Welcome

Thank you for choosing Freenove products!

Get Support and Offer Input

Freenove provides free and responsive product and technical support, including but not limited to:

- Product quality issues
- Product use and build issues
- Questions regarding the technology employed in our products for learning and education
- Your input and opinions are always welcome
- We also encourage your ideas and suggestions for new products and product improvements

For any of the above, you may send us an email to:

support@freenove.com

Safety and Precautions

Please follow the following safety precautions when using or storing this product:

- Keep this product out of the reach of children under 6 years old.
- This product should be used only when there is adult supervision present as young children lack necessary judgment regarding safety and the consequences of product misuse.
- This product contains small parts and parts, which are sharp. This product contains electrically conductive parts. Use caution with electrically conductive parts near or around power supplies, batteries and powered (live) circuits.
- When the product is turned ON, activated or tested, some parts will move or rotate. To avoid injuries to hands and fingers, keep them away from any moving parts!
- It is possible that an improperly connected or shorted circuit may cause overheating. Should this happen, immediately disconnect the power supply or remove the batteries and do not touch anything until it cools down! When everything is safe and cool, review the product tutorial to identify the cause.
- Only operate the product in accordance with the instructions and guidelines of this tutorial, otherwise parts may be damaged or you could be injured.
- Store the product in a cool dry place and avoid exposing the product to direct sunlight.
- After use, always turn the power OFF and remove or unplug the batteries before storing.

About Freenove

Freenove provides open source electronic products and services worldwide.

Freenove is committed to assist customers in their education of robotics, programming and electronic circuits so that they may transform their creative ideas into prototypes and new and innovative products. To this end, our services include but are not limited to:

- Educational and Entertaining Project Kits for Robots, Smart Cars and Drones
- Educational Kits to Learn Robotic Software Systems for Arduino, Raspberry Pi, micro: bit and Raspberry Pi Pico W.
- Electronic Component Assortments, Electronic Modules and Specialized Tools
- **Product Development and Customization Services**

You can find more about Freenove and get our latest news and updates through our website:

http://www.freenove.com

Copyright

FREENOVE TM

Contents

Raspberry Pi NAS Based on openmediavault

This project combines the Raspberry Pi 5 with this product to build a Raspberry Pi Network Attached Storage (NAS) based on the OMV solution, suitable for home environments or small home offices.

Introduction to openmediavault

openmediavault is the next generation network attached storage (NAS) solution based on Debian Linux. It contains services like SSH, (S)FTP, SMB/CIFS, rsync and many more. Thanks to the modular design of the framework, it can be enhanced via plugins. openmediavault is primarily designed to be used in home environments or small home offices, but is not limited to those scenarios. It is a simple and easy to use out-of-the-box solution that will allow everyone to install and administrate a Network Attached Storage without deeper knowledge.

Note: openmediavault (like other NAS solutions) expects to have full, exclusive control over OS configuration and cannot be used within a container. In addition, no graphical desktop user interface can be installed in parallel.

For more detailed information on OMV, please refer to its official website:
https://www.openmediavault.org/

Cautions

- **Project Copyright**: The original author of this project is OpenMediaVault. Freenove implements it as a Network Attached Storage (NAS) solution for the Raspberry Pi. This project adheres to the GNU General Public License v3.0 (GPL-3.0).

- **Supprted Countries & Regions:** The system supports a wide range of protocols including SSH, FTP/SFTP, SMB/CIFS, and rsync, among others.

- **Pricing:** The openmediavault software is currently free to use. Please note that we cannot guarantee it will remain free of charge in the future.

- **Seeking Help If you encounter any issues after carefully following the provided tutorial**, please do not hesitate to contact our support team at **support@freenove.com.**
  Important Note: This project's API and user interface are entirely dependent on openmediavault. Should OpenMediaVault cease to provide these components, we will also delete the corresponding documentation, tutorials, and code.

Disclaimer

openmediavault is an open-source NAS (Network Attached Storage) solution available at: https://github.com/openmediavault/openmediavault

We have only adapted it for third-party learning and NAS functionality trials, without any commercial promotion or application. This tutorial is intended solely for enthusiasts to supplement their learning.

Important Notes:

1. As this project utilizes a third-party open-source platform, please direct any technical issues encountered during setup to the original repository: https://github.com/openmediavault/openmediavault/issues
2. For advanced functionality extensions—including plugins, RAID configurations, Docker integration, and more—please refer to the official openmediavault forum: https://forum.openmediavault.org/

If you have any concerns, please feel free to contact us via support@freenove.com

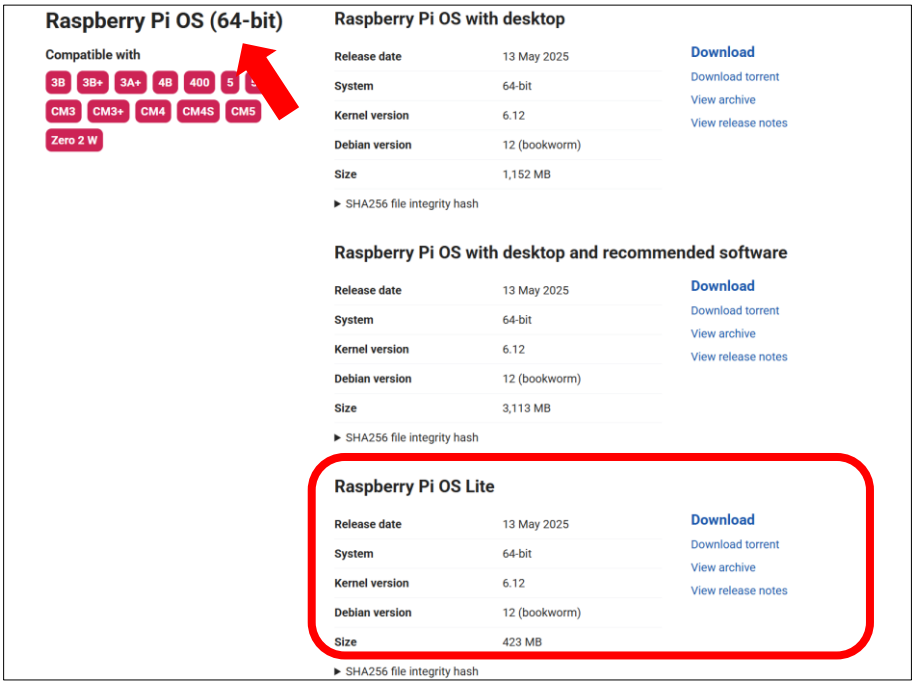
Openmediavault Installation & Configuration

In this guide, we will walk through the process of setting up a Raspberry Pi-based NAS using OMV. This involves installing the openmediavault software on your Raspberry Pi and configuring it accordingly. **For optimal stability and performance, a wired Ethernet connection is highly recommended.**

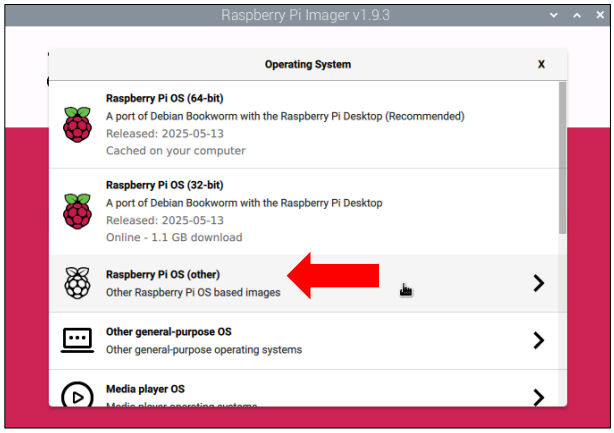
1. Flashing Raspberry Pi OS

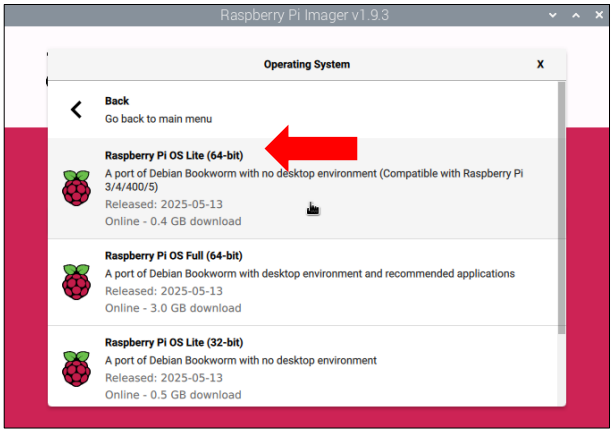
According to the notes in the openmediavault introduction, the system must be installed in a no-GUI environment. Therefore, please first install a fresh version of **Raspberry Pi OS Lite (64-bit)** on your SD card or NVMe SSD. You can download the system image using either of the following methods:

1. Manually download from Raspberry Pi official website: https://www.raspberrypi.com/software/operating-systems/



2. Use Raspberry Pi Imager tool, select Raspberry Pi OS (other) -> Raspberry Pi OS Lite (64-bit) to install.





Note: For detailed Raspberry Pi OS installing guide, please refer to the Raspberry Pi OS Section in Chapter 1 or Section 2.4 in Chapter 2 of the Main tutorial.

2. Connecting to Raspberry Pi via SSH

As the OS we installed is without GUI, please remote control the Raspberry Pi via SSH. The operation is as shown below:

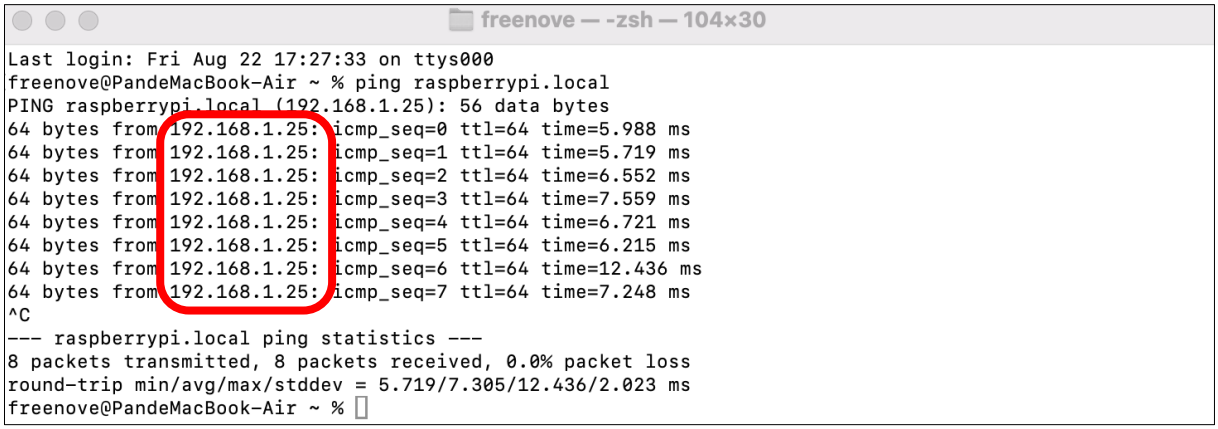
For macOS users: Remote Control from MAC OS

For Windows users: Remote Control from Windows

Remote Control from MAC OS

Press Command + Space, Enter "Terminal" to open the terminal, and type in the following command:

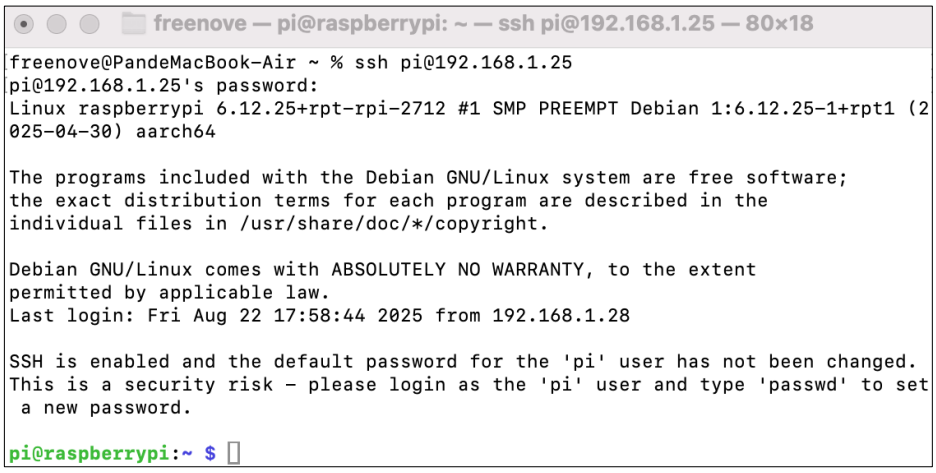
```
ping raspberrypi.local
```



From the above command, you can get the IP address of your RPi. In our case, the IP address is 192.168.1.25. Run the following command to connect to the Pi. Replace [192.168.1.25] with your Pi's actual IP address.

```
ssh pi@192.168.1.25
```

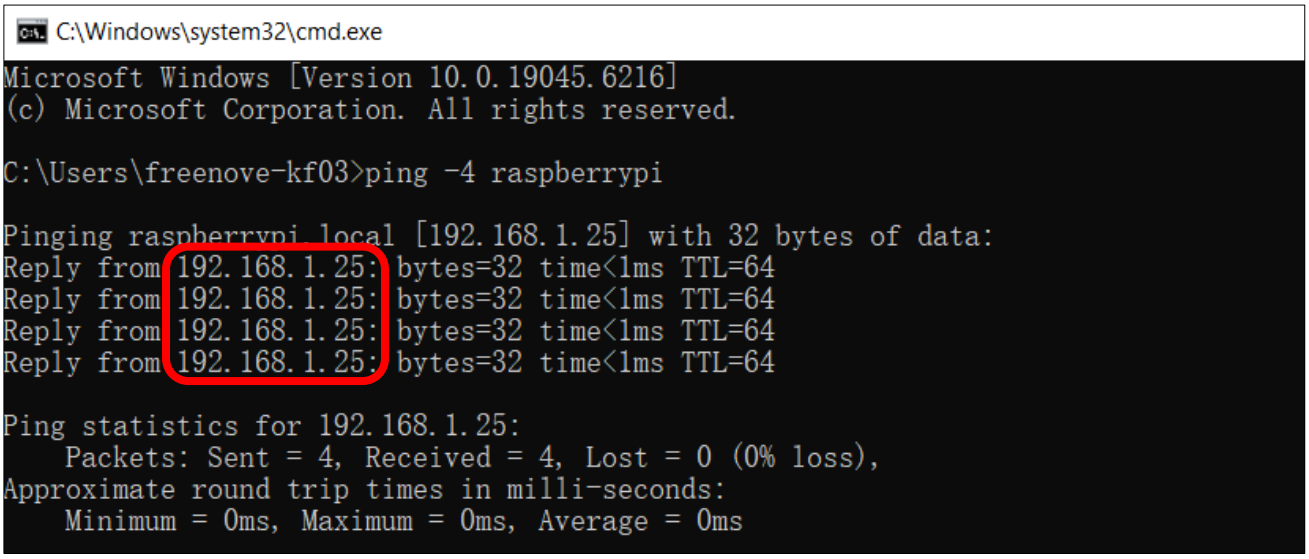
When you see **pi@raspberrypi:~ $,** you have logged in Pi successfully.



Remote Control from Windows

Press **Win+R**. Enter **cmd**. Then use this command to check IP:

```
ping -4 raspberrypi
```



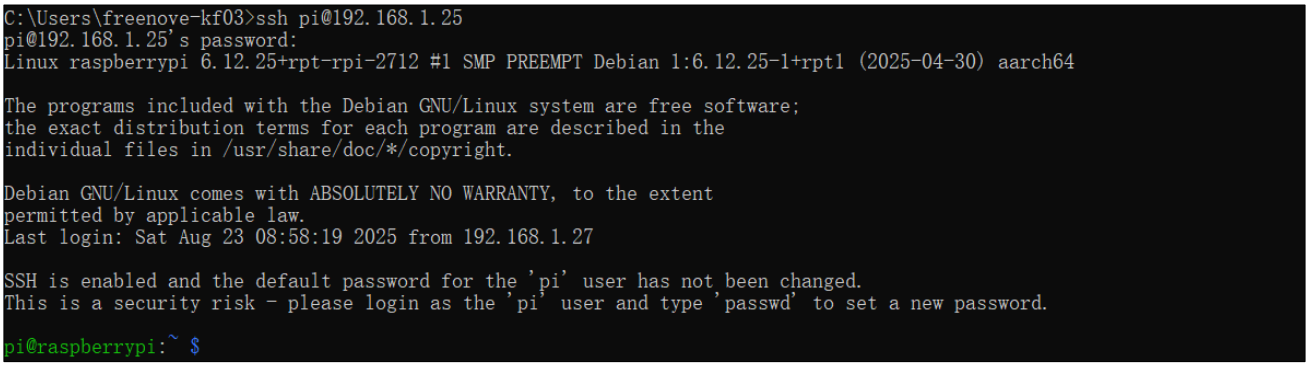
From the above command, you can get the IP address of your RPi. In our case, the IP address is **192.168.1.25**.

Alternatively, you can login your **router** client to **inquiry IP address** named "**raspberrypi**".

Enter the following command:

Replace [192.168.1.25] with your Pi's actual IP address.

```
ssh pi@192.168.1.25
```



3. Installing openmediavault

Run the following two commands separately to update the system software packages.

```
sudo apt update
sudo apt upgrade
```

```
pi@raspberrypi:~ $ sudo apt update
Get:1 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm InRelease [151 kB]
Get:2 https://mirrors.tuna.tsinghua.edu.cn/debian-security bookworm-security InRelease [48.0 kB]
Get:3 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm-updates InRelease [55.4 kB]
Get:4 https://mirrors.tuna.tsinghua.edu.cn/raspberrypi bookworm InRelease [55.0 kB]
Get:5 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/main armhf Packages [8,508 kB]
Get:6 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/main arm64 Packages [8,693 kB]
Get:7 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/main Translation-en [6,109 kB]
Get:8 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/contrib armhf Packages [42.9 kB]
Get:9 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/contrib arm64 Packages [45.7 kB]
Get:10 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/contrib Translation-en [48.4 kB]
Get:11 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/non-free-firmware arm64 Packages [5,832 B]
Get:12 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/non-free-firmware armhf Packages [5,480 B]
Get:13 https://mirrors.tuna.tsinghua.edu.cn/debian bookworm/non-free-firmware Translation-en [20.9 kB]
Get:14 https://mirrors.tuna.tsinghua.edu.cn/debian-security bookworm-security/main arm64 Packages [273 kB]
Get:15 https://mirrors.tuna.tsinghua.edu.cn/debian-security bookworm-security/main armhf Packages [258 kB]
Get:16 https://mirrors.tuna.tsinghua.edu.cn/debian-security bookworm-security/main Translation-en [167 kB]
Get:17 https://mirrors.tuna.tsinghua.edu.cn/debian-security bookworm-security/contrib armhf Packages [504 B]
```

```
pi@raspberrypi:~ $ sudo apt upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

Run the following wget:

```
sudo apt install wget
```

```
pi@raspberrypi:~ $ sudo apt install wget
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
wget is already the newest version (1.21.3-1+deb12u1).
wget set to manually installed.
The following package was automatically installed and is no longer required:
  rpicam-apps-lite
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

Before installing openmediavault, please run the following pre-installation script to set up a persistent Ethernet connection and avoid subsequent connectivity issues. After completion, use `sudo reboot` to restart the Raspberry Pi.

```
wget -O - https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/preinstall | sudo bash
```

```
pi@raspberrypi:~ $ wget -O - https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/preinstall | sudo bash
--2025-08-23 09:45:55--  https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/preinstall
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 2606:50c0:8001::154, 2606:50c0:8002::154, 2606:50c0:8003::154, ...Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|2606:50c0:8001::154|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 603 [text/plain]
Saving to: 'STDOUT'

-                                   100%[=================================================================>]     603  --.-KB/s    in 0s

2025-08-23 09:45:56 (59.4 MB/s) - written to stdout [603/603]
```

After rebooting, please reconnect to the Raspberry Pi using **ssh pi@[IP address]**, then execute the following command to download and run the openmediavault installation script.
Since a large number of dependency packages need to be installed, the entire process may take 10 to 30 minutes.
After the installation is complete, the Raspberry Pi will automatically reboot. If it does not reboot automatically, please manually execute **sudo reboot** to restart the Raspberry Pi.

```
wget -O - https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/install | sudo bash
```

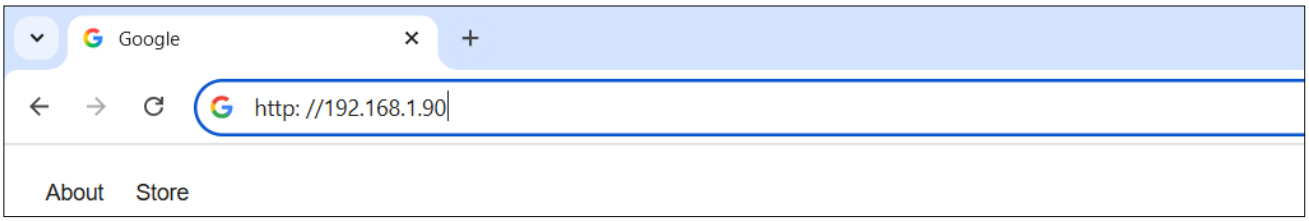
```
pi@raspberrypi:~ $ wget -O - https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/install | sudo bash
--2025-08-23 09:54:56--  https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/install
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 2606:50c0:8003::154, 2606:50c0:8002::154, 2606:50c0:8001::154, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|2606:50c0:8003::154|:443... connected.
HTTP request sent, awaiting response... Read error (Error in the pull function.) in headers.
Retrying.

--2025-08-23 09:54:58--  (try: 2)  https://raw.githubusercontent.com/OpenMediaVault-Plugin-Developers/installScript/master/install
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|2606:50c0:8003::154|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 24786 (24K) [text/plain]
Saving to: 'STDOUT'
```

As shown below, openmediavault has been installed successfully.
After rebooting, the Raspberry Pi's IP may change. You can run refer to the previous section to check the IP address.

```
Purging configuration files for dnsmasq-base (2.90-4~deb12u1) ...
Purging configuration files for raspberrypi-net-mods (1.4.3) ...
Purging configuration files for ppp (2.4.9-1+1.1+b1) ...
Purging configuration files for modemmanager (1.20.4-1) ...
Processing triggers for dbus (1.14.10-1~deb12u1) ...
[2025-08-23 10:00:44+0800] [omvinstall] Enable and start systemd-resolved ...
[2025-08-23 10:00:45+0800] [omvinstall] Unblocking wifi with rfkill ...
[2025-08-23 10:00:45+0800] [omvinstall] Adding eth0 to openmediavault database ...
[2025-08-23 10:00:45+0800] [omvinstall] IP address may change and you could lose connection if running this script via ssh.
```

Now you can access the openmediavault Web interface via the browser. (Replace the <IPADDRESS> with your Pi's IP.)

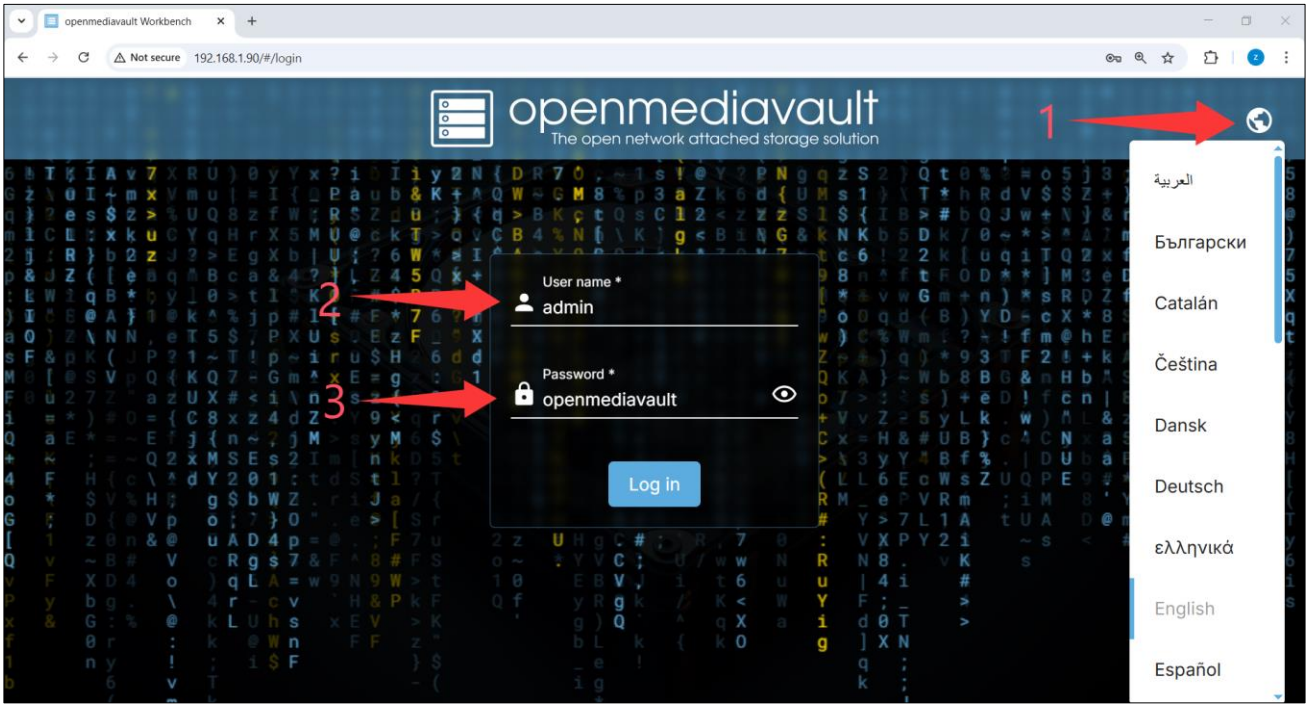
```
http: //<IPADDRESS>
```



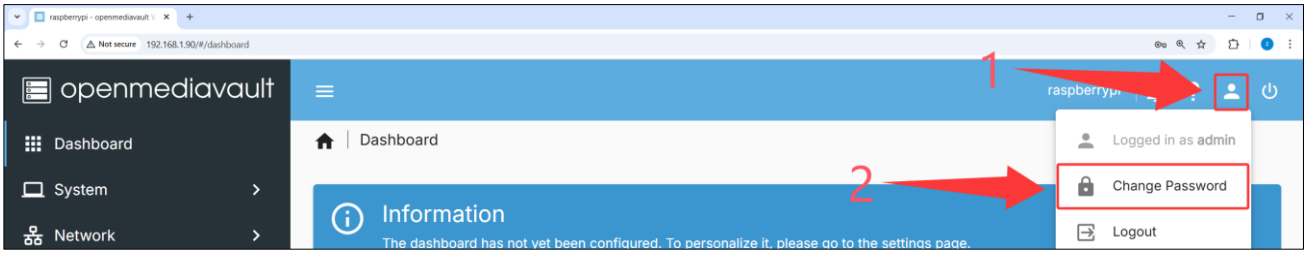
4. Configuring openmediavault

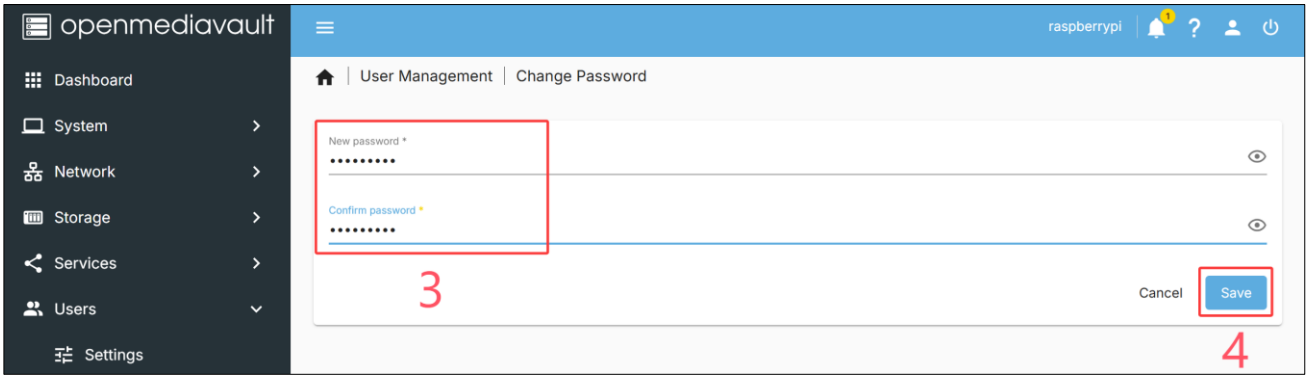
4.1 Changing Password & Including Dashboard Components

After the openmediavault interface loads in the browser, first switch the display language, then log in using the default username **admin** and default password **openmediavault** to proceed with further operations.

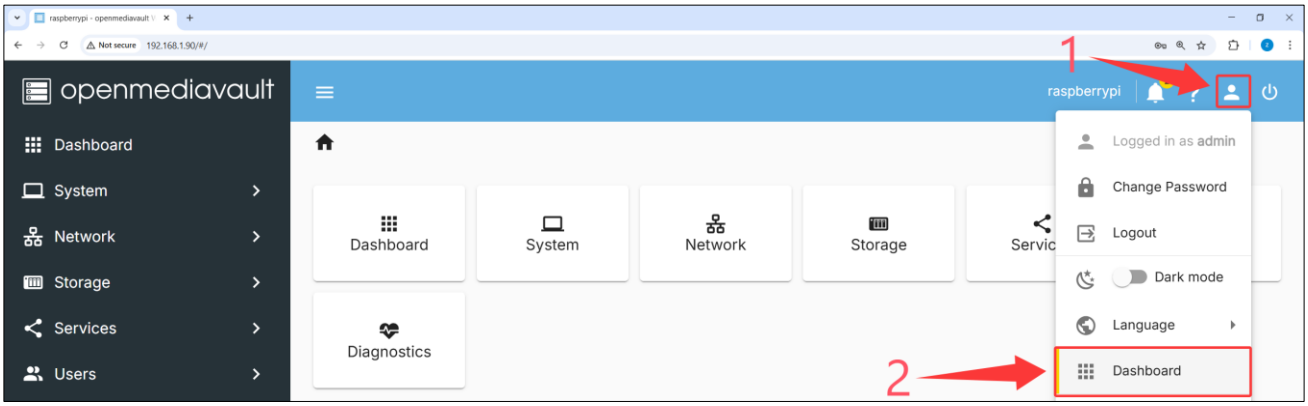


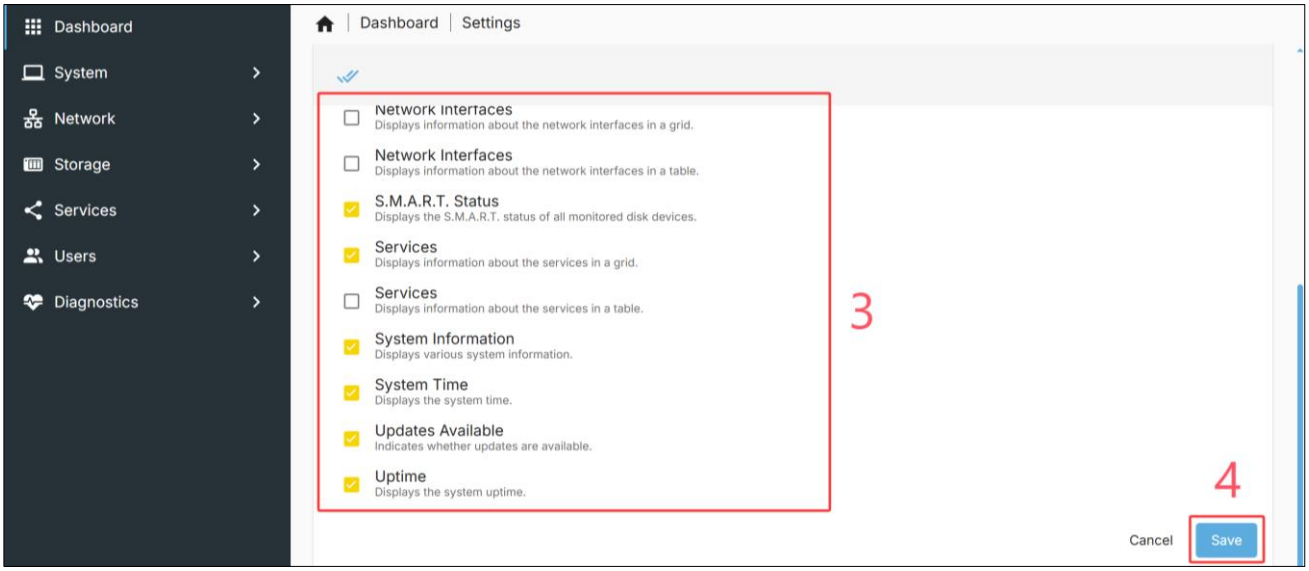
After logging in, please change the default password to prevent unauthorized access by others. Click the icon in the upper right corner, select "Change Password", enter your new password, and click "Save" to confirm.



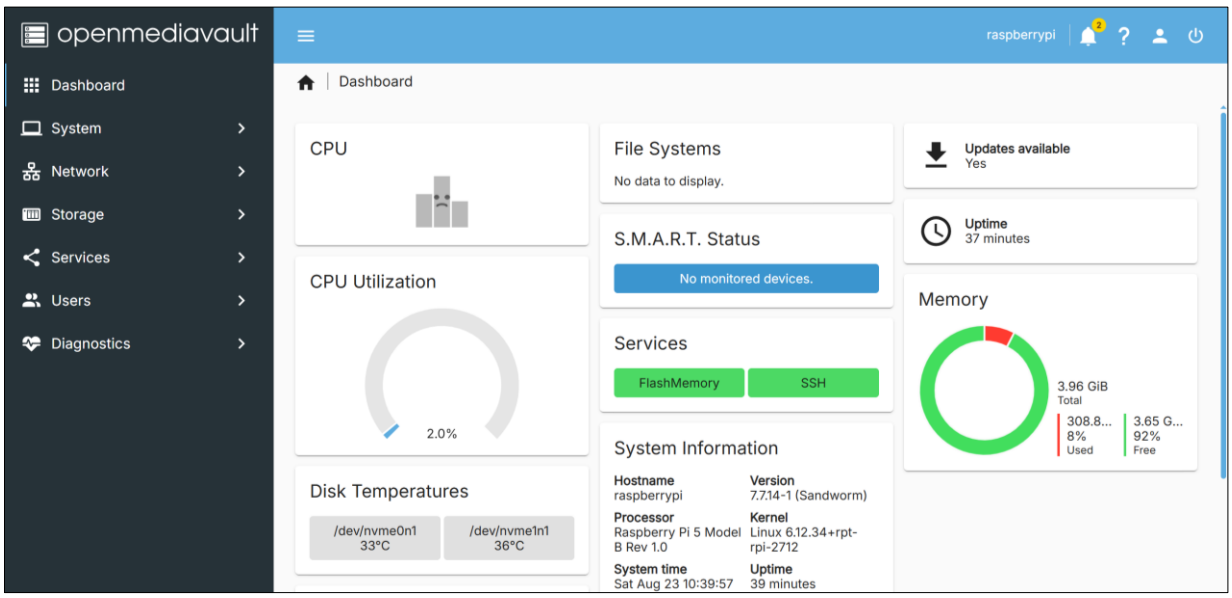


Next, we will add commonly used information widgets to the dashboard for real-time system monitoring. Click the icon in the upper right corner, select "Dashboard", check the system information boxes you wish to display, and finally click "Save" to confirm. (For configuration guidance, refer to Dashboard Settings)



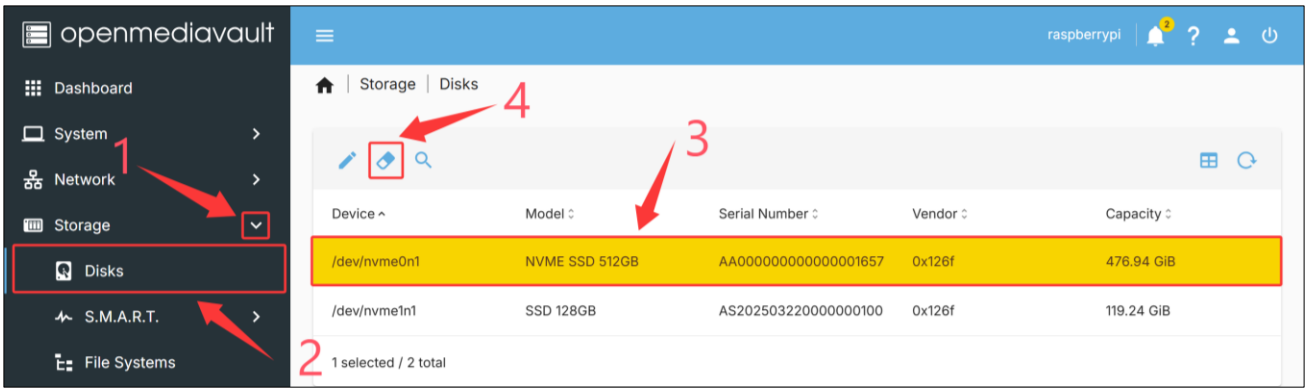


You can now view the real-time status information of your Raspberry Pi NAS system on the dashboard.



4.2 Adding SSD to NAS & Creating Shared Folder

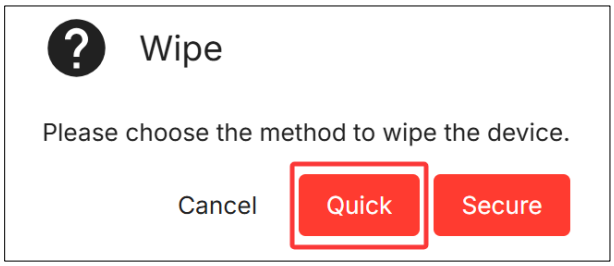
Expand "Storage" → "Disks" in the left menu. You will now see the NVMe SSDs connected to your Raspberry Pi 5. Select the SSD you wish to format (if the SSD already has the Raspberry Pi OS installed, the “eraser” icon () will be unavailable—please choose another SSD). Click the “eraser” icon to format it, which will restore the drive to the state expected by openmediavault.



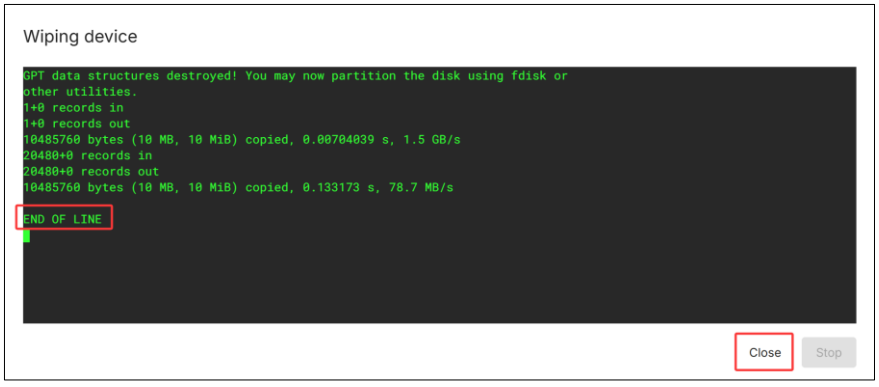
A confirmation window will now pop up. Please check the "Confirm" box and click "Yes".

Note: This operation will permanently erase all data on the SSD. Be sure to back up any important data beforehand.

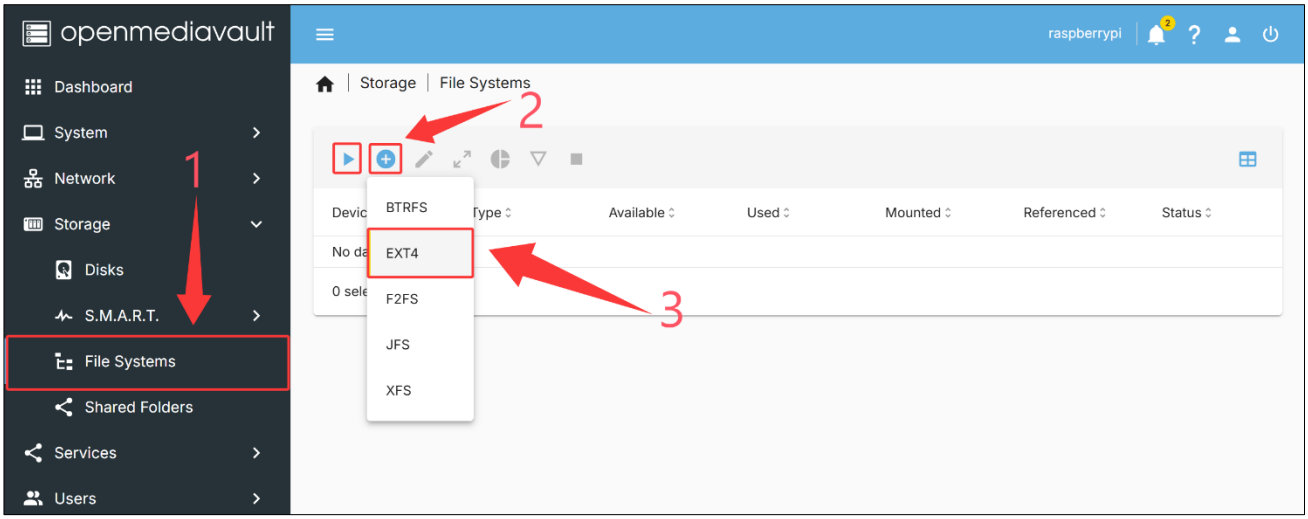
Select the “Quick” mode.



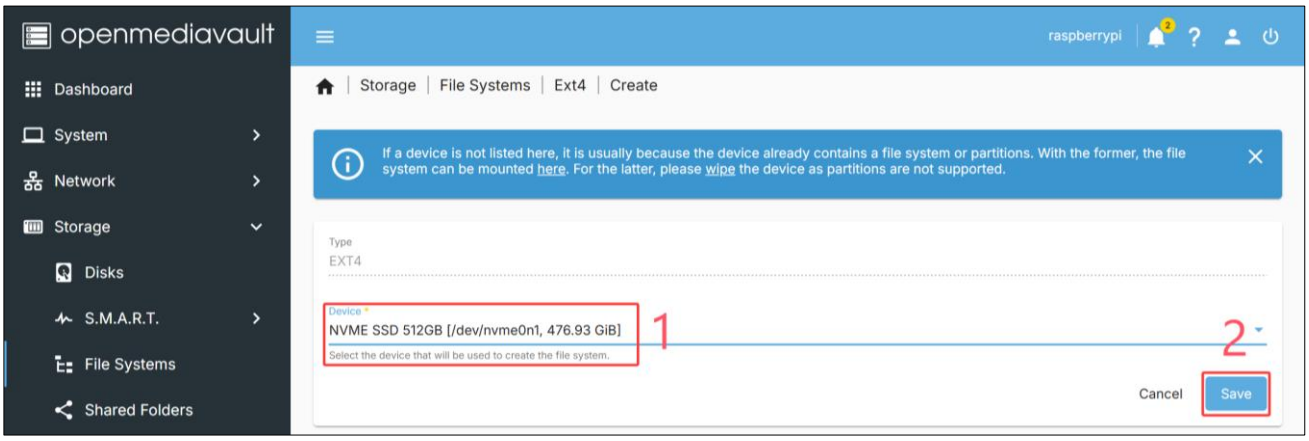
When you see “**END OF LINE**”, it indicates that the wiping has finished. Click “Close”.

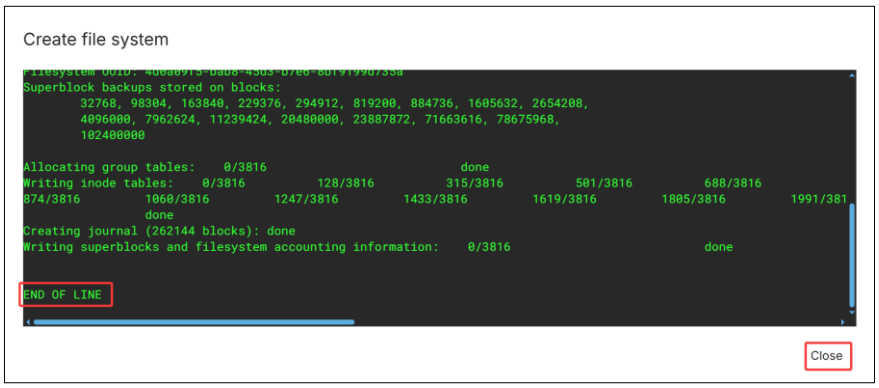


After formatting, navigate to the "File Systems" tab and click the icon. Select "EXT4" as the file system type (recommended for its lower performance impact on Raspberry Pi devices). If the SSD already has an existing file system, click the icon instead to proceed directly to the next steps.

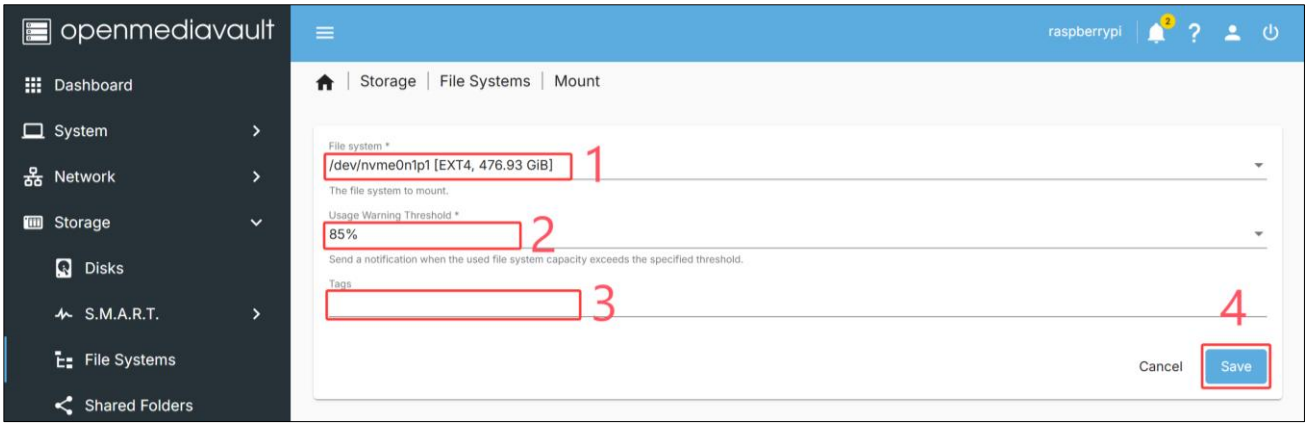


Select the SSD device to be formatted with the EXT4 file system and click "Save".
If the "**END OF LINE**" prompt appears after the operation is completed, it indicates that the erasure has been successfully finished. Click "Close" to exit the current window.



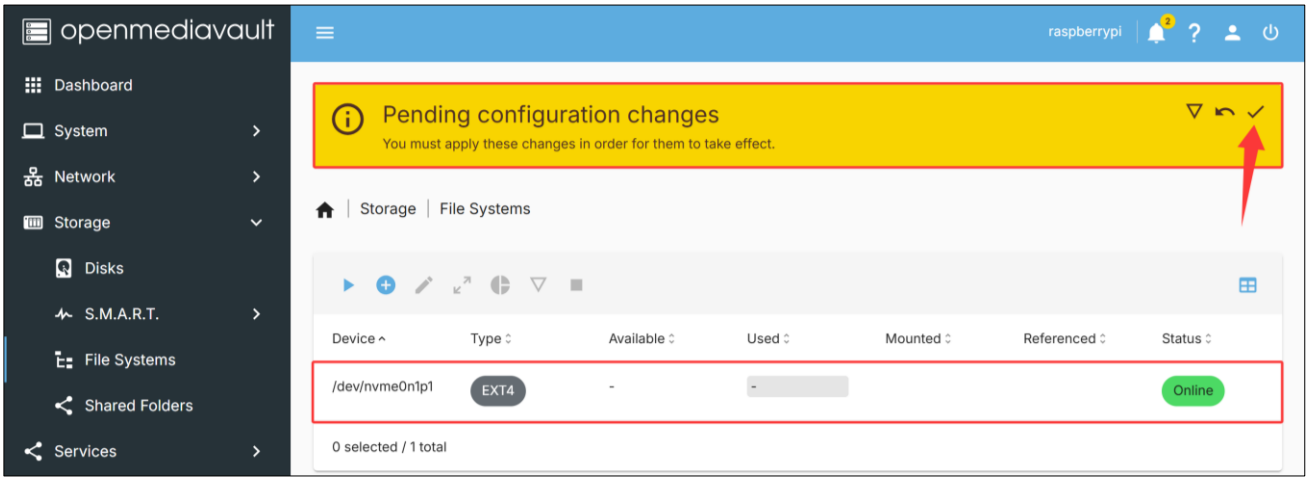


Select the SSD to be mounted, set the warning threshold, add a label, and finally click "Save" to complete the mounting process.

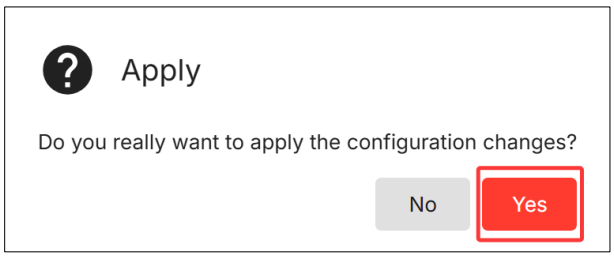


After saving, the status of the SSD will display as "Online" in the File Systems section. A yellow notification bar will appear at the top of the page—be sure to click the ✓ icon to activate the changes.

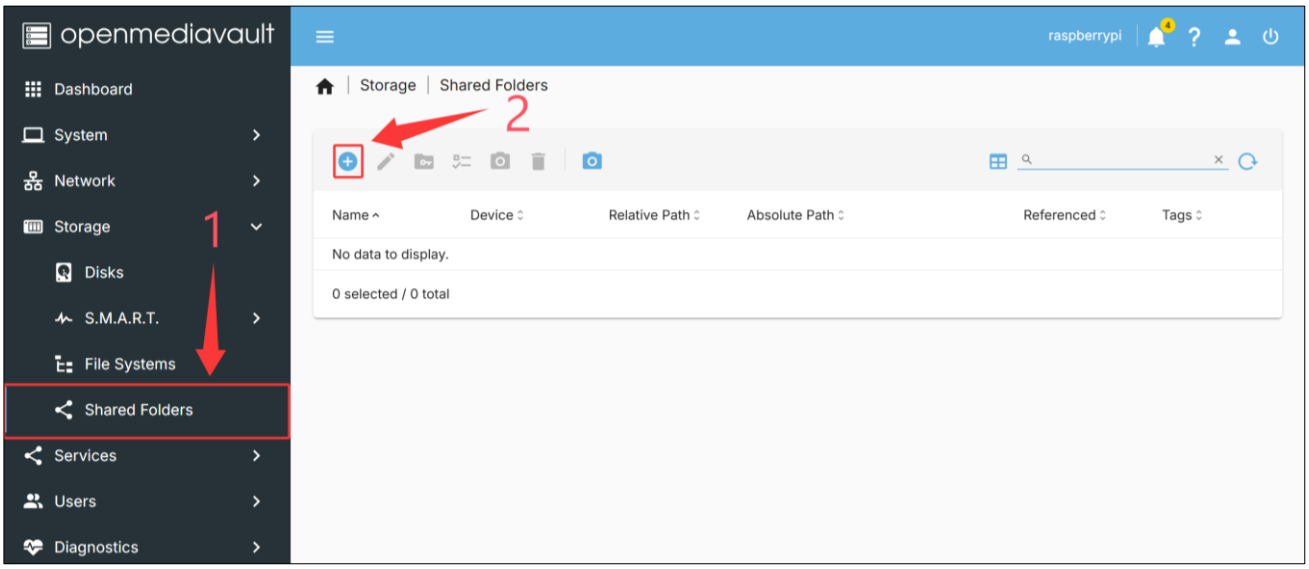
Note: This step is required for all subsequent configuration changes to take effect.



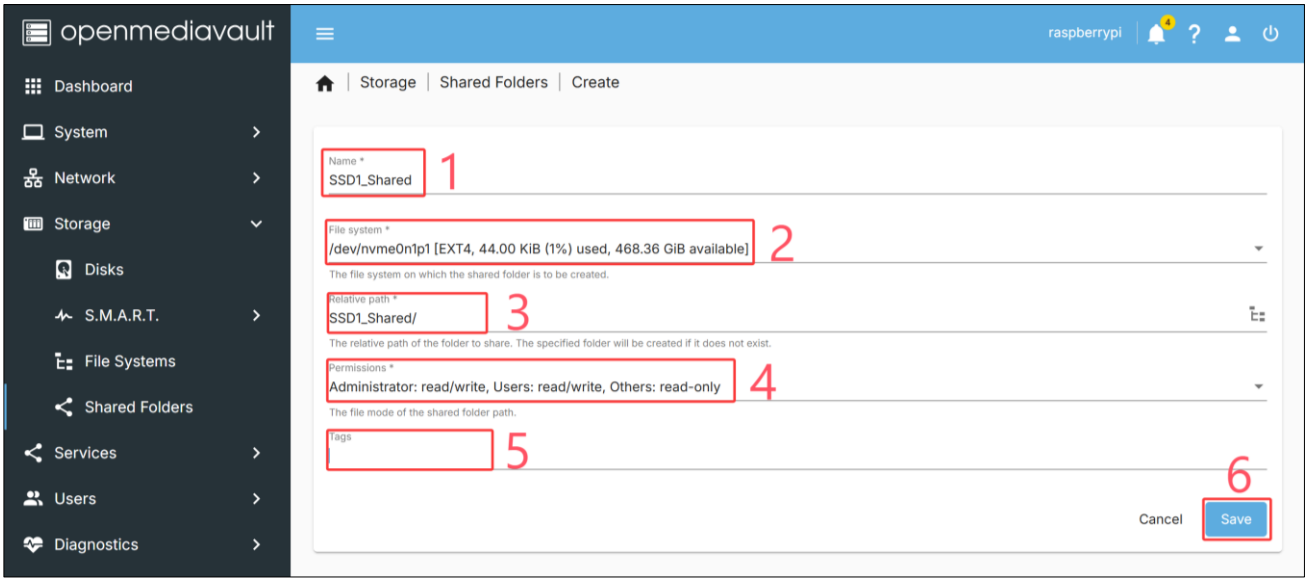
Click “Yes” to have the configuration changes take effect.



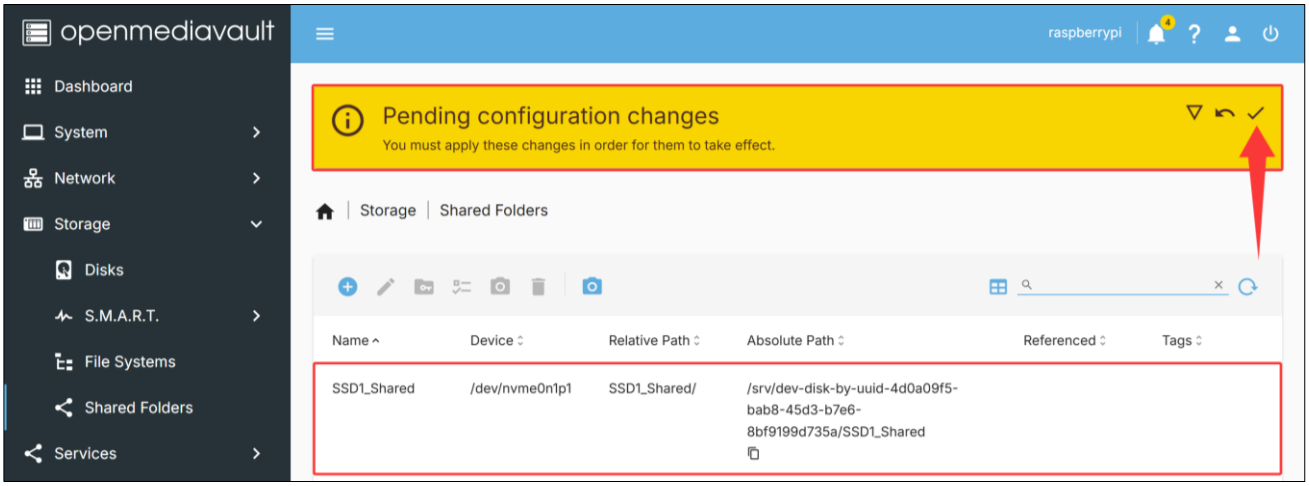
Please navigate to "Shared Folders" and click the icon to create a new shared folder for this SSD device.



Fill in the name of the shared folder, select the mounted SSD, configure permissions and tags (the relative path may be left blank), and finally click "Save" to confirm.

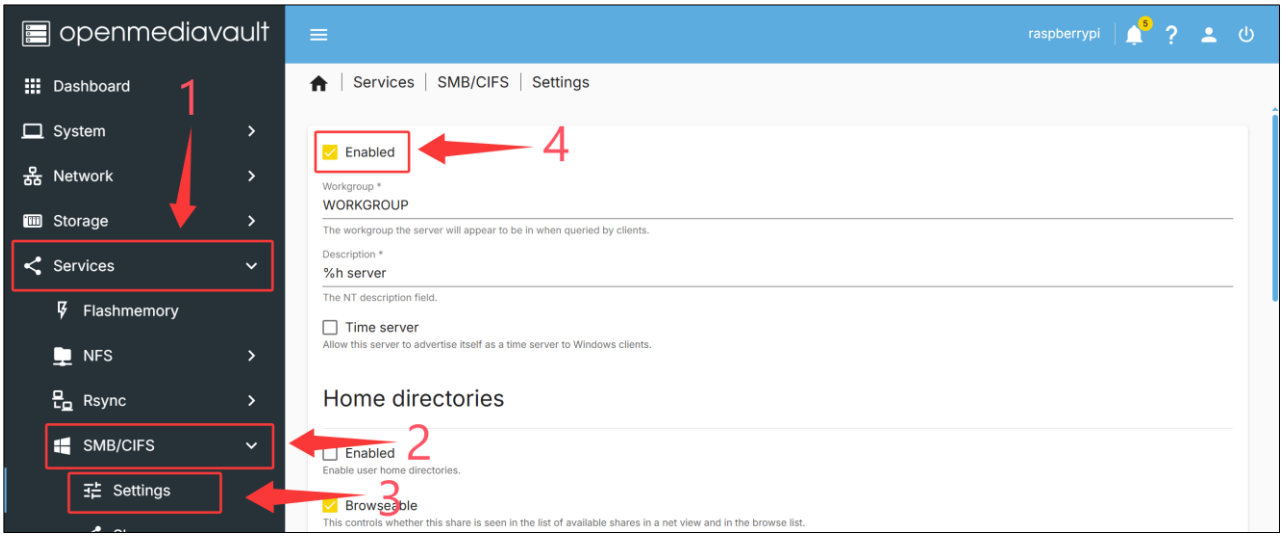


In the shared folders list, you can now see the created "**SSD1_Shared**" folder. A yellow notification bar will appear at the top of the page—be sure to click the ✓ icon to activate the changes.

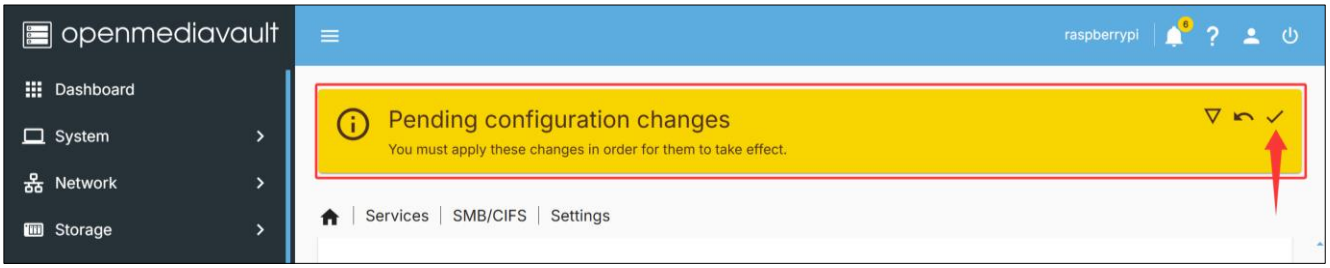


4.3 Enabling SAMBA/CIFS

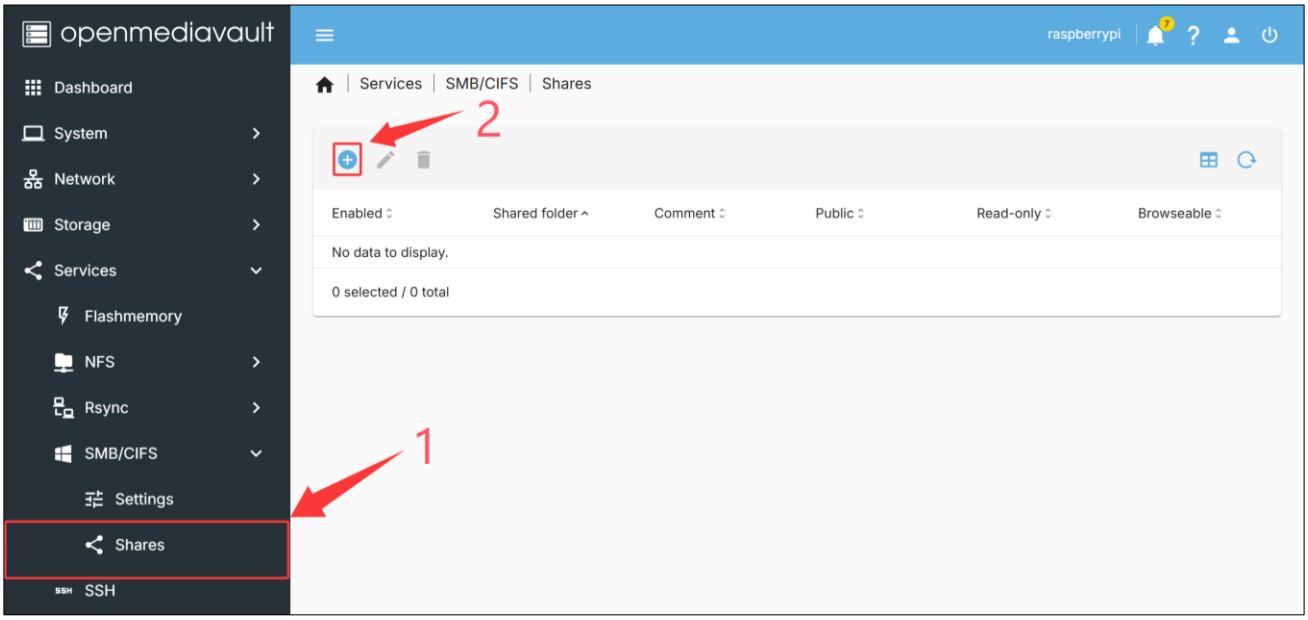
Your shared folders must have protocols like SMB enabled to be discoverable on the network. Go to "Services" -> "SMB/CIFS" -> "Settings," check "Enable," and click "Save" at the bottom of the page to enable the service. Please note that each shared folder must be individually configured and have SMB enabled.



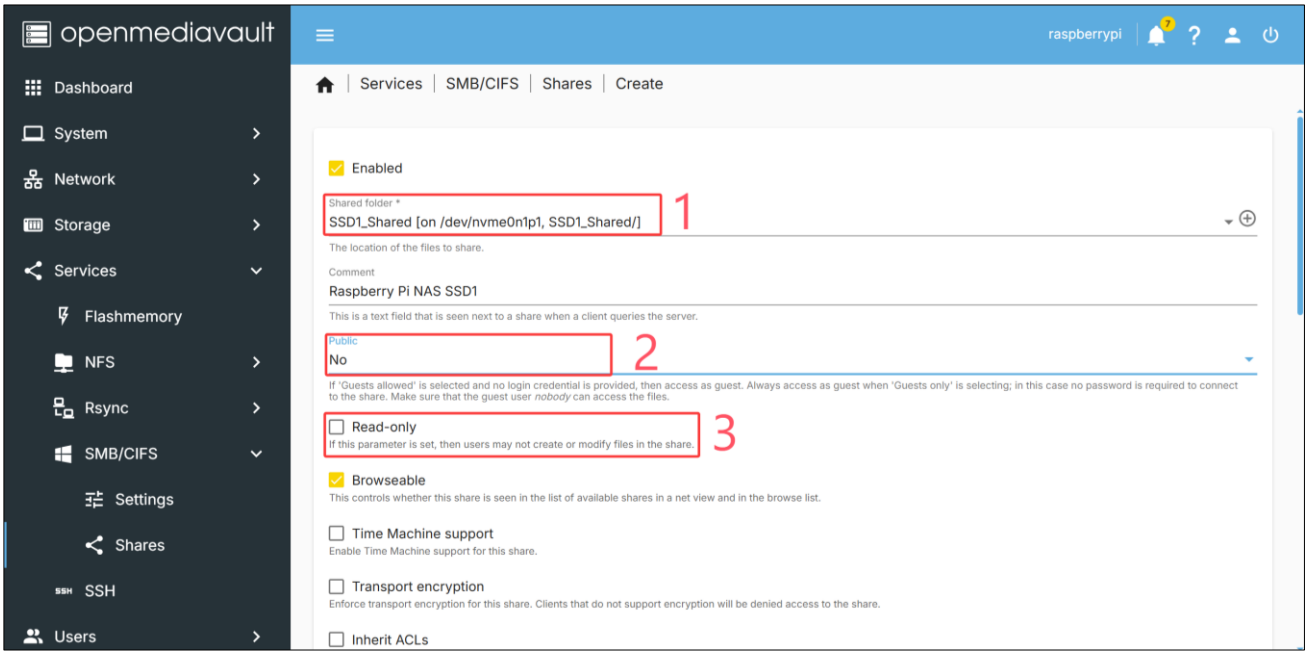
After saving, a yellow notification bar will appear at the top of the page—be sure to click the ✓ icon to activate the changes.



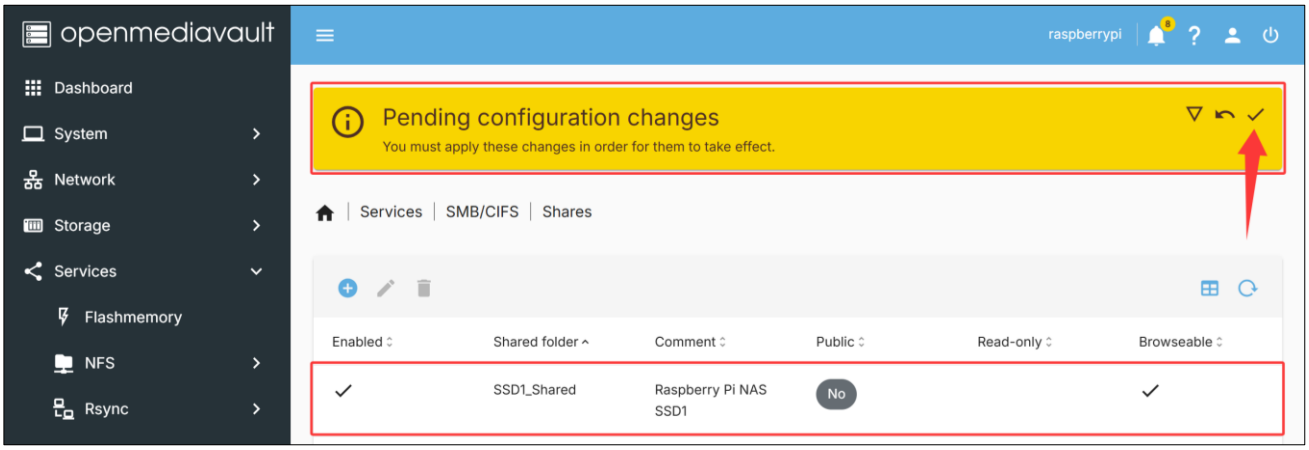
Expand “SMB/CIFS” to select “Shares”. Click the icon to add the created shared files to the list.



Select the "SSD1_Shared" shared folder, set "Public" to "No" (only allow authorized users to access), configure "Read-only" as needed (default is read/write), and finally click "Save" at the bottom to confirm the settings.

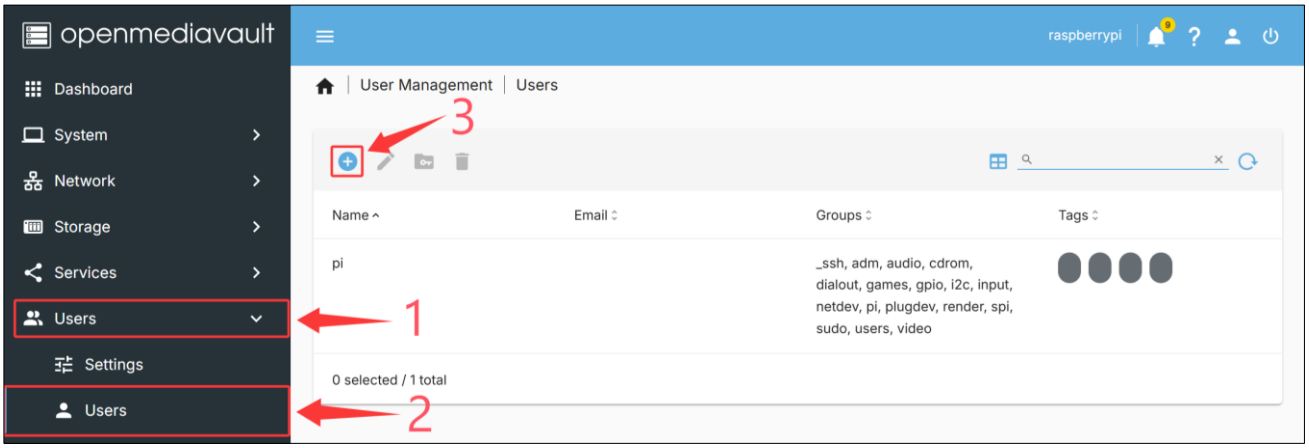


You can now see the successfully added "**SSD1_Shared**" folder in the SMB shared list. A yellow notification bar will appear at the top of the page—be sure to click the ✓ icon to activate the changes.

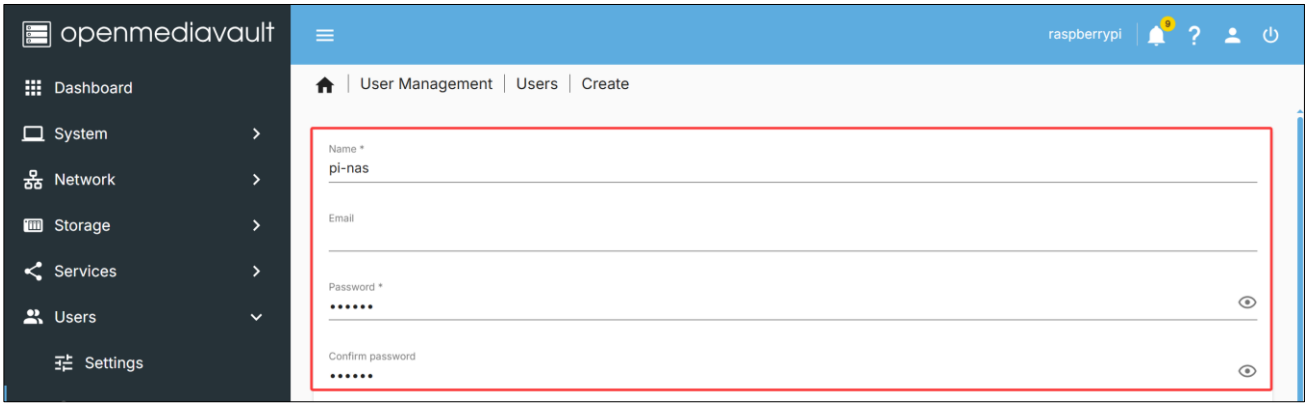


4.4 Adding Users

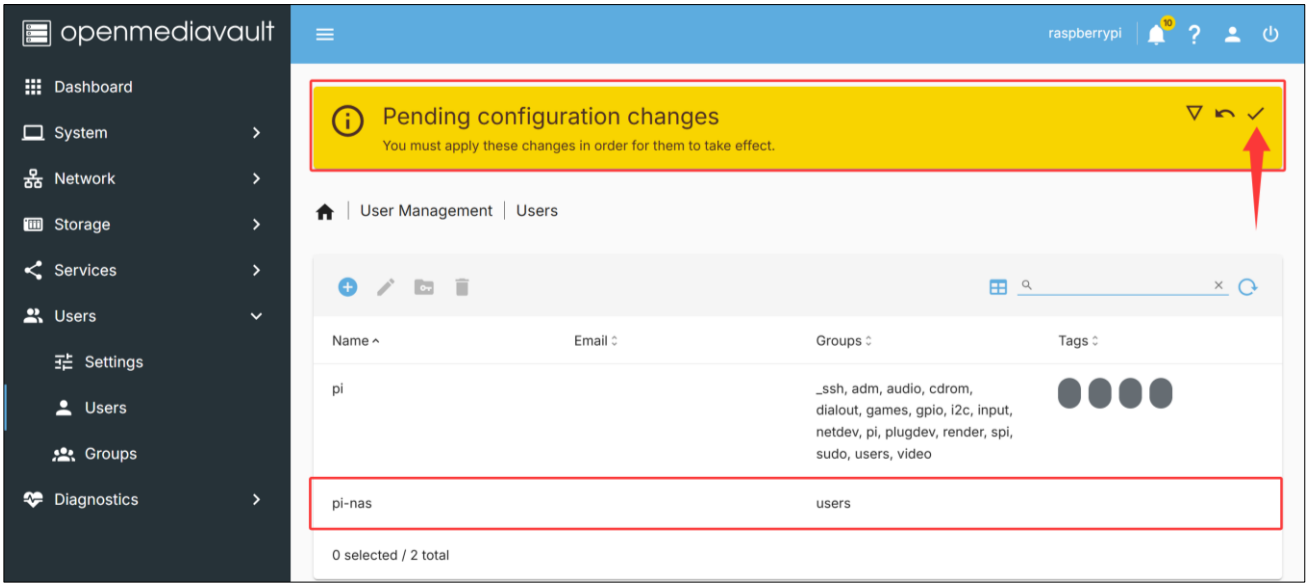
Navigate to "Users" → "Users", click the ⊕ icon and select "Create" to set up a new user for openmediavault. You can later access the shared folders using this username and password.



Fill in the username and password. Scroll down to the end of the page and click "Save" to save the changes.



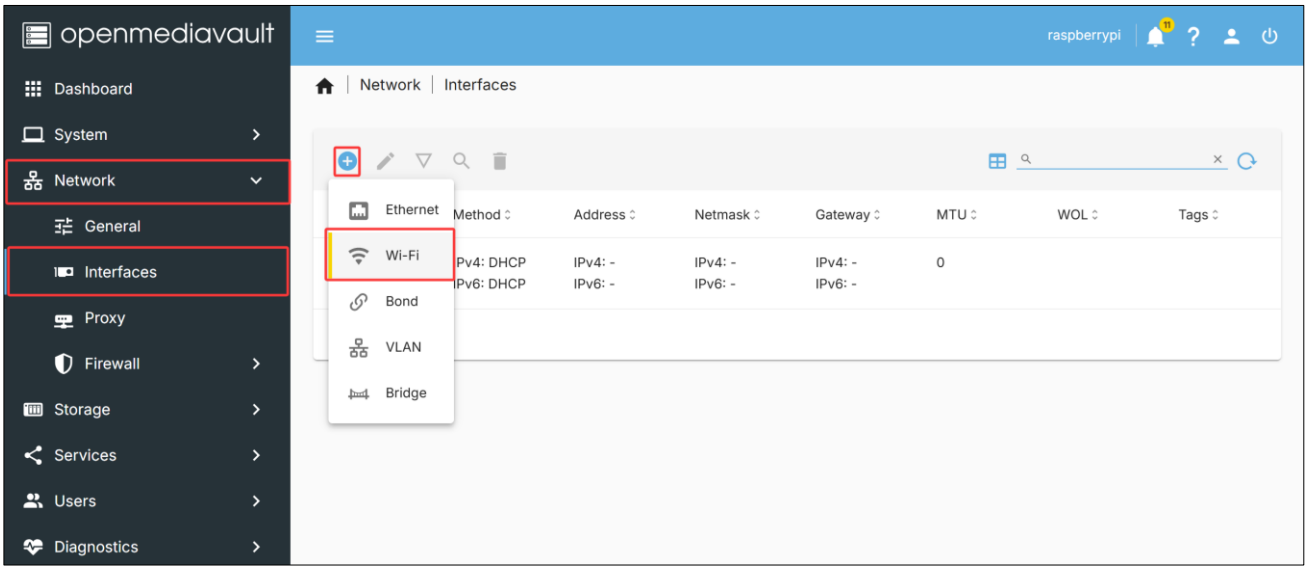
You can see that the user “pi-nas” has been created. A yellow notification bar will appear at the top of the page—be sure to click the icon to activate the changes.



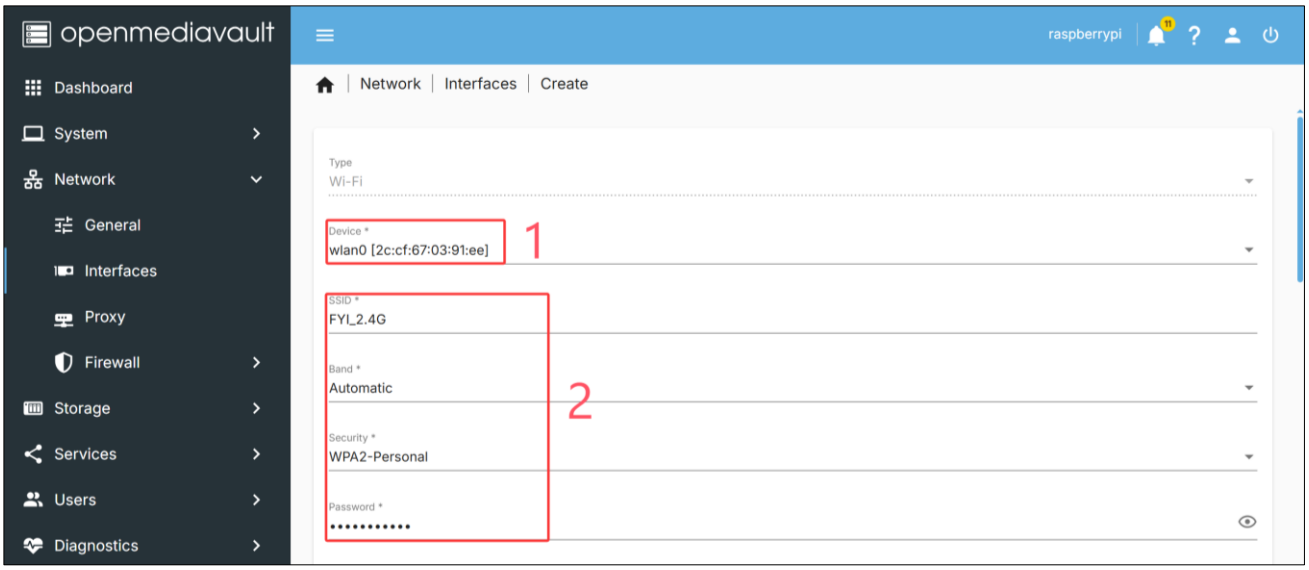
4.5 Enabling Wi-Fi for openmediavault

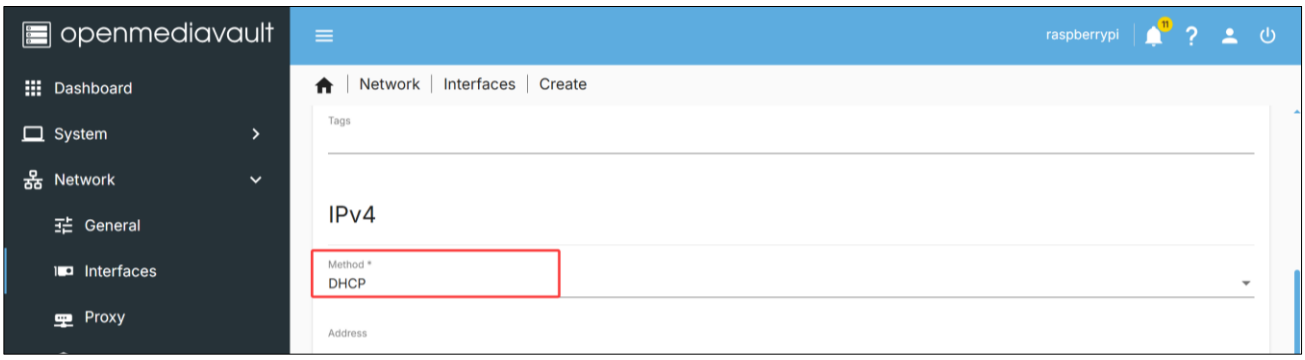
If you need to configure Wi-Fi, navigate to "Network" → "Interfaces", click the icon and select "Wi-Fi".

Note: Wireless connections may suffer from slower transfer speeds or unstable connectivity due to bandwidth limitations or signal fluctuations. If you do not need to enable Wi-Fi, proceed directly to the next step.

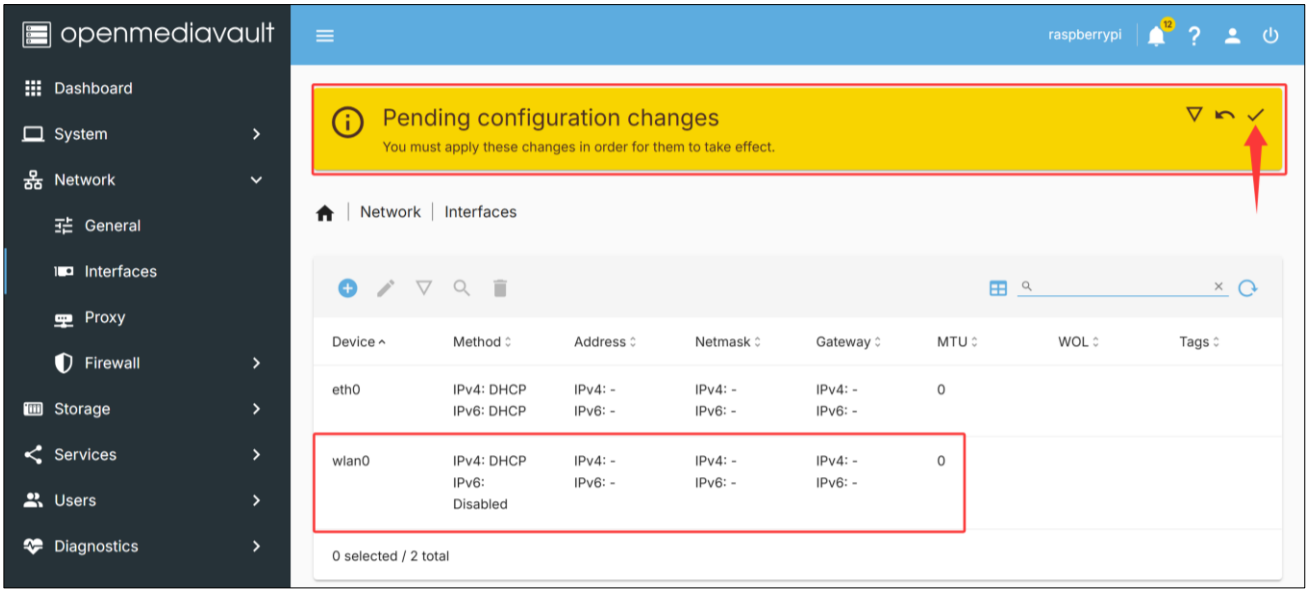


Select wlan0 in the Device field, and accurately enter your Wi-Fi **SSID** (network name) and **Password**. Incorrect information will cause connection failure. Set IPv4 to DHCP, scroll to the bottom of the page, and click "Save" to confirm the settings.





You can see that the network interface wlan0 has been included. A yellow notification bar will appear at the top of the page—be sure to click the ✓ icon to activate the changes.



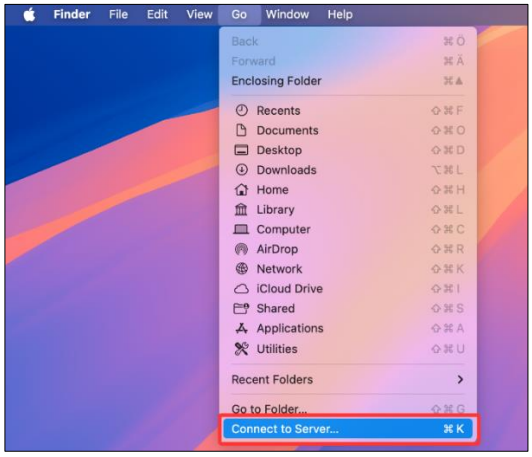
5. Accessing Raspberry Pi NAS

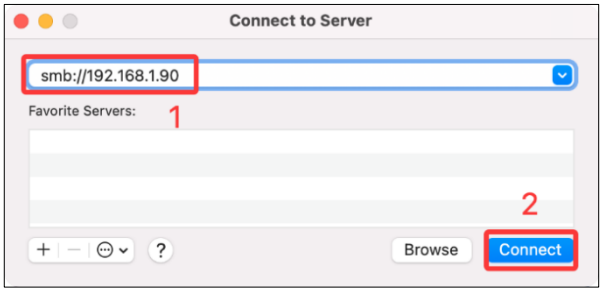
After the configuration is complete, you can directly access the Raspberry Pi NAS shared storage from your computer.

Below are the methods to access the Raspberry Pi NAS on different operating systems:

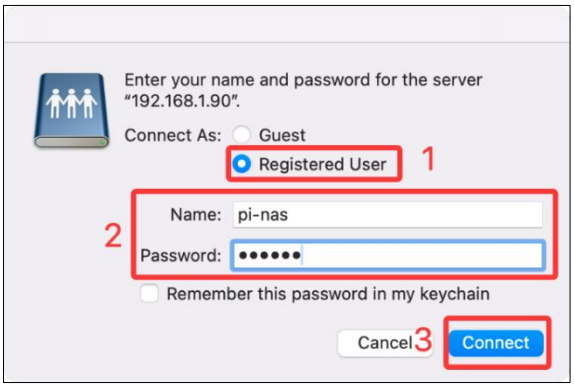
MAC OS

In the "Go" menu, select "Connect to Server" (or press Command + K), enter **smb://<IPADDRESS>** (Note: Replace <IPADDRESS> with the actual IP address of your Raspberry Pi), and then click "Connect".

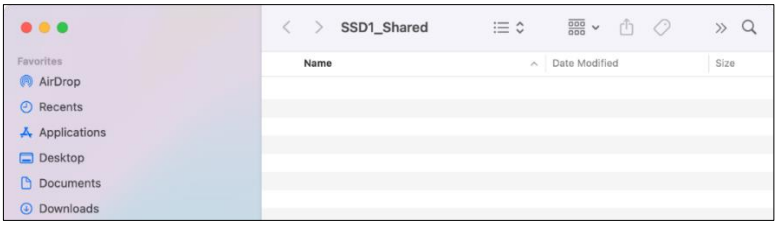




Check “Registered User”, enter the user name pi-nas and your password, and then click “Connect”.

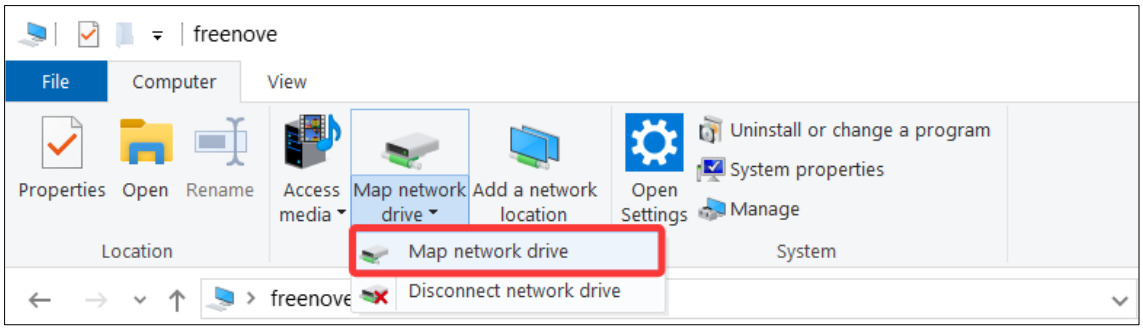


MacOS will automatically open an access window for **SSD1_Shared**, allowing you to drag and drop files directly for transfer.

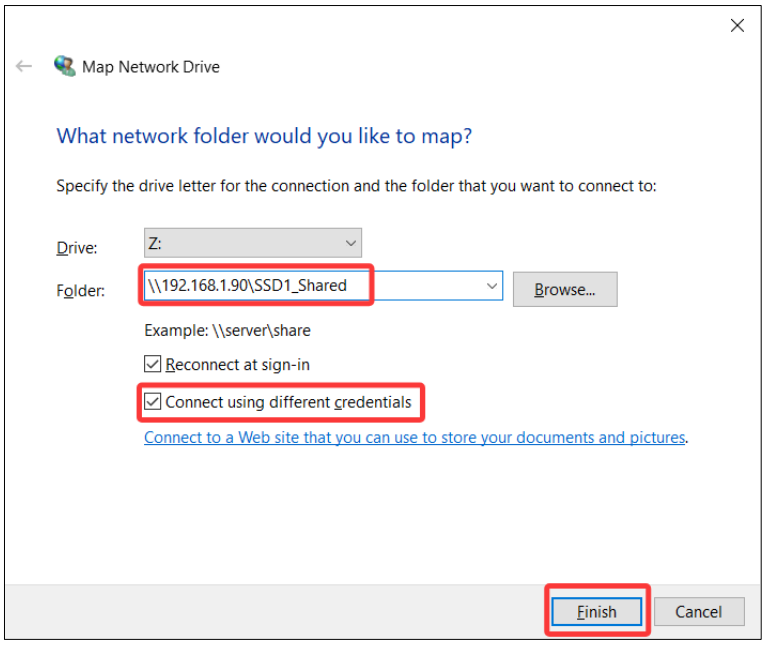


Windows OS

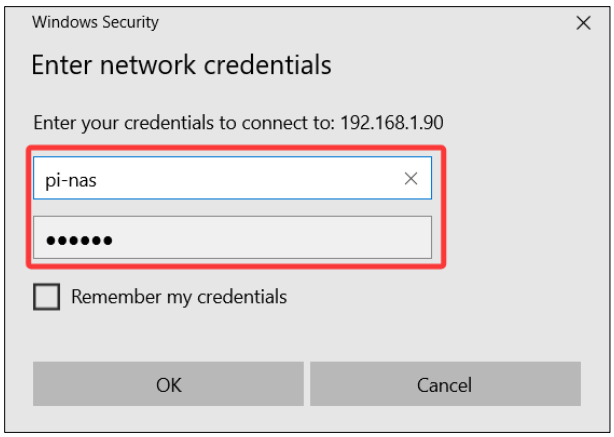
Open File Explorer, select "Map network drive".



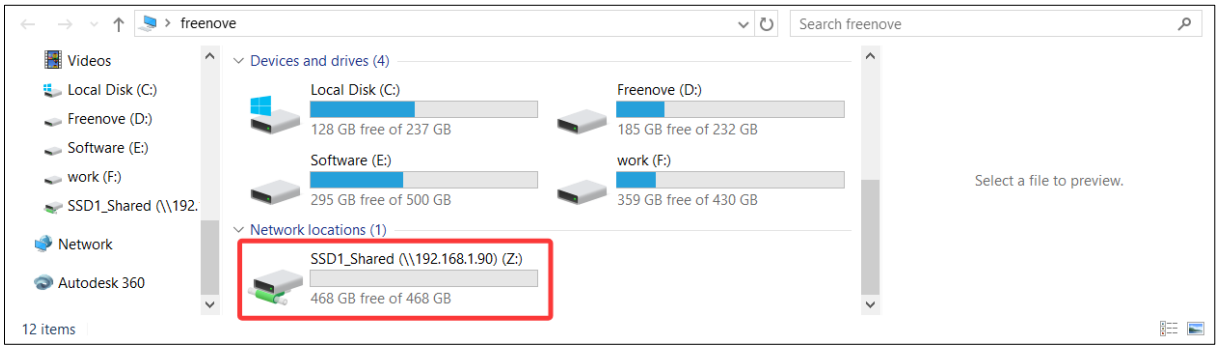
Enter **\\<IPADDRESS>\Shared** (Note: Replace <IPADDRESS> with the actual IP address of your Raspberry Pi, and Shared with the name of the shared folder you created). Check the box for "Connect using different credentials", and then click "Finish".



Fill in the username and password, then click “OK”.



You can now see that **SSD1_Shared** has been successfully added, and you may begin accessing this shared folder.



The test_file.txt has been copied to the **SSD1_Shared** shared folder, with a measured transfer rate of 112 MB/s, reaching the theoretical maximum speed of the Raspberry Pi's wired network.