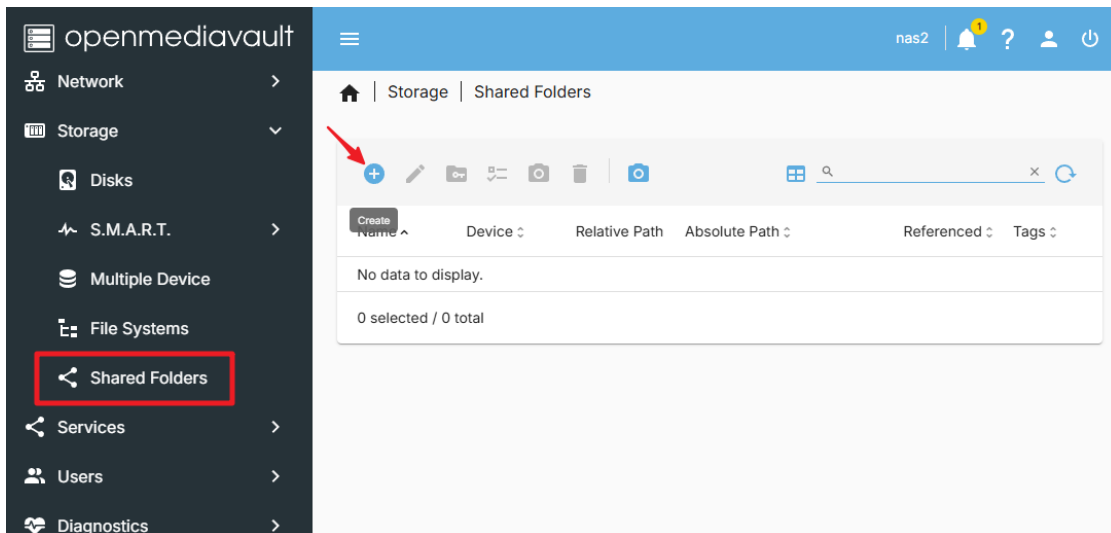
5. After mounting, please Apply, and then you can see the data on your hard drives in the file system.



At this point, you have successfully configured OpenMediaVault and mounted your hard drives. You can now use OpenMediaVault to manage your storage.

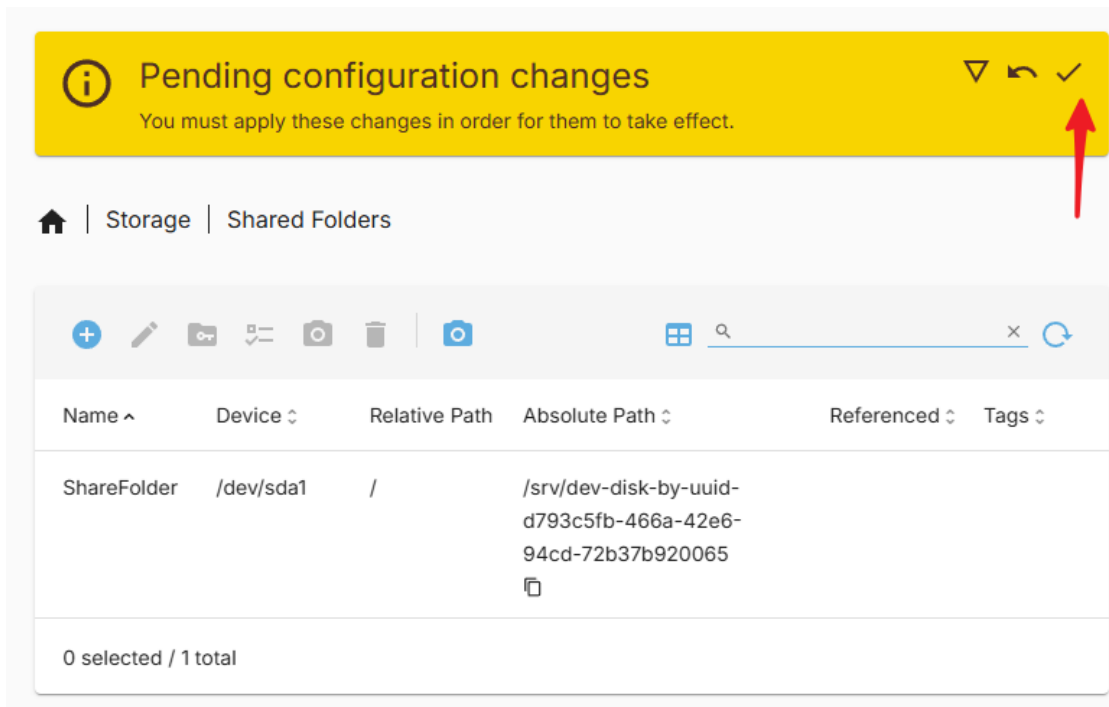
4.6 6. Create a Shared Folder

1. In the Storage page, go to the Shared Folders tab. And click the Create button.



2. In the Create Shared Folder page, enter the name of the shared folder, select the hard drive you want to share, the path of the shared folder, and set the permissions of the shared folder. Then click the Save button.

3. Now you can see the shared folder you just created. Confirm it is correct, then apply.

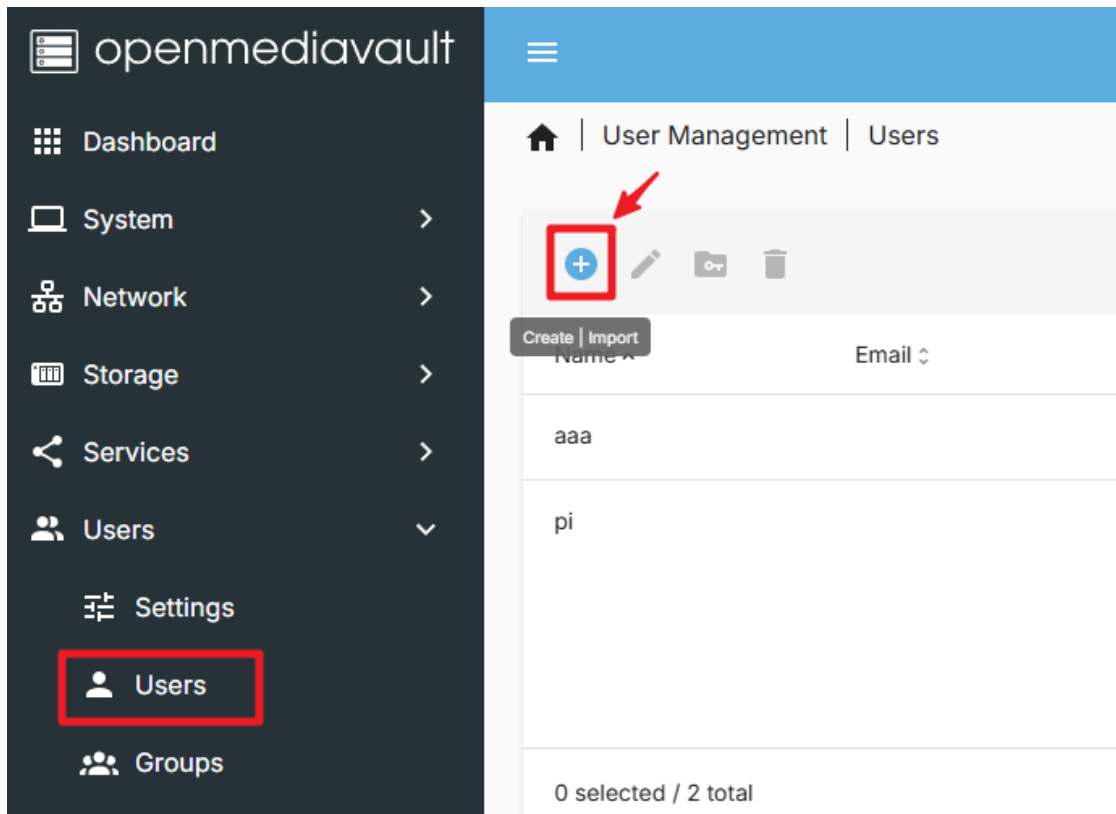


You have now successfully created a shared folder.

4.7 7. Create a New User

To access the folder, we need to create a new user, please follow these steps:

1. In the User page, click the Create button.



2. In the Create User page, enter the new user's username and password, then click the Save button.

Name *

sunfounder

Email

Password *

Confirm password

Shell

/usr/bin/sh

Groups

Select groups ...

SSH public keys

No data to display.

☒ Disallow account modification

Disallow the user to modify their own account.

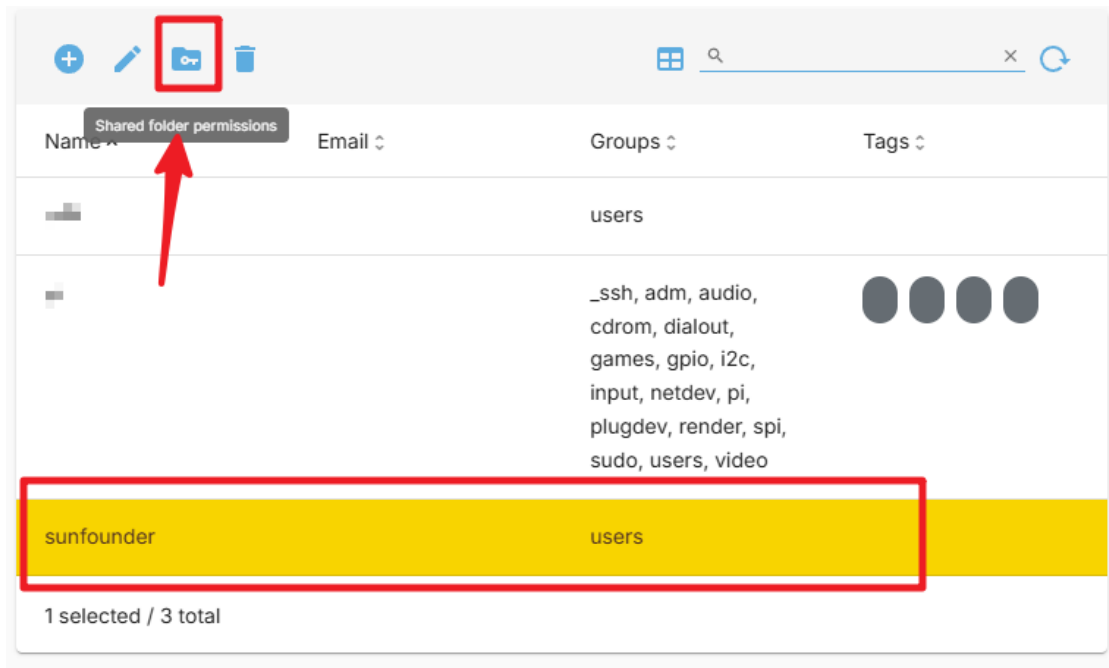
Tags

Cancel Save

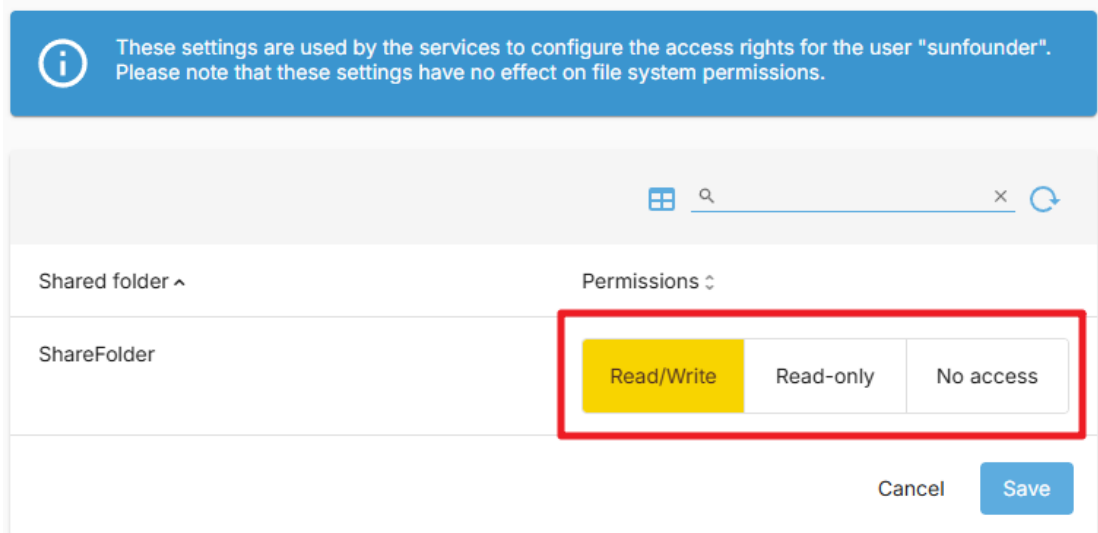
You have now successfully created a new user.

4.8 8. Set Permissions for the New User

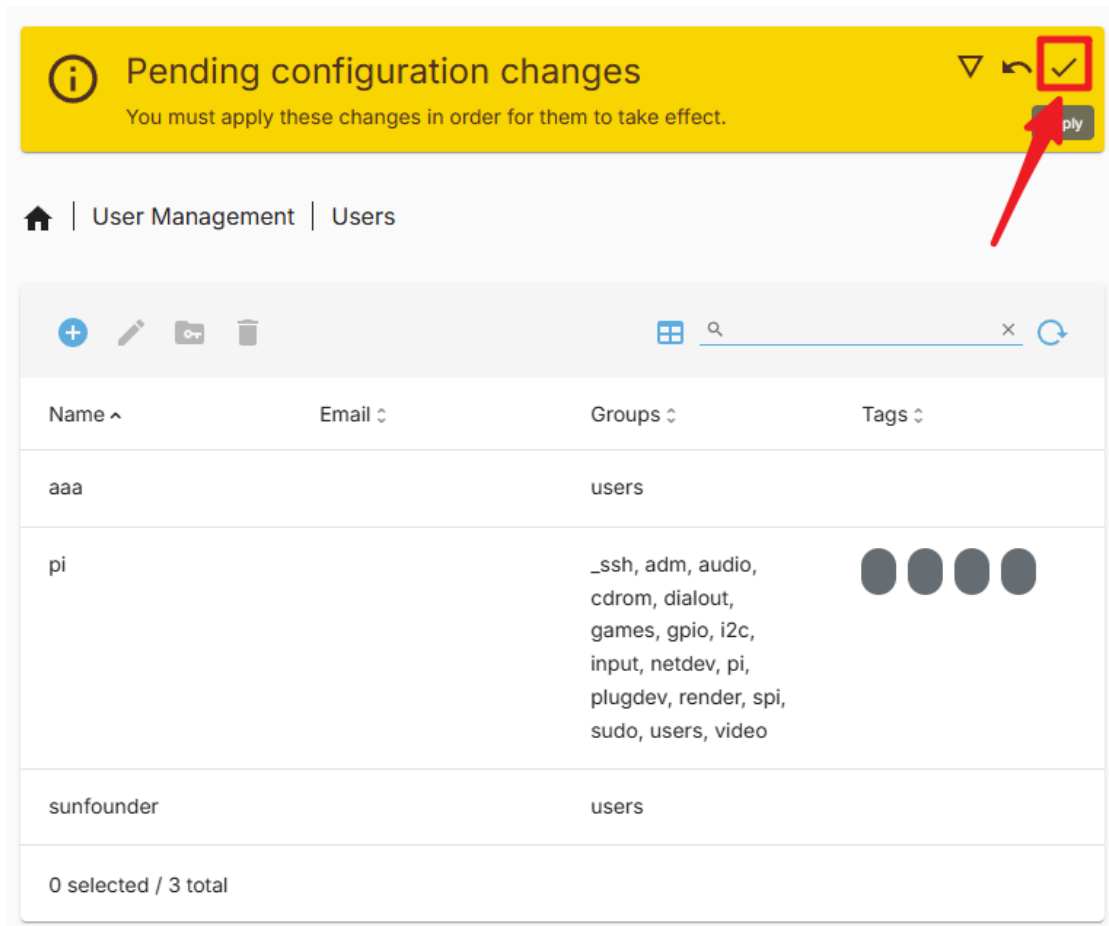
1. In the Shared Folders page, click on the shared folder you just created. Then click the Permissions button.



2. In the Permissions page, set the permissions. Then click the Save button.



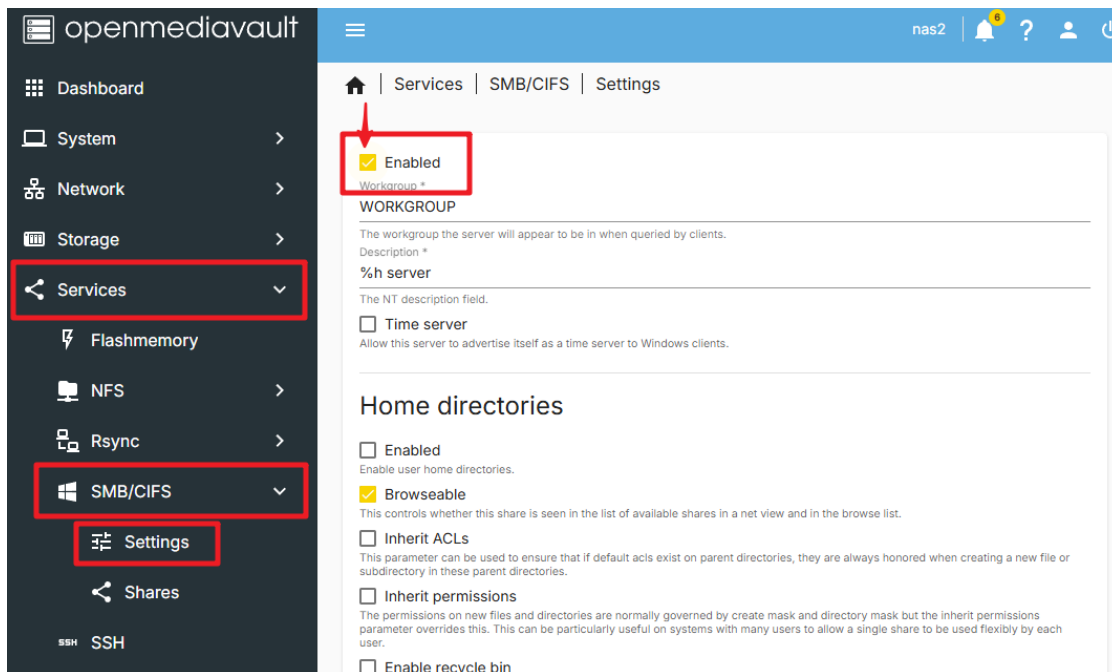
3. After completing, click the Apply button.



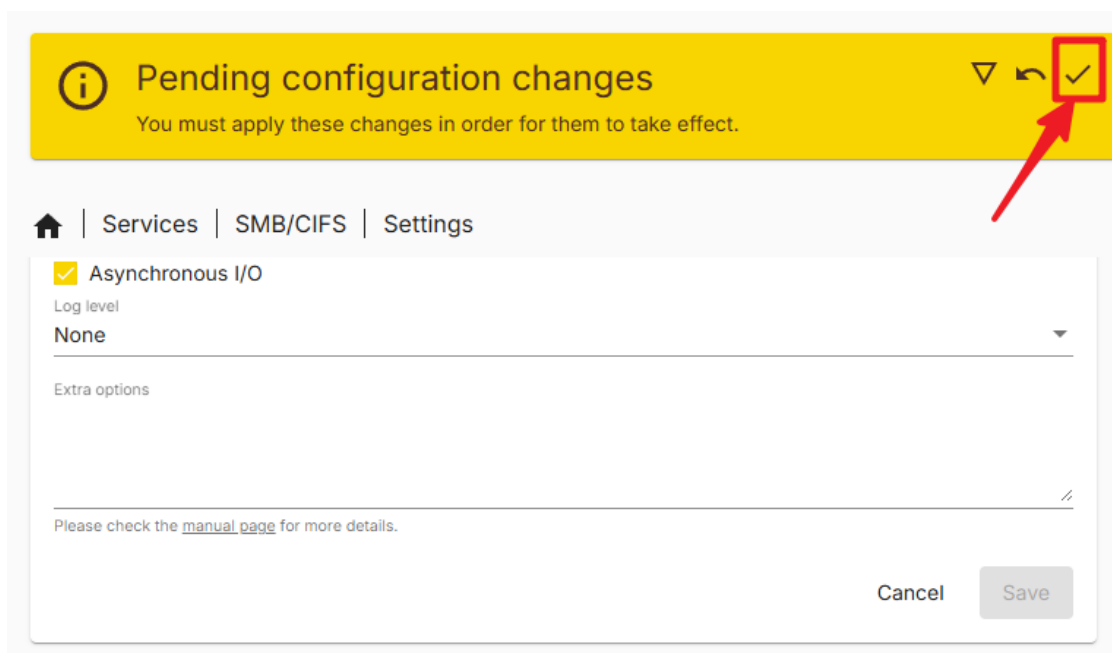
You can now use this new user to access your shared folder.

4.9 9. Configure the SMB Service

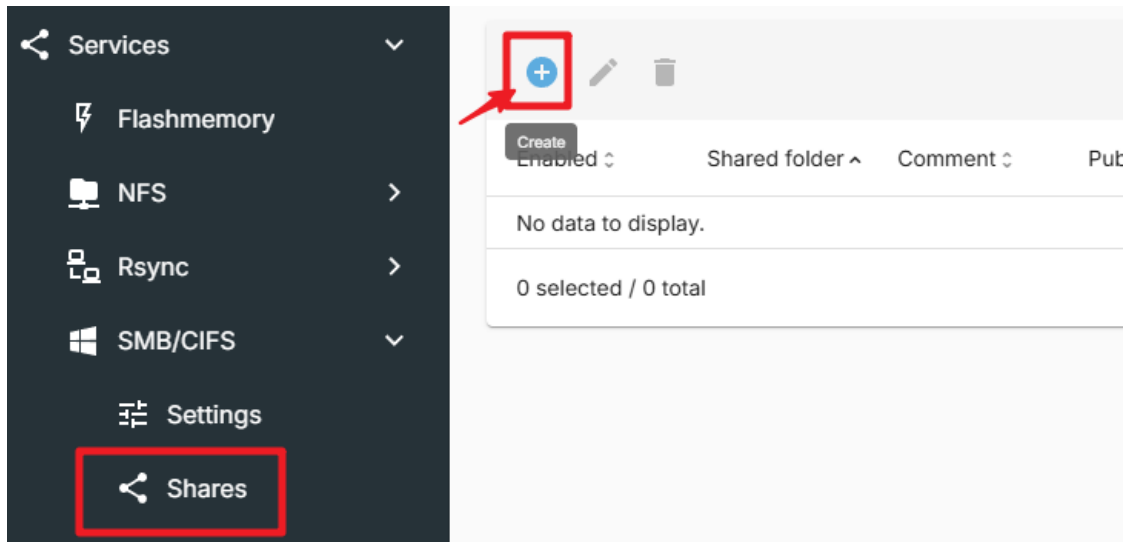
1. In the Services page, find the SMB/CIFS > Setting tab. And check the Enable option. Then click the Save button.



2. Apply the changes by clicking the **Apply** button.



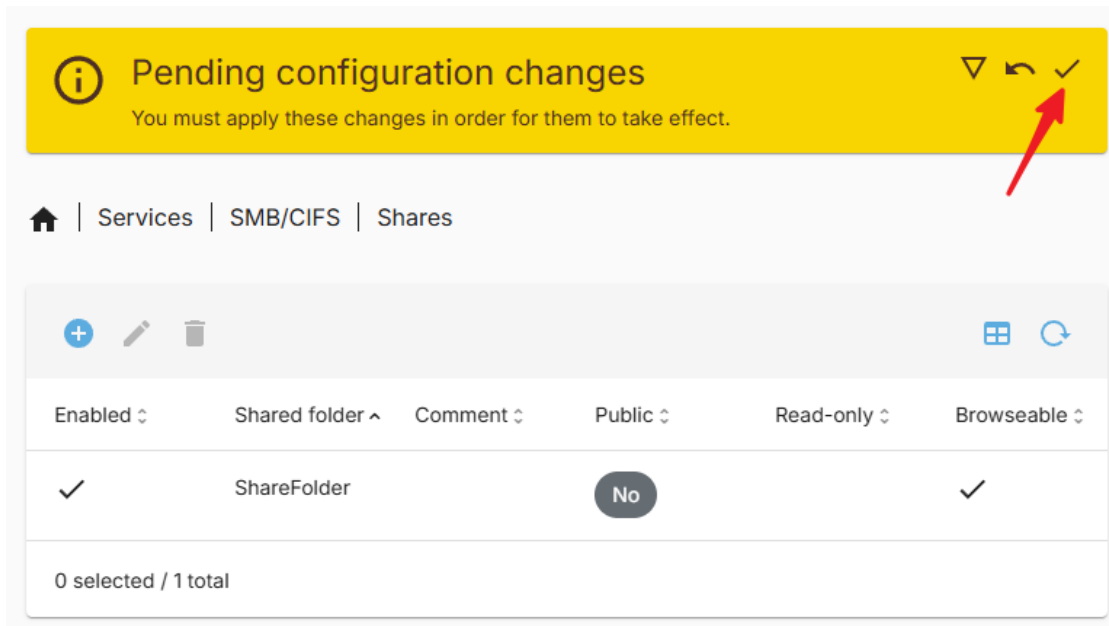
3. Enter the Shares page, click the Create button.



4. In the Create Share page, select the path of the shared folder. Then click the Save button. Incidentally, there are many options on this page that you can configure as needed.



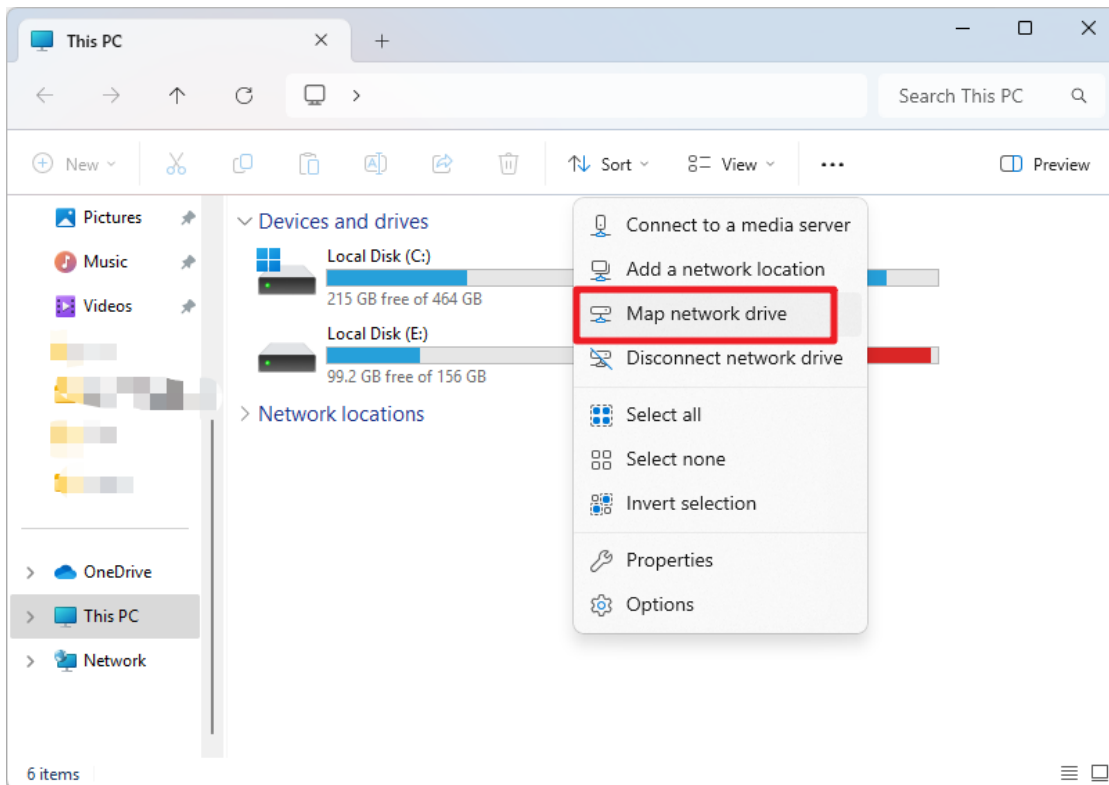
5. Click Apply.



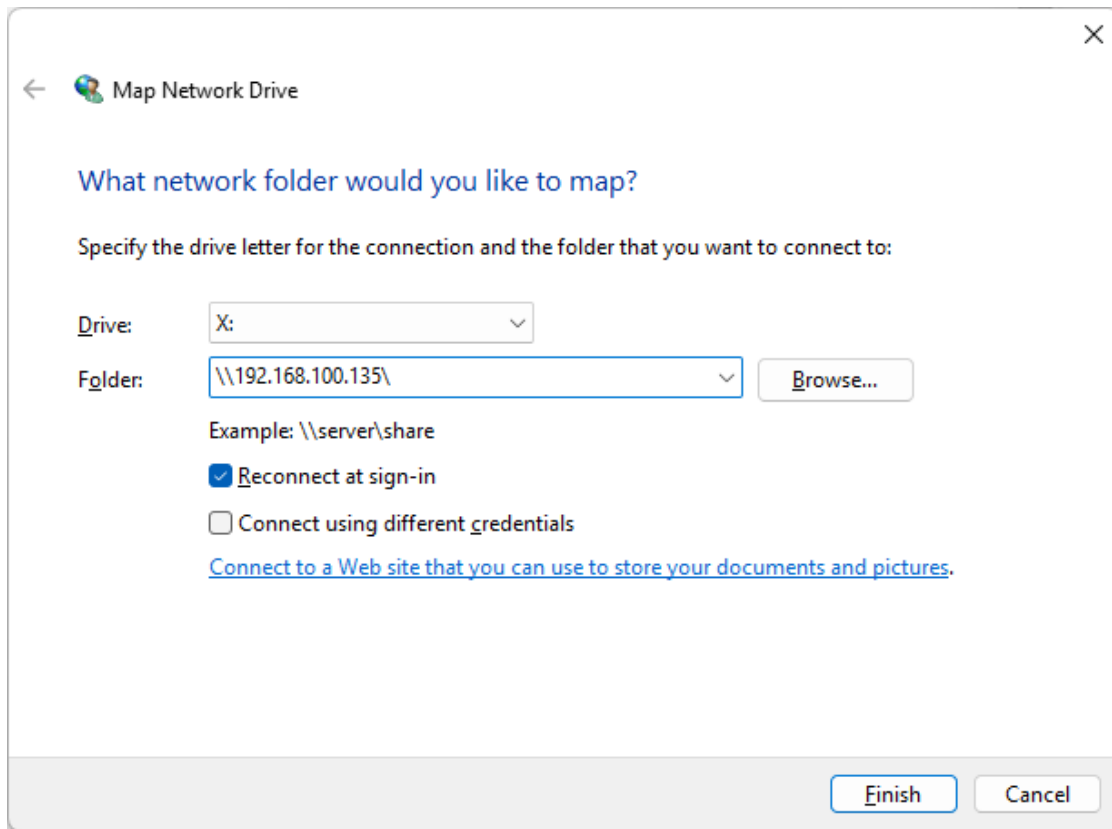
You have now successfully configured the SMB service. You can now use the SMB protocol to access your shared folder.

4.10 10. Access the Shared Folder on Windows

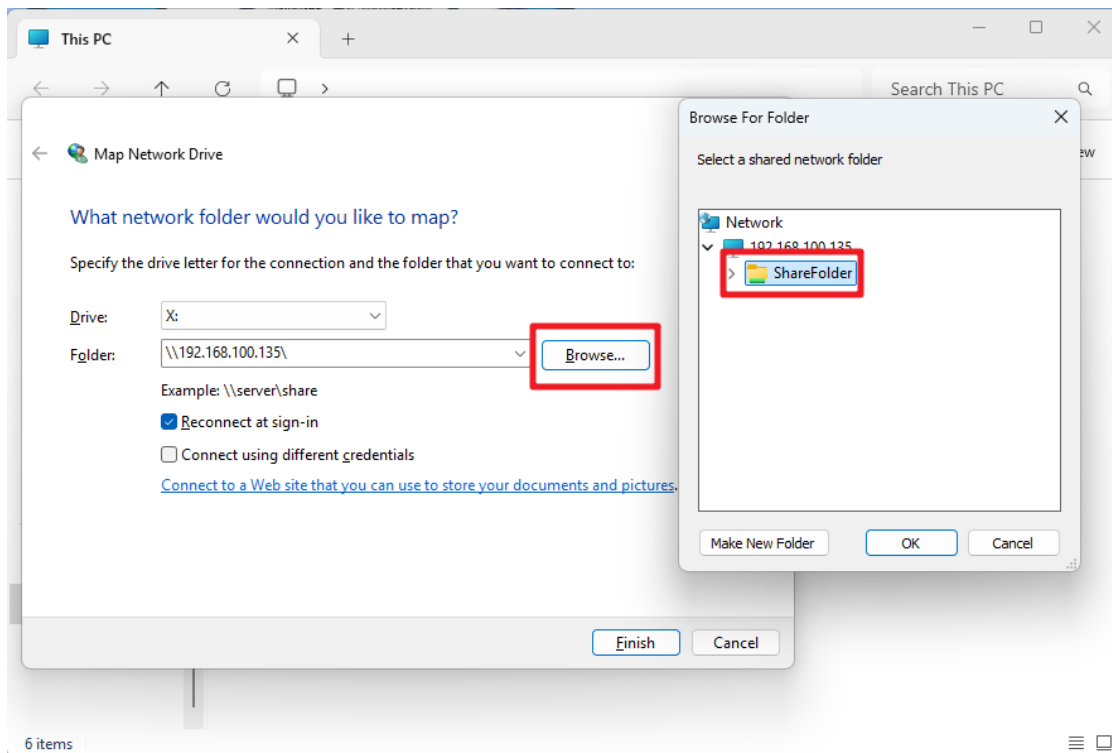
1. Open This PC, then click Map network drive.



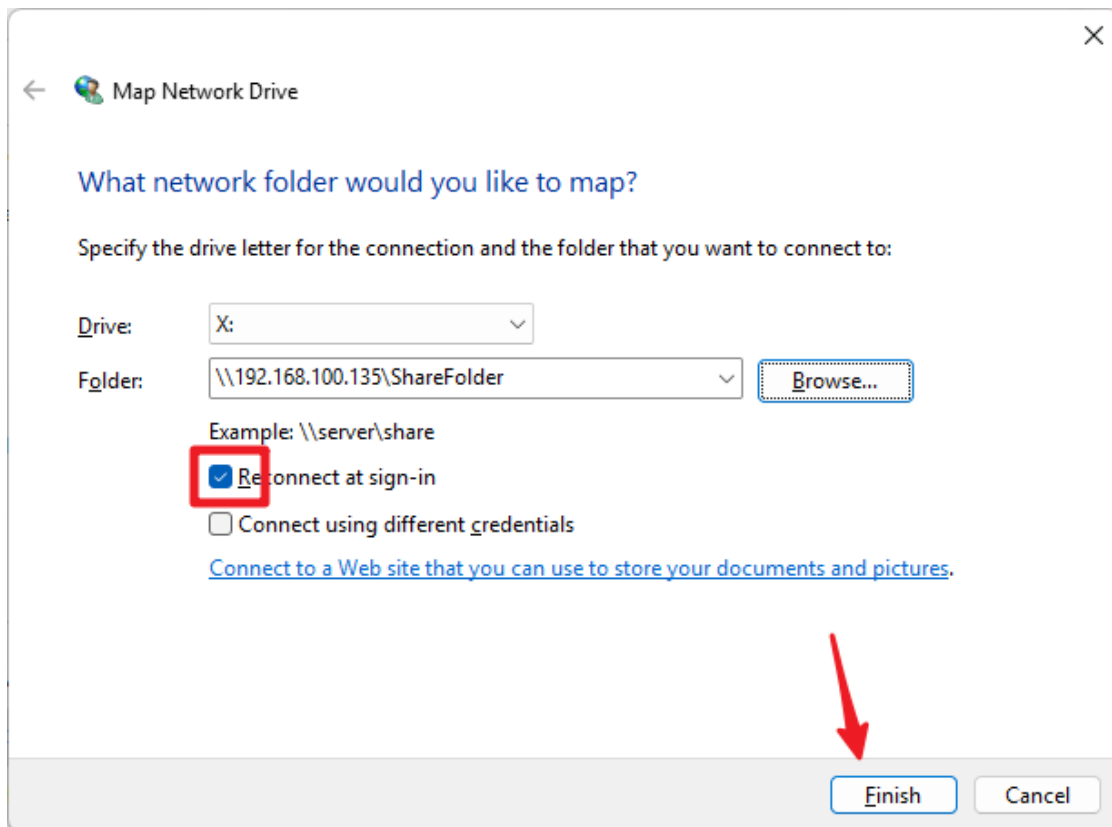
2. In the pop-up dialog box, enter the IP of the Raspberry Pi in the Folder field, for example, \\192.168.1.100\, or the Raspberry Pi's hostname, for example, \\pi.local\.



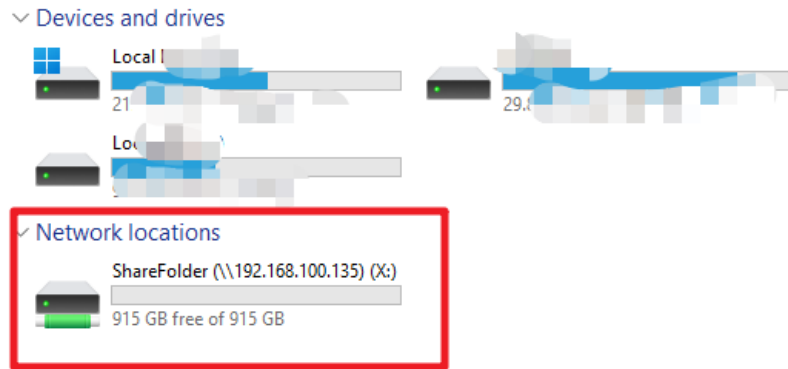
3. Click the browse button, then select the shared folder you want to access. During this process, you will need to enter the username and password you created earlier.



4. Check "Reconnect at sign-in", and click the Finish button.

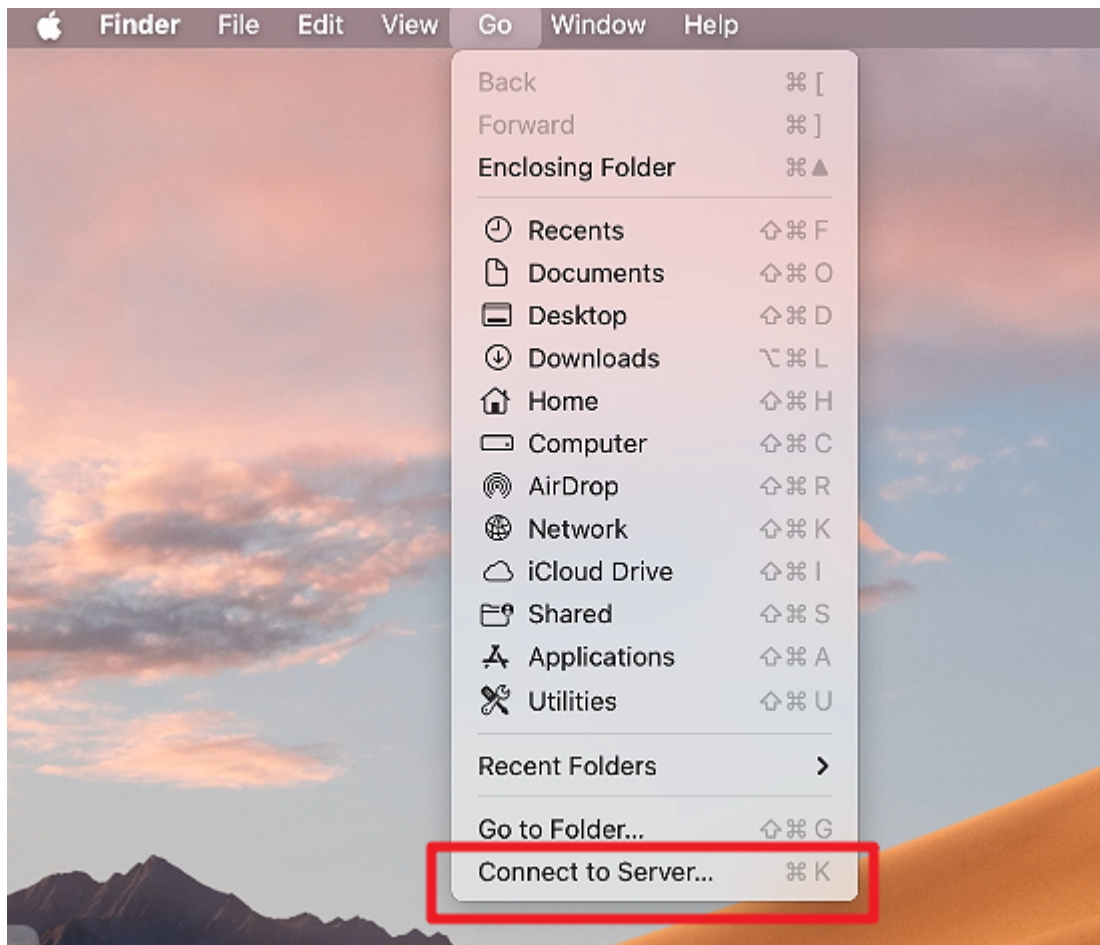


5. You can now access the NAS shared folder.

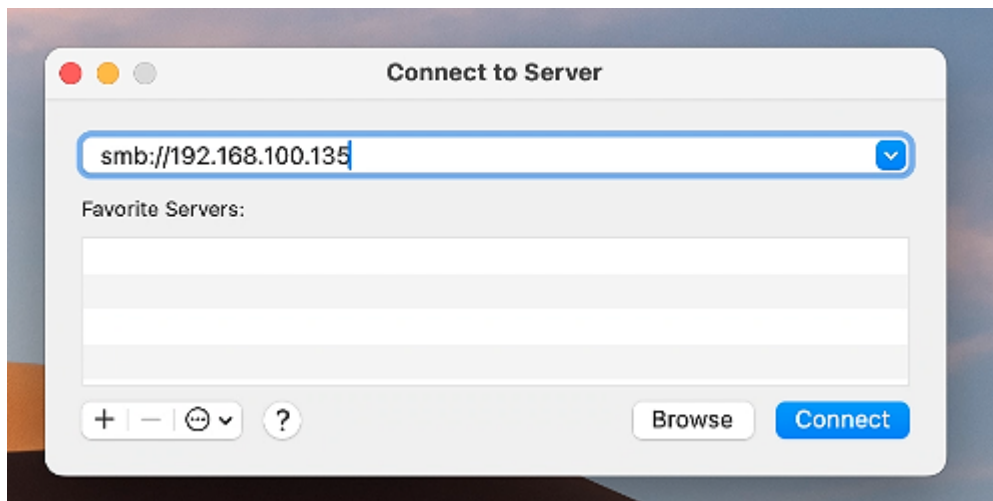


4.11 10. Access the Shared Folder on Mac

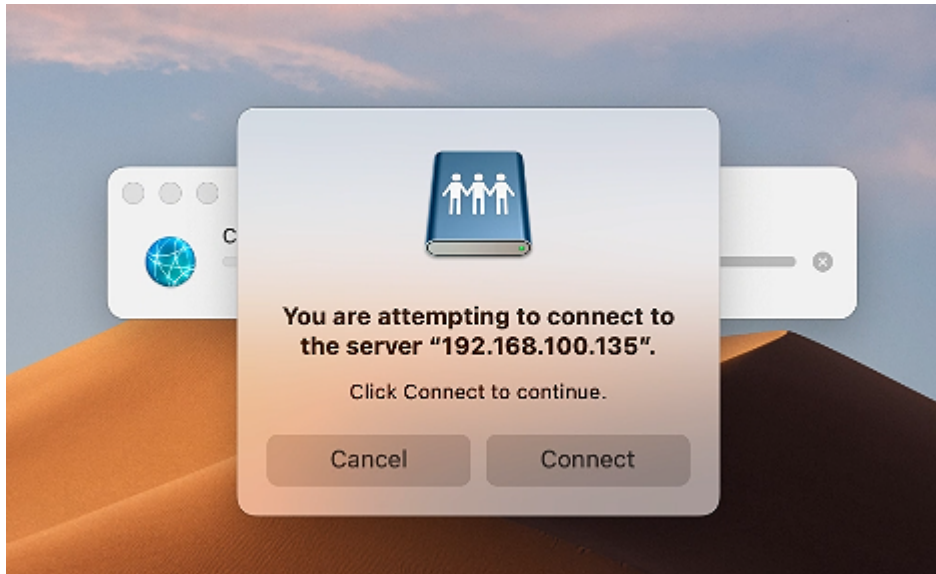
1. In the Go menu, click **Connect to Server**.



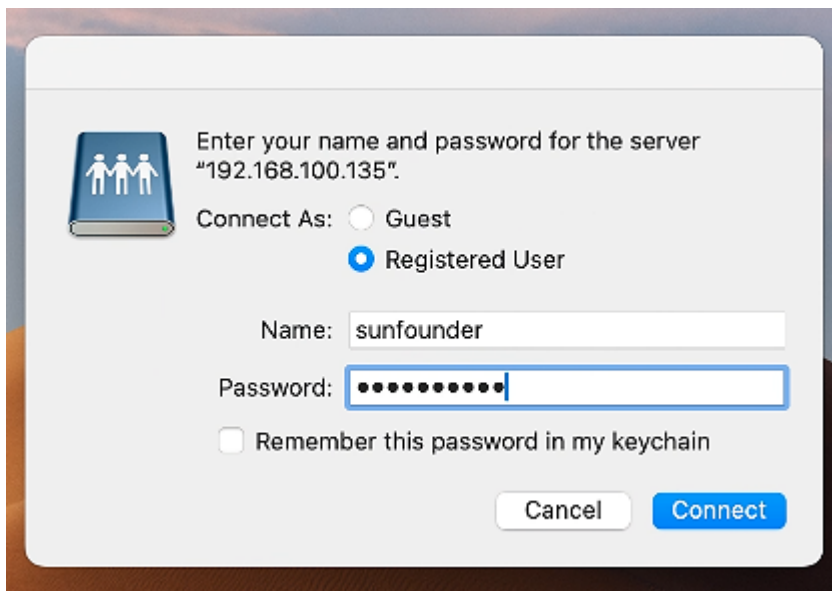
2. In the pop-up dialog box, enter the IP of the Raspberry Pi, such as `smb://192.168.1.100`, or the Raspberry Pi's hostname, such as `smb://pi.local`.



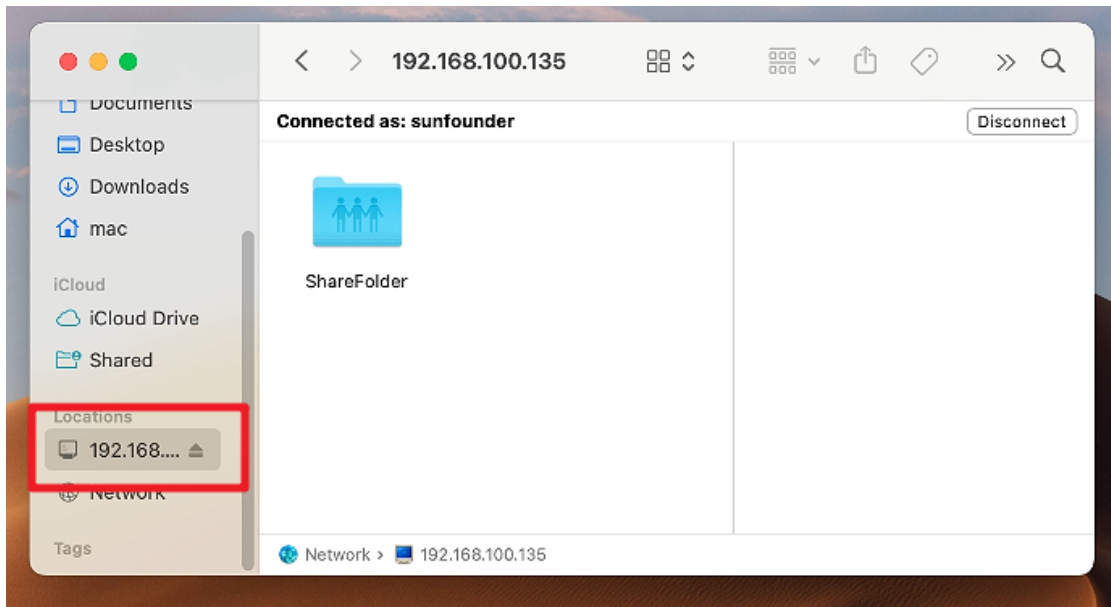
3. Click the Connect button.



4. In the pop-up dialog box, enter the username and password you created earlier. Click the Connect button.



5. You can now access the NAS shared folder.



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5. SET UP OR INSTALL SOFTWARE

Now that the system has been written to either the Micro SD or NVMe SSD, you can insert them into the Pironman 5 slot. Then press the power button to turn on the device.

After powering on, you will see the various power LEDs lit up, but the OLED screen, RGB LEDs, and RGB fans (the two fans on the side) will not be operational yet, as they need to be configured. If there is a screen garbling issue, please ignore it for now; it will be resolved after configuration.

Before configuring, you need to boot up and log into your Raspberry Pi. If you're unsure how to log in, you can visit the official Raspberry Pi website: .

You can then proceed to select the configuration tutorial based on your system.

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5.1 Set Up on Raspberry Pi

Note: Before configuring, you need to boot up and log into your Raspberry Pi. If you're unsure how to log in, you can visit the official Raspberry Pi website: .

5.1.1 Configuring Shutdown to Deactivate GPIO Power

To prevent the OLED screen and RGB fans, powered by the Raspberry Pi GPIO, from remaining active post-shutdown, it's essential to configure the Raspberry Pi for GPIO power deactivation.

1. Manually edit the EEPROM configuration file with this command:

```
sudo rpi-eeprom-config -e
```

2. Modify the POWER_OFF_ON_HALT setting in the file to 1. For instance:

```
BOOT_UART=1
POWER_OFF_ON_HALT=1
BOOT_ORDER=0xf41
```

3. Press Ctrl + X, Y and Enter to save the changes.

5.1.2 Downloading and Installing the pironman5 Module

1. For lite systems, initially install tools like git, python3, pip3, setuptools, etc.

```
sudo apt-get update
sudo apt-get install git -y
sudo apt-get install python3 python3-pip python3-setuptools -y
```

2. Proceed to download code from GitHub and install the pironman5 module .

```
cd ~
git clone -b nas https://github.com/sunfounder/pironman5.git
cd ~/pironman5
sudo python3 install.py
```

After successful installation, a system reboot is required to activate the installation. Follow the on-screen reboot prompt.

Upon reboot, the `pironman5.service` will start automatically. Here are the primary configurations for Pironman 5:

- The OLED screen displays CPU, RAM, Disk Usage, CPU Temperature, and the Raspberry Pi's IP Address.

3. You can use the `systemctl` tool to start, stop, restart, or check the status of `pironman5.service`.

```
sudo systemctl restart pironman5.service
```

- **restart:** Use this command to apply any changes made to the settings of pironman 5.
- **start/stop:** Enable or disable the `pironman5.service`.
- **status:** Check the operational status of the `pironman5` program using the `systemctl` tool.

Button Functions

- **Short press:** Powers on the Raspberry Pi, wakes up the OLED screen, or cycles through different OLED display modes.
- **Long press (2 seconds):** Initiates a safe shutdown of the Raspberry Pi.
- **Long press (5 seconds):** Forces an immediate power cut (hard shutdown).

Note: The 5-second long press is equivalent to unplugging the power and should only be used when the system is unresponsive, as it may lead to data loss or file system corruption.

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6. CONTROL WITH COMMANDS OR DASHBOARD

Once you have successfully installed the `pironman5` module, the `pironman5.service` will automatically start upon reboot.

You can monitor and control the Pironman 5 via commands, or by accessing the dashboard through the webpage at `http://<ip>:34001`.

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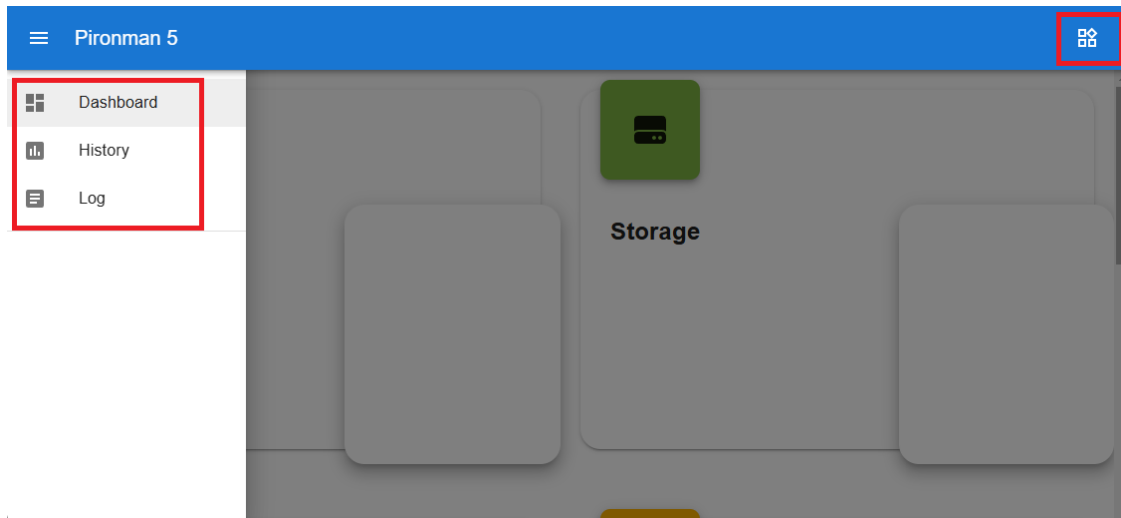
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6.1 View and Control from Dashboard

Once you have successfully installed the `pironman5` module, the `pironman5.service` will start automatically upon reboot.

Now you can open the monitoring page in your browser to see the information about your Raspberry Pi, configure the RGB, and control the fan, etc. The page link is: `http://<ip>:34001`.

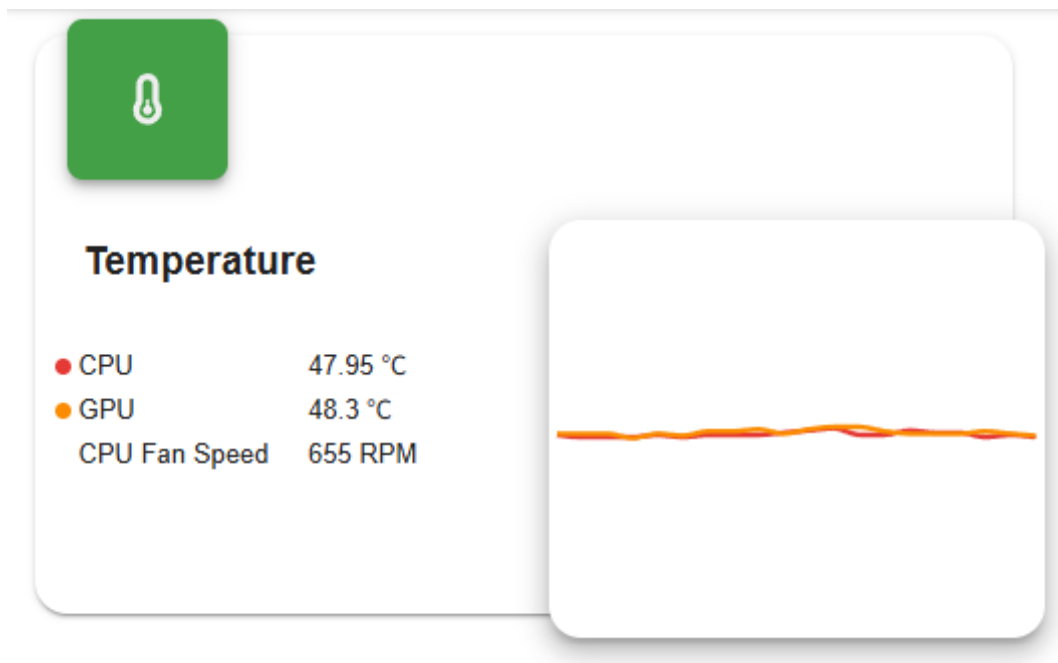
This page has **Dashboard**, **History**, **Log**, and a **Settings** page.



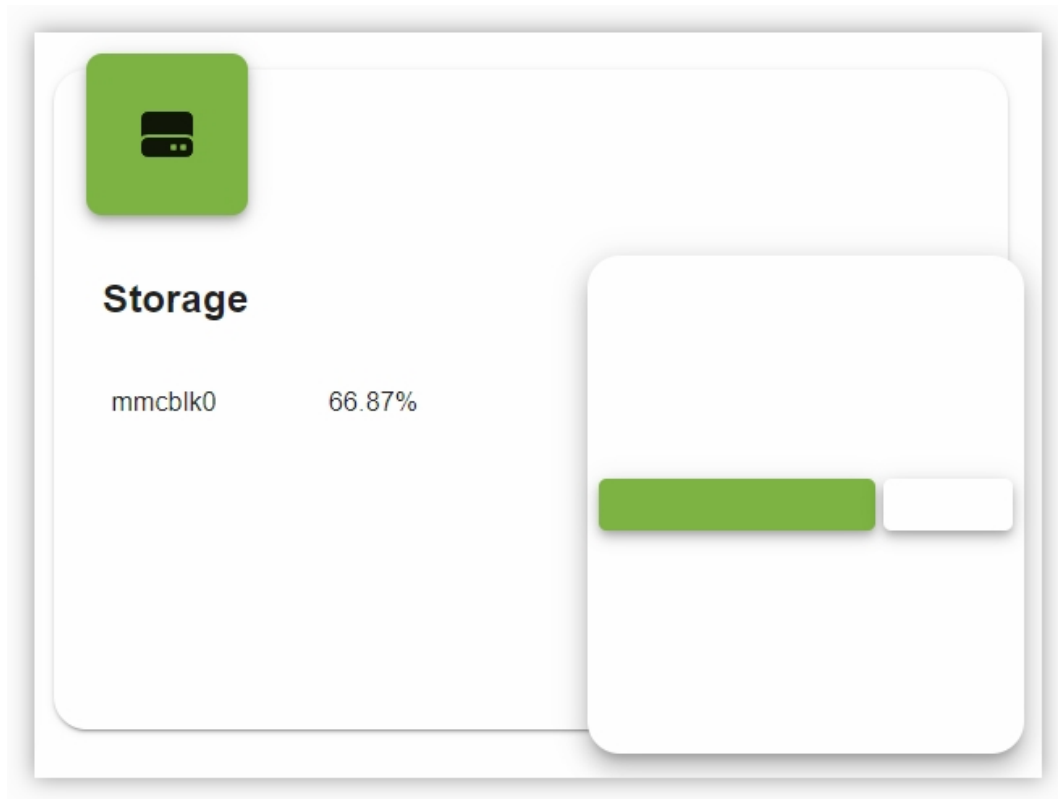
6.1.1 Dashboard

There are multiple cards to view the relevant status of the Raspberry Pi, including:

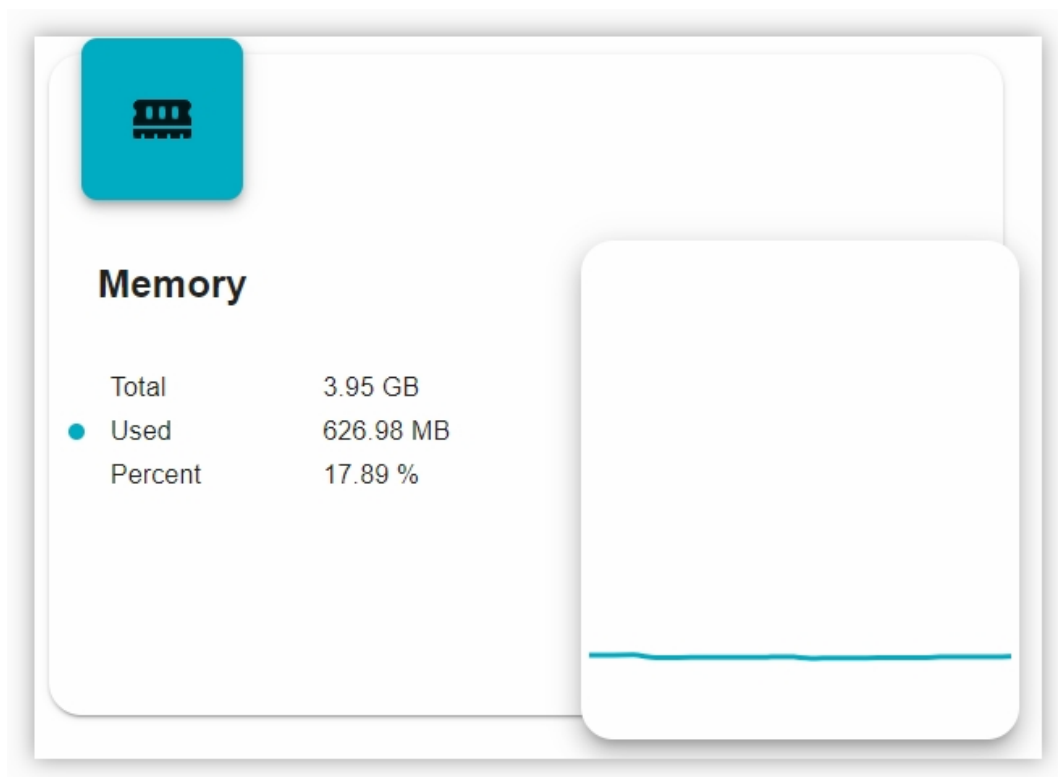
- **Temperature:** View the Raspberry Pi's CPU & GPU temperature and the PWM fan speed.



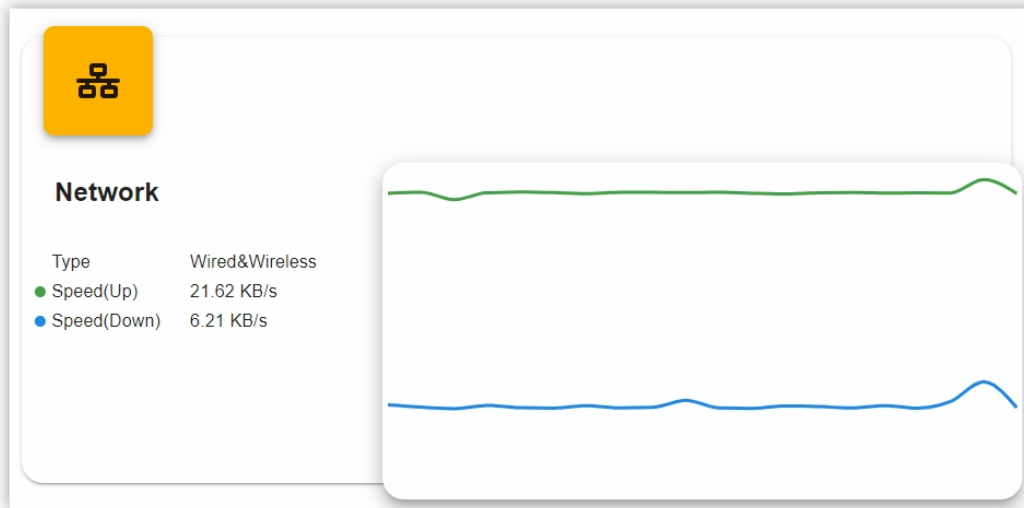
- **Storage:** Displays the storage capacity of a Raspberry Pi, showing various disk partitions with their used and available space.



- **Memory:** Shows the Raspberry Pi's RAM usage and percentage.



- **Network:** Displays the current network connection type, upload, and download speeds.

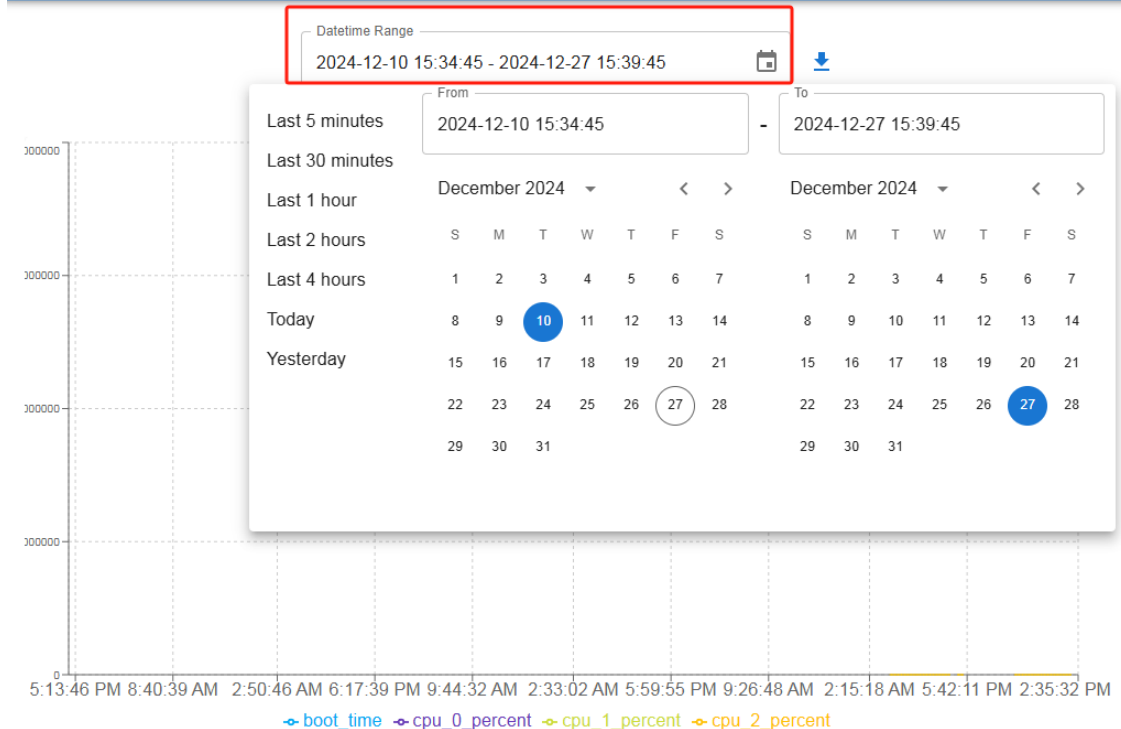
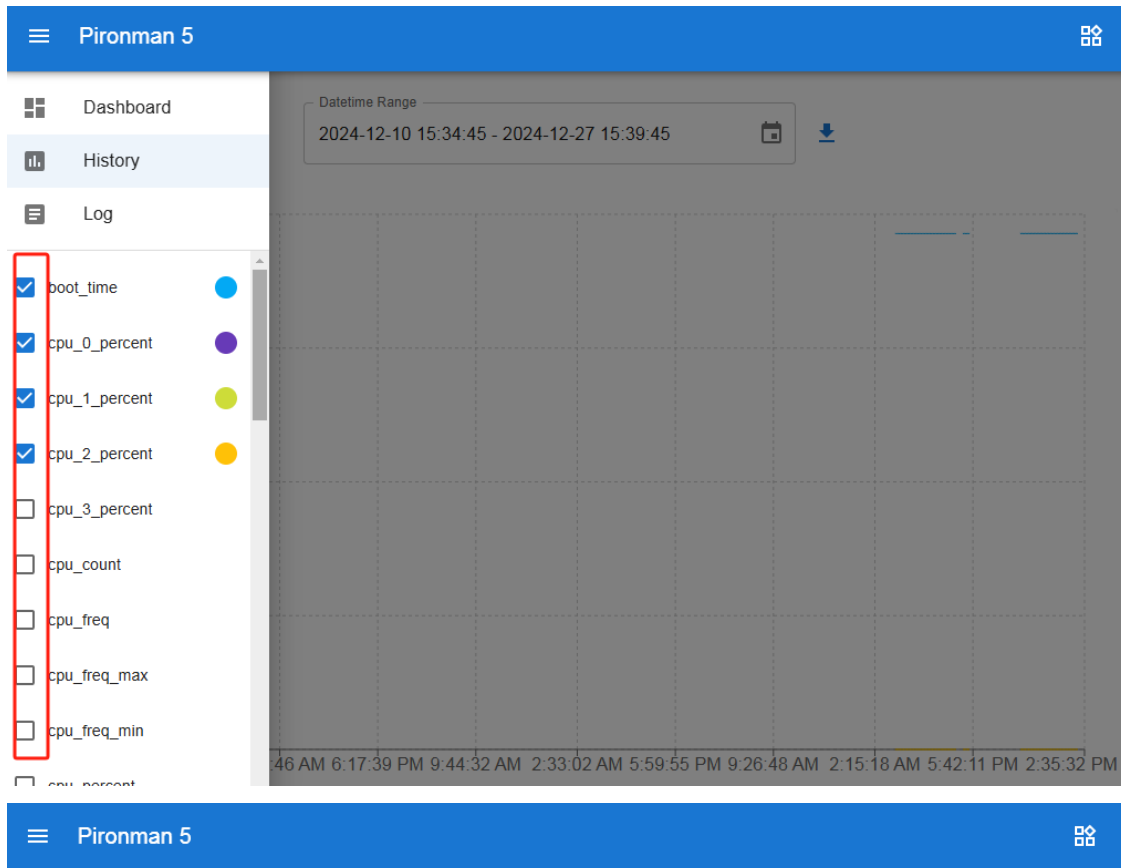


- **Processor:** Illustrates the Raspberry Pi's CPU performance, including the status of its four cores, operating frequencies, and CPU usage percentage.



6.1.2 History

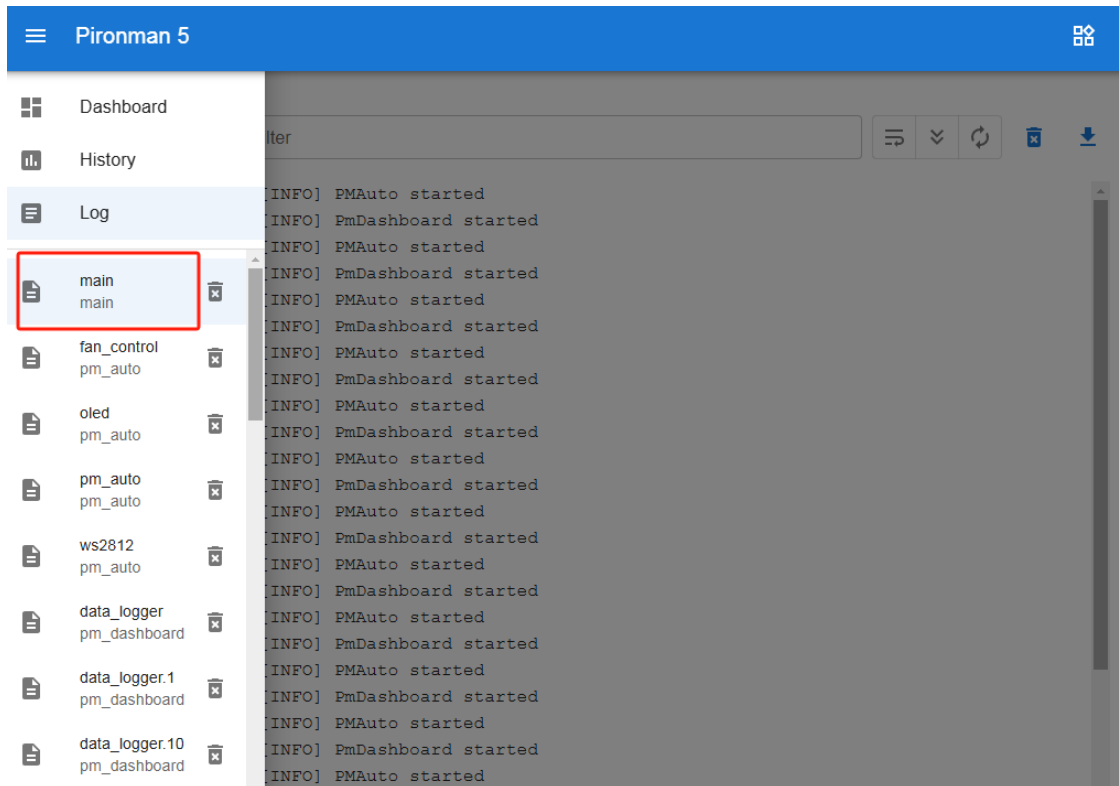
The History page allows you to view historical data. Check the data you want to view in the left sidebar, then select the time range to see the data for that period, and you can also click to download it.



6.1.3 Log

The Log page is used to view the logs of the currently running Pironman5 service. The Pironman5 service includes multiple sub-services, each with its own log. Select the log you want to view, and you can see the log data on the right. If it is blank, it may mean there is no log content.

- Each log has a fixed size of 10MB. When it exceeds this size, a second log will be created.
- The number of logs for the same service is limited to 10. If the number exceeds this limit, the oldest log will be automatically deleted.
- There are filter tools above the log area on the right. You can select the log level, filter by keywords, and use several convenient tools, including **Line Wrap**, **Auto Scroll** and **Auto Update**.
- Logs can also be downloaded locally.



≡

Pironman 5

Lines

Level

Filter

100

Info

24/12/25 11:24:39.863 [INFO] PMAuto started

24/12/25 11:24:39.968 [INFO] PmDashboard started

24/12/25 13:47:49.455 [INFO] PMAuto started

24/12/25 13:47:49.560 [INFO] PmDashboard started

24/12/25 16:11:23.133 [INFO] PMAuto started

24/12/25 16:11:23.222 [INFO] PmDashboard started

24/12/25 16:16:32.032 [INFO] PMAuto started

24/12/25 16:16:34.521 [INFO] PmDashboard started

24/12/25 16:20:17.402 [INFO] PMAuto started

24/12/25 16:20:17.509 [INFO] PmDashboard started

24/12/25 16:32:39.582 [INFO] PMAuto started

24/12/25 16:32:39.689 [INFO] PmDashboard started

24/12/25 17:26:27.200 [INFO] PMAuto started

24/12/25 17:26:27.303 [INFO] PmDashboard started

24/12/26 14:05:40.280 [INFO] PMAuto started

24/12/26 14:05:40.371 [INFO] PmDashboard started

24/12/26 15:14:41.411 [INFO] PMAuto started

24/12/26 15:14:41.535 [INFO] PmDashboard started

24/12/26 16:22:14.609 [INFO] PMAuto started

24/12/26 16:22:14.670 [INFO] PmDashboard started

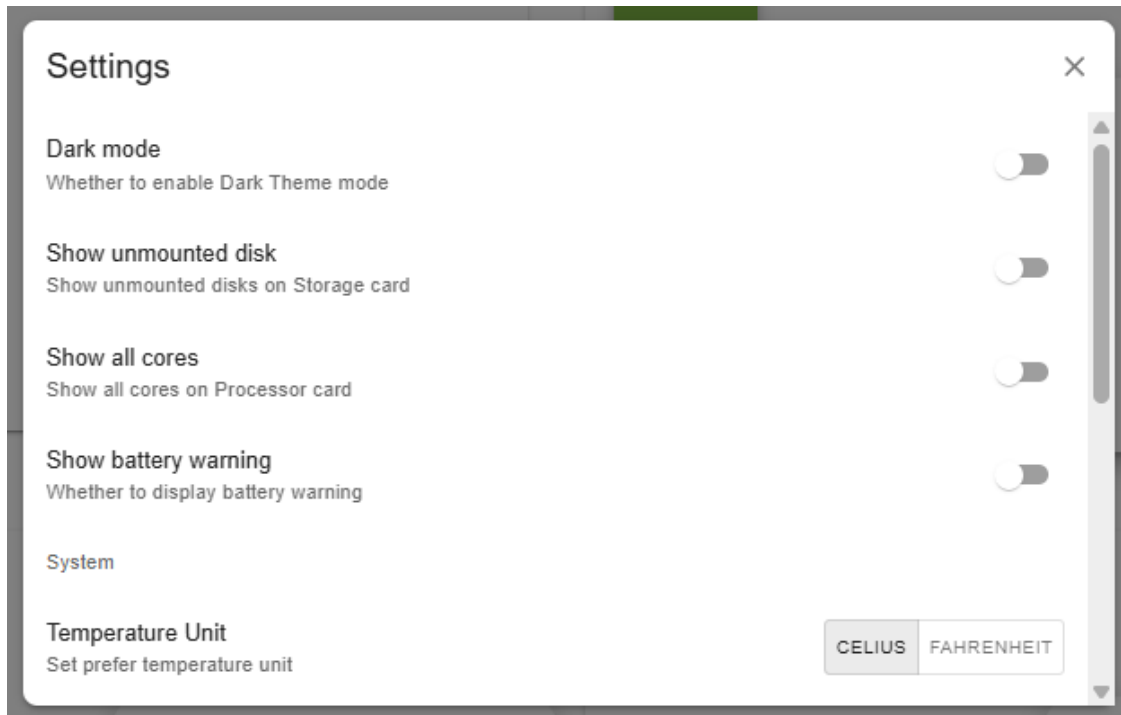
24/12/26 17:29:47.862 [INFO] PMAuto started

24/12/26 17:29:47.917 [INFO] PmDashboard started

24/12/27 11:55:39.598 [INFO] PMAuto started

6.1.4 Settings

There is a settings menu in the upper right corner of the page where you can customize the settings according to your preferences. After making modifications, the changes will be saved automatically. If needed, you can click the CLEAR button at the bottom to clear the historical data.



- **Dark Mode:** Toggle between light and dark mode themes. The theme option is saved in the browser cache. Changing the browser or clearing the cache will revert to the default light theme.
- **Show Unmounted Disk:** Whether to show unmounted disks in the dashboard.
- **Show All Cores:** Whether to show all cores in the dashboard.
- **Show Battery Warning:** Whether to show battery warning in the dashboard.
- **Temperature Unit:** Set the temperature unit displayed by the system.

About OLED Screen



- **OLED Enable:** Whether to enable OLED.
- **OLED Disk:** Set OLED disk.
- **OLED Network Interface:**
 - **all:** Toggle the display between the Ethernet IP and Wi-Fi IP in sequence.
 - **eth0:** Display only the Ethernet IP
 - **wlan0:** Display only the Wi-Fi IP
- **OLED Rotation:** Set OLED rotation.
- **OLED Sleep Timeout:** Set OLED sleep timeout.

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6.2 Control with Commands

In addition to viewing data from the Pironman 5 and controlling various devices through the Dashboard, you can also use commands to control them.

Note:

- For the **Home Assistant** system, you can only monitor and control the Pironman 5 through the dashboard by opening the webpage at `http://<ip>:34001`.

6.2.1 View the Basic Configurations

The `pironman5` module offers basic configurations for Pironman, which you can review with the following command.

```
sudo pironman5 -c
```

Use `pironman5` or `pironman5 -h` for instructions.

Pironman 5 NAS command line interface

positional arguments:

{start,restart,stop} Command

options:

```
-h, --help            show this help message and exit
-v, --version          Show version
-c, --config           Show config
-dl {debug,info,warning,error,critical}, --debug-level {debug,info,warning,error,
critical}              Debug level
--background [BACKGROUND]
                       Run in background
-rd, --remove-dashboard
                       Remove dashboard
-cp [CONFIG_PATH], --config-path [CONFIG_PATH]
                       Config path
-eh [ENABLE_HISTORY], --enable-history [ENABLE_HISTORY]
                       Enable history, True/true/on/On/1 or False/false/off/Off/0
-u [{C,F}], --temperature-unit [{C,F}]
                       Temperature unit
-oe [OLED_ENABLE], --oled-enable [OLED_ENABLE]
                       OLED enable True/true/on/On/1 or False/false/off/Off/0
-or [{0,180}], --oled-rotation [{0,180}]
                       Set to rotate OLED display, 0, 180
-os [OLED_SLEEP_TIMEOUT], --oled-sleep-timeout [OLED_SLEEP_TIMEOUT]
                       OLED sleep timeout in seconds
```

Note: Each time you modify the status of `pironman5.service`, you need to use the following command to make the configuration changes take effect.

```
sudo systemctl restart pironman5.service
```

- Verify the pironman5 program status using the systemctl tool.

```
sudo systemctl status pironman5.service
```

- Alternatively, inspect the program-generated log files.

```
ls /var/log/pironman5/
```

6.2.2 Check the OLED Screen

When you have installed the pironman5 library, the OLED screen displays CPU, RAM, Disk Usage, CPU Temperature, and the Raspberry Pi's IP Address, and it shows this every time you reboot.

If your OLED screen does not display any content, you need to first check if the OLED's FPC cable is connected properly.

Then you can check the program log to see what might be the problem through the following command.

```
cat /var/log/pironman5/pm_auto.oled.log
```

Or check if the OLED's i2c address 0x3C is recognized:

```
i2cdetect -y 1
```

6.2.3 Setting the OLED

When the OLED is installed and rebooted, it will light up.

You can turn on/off the OLED using the following command. The argument could be `on` or `off`.

```
sudo pironman5 -oe on
```

You can set the rotation of the OLED using the following command. The argument could be `0` or `180`.

```
sudo pironman5 -or 180
```

To protect the OLED, the OLED will be turned off. After the OLED is turned off, you can click the power button to wake up the OLED. After a certain time, the OLED will be turned off again. You can use the following command to adjust the OLED's sleep time. The range is (5s to 600s). The following command sets the OLED's sleep time to 10s.

```
sudo pironman5 -os 10
```

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7. HARDWARE

This chapter is a detailed description of all the components in Pironman, as well as the associated software configuration.

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7.1 Log in to the Raspberry Pi OS

In this chapter, you will learn how to log in to the Raspberry Pi. This section will guide you through opening the terminal, which you will use in later chapters to enter commands.

Note: If you are already familiar with Raspberry Pi operations, you can skip this chapter.

For command-line access, you can use SSH to connect to the Raspberry Pi's Bash shell, the default Linux shell which allows for managing the device via commands.

Required Components

- Pironman 5
- Power Adapter
- Micro SD card or NVMe SSD with pre-installed Raspberry Pi OS

Steps:

1. Insert the Micro SD card into the Pironman 5.
2. Connect the Pironman 5 to a power source using the power adapter.

3. For detailed tutorials on setting up remote access depending on your computer's operating system, see the following sections:

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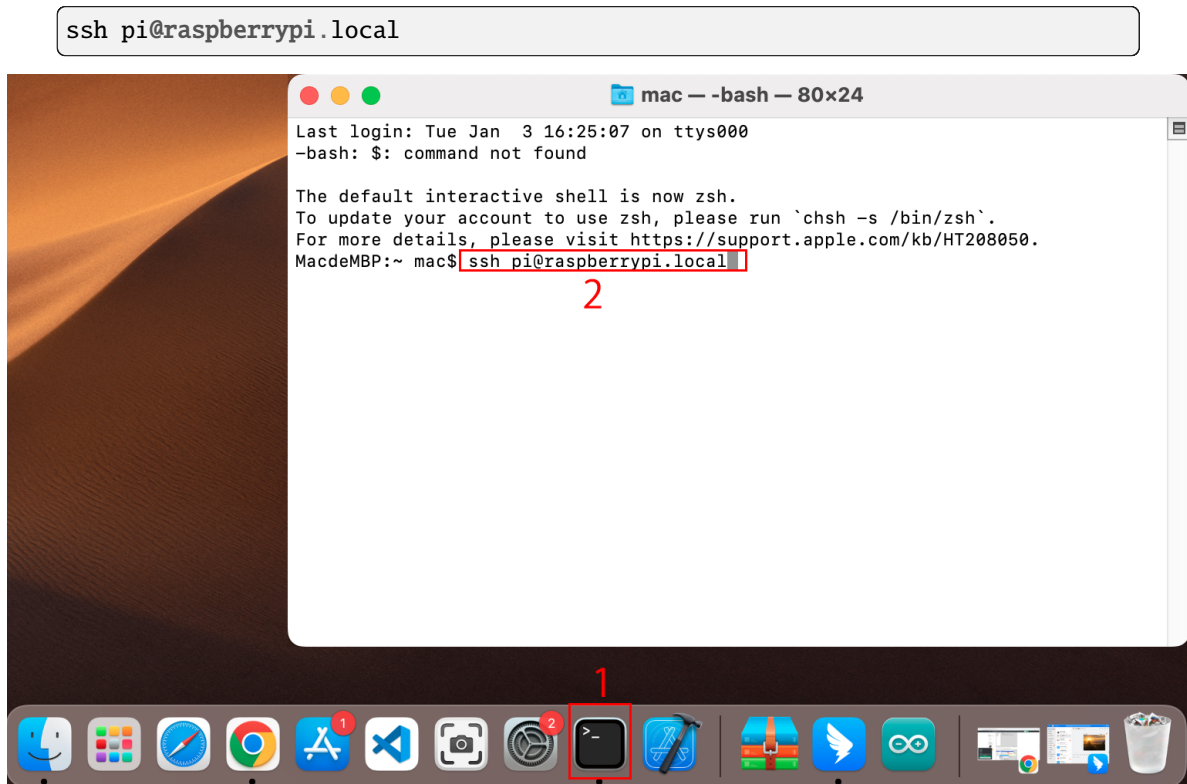
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7.1.1 For Mac OS X Users

For Mac OS X users, SSH (Secure Shell) offers a secure and convenient method to remotely access and control a Raspberry Pi. This is particularly handy for working with the Raspberry Pi remotely or when it's not connected to a monitor. Using the Terminal application on a Mac, you can establish this secure connection. The process involves an SSH command incorporating the Raspberry Pi's username and hostname. During the initial connection, a security prompt will ask for confirmation of the Raspberry Pi's authenticity.

1. To connect to the Raspberry Pi, type the following SSH command:



2. A security message will appear during your first login. Respond with **yes** to proceed.

```
The authenticity of host 'raspberrypi.local'
(2400:2410:2101:5800:635b:f0b6:2662:8cba) can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

3. Input the password for the Raspberry Pi. Be aware that the password won't display on the screen as you type, which is a standard security feature.

```
pi@raspberrypi.local's password:
Linux raspberrypi 5.15.61-v8+ #1579 SMP PREEMPT Fri Aug 26 11:16:44 BST
2022 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: Thu Sep 22 12:18:22 2022
pi@raspberrypi:~ $
```

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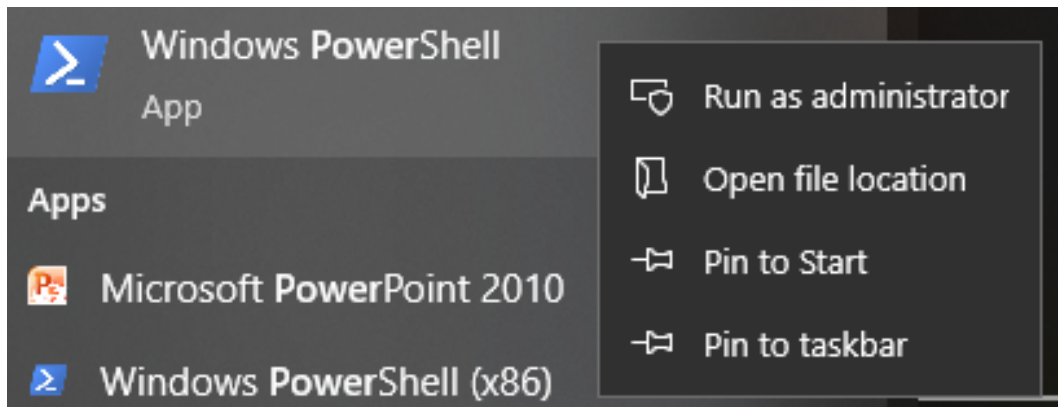
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7.1.2 For Windows Users

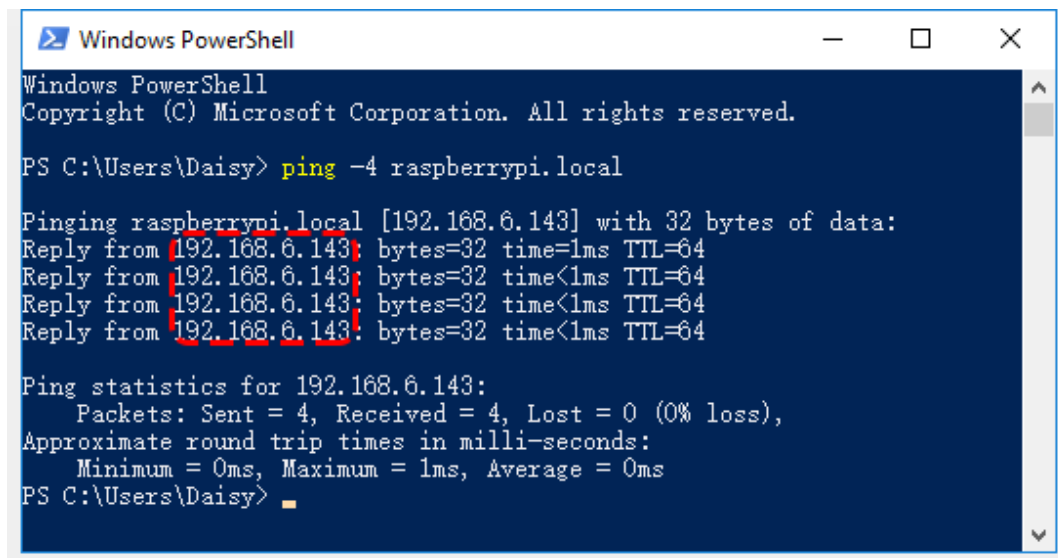
For Windows 10 or higher users, remote login to a Raspberry Pi can be achieved through the following steps:

1. Search for powershell in your Windows search box. Right-click on Windows PowerShell and select Run as administrator.



- Determine your Raspberry Pi's IP address by typing `ping -4 <hostname>.local` in PowerShell.

```
ping -4 raspberrypi.local
```



The Raspberry Pi's IP address will be displayed once it's connected to the network.

- If the terminal displays Ping request could not find host pi.local. Please check the name and try again., verify the hostname you've entered is correct.
 - If the IP address still isn't retrievable, check your network or WiFi settings on the Raspberry Pi.
- Once the IP address is confirmed, log in to your Raspberry Pi using `ssh <username>@<hostname>.local` or `ssh <username>@<IP address>.`

```
ssh pi@raspberrypi.local
```

Warning: If an error appears stating The term 'ssh' is not recognized as the name of a cmdlet..., your system may not have SSH tools pre-installed. In this case, you need to use a third-party tool like .

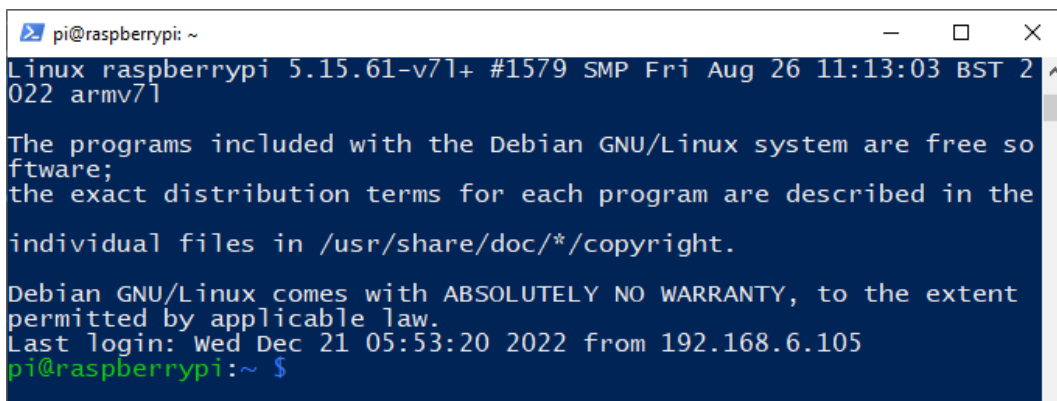
- A security message will appear on your first login. Enter yes to proceed.

```
The authenticity of host 'raspberrypi.local
(2400:2410:2101:5800:635b:f0b6:2662:8cba)' can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

5. Enter the password you previously set. Note that the password characters won't be displayed on the screen, which is a standard security feature.

Note: The absence of visible characters when typing the password is normal. Ensure you input the correct password.

6. Once connected, your Raspberry Pi is ready for remote operations.



```
pi@raspberrypi: ~
Linux raspberrypi 5.15.61-v7l+ #1579 SMP Fri Aug 26 11:13:03 BST 2022 armv7l

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.

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permitted by applicable law.
Last login: Wed Dec 21 05:53:20 2022 from 192.168.6.105
pi@raspberrypi:~ $
```

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7.1.3 For Linux/Unix Users

1. Locate and open the **Terminal** on your Linux/Unix system.
2. Ensure your Raspberry Pi is connected to the same network. Verify this by typing `ping <hostname>.local`. For example:

```
ping raspberrypi.local
```

You should see the Raspberry Pi's IP address if it's connected to the network.

- If the terminal shows a message like `Ping request could not find host pi.local. Please check the name and try again.`, double-check the hostname you've entered.
 - If you're unable to retrieve the IP address, inspect your network or WiFi settings on the Raspberry Pi.
3. Initiate an SSH connection by typing `ssh <username>@<hostname>.local` or `ssh <username>@<IP address>`. For instance:

```
ssh pi@raspberrypi.local
```

4. On your first login, you'll encounter a security message. Type `yes` to proceed.

```
The authenticity of host 'raspberrypi.local'
(2400:2410:2101:5800:635b:f0b6:2662:8cba)' can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

5. Enter the password you previously set. Note that for security reasons, the password won't be visible as you type.

Note: It's normal for the password characters not to display in the terminal. Just ensure to enter the correct password.

6. Once you've successfully logged in, your Raspberry Pi is now connected, and you're ready to proceed to the next step.

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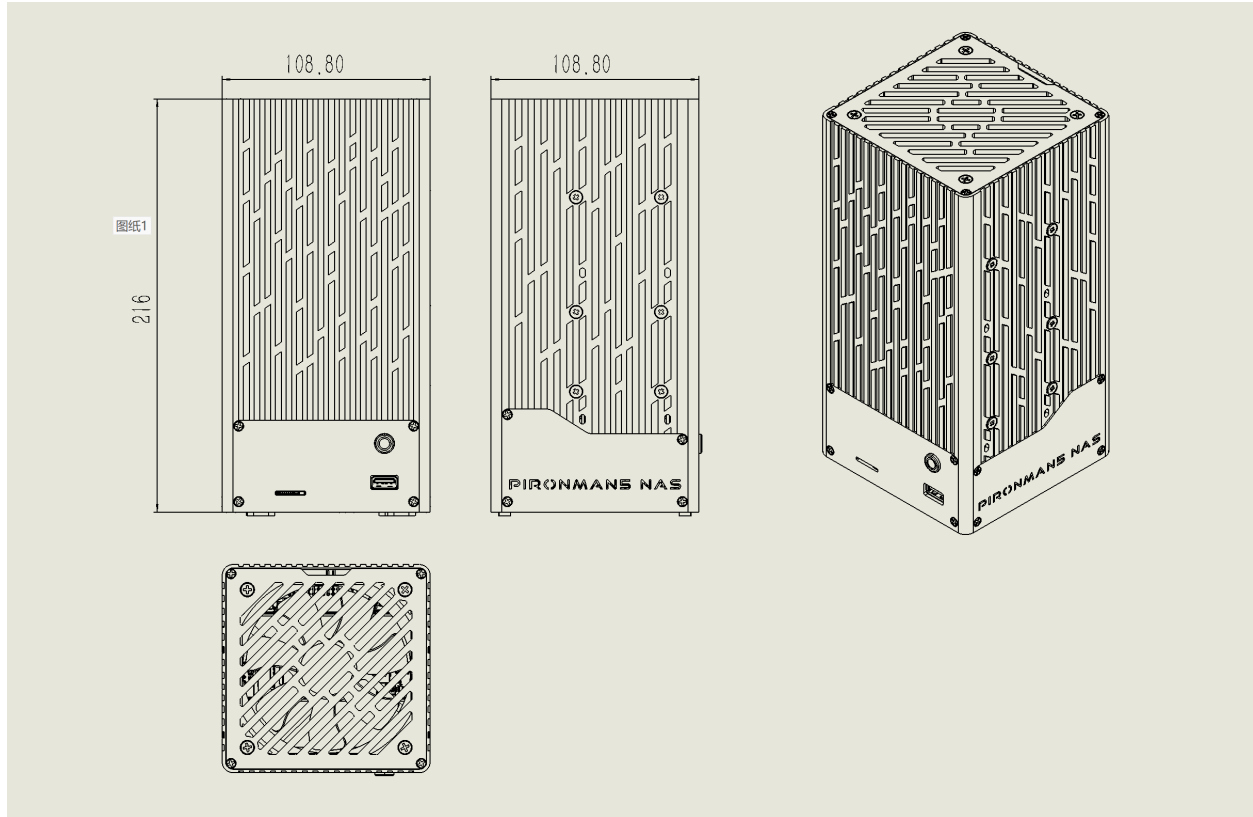
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7.2 Features

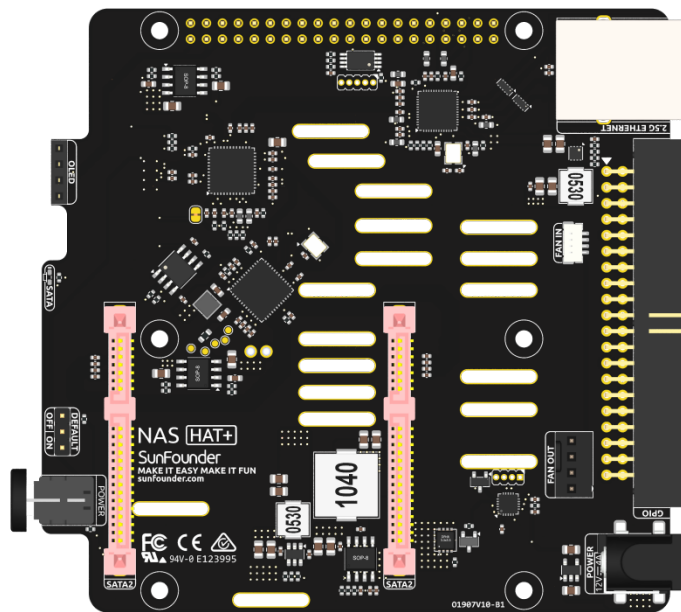
Parameters

- Dimension: 108.8 x 108.8 x 216mm
- **Material**
 - Main body: aluminum alloy
 - Side panel: acrylic
- Support Platform: Raspberry Pi 5
- Power Input: USB Type C, 12V/5A
- **Interfaces**
 - Raspberry Pi standard 40-Pin GPIO
 - spring-loaded Micro SD socket
 - USB Type C power input
 - 2 x USB 2.0
 - 2 x USB 3.0
 - Gigabit LAN port
 - 2 x 4Kp60 HDMI Type A
- Power button
- OLED screen: 0.96" 128x64 resolution
- 9025 PWM Fan, 3010 CPU Fan
- Storage: 3.5-inch SATA (compatible with 2.5-inch) x2, micro SD card x1, PCIe Gen2 x1 NVMe SSD x2
- 1220 Battery for RTC

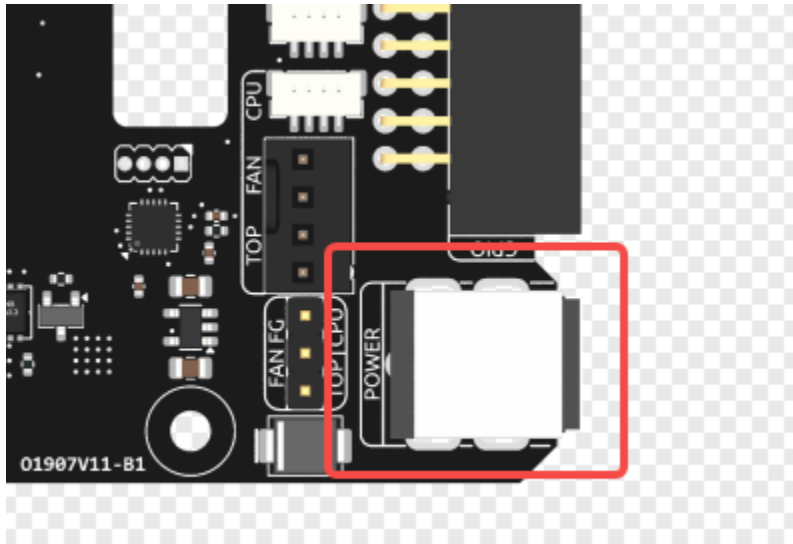
Dimensional Drawing



7.3 Pironman 5 NAS HAT

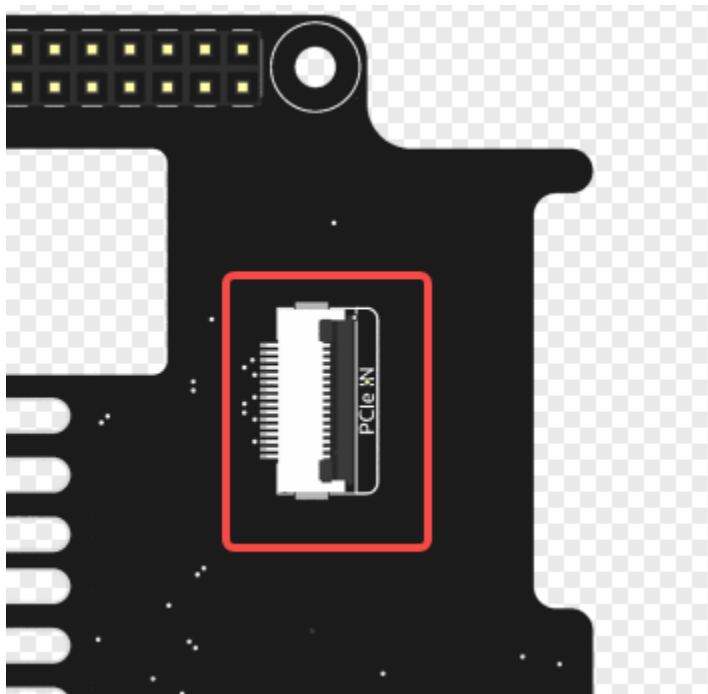


Power Input



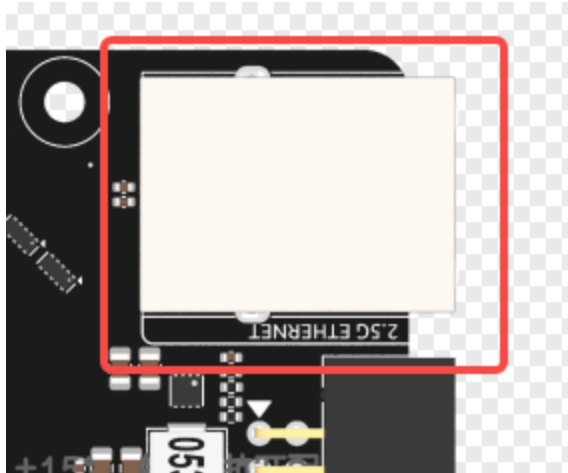
The board uses a DC 5.5-2.1 input connector, with an input voltage requirement of 12V/4A. The power input supplies power directly to the hard drives, so the voltage must be 12V $\pm$ 10%.

PCIe Input and PCIe Switch



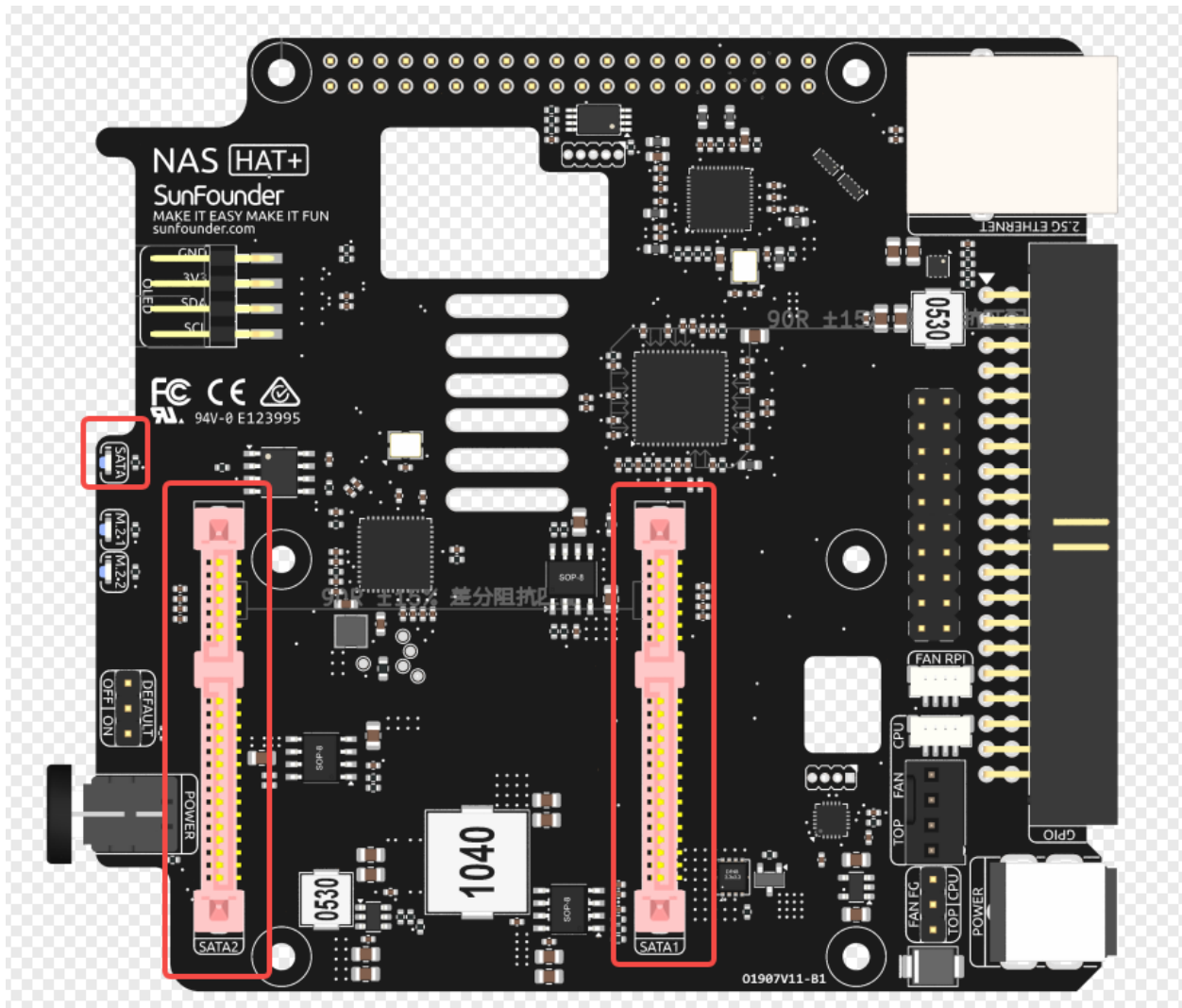
The PCIe connector is located on the back of the board and uses a standard Raspberry Pi PCIe FFC interface to connect to the Raspberry Pi 5. The PCIe interface is split into two PCIe Gen2 lanes via an onboard ASM1182e PCIe switch, which connects to the 2.5G Ethernet controller and the SATA controller. Note: ASM1182e supports PCIe Gen2 input/output only and does not support Gen3.

2.5G Ethernet Controller



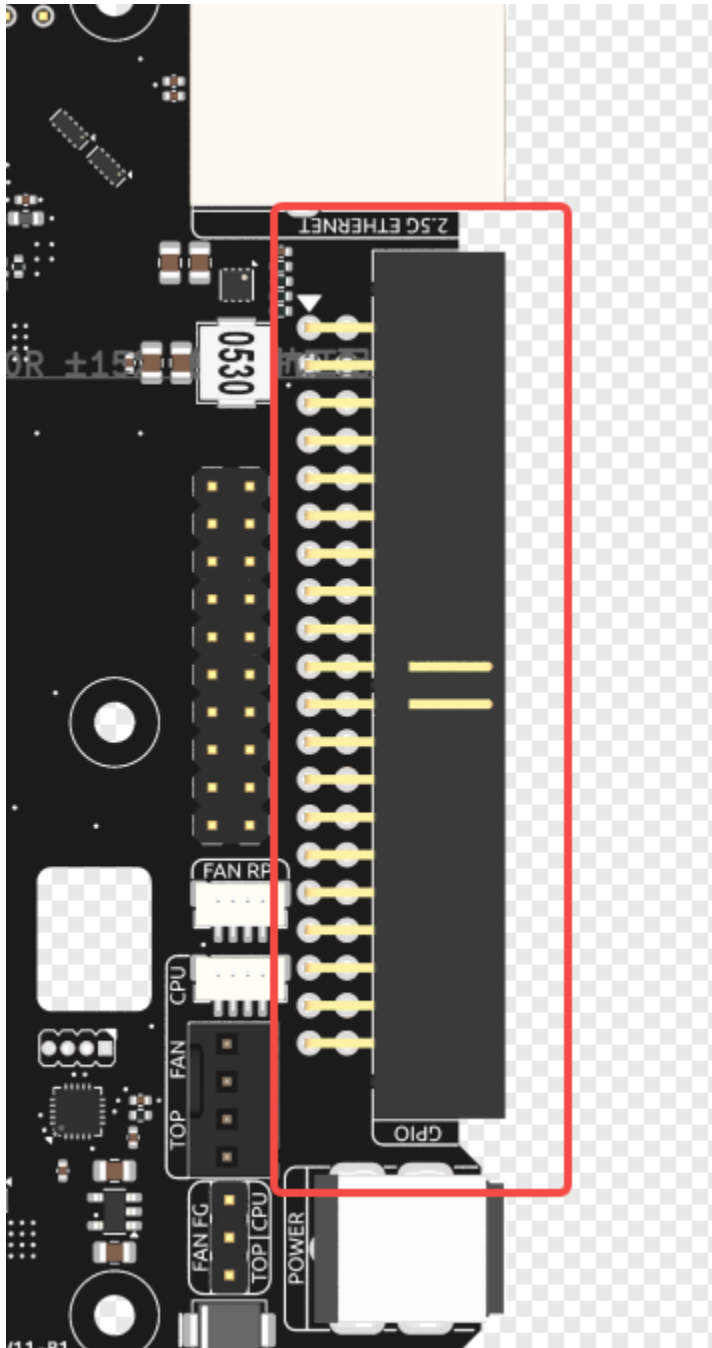
The board integrates a PCIe to 2.5G Ethernet controller, routed through the PCIe switch. This interface can be used in parallel with the onboard 1Gb Ethernet port on the Raspberry Pi. The Ethernet controller uses the RTL8125 chip, compatible with the `r8169` driver. Most Linux kernels include this driver by default, so no additional installation is typically required.

Dual SATA Ports



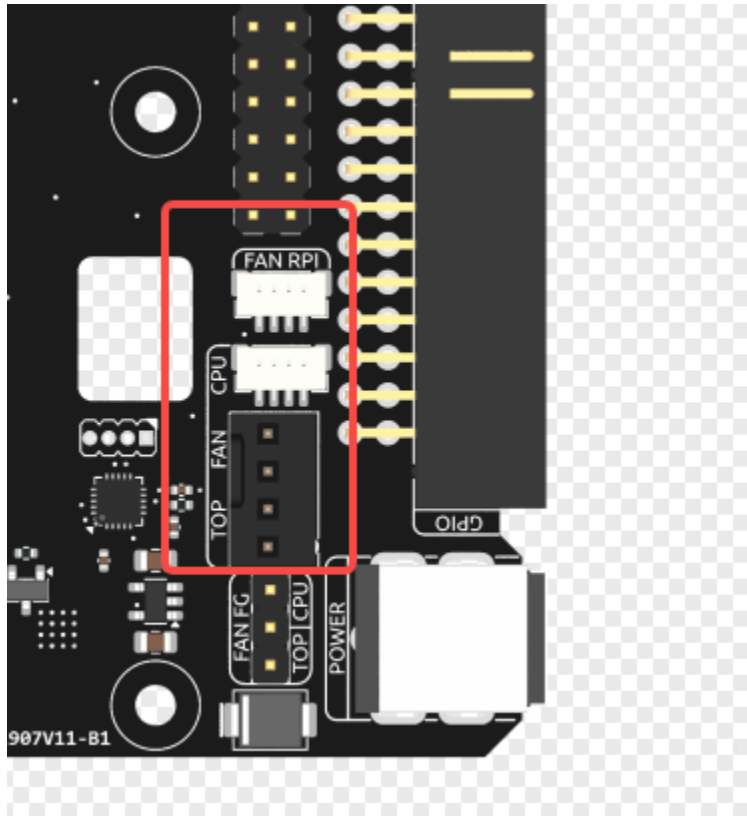
The board uses an ASM1061 PCIe to dual SATA controller, allowing connection of 3.5" or 2.5" SATA hard drives. RAID0/RAID1 can be configured via the mdadm software tool. A single SATA LED indicates disk activity; it will blink when either drive is accessed.

Raspberry Pi GPIO Header



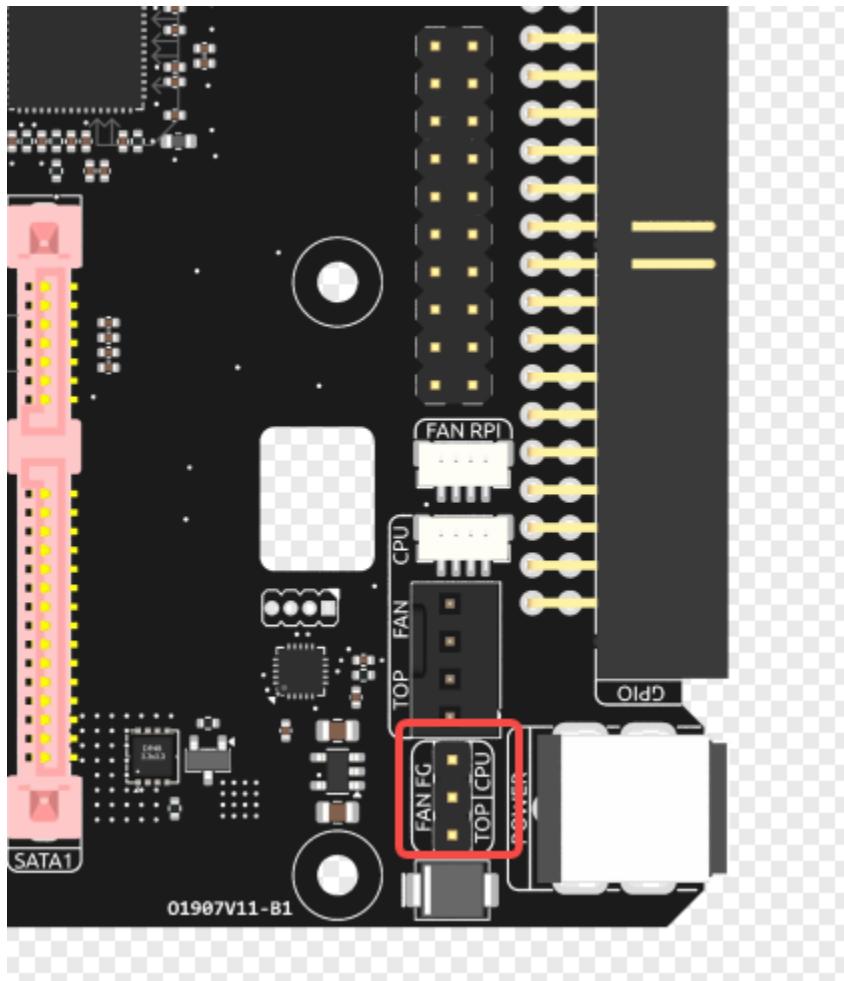
The board replicates the full Raspberry Pi GPIO header. Except for the I2C interface (used for the OLED display) and the ID SC/ID SD pins (connected to the onboard EEPROM), all GPIO pins are fully available. Since I2C allows multiple devices on the same bus, these pins are also accessible externally.

Fan Interface



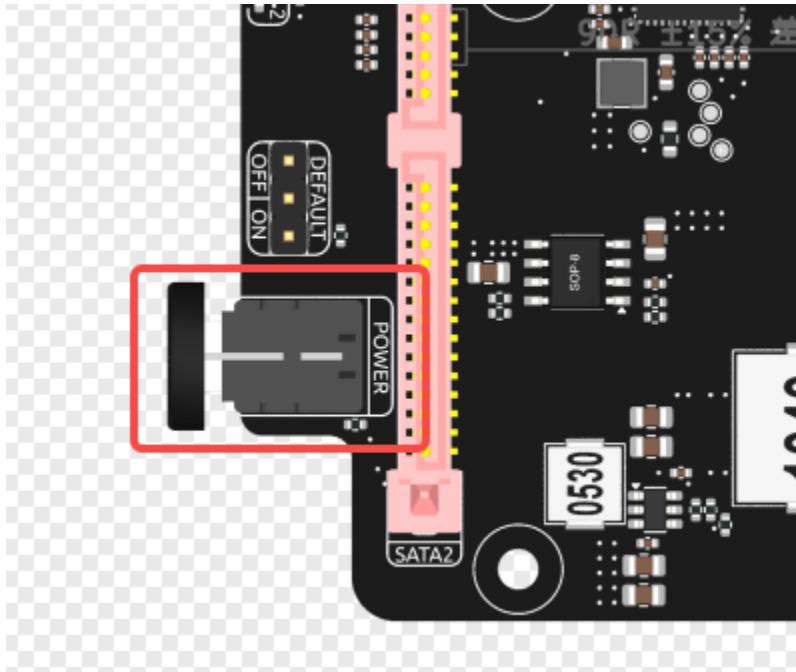
The fan header adapts the Raspberry Pi's 5V SH1.0 fan interface to a standard 12V PC case fan connector. The FAN RPi port connects to the Raspberry Pi, while the TOP FAN port connects to the biggest fan on the case, and the CPU port connects to the activate cooler.

Fan Frequency Generator



The Raspberry Pi has a Fan Frequency Generator interface that outputs a pulse signal proportional to the fan speed. The main control system reads the frequency of this pulse to calculate the real-time fan speed and determine whether the fan is running or experiencing any issues. You can switch jumpers to control either the top fan or the active cooler.

Power Button and Power Control



The power button includes an integrated power indicator LED. The button connects to an onboard microcontroller that manages the power switch logic:

- Short press: Power on
- Long press (2 seconds): Graceful shutdown (simulates pressing the Pi's power button)
- Hold for 5 seconds: Immediate power cut-off

Shutdown Behavior:

When a 2-second long press is detected, the microcontroller simulates a power button press on the Raspberry Pi via pogo pins. It then monitors the 3.3V line to confirm system shutdown. To enable this, make sure the Raspberry Pi EEPROM is configured with `POWER_OFF_ON_HALT=1`. Once 3.3V drops, the microcontroller will cut off the main system power.

Even when the system is off, the microcontroller remains powered (~60mW consumption).

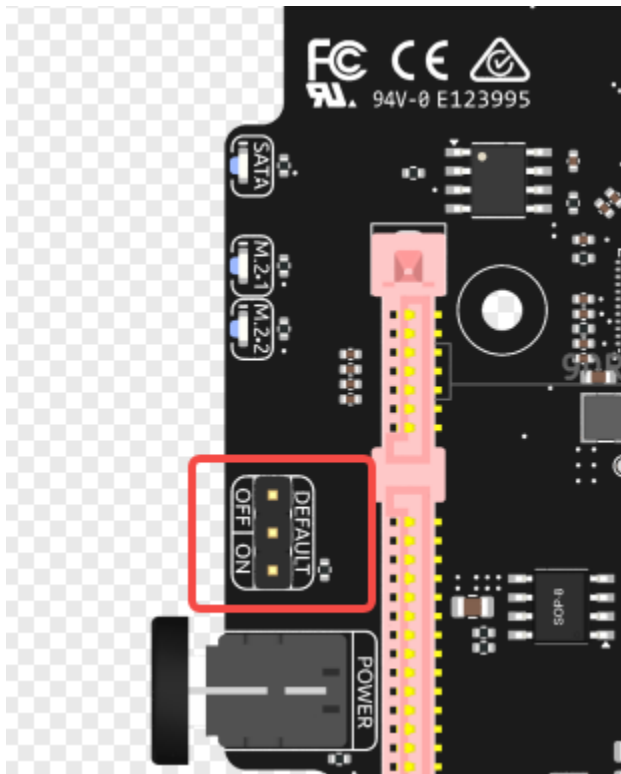
OLED Wake Feature: After powering on, a short press on the power button can wake the OLED from sleep mode.

OLED Interface



A 4-pin 2.54mm header is provided for an OLED module over the I2C bus. The board is designed to be compatible with a dedicated OLED display that can be directly mounted.

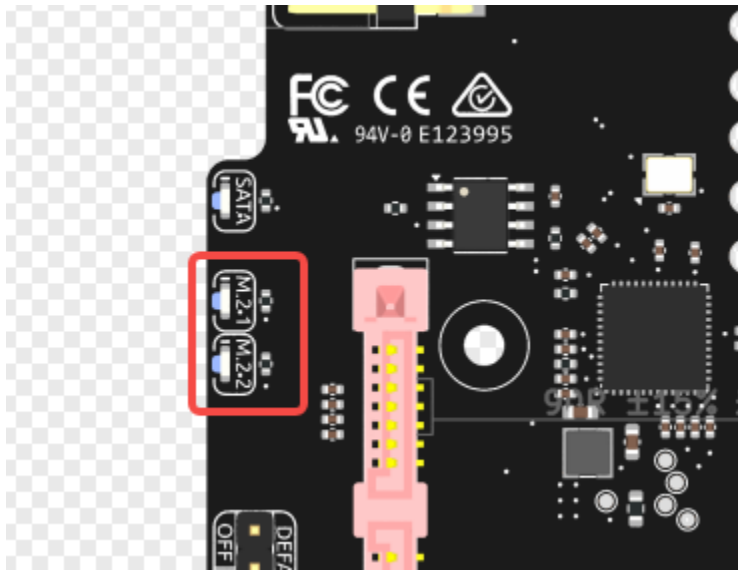
Default ON/OFF Jumper



Default power behavior can be configured via a jumper:

- Jumper on **ON** side: Auto power-on when power is applied
- Jumper on **OFF** side: Requires pressing the power button to turn on

NVMe State



To indicate the state of the NVMe drive.

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7.4 NAS Dual NVMe Board

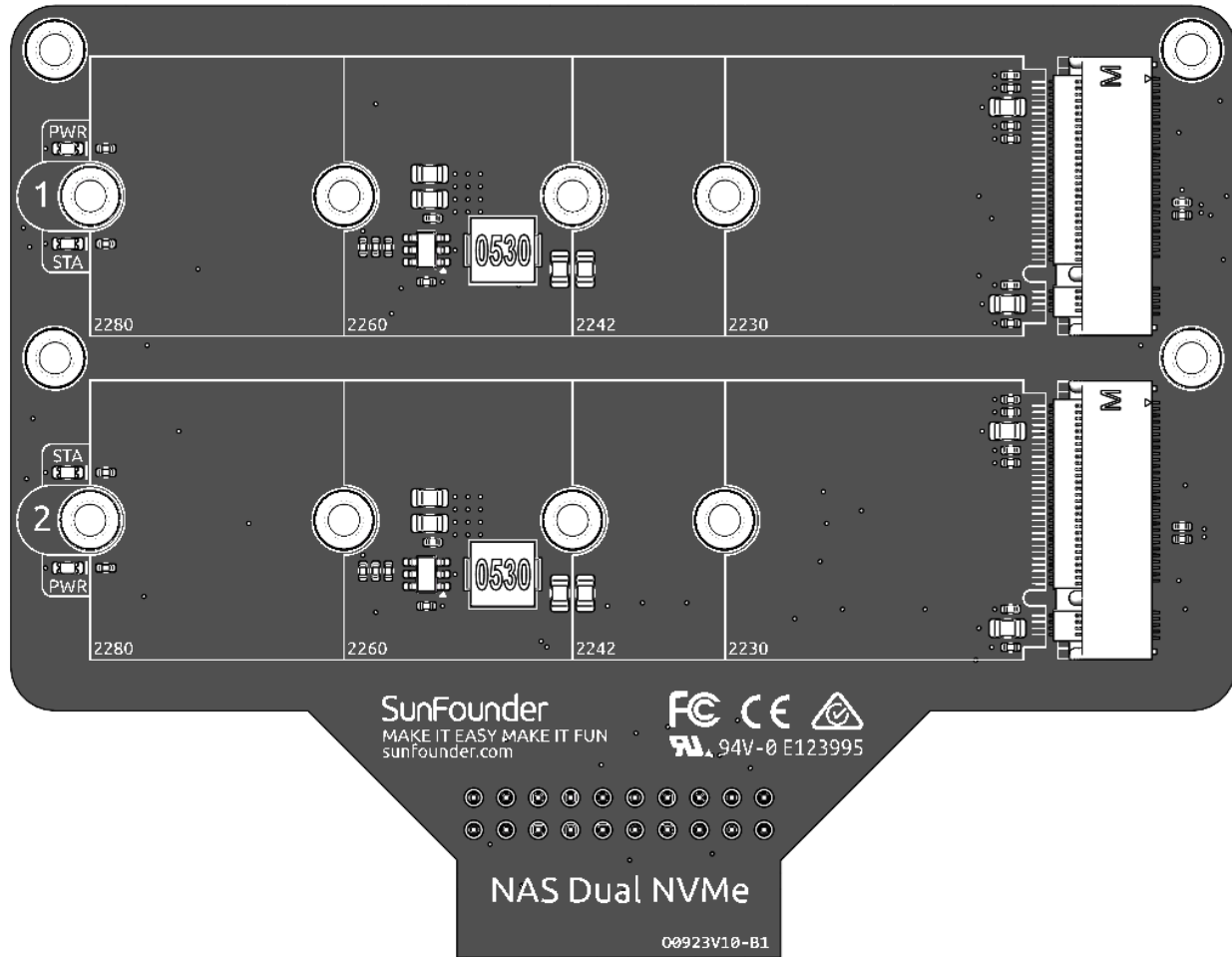
The **Dual NVMe PIP** (PCIe Peripheral Board), is a PCIe adapter designed specifically for NVMe solid-state drives.

The Raspberry Pi 5's PCIe interface natively offers a single **Gen2 x1** lane (500 MB/s). By integrating the **ASM1182e** PCIe switch chip, the Dual NVMe PIP expands this into **two independent Gen2 x1 lanes**, allowing you to connect:

- **Two M.2 NVMe SSDs**, or
- **One M.2 NVMe SSD + one M.2 Hailo-8/8L AI accelerator**

Key Notes:

- Gen3 is not supported
- Supports NVMe SSD sizes: **2230, 2242, 2260, 2280** (all in M.2 M-key slots)



- The board assemble to NAS HAT with 20 pin header.
- **STA**: A Status LED indicator.
- **PWR**: A Power LED indicator.

7.4.1 About the Model

M.2 SSDs, known for their compact size, come in various types mainly differentiated by their keying (notch design on the connector) and the interface they use. Here are the primary types:

- **M.2 SATA SSDs**: These use the SATA interface, similar to 2.5-inch SATA SSDs but in the smaller M.2 form factor. They are limited by the SATA III maximum speeds of around 600 MB/s. These SSDs are compatible with M.2 slots keyed for B and M keys.
- **M.2 NVMe SSDs**: These SSDs use the NVMe protocol over PCIe lanes and are significantly faster than M.2 SATA SSDs. They are suitable for applications requiring high read/write speeds like gaming, video editing, and data-intensive tasks. These SSDs typically require M-keyed slots. These drives utilize the PCIe (Peripheral Component Interconnect Express) interface, with different versions like 3.0, 4.0, and 5.0. Each new version of PCIe effectively doubles the data transfer speed of its predecessor. However, the Raspberry Pi 5 uses a PCIe 3.0 interface, capable of delivering transfer speeds up to 3,500 MB/s.

M.2 SSDs come in three key types: B key, M key, and B+M key. However, later on, the B+M key was introduced, combining the functionalities of the B key and M key. As a result, it replaced the standalone B key. Please refer to the image below.

6 contacts wide



Socket for "B key" edge connector

5 contacts wide



Socket for "M key" edge connector

6 pins wide

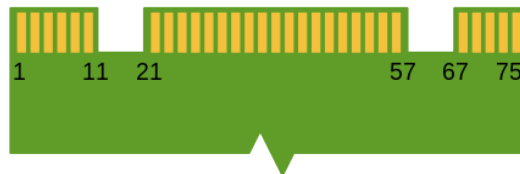


"B key" edge connector

5 pins wide



"M key" edge connector



"B & M key" edge connector

picture from Wikipedia

In general, M.2 SATA SSDs are B+M-keyed (can fit in sockets for B-keyed and M-keyed modules), while M.2 NVMe SSDs for PCIe 3.0 x4 lane are M-keyed.



M.2 NVME SSD

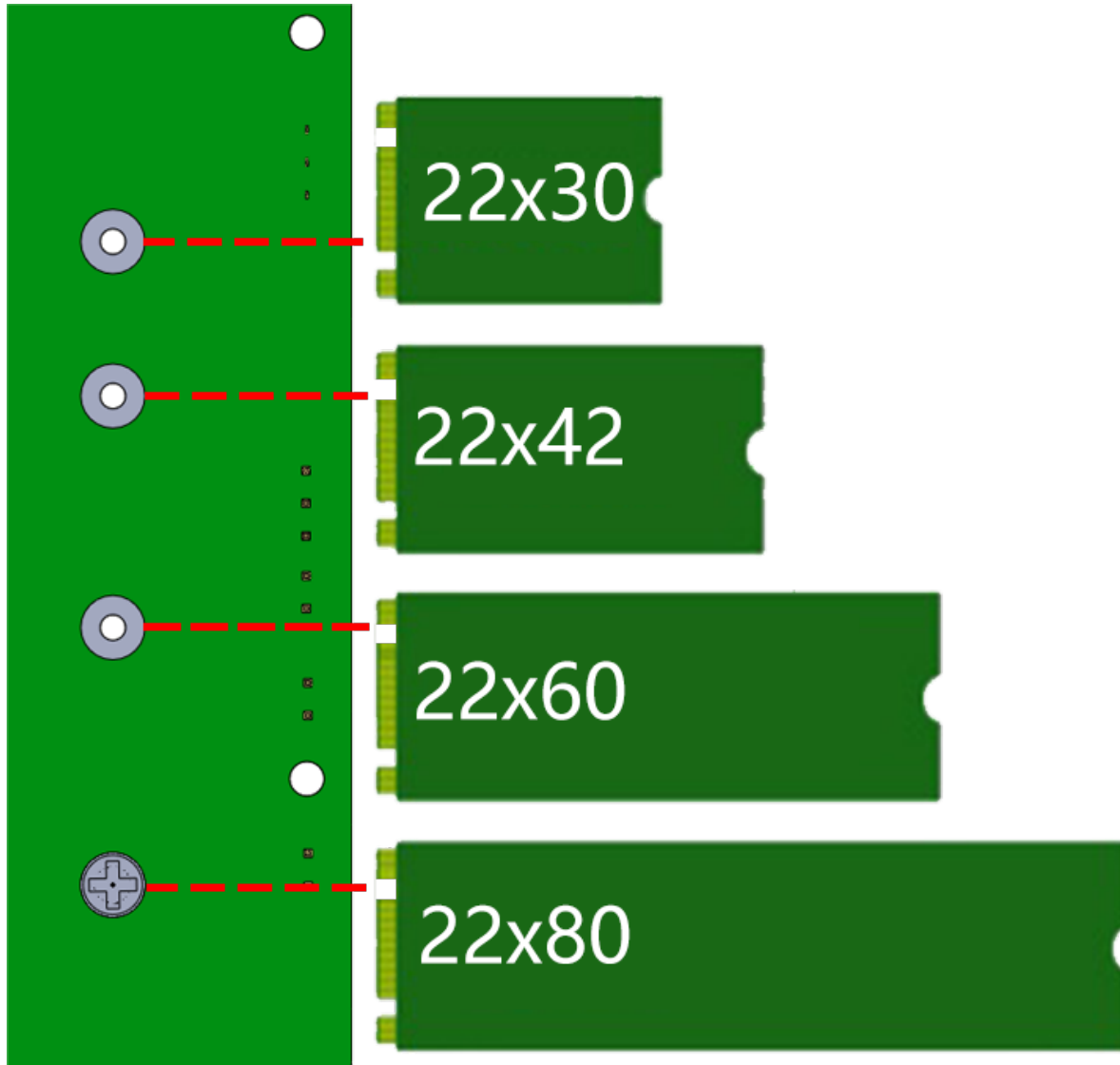


M.2 SATA SSD

7.4.2 About the Length

M.2 modules come in different sizes and can also be utilized for Wi-Fi, WWAN, Bluetooth, GPS, and NFC.

Pironman 5 NAS supports four (PCIe Gen 2.0) NVMe M.2 SSD sizes based on their names: 2230, 2242, 2260, and 2280. The “22” is the width in millimeters (mm), and the two following numbers are the length. The longer the drive, the more NAND flash chips can be mounted; therefore, the more capacity.



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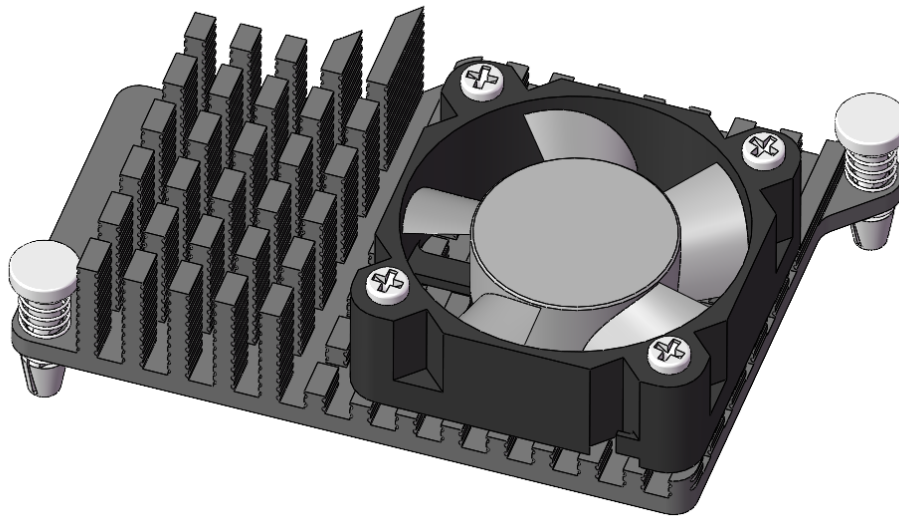
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7.5 Fans

7.5.1 Active Cooler

The Active Cooler on the Pironman 5 NAS is controlled by the Raspberry Pi system.



Regarding cooling solutions for the Raspberry Pi 5, especially under heavy load, the design of the Pironman 5 NAS incorporates a smart cooling system. It features a primary Active Cooler (active cooler) and a supplementary RGB fan. The cooling strategy is closely integrated with the Raspberry Pi 5's thermal management system.

The Active Cooler's operation is based on the Raspberry Pi 5's temperature:

- Below 50°C, the Active Cooler remains off (0% speed).
- At 50°C, the fan starts at a low speed (30% speed).
- Reaching 60°C, the fan increases to a medium speed (50% speed).
- At 67.5°C, the fan ramps up to a high speed (70% speed).
- At 75°C and above, the fan operates at full speed (100% speed).

This temperature-to-speed relationship also applies when the temperature decreases, with a 5°C hysteresis. The fan speed reduces when the temperature falls 5°C below each of these thresholds.

- Commands to monitor the Active Cooler. To check the Active Cooler's status:

```
cat /sys/class/thermal/cooling_device0/cur_state
```

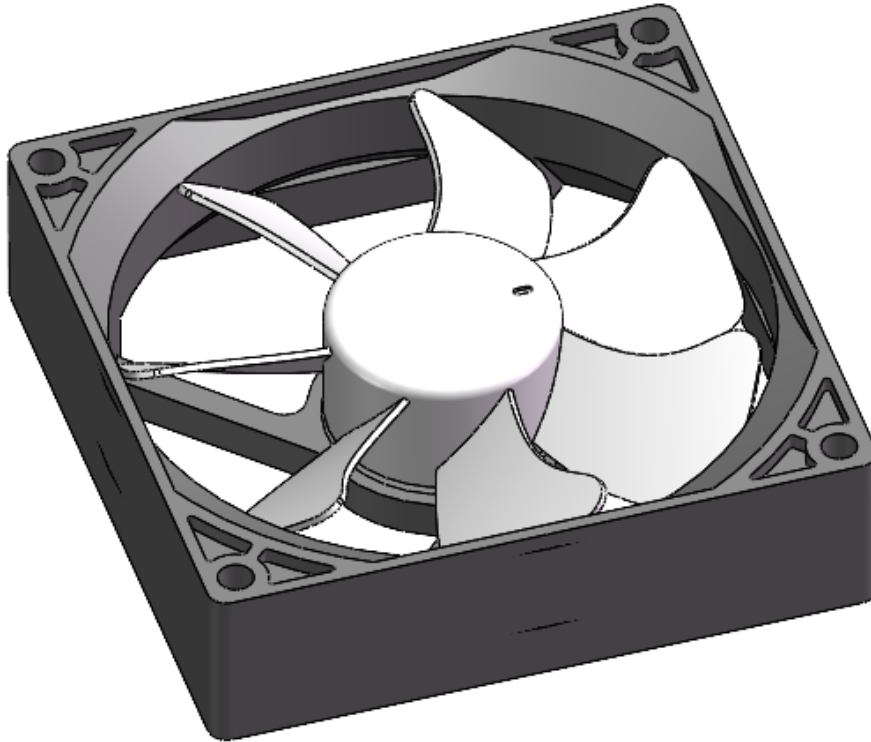
- To view the Active Cooler's speed:

```
cat /sys/devices/platform/cooling_fan/hwmon/*/fan1_input
```

In the Pironman 5 NAS, the Active Cooler is a critical component for maintaining optimal operating temperatures, particularly during intensive tasks, ensuring the Raspberry Pi 5 runs efficiently and reliably.

7.5.2 PWM Fan

The PWM fan on the Pironman 5 is controlled by the Raspberry Pi system.



Regarding cooling solutions for the Raspberry Pi 5, especially under heavy load, the design of the Pironman 5 incorporates a smart cooling system. It features a primary PWM fan and two supplementary RGB fans. The cooling strategy is closely integrated with the Raspberry Pi 5's thermal management system.

The PWM fan's operation is based on the Raspberry Pi 5's temperature:

- Below 50°C, the PWM fan remains off (0% speed).
- At 50°C, the fan starts at a low speed (30% speed).
- Reaching 60°C, the fan increases to a medium speed (50% speed).
- At 67.5°C, the fan ramps up to a high speed (70% speed).
- At 75°C and above, the fan operates at full speed (100% speed).

This temperature-to-speed relationship also applies when the temperature decreases, with a 5°C hysteresis. The fan speed reduces when the temperature falls 5°C below each of these thresholds.

- Commands to monitor the PWM fan. To check the PWM fan's status:

```
cat /sys/class/thermal/cooling_device0/cur_state
```

- To view the PWM fan's speed:

```
cat /sys/devices/platform/cooling_fan/hwmon/*/fan1_input
```

In the Pironman 5, the PWM fan is a critical component for maintaining optimal operating temperatures, particularly during intensive tasks, ensuring the Raspberry Pi 5 runs efficiently and reliably.

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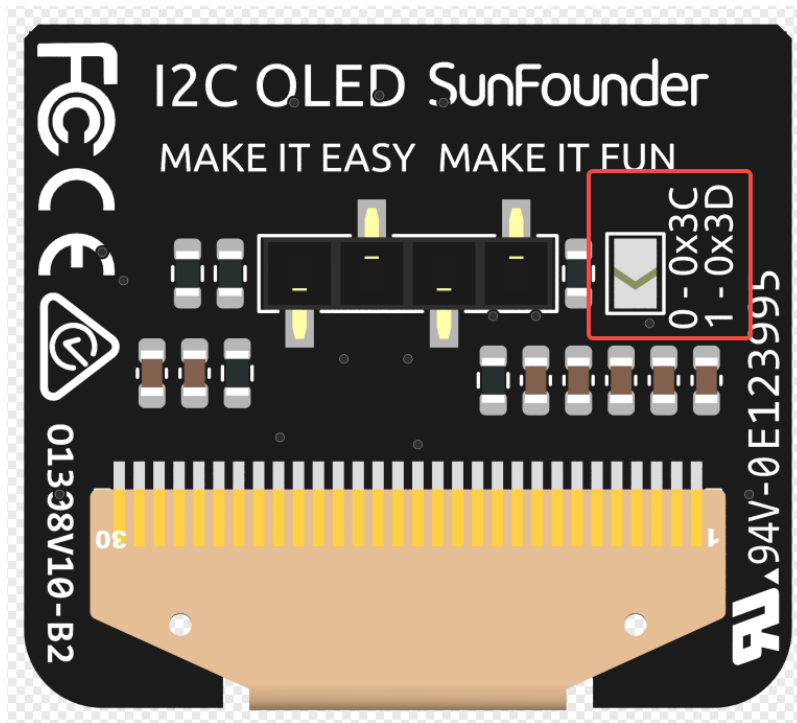
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7.6 OLED Screen

The OLED module can be directly fixed on the Piroman5 NAS via 4-pin pins.

- **Size:** 0.96"
- **Material:** PM OLED
- **Color:** White light
- **Driver:** SSD1306
- **Voltage:** 3.3V
- **Resolution:** 128*64
- **Display Area:** 21.74x10.86mm
- **Panel Size:** 26.70x19.26x1.42mm
- **Pixel Pitch:** 0.17x0.17mm
- **Pixel Size:** 0.154x0.154mm
- **Viewing Angle:** Full view
- **Operating Temperature:** -20~70°C
- **Communication Method:** IIC
- **Address:** 0x3C or 0x3D

Connect the pads on the back and the address will change from 0x3C to 0x3D.



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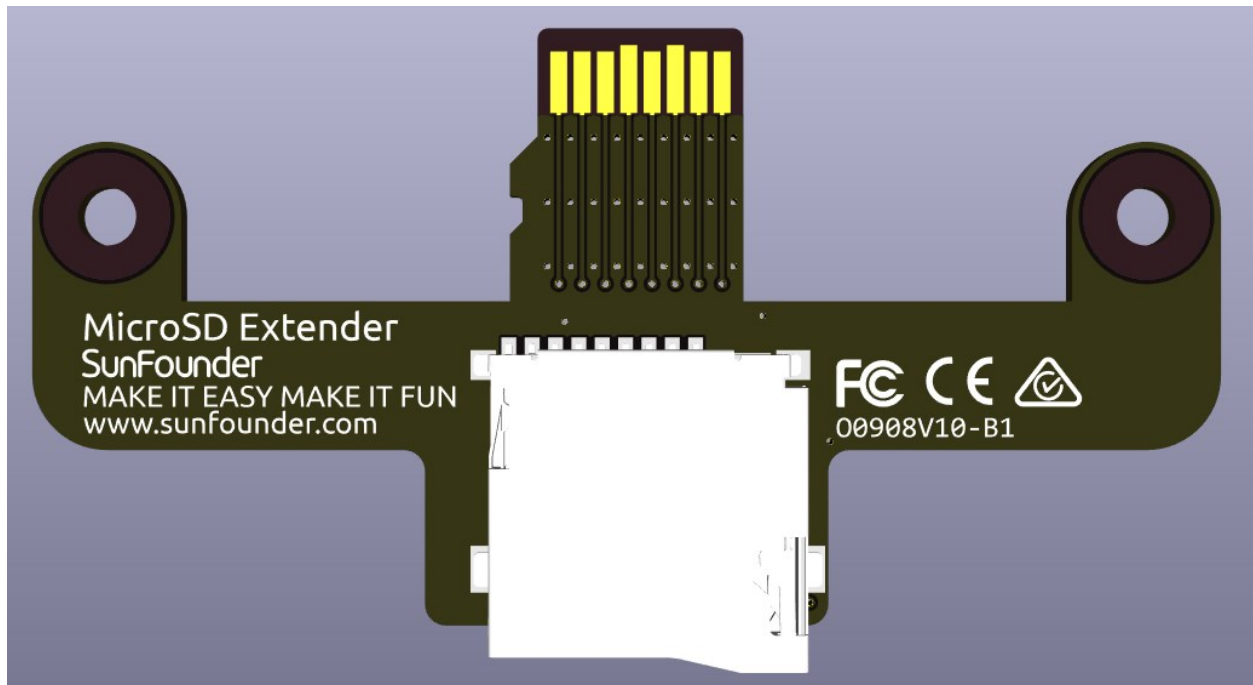
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7.7 MicroSD Extender

This is a Micro SD card expansion board, which extends the Raspberry Pi's MicroSD card slot to the outside and adds a spring-loaded card slot.



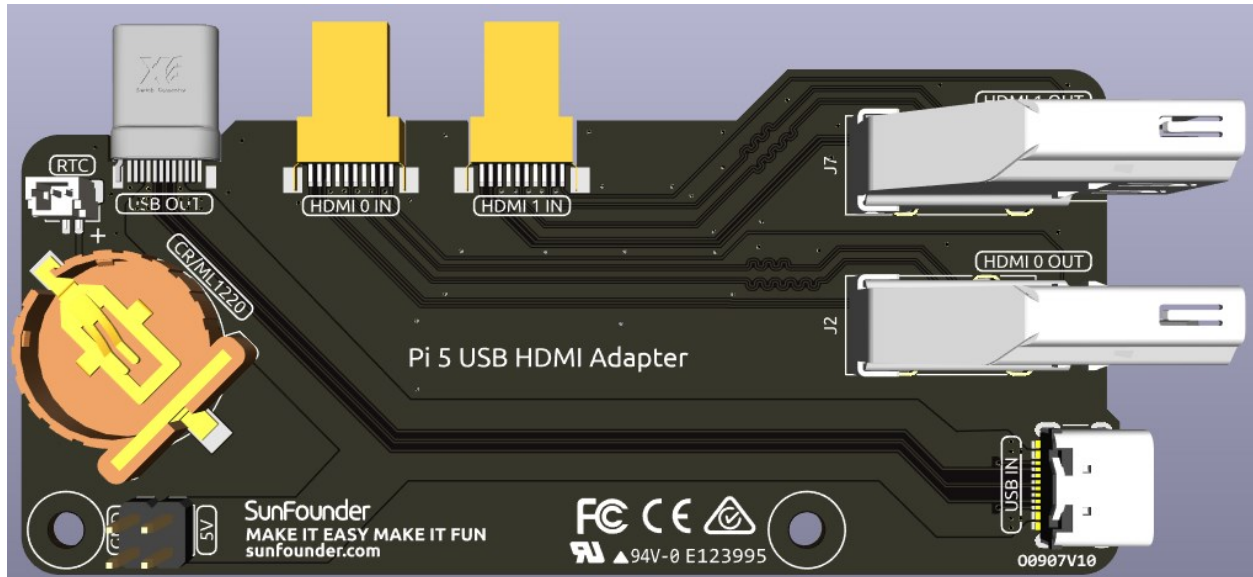
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7.8 OTG HDMI Adapter



This USB HDMI adapter board is specifically designed for the Raspberry Pi 5. Its primary function is to reposition the USB and HDMI connections to align with the USB interface side of the Raspberry Pi, enhancing accessibility and cable management.

Additionally, the HDMI port is converted to a standard HDMI Type A interface, offering broader compatibility.

OTG

The OTG interface utilizes the USB Type-C port on the Raspberry Pi to enable OTG (On-The-Go) functionality. This feature adds an additional front-facing USB 2.0 port, making it convenient to quickly connect and use simple USB devices.

By default, OTG functionality is not enabled in the system. However, it is automatically activated after installing the Pironman 5 software. If needed, you can manually enable it by modifying the `/boot/firmware/config.txt` file:

```
dtoverlay=dwc2,dr_mode=host
```

This line configures the USB controller to operate in host mode, which is required for OTG functionality. Be sure to reboot the system after making changes to the configuration file for them to take effect.

1220RTC Battery Holder

A 1220RTC battery holder is incorporated for convenient installation of an RTC battery. It connects to the Raspberry Pi's RTC interface via an SH1.0 2P reverse cable.

The battery holder is compatible with both CR1220 and ML1220 batteries. If using an ML1220 (Lithium Manganese Dioxide battery), charging can be configured directly on the Raspberry Pi. Note that the CR1220 is not rechargeable.

Enabling Trickle Charging

Warning: If you're using a CR1220 battery, do not enable trickle charging as it can cause irreparable damage to the battery and risk damaging the board.

By default, the trickle charging feature for the battery is disabled. The `sysfs` files indicate the current trickle charging voltage and limits:

```
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage
0
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_
↪max
4400000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_
↪min
1300000
```

To enable trickle charging, add `rtc_bbat_vchg` to `/boot/firmware/config.txt`:

- Open the `/boot/firmware/config.txt`.

```
sudo nano /boot/firmware/config.txt
```

- Add `rtc_bbat_vchg` to `/boot/firmware/config.txt`.

```
dtparam=rtc_bbat_vchg=3000000
```

After rebooting, the system will display:

```
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage
3000000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_
↪max
4400000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_
↪min
1300000
```

This confirms the battery is now under trickle charging. To disable this feature, simply remove the `dtparam` line from `config.txt`.

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COMPATIBLE NVME SSDS

8.1 Compatible NVMe SSDs

- ADATA Legend 700
- ADATA Legend 800
- AData XPG SX8200 Pro
- Axe Memory Generic Drive
- Crucial P2 M.2
- Crucial P3 M.2
- Crucial P3 Plus M.2
- Inland PCIe NVMe SSD
- KIOXIA EXCERIA NVMe SSD
- KIOXIA EXCERIA G2 NVMe SSD
- Kingston KC3000
- Kingston NV2
- Lexar NM710
- Lexar NM620
- Netac NV3000 NVMe SSD
- Netac NV2000 NVMe SSD
- Origin Inception TLC830 Pro NVMe SSD
- Ortal ON-750-128 NVME SSD
- Pineberry Pi Pinedrive (2280)
- PNY CS1030
- Sabrent Rocket 4.0
- Sabrent Rocket Nano
- Samsung 970 EVO Plus
- Samsung 980
- Samsung 980 Pro
- Samsung 990 Pro

- TeamGroup MP33
- Western Digital SN570
- Western Digital SN530
- Western Digital Black SN750 SE
- Western Digital Blue SN550 series (If you know how to install latest rpi-eeeprom-updates, pieeprom-2024-01-24.bin fixed the Western Digital Blue SN550 nvme boot issue Refer to <https://forums.raspberrypi.com/viewtopic.php?t=364327>.)
- XPG GAMMIX S70 BLADE
- XPG SX8200 Pro

8.2 Uncompatible NVMe SSD

We recommend avoiding the following NVMe SSD drives which is equipped with a Phison controller due to their proven incompatibility:

- Western Digital SN740
- Western Digital Black SN770
- WD Blue SN580 series
- Western Digital Green SN350 series
- Western Digital Black SN850 series
- WD BLACK 8TB SN850X
- Inland tn446 nvme drive
- Corsair MP600 SSD
- Samsung PM991
- Kingston OM8SEP4256Q-A0
- Transcend 110Q (TS500GMTE110Q)
- Other NVMe SSD drivers equipped with the same Phison controller

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FAQ

This section provides answers to the most common issues and questions when installing, configuring, and operating the Pironman 5 NAS. The content is organized by topic for clarity.

- *General Questions*
- *Hardware & Compatibility*
- *Cooling & Fans*
- *Power & Button*
- *Storage & RAID*
- *OpenMediaVault*
- *Dashboard & pironman5 Module*
- *NVMe Boot Issues*
- *Network*
- *Troubleshooting Summary*

9.1 General Questions

What operating systems are supported for Pironman 5 NAS? Pironman 5 NAS officially supports Raspberry Pi OS Lite (64-bit). Desktop versions and Home Assistant OS are **not** supported for OpenMediaVault installation.

Can I boot directly from NVMe SSD? Yes. The Raspberry Pi 5 can boot from NVMe after updating the bootloader and setting the boot priority to *NVMe/USB* → *SD Card*. Ensure you complete the bootloader update steps before writing the OS to the NVMe drive.

Do both NVMe slots support booting? Yes. Both M.2 NVMe slots support booting, but only PCIe Gen2 speeds are supported due to the PCIe switch.

9.2 Hardware & Compatibility

Which NVMe SSDs are compatible? Most 2280 PCIe Gen3/Gen4 drives are compatible but will operate at PCIe Gen2 speed. A compatibility list is available in the hardware chapter.

Can I use 3.5" HDDs without external power? Yes. The NAS HAT provides 12V power via the included power supply (12V/5A). Do not use lower-current adapters.

Why is the OLED screen blank? Common causes:

1. The FPC cable is not fully inserted.
2. The pironman5 service is not running.
3. The I2C interface is disabled.
4. The OLED address (0x3C) is not detected.

Check with:

```
i2cdetect -y 1
```

If 0x3C is missing, recheck the cable.

9.3 Cooling & Fans

Why is the top fan not spinning? Check the following:

- The fan is connected to the correct header.
- The pironman5 service is running.
- The fan mode is not set to “off” in the dashboard.
- The jumper on the Fan Frequency Generator is set correctly.

The fan speed reading is always 0 RPM. What should I do?

- Ensure the fan supports tachometer output.
- Verify the tachometer jumper is connected to the correct fan (TOP FAN or CPU FAN).
- Restart the service:

```
sudo systemctl restart pironman5.service
```

9.4 Power & Button

The system does not turn on automatically. How do I enable auto-power? Move the ON/OFF jumper on the NAS HAT to the ON position. This enables auto-power-on when the 12V adapter is connected.

Long-press shutdown does not fully power off. Why? You must enable:

```
POWER_OFF_ON_HALT=1
```

Using:

```
sudo rpi-eeprom-config -e
```

Without this setting, the microcontroller cannot cut main power after the OS halts.

9.5 Storage & RAID

Why doesn't OpenMediaVault detect my NVMe or SATA drives?

- Confirm the OS is Raspberry Pi OS Lite (desktop version will fail).
- Ensure the PCIe boot delay was disabled by adding:
`dtparam=pciex1_no_10s=on`
 to `config.txt` on the boot partition.
- Check cable seating for SATA drives.
- Reboot the system after installing OMV.

Creating RAID 0/1 fails with “500 Internal Server Error”. What should I do? This is a known OMV issue. Reboot OMV and try again. Ensure both drives are wiped before creating RAID.

Why is RAID synchronization extremely slow? RAID operations are CPU-bound on Raspberry Pi. Speed improves after initial sync completes. You can monitor progress in OMV under *Storage* → *RAID Management*.

9.6 OpenMediaVault

I cannot access OMV using `http://raspberrypi.local`. What should I try?

- Use the IP address instead: `http://<Pi-IP>`
- Ensure both your computer and the Pi are on the same network.
- If using Wi-Fi, confirm the SSID and country code are set in Raspberry Pi Imager.
- If you enabled SSH key-only login, ensure the key is valid.

OMV asks for login but credentials do not work. What is the default?

- **Username:** admin
- **Password:** openmediavault

If you changed it and forgot, reset via SSH:

```
sudo omv-rpc -u admin "UserMgmt" "setPassword" '{"username":"admin","password":"newpass"}'
```

9.7 Dashboard & pironman5 Module

The dashboard at `http://<ip>:34001` does not load. How can I fix it?

1. Verify the service is running:

```
sudo systemctl status pironman5.service
```

2. Restart the service:

```
sudo systemctl restart pironman5.service
```

3. Ensure port 34001 is not blocked by iptables or firewall rules.

How do I clear dashboard historical data? Open the Settings menu in the top-right corner and click **CLEAR**.

9.8 NVMe Boot Issues

My Pi boots only when an SD card is inserted, even after installing the OS on NVMe. Possible fixes:

- Ensure the bootloader was correctly written using “NVMe/USB Boot”.
- Ensure `config.txt` contains:
`dtoverlay=piex1_no_10s=on`
- Reflash the NVMe OS image.
- Disconnect all USB storage devices during testing.

The NVMe drive is not detected at all. What can I do?

- Reseat the NVMe module.
- Try the other NVMe slot.
- Ensure the drive is single-sided (double-sided drives may touch the metal case).
- Some high-power Gen4 SSDs may fail; try a lower-power model.

9.9 Network

The 2.5G Ethernet port doesn’t show up. What should I check?

- Kernel 6.1+ includes r8169 driver required for RTL8125.
- Check with:

```
ip link
```

If not present:

- Update Raspberry Pi OS:

```
sudo apt update && sudo apt full-upgrade
```

Can I use both Gigabit Ethernet and 2.5G Ethernet simultaneously? Yes. Both interfaces operate independently and can be bonded or bridged using Linux tools.

9.10 Troubleshooting Summary

Where can I find logs if something goes wrong?

Pironman service logs:

```
ls /var/log/pironman5/
```

Check OLED logs:

```
cat /var/log/pironman5/pm_auto.oled.log
```

Check service status:

```
sudo systemctl status pironman5.service
```

What should I try first if “something doesn’t work”?

A recommended quick checklist:

1. Reboot the Pi.
2. Check power supply (12V/5A).
3. Confirm cables (NVMe, SATA, OLED).
4. Update the system.

```
sudo apt update && sudo apt full-upgrade
```

5. Restart pironman5:

```
sudo systemctl restart pironman5.service
```

Parameters

- Dimension: 108.8 x 108.8 x 216mm
- **Material**
 - Main body: aluminum alloy
 - Side panel: acrylic
- Support Platform: Raspberry Pi 5
- Power Input: USB Type C, 12V/5A
- **Interfaces**
 - Raspberry Pi standard 40-Pin GPIO
 - spring-loaded Micro SD socket
 - USB Type C power input
 - 2 x USB 2.0
 - 2 x USB 3.0
 - Gigabit LAN port
 - 2 x 4Kp60 HDMI Type A
- Power button

- OLED screen: 0.96" 128x64 resolution
- 9025 PWM Fan, 3010 CPU Fan
- Storage: 3.5-inch SATA (compatible with 2.5-inch) x2, micro SD card x1, PCIe Gen2 x1 NVMe SSD x2
- 1220 Battery for RTC

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