

**\*Please download this document and view it locally\***

# **Getting Started with**



## **(Openmediavault 4)**

April 3rd, 2020 - Rev 1.5

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## Version History:

April 7th, 2018 - Rev 0.2 (Links updated, minor edits.)

April 8th, 2018 - Rev 0.3 (SBC Samba note in Q&A, minor edits.)

April 24th, 2018 - Rev 0.4 (Minor edits.)

July 16th, 2018 - Rev 1.0 (Network settings, New Version Release, Docker Note,

Rsync - Disk to Disk backup, SBC edits, other Minor edits.)

September 10th, 2018 – Rev 1.1 (R-PI note, Getting Involved, Add-On's addition, Minor edits. Rsync backup Recovery)

March 22th, 2019 – Rev 1.2 (SBC – initial interface config., LMB update,)

May 26th, 2019 – Rev 1.3 (SBC Network Manager notes, FQDN change, minor edits.)

September 1st, 2019 – N/A (Docker ports note.)

November 25th, 2019 – N/A (Slightly revised RSYNC backup.)

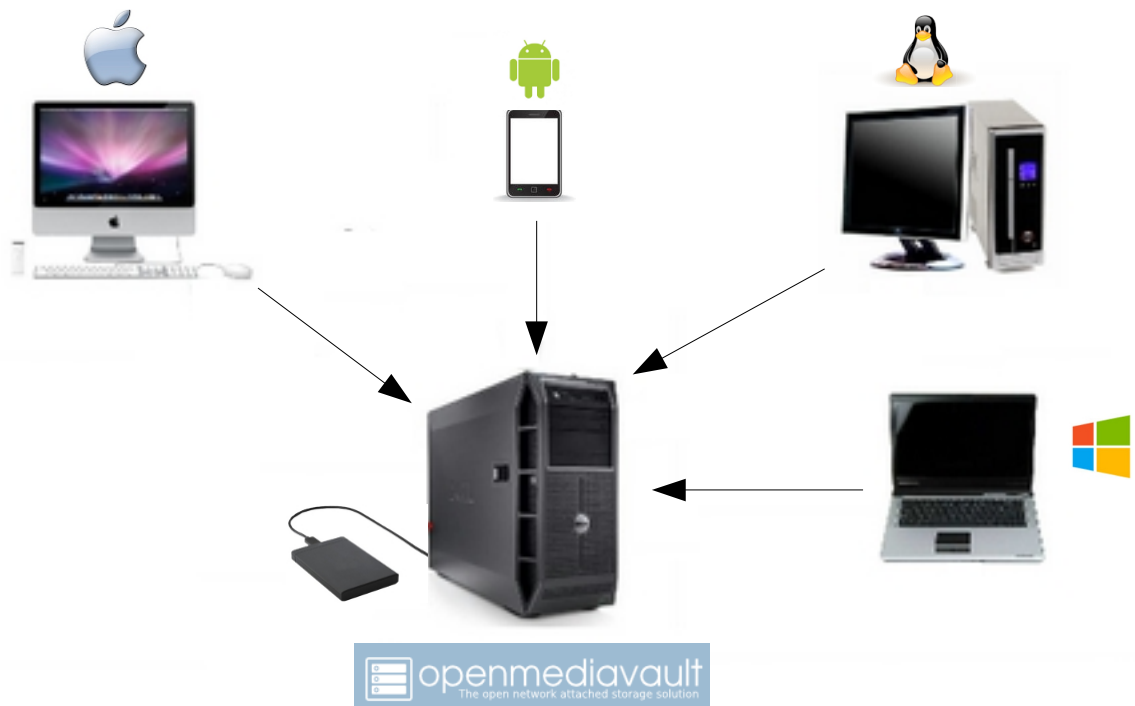
December 10th, 2019 – Rev 1.4 (Labeled for archive. Now the base for OMV5)

April 3rd, 2020 – Rev 1.5 (Archived)

# Introduction to Openmediavault

Openmediavault is File Server / NAS system designed to work on most modern IBM compatible PC systems, to include typical x86 and x64 PC's and select ARM devices. Openmediavault (OMV) can be thought of as filling a role similar to Microsoft's Server Essentials, but extends far beyond the role of a basic File Server with additional functionality added VIA plugin's and Dockers. OMV is designed to work with popular client operating systems and multiple filesystem types, utilizing proven data sharing techniques on small and medium sized Local Area Networks.

In meeting the needs of its intended users, individuals and small-to-medium-sized businesses, Openmediavault is designed for flexibility.



## History

Openmediavault's history began with Volker Theile, who was the only active developer of the FreeNAS project by the end of 2009. Volker became interested in completely rewriting FreeNAS, for use on Linux. Initially, he named the rewritten package **coreNAS**. Shortly thereafter, Volker discarded the name **coreNAS** in favor of **Openmediavault**. Openmediavault's initial release was on 17 October 2011. It's built upon very mature and proven software layers and is under constant development. Openmediavault relies on the Debian project and uses their system and repositories as a base. The project focuses on making a stable and extensible NAS system that is intuitive and easy to use.

## **Purpose**

The purpose of Openmediavault (hereafter referred to as “OMV”), is to provide a NAS system that is highly “extensible” with value added plugin’s and access to numerous Dockers that are desirable and beneficial to home users and small businesses at little to no cost.

One of the ambitions of the OMV project is to make advanced NAS technologies and features available to inexperienced users in an easy to use WEB GUI, thereby making it possible for people, without extensive knowledge of Linux, to gain easy access to advanced technologies.

## **Getting Involved**

If businesses and home users find OMV to be beneficial, consider supporting the project with a modest donation. While OMV is free, donations to cover Web site costs, hardware for testing, and other unavoidable expenses are needed and very much appreciated.

[Donate to OMV](#) (Main project development) and

[Donate OMVextras.org](#) (Development of Plugins and support for Single Board Computers.)

The OMV project is looking for coding talent and contributors. If one has developer experience, (BASH, PHP, Python, Javascript) the project would like to hear from you. Users with Linux experience are invited to help out on the [OMV Forum](#).

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## **About this Guide**

In computing, generally speaking, there are several ways to do the same thing. By extension, methods and methodology become progressively more advanced as a user's skill level increases. With these notes in mind, methods found in this guide may not be considered as “Best Practice”, especially from a hardened security perspective. The purpose and intent of this guide is to provide a walk-through to get users up and running as quickly and easily as possible.

- This guide contains links to external sources of information and software. It's best used on a PC connected to the Internet.

- This is a community document and a work in progress. Input and feedback are welcome and can be sent to: [omvguide@gmail.com](mailto:omvguide@gmail.com)

## **Beginners:**

This document is intended for beginners who will, primarily, be using the OMV's GUI. Beginners are assumed to have basic knowledge of computers and their LAN systems, and a Windows or Apple PC. The focus of this guide will be to take a technically easy route, for the widest possible cross section of new users, toward accomplishing basic tasks using methods and processes that are easy to understand and duplicate.

## **Advanced Users:**

OMV was designed to be intuitive for advanced users and beginners alike. After the installation is complete, for a streamlined setup, see the [Quick Start Guide](#).

**As a cautionary note for Advanced Users:**

Many of the configuration files traditionally used to customize Debian Linux are controlled by the OMV system database. As a result, manual edits of configuration files may be overwritten as of the next, on-demand, configuration change in the OMV GUI. Further, it is possible to “break” OMV with alterations and permissions changes to the files of the boot drive, on the command line. In the beginning it's best to rely, primarily, on the GUI for configuration and control. Otherwise, before attempting to customize the operating system, backing up the boot drive is highly recommended.

---



# Hardware

Hardware requirements to run OMV are very modest, however, actual hardware requirements for specific “use cases” vary widely. The following is intended only as general guidance.

## **Compatibility:**

OMV 4.X is currently supported by Debian 9, “Stretch”.

OMV 3.X, an older legacy release, is supported by Debian 8, “Jessie”.

Compatible hardware and other requirements of Debian Linux are available at [Debian.org](http://Debian.org)

## **ARM Hardware:**

The OMV project maintains various images for ARM platforms (Single Board Computers). Browse for installation images [here](#).

## **64 bit hardware (x64):**

The OMV project maintains convenient, fully integrated, OMV/Debian installation ISO's. This is the best method for getting OMV up and running quickly.

## **32 bit Hardware (i386):**

While OMV is supported by 32bit Debian installations, it's a two step process referenced in; “[Alternate i386 – 32bit Installations](#)”. The OMV project does not provide integrated 32bit installation ISO's.

## **Minimum Hardware requirements**

OMV/Debian will run on i386, amd64, and select ARM platforms, with 1GB of ram or less, but performance expectations should be adjusted accordingly. The system boot drive should have a minimum of 8GB capacity.

## **Recommended Minimum requirements**

For basic File Server operations - 1 or 2 users:

- Any of the ARM Single Board Computers supported by OMV.
- Intel Core 2 Duo or equivalent AMD processor and 1GB of RAM.

If flash media is used, (USB thumb-drives, SD-cards, etc.) the system boot drive should have at least 16GB capacity, for longer life.

## ***Recommended Hardware and Considerations for a good use experience***

### **ARM - Single Board Computers:**

If considering a **Single Board Computer** (hereafter referred to as an “SBC”) as a primary NAS server for home use, note that support for SBC's is for **the current OMV release only**. Archived images of previous versions are not maintained. Accordingly, if users set up an SBC, see the ending note in [Operating System Backup](#).

### **Raspberry PI's**

(Hereafter referred to as “R-PI's”.)

Given the current market for SBC's, the majority of SBC users will likely be owners of R-PI's.

While OMV will run on a R-PI (model 2B and above) performance is poor.

What exactly does “poor performance” mean? In this context, if the R-PI's CPU is running at 100%, OMV may not show up on the network and / or network shares may not open. This may give the false impression that there's a permission problem. In other instances, the WEB GUI login page may not respond.

These issues may appear to be software related problems, but that's not the case. R-PI's are very easily over stressed and, during those periods, they may not respond to external input. With the performance limitation in mind, an R-PI should be used only as a basic file server for 1 user home environments, where multitasking is less likely. If running automated tasks, it's best to schedule them to run in the early morning hours when user access would not be affected.

### **X86 or X64**

- Intel i3 (or equivalent AMD processor), 4GB ram or better (ECC preferred) and a 16GB system boot drive will provide good performance in home or small business use cases.
- As the number of NAS users increase and server processes are added, processing power and memory requirements increase.
- For file caching, in support of normal file system operations, performance is better with more RAM.
- The number of a Motherboard's SATA or SAS ports can be a factor if future storage expansion is needed.
- A case design that accommodates the physical installation of additional hard drives can be helpful.
- Integrated video is preferred over add-on Video cards. With OMV's headless server design, add-on Video cards are an excessive and unnecessary power drain, with no performance benefit. Installing a high end, high powered Video card in a headless server is analogous to installing a 65 to 200 watt light bulb in a closet, without a switch, and closing the door.

## ***Where CPU Power is Needed – “Transcoding”***

Transcoding is a process for translating media file formats into types that mobile devices understand. Since mobile devices are low powered, they're not capable of re-processing high resolution media files smoothly so the processing burden is often transferred to the media server.

[Plex](#), a popular media server, recommends at least 2000 on the CPU's [PassMark](#) score for each concurrent 1080p transcoded stream. ([See the advice article here](#))

If NAS administrators have a lot of smart phone users, in their homes or businesses, who will be watching transcoded video on the small screen, CPU loading may bear some thought.

Look up your CPU here. [https://www.cpubenchmark.net/cpu\\_list.php](https://www.cpubenchmark.net/cpu_list.php)

## Selecting a Boot Drive

Nearly any type of hard drive, SSD, or flash device (USB thumb-drives and SD-cards) 8GB or larger, will function as an OMV boot drive.

However, some notions of achieving a “Faster” or a “Better Performing NAS server” by using certain types of fast boot media should be dispelled.

Server booting requirements and considerations are different when compared to desktop and business workstation requirements.

- Given OMV's lean configuration, boot times are fast. Boot times of 1 minute and Shutdown times of 20 seconds are common, even when using relatively slow flash media such as USB thumb-drives and SD-cards. (Recent models can be quite fast – check their benchmarks.)
- Typically servers are rebooted no more than once a week. When automated, a reboot event is usually scheduled after-hours when users are not affected.
- After the boot process is complete, most of OMV's file server functions are running from RAM.

### **Conclusion – for Linux NAS operations, fast boot media is not important.**

- “The WEB/GUI is more responsive with fast media.”

This is the single instance where an SSD or a spinning hard drive may create the illusion of higher performance. In the traditional role of a NAS as a File Server, when the server boots, the Linux kernel and most of the necessary processes required to act as a File Server are loaded into RAM - the fastest possible media for execution.

OMV's WEB/GUI interface is another matter. Loading WEB pages may call files from the boot drive, which may make the server appear to be slower, when using slow media. However, the speed of the boot drive has little impact on overall server functions and actual NAS performance.

**\*\*The above assumes that adequate RAM has been provisioned. Otherwise, in low RAM scenarios, faster media may affect operations if a SWAP partition is used.\*\***

## Final Notes on Choosing a Boot Drive

OMV's boot requirements are very modest:

While some users prefer traditional hard drives or SSD's, the boot requirement can be served with USB thumb-drives and SD-cards, 8GB or larger.

With USB connections on the *outside* of a PC case, cloning USB drives for [operating system backup](#) is an easy process. Given this consideration, some users prefer USB thumb-drives and other external flash media to internal drives. Further, given the ease of operating system recovery, in the event of a boot drive failure, beginners are encouraged to consider using flash media.

If flash media is used:

New name brand drives are recommended such as Samsung, SanDisk, etc. While not absolutely essential for the purpose; **USB3** thumb-drives are preferred, due to their more advanced controllers, and SD-cards branded **A1** for their improved random read/write performance. **USB3** thumb-drives and **A1** spec'ed SD-cards are faster and, generally speaking, more reliable than similar items with older specifications.

While boot drive size matters, bigger is not always better. An acceptable size trade off for wear leveling and speed of cloning is between 16 and 32GB. (“**Wear leveling**” will be explained during the

installation and configuration of the flash-memory plugin.)

The **flash-memory plugin** is required for flash media. Its purpose and installation is detailed in [The Flash Memory Plugin](#).

**Use-case exceptions where boot media larger than 32GB may be useful:**

- Running applications that utilize WEB interfaces, such as Plex, Emby, etc.
- Hosting Web Servers with extensive content.
- Hosting Virtualized Guest operating systems with desktops. (Does not apply to ARM platforms. ARM platforms can not virtualize 386 or x64 platforms. )

(There's no penalty for starting with a smaller boot drive. Moving to a larger drive, if needed, can be done later.)

**\*\* Note:** Buying flash devices on-line, even from reputable retailers, comes with the substantial risk of buying fakes. Buying flash drives, in sealed packaging, from walk-in retail stores with liberal return policies is recommend. The use of cheap generics, fakes or knockoffs is highly discouraged. They tend to have a short life and they're known to cause problems, even if they initially test error-free. In addition, to detect fakes or defective media even when new; all SD-cards and USB thumb-drives, should be formatted and tested in accordance with the process outlined under [Format and Testing Flash Media](#). If they fail error testing, return them for a refund. **\*\***

---

## **Hardware - The Bottom Line**

Again, OMV/Debian's hardware requirements are modest. While **64bit platforms** are preferred for the easiest possible installation process, nearly any IBM compatible PC or Laptop produced in the last 10 years could be re-purposed as an OMV server.

However, it should be noted that newer hardware is, generally speaking, more power efficient and it's higher performing. The power costs of running older equipment that is on-line, 24 hours a day, can easily pay for newer, more power efficient equipment over time.

Further, the supported ARM platforms are both power efficient and capable of providing file server functions, in a home environment. (Again, performance expectations should be adjusted in accordance with the capabilities of the hardware.)

## X64 Download / Installation

This guide assumes the user will be installing from a CD, burned from an image found at OMV's files repository, using 64 bit hardware.

### Downloading

Beginners should download the **latest stable version** and burn a CD ISO.

([Rufus](#) or a similar utility can be used to create a bootable USB thumb-drive, to use as installation media, if a CDROM drive is not installed.)

Download OMV from <https://sourceforge.net/projects/openmediavault/files/> and copy or download the SHA or MD5 checksums for your ISO. The checksum value will be used with the MD5 SHA checksum utility. (Windows Notepad can open MD5 files by selecting “**All Files**”, next to the file name drop down.)

**\*\*Note:** If users install Beta versions of OMV, they are agreeing to be a “tester”. As part of being a tester, users may experience issues or bugs that can not be resolved and lose data. Plan accordingly, with full data backup.\*\*

### Verify the download

After the download is complete, verify the download with a [MD5 & SHA checksum utility](#). MD5 and SHA hashes check for image corruption that may have occurred during the download.

**\*\*Beginners Note\*\***

**DO NOT SKIP THIS STEP.** The chance of image corruption is high when downloading and it's pointless to build a server with flawed software. Even the slightest corruption of the installation ISO may ruin your installation and the effects may not be noticed until well after your server is built and in use. Headaches can be avoided by checking the image.

### When using Flash Media:

If installing to a USB drive or an SD-Card, format and test your device before use, in accordance with the with the process outlined under [Format and Test Flash Media](#).

### Burning a CD

In most cases, double clicking on files with an “**.ISO**” extension will trigger a CD burning utility on a Windows Computer or a MAC. If help is needed for this process, see the following link.

[How to burn an ISO image in Windows 7, 8, 10](#)

**\*\*Beginners Note\*\***

Avoid using a bootable USB thumb-drive as software installation source (in place of a CD), and writing to another USB thumb-drive that is intended to be the OMV boot drive. On some hardware platforms the use of two thumb-drives, during the install, can create a drive device name/order issue with the Grub boot loader. Using a CD as the installation source eliminates this potential issue.

## Installing

**\*\*If your PC platform won't boot onto a CD or USB drive installation media, it may be necessary to change the boot order in BIOS, to set the CD/DVD or USB drive to the top of the boot order. This link can provide assistance on this topic. → [How To Enter BIOS](#)**

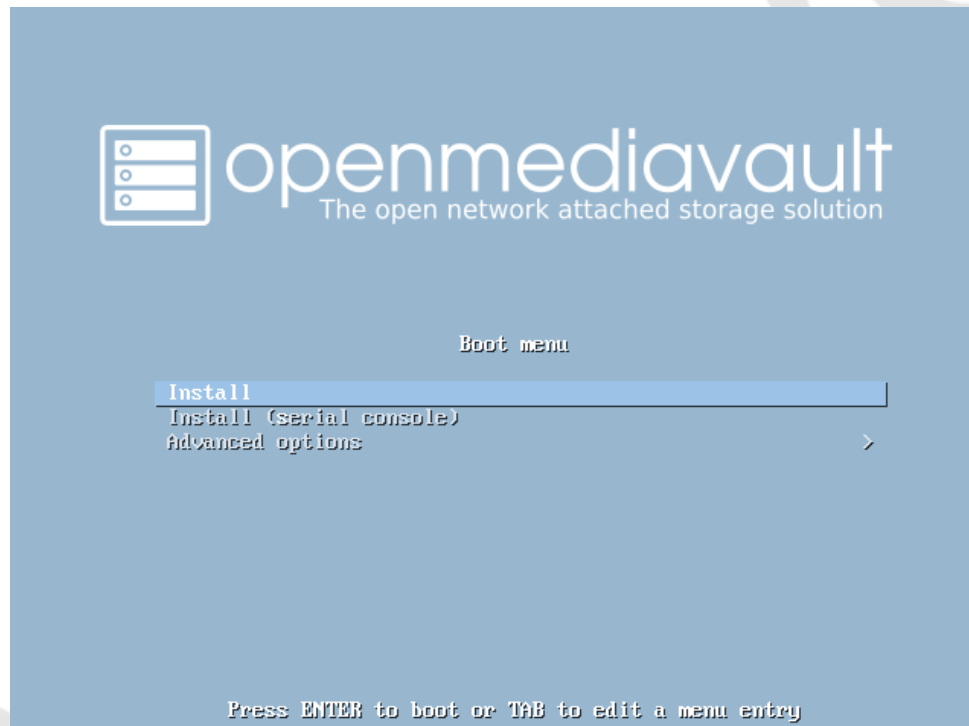
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For users who prefer videos to a text guide:

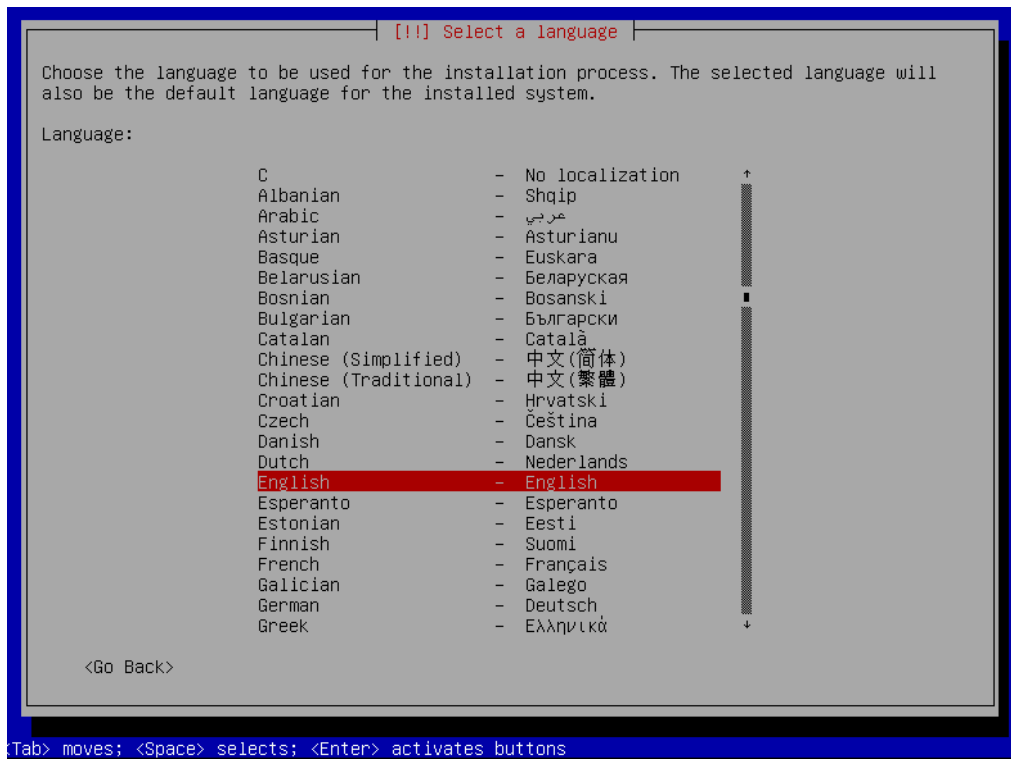
The following is a link to a video of the installation process.

[Video of OMV install](#)

### Boot Menu: Select Install



## Select a Language: (As needed)





## Select your Location: (As appropriate.)

[[!]] Select your location

The selected location will be used to set your time zone and also for example to help select the system locale. Normally this should be the country where you live.

This is a shortlist of locations based on the language you selected. Choose "other" if your location is not listed.

Country, territory or area:

Antigua and Barbuda  
Australia  
Botswana  
Canada  
Hong Kong  
India  
Ireland  
New Zealand  
Nigeria  
Philippines  
Singapore  
South Africa  
United Kingdom  
**United States**  
Zambia  
Zimbabwe  
other

<Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons

## Configure the Keyboard: (Select as appropriate)

[[!]] Configure the keyboard

Keymap to use:

**American English**  
Albanian  
Arabic  
Asturian  
Bangladesh  
Belarusian  
Bengali  
Belgian  
Bosnian  
Brazilian  
British English  
Bulgarian  
Bulgarian (phonetic layout)  
Burmese  
Canadian French  
Canadian Multilingual  
Catalan  
Chinese  
Croatian  
Czech  
Danish  
Dutch  
Dvorak  
Dzongkha  
Esperanto  
Estonian

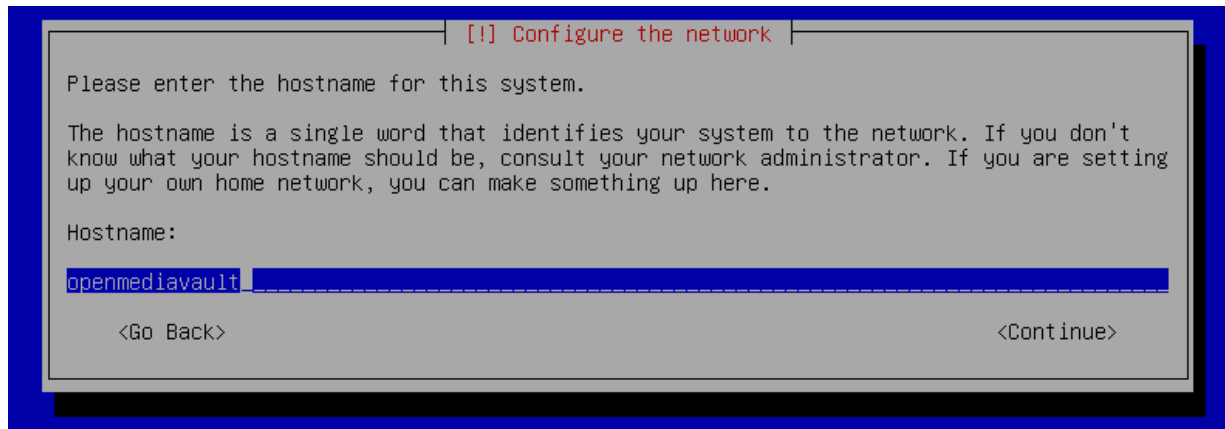
↑  
↓

<Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons

17

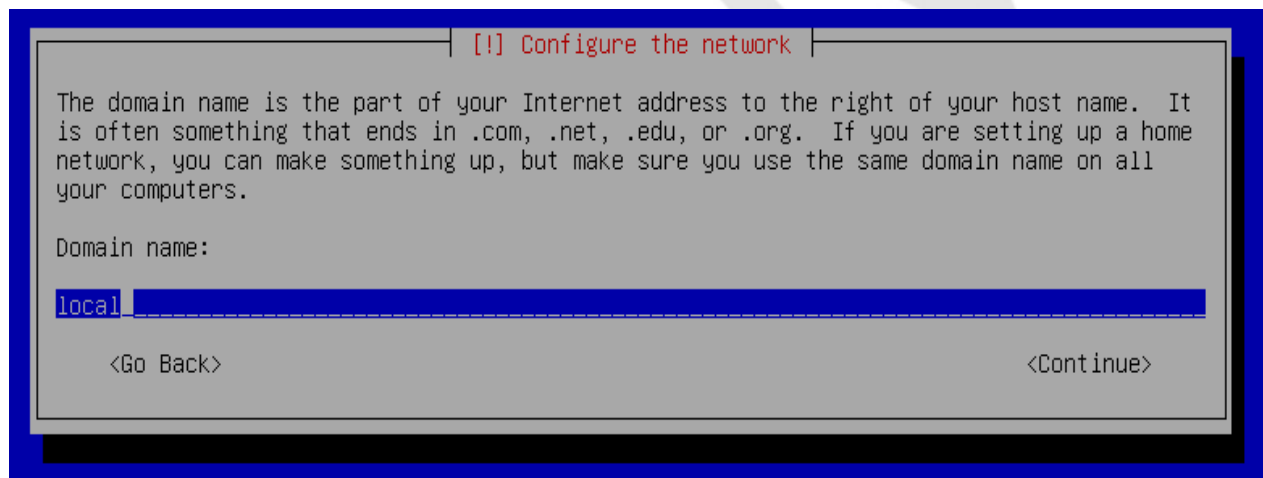
**Configure the Network:** While the default hostname is fine, a server name that is a bit shorter might be easier later on. (Something like **OMV1**).



The screenshot shows a window titled "[!] Configure the network". Inside, it says "Please enter the hostname for this system." followed by an explanatory paragraph: "The hostname is a single word that identifies your system to the network. If you don't know what your hostname should be, consult your network administrator. If you are setting up your own home network, you can make something up here." Below this, the label "Hostname:" is followed by a text input field containing "openmediavault". At the bottom, there are two buttons: "<Go Back>" on the left and "<Continue>" on the right.

**Configure the Network:**

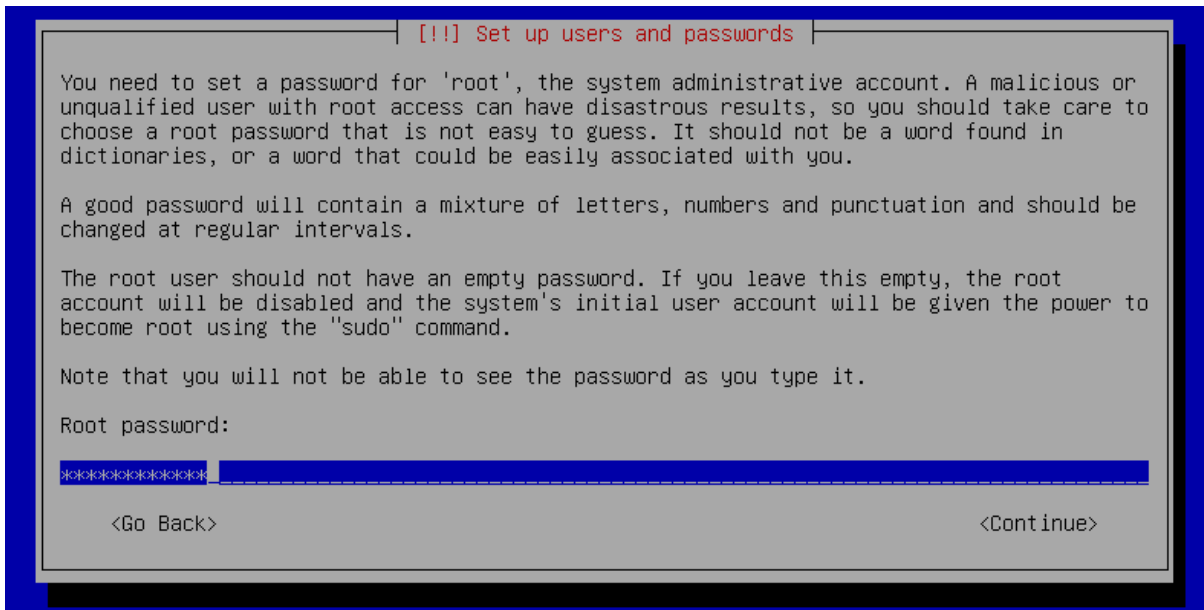
If applicable, enter your domain name suffix. Otherwise, for home users and businesses with peer to peer networks, the default entry is fine.



The screenshot shows a window titled "[!] Configure the network". Inside, it says "The domain name is the part of your Internet address to the right of your host name. It is often something that ends in .com, .net, .edu, or .org. If you are setting up a home network, you can make something up, but make sure you use the same domain name on all your computers." Below this, the label "Domain name:" is followed by a text input field containing "local". At the bottom, there are two buttons: "<Go Back>" on the left and "<Continue>" on the right.

**Set up users and passwords:** Follow the guidance.

While not recommended, it would be better to write down the root password, then to forget it.



Set up users and passwords

You need to set a password for 'root', the system administrative account. A malicious or unqualified user with root access can have disastrous results, so you should take care to choose a root password that is not easy to guess. It should not be a word found in dictionaries, or a word that could be easily associated with you.

A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.

The root user should not have an empty password. If you leave this empty, the root account will be disabled and the system's initial user account will be given the power to become root using the "sudo" command.

Note that you will not be able to see the password as you type it.

Root password:

\*\*\*\*\*

<Go Back> <Continue>

---

**Configure the Clock:** Select your time zone.  
(NO PIC)

---

**Partition Disks 1:**

If two media devices are available for installation, this screen is displayed.



Partition disks

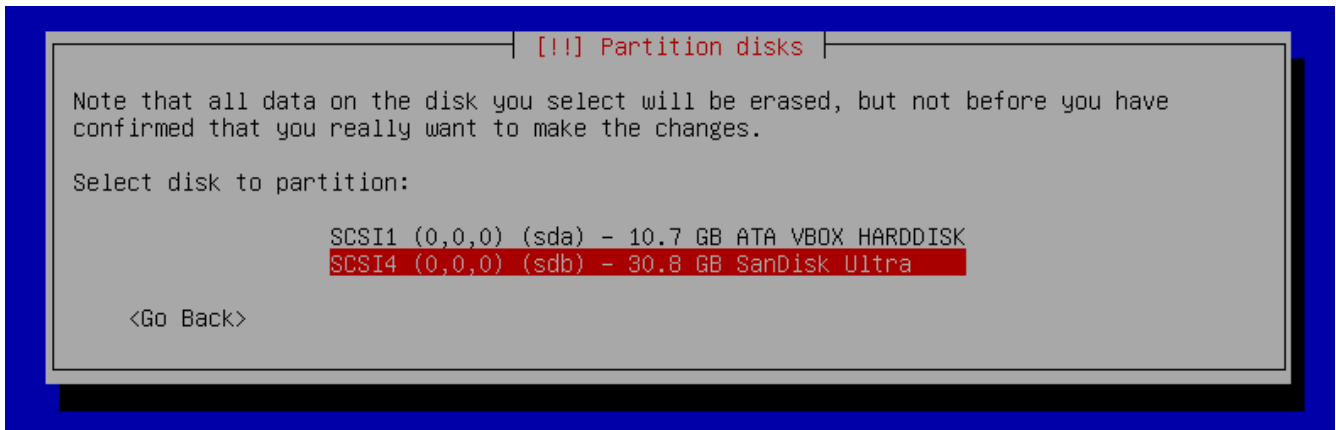
More than one storage device has been detected

Please ensure you select the correct device for the operating system in the following list to prevent data loss. If you can't identify the correct storage device, then shutdown the system and unplug all storage devices except the one you want to use for the operating system.

<Continue>

## Partition Disks 2:

If installing to a single internal drive, there will be only one selection available. In this instance, the installation is placed on a USB thumb-drive



**\*\*If installing to a USB drive, at this point, it is possible to an error may pop-up regarding partitioning the drive, and recommend a reboot. Follow the recommendation. After the reboot, the 2<sup>nd</sup> partition operation will succeed.\*\***

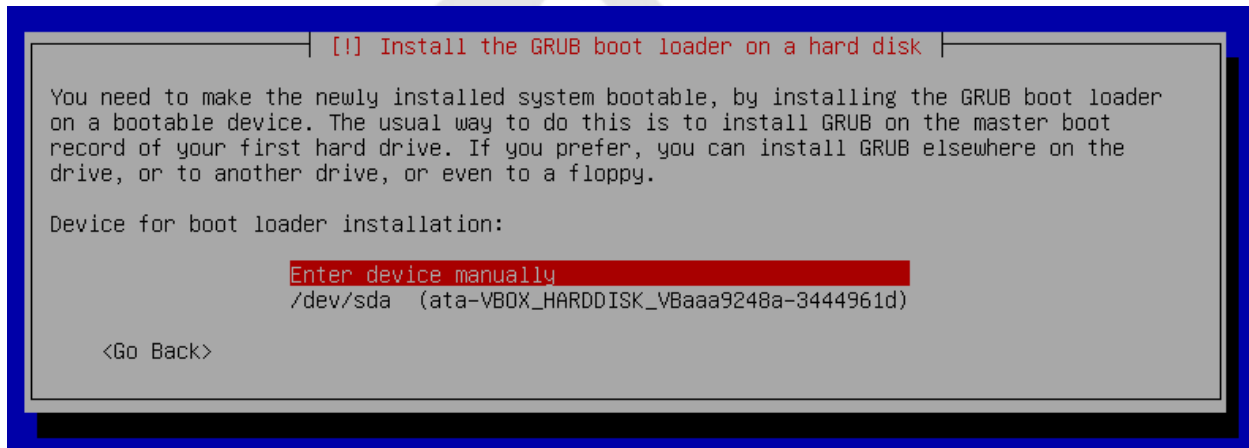
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**\*\* If installing to a hard drive, the following screen will appear. \*\***

### Install the GRUB Boot Loader on a Hard Disk:

Select the appropriate disk in your server.

(Generally the boot drive will be **/dev/sda** which is, in most cases, the first sata port.)



The system installs.....

---

### Configure the Package Manager:

Debian Archive Mirror Country

(NO PIC)

While the advice given in this screen is true, without testing, there's no way to know which Debian archive mirror is best. Without testing, picking your country or the closest location would be the logical choice.

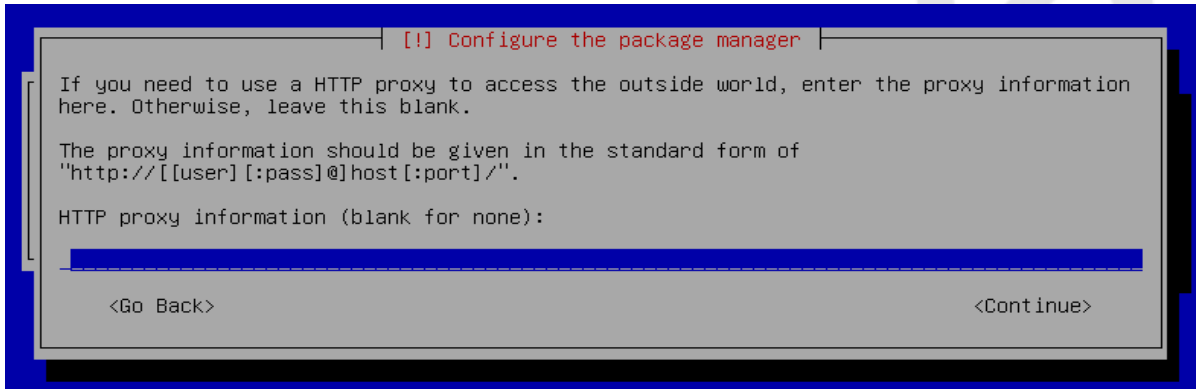
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---

**Configure the Package Manager:**  
Debian Archive Mirror  
(NO PIC)  
The default choice is usually best.

---

**Configure the Package Manager: HTTP proxy**  
In most cases this entry will be blank.  
(If a proxy is required, note the form of entry required in the dialog box.)

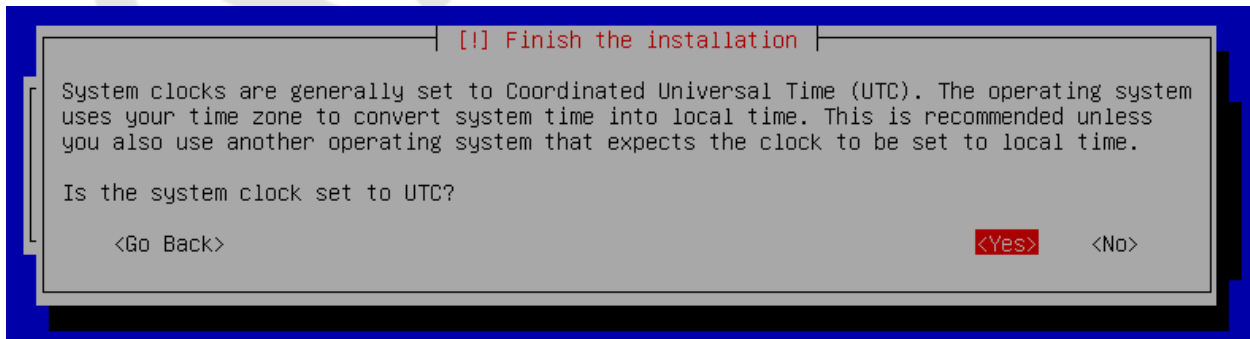


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**Debian Archive Mirror**  
(NO PIC)  
The default choice is usually best.

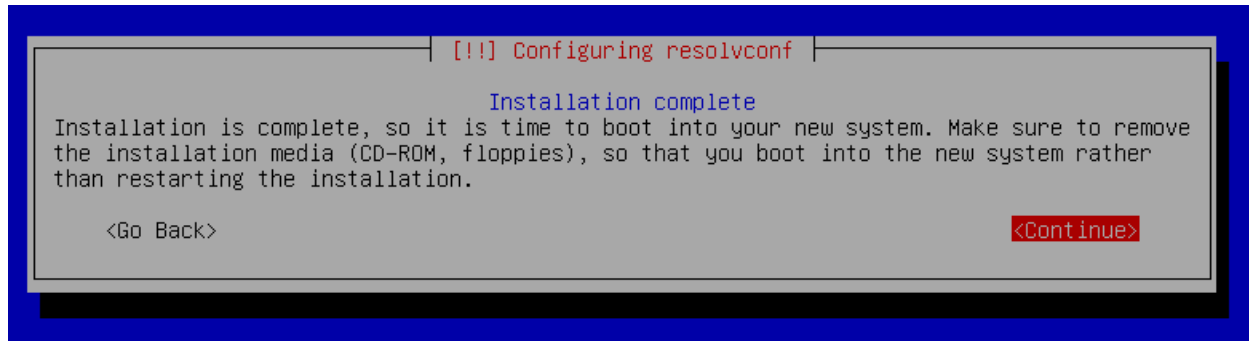
---

**Finish the Installation:**  
Accept the default.



### Installation Complete:

**Remove the CD or USB installation source, then hit ENTER.**  
(Otherwise, the installation process will re-start.)



## First Boot

Allow the installation to boot. Normally, DHCP will assign an IP address to OMV and the address will be printed to the screen. However, on odd occasions the following issue may be observed.

```
openmediavault 3.0.94 (Erasmus) openmediavault tty1
Copyright (C) 2009-2017 by Volker Theile. All rights reserved.

To manage the system visit the openmediavault web control panel:
No network interface(s) available

By default the web control panel administrator account has the
username 'admin' and password 'openmediavault'.
It is recommended that you change the password for this account
within the web control panel or using the 'omv-firstaid' CLI
command.

For more information regarding this appliance, please visit the
web site: http://www.openmediavault.org

openmediavault login: _
```

This is due to a slow response from your DHCP server, during a fast boot process. An easy method of finding the IP address is:

At the login prompt type **root**

When prompted enter your root **password**.

At the # prompt type **ip addr**

```
root@OMV-Server:~# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def
t qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
oup default qlen 1000
    link/ether 6c:0b:84:de:b4:59 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.55/24 brd 192.168.1.255 scope global eno1
        valid_lft forever preferred_lft forever
```

To access the WEB control panel, the IP address for the Ethernet interface is needed. In this case it's **192.168.1.55** (/24, the subnet mask, can be ignored.)

**\*\*Note:** In OMV4, the Ethernet interface name may have a variety of designations such as **eno1**, **enp1s0f0**, etc. In OMV3, and versions prior, the default Ethernet interface was **eth0**.

With a known IP address, proceed to [OMV - Initial Configuration](#).

## ARM Platforms Download / Installation

Unlike traditional PC installers that run scripts to “sense” a broad variety of hardware, and adjust the installation to work on a variety of platforms, ARM devices have fixed hardware. Since the hardware platform is known, creating “preinstalled” OMV images is possible.

OMV ARM images, on first boot, are designed to check the size of media they're installed on and expand partitions to make use of extra space. As part of the automated software update processes, a wired network connection is required to complete the installation.

[Download](#) the appropriate image for your ARM device and the associated checksum.

(Note that the checksum for the image you require may be in a **readme.txt** file with checksums for several other image files.) Along with the value for your image, found in the **readme.txt** file, users will need a [MD5 & SHA checksum utility](#) to check your image before flashing it onto an SD-card.

### **\*\*BEGINNERS NOTE\*\***

**DO NOT SKIP THIS STEP:** The chance of image corruption is high when downloading and it's pointless to build a server with flawed software. Even the slightest corruption of the installation image can ruin your installation and it may not be noticed until well after your server is built and in use. Headaches can be avoided by checking the image.

---

The following installation process applies to most ARM installations, with the exception of some **Banana Pi**'s where post-installation commands may be required.

Read the **readme.txt** file *carefully* for preinstallation notes and instructions. The **readme.txt** file for your device can found in the download directory with the image file for your SBC.



## Utilities for Installation

To prepare for and install an ARM image, a few utilities are needed:

[SDFormatter](#) (get the latest version), [h2testw1.4](#), [Etcher](#), and [PuTTY](#). Download and install these utilities on the PC that the user will be using to manage OMV.

**\*\*Note:** While SDFormatter and PuTTY install like many Windows programs, Etcher and h2testw 1.4 are stand-alone programs and do not install. Simply unzip them, place them on your desktop and double click the executable.\*\*

### SD-Cards:

SD-cards are typically used in non-critical data storage applications such as digital cameras and video recorders. Since errors are unlikely to be noticed in these applications, low-end manufacturers cut corners in production leading to media that may have errors in it, even when new. Along similar lines, recently, there have been problems with fake SD-cards sold with labels claiming higher than actual capacity.

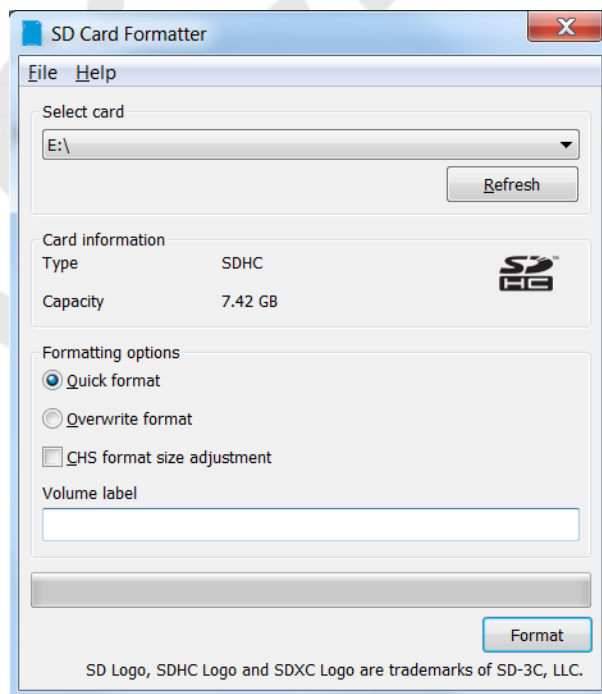
For these reasons and more, it is recommended that **all** SD-cards, new or used, be formatted with **SDFormatter** and tested with **h2testw1.4** before flashing an image onto them.

## Format and Test Flash Media

Using SDFormatter, do a clean format:

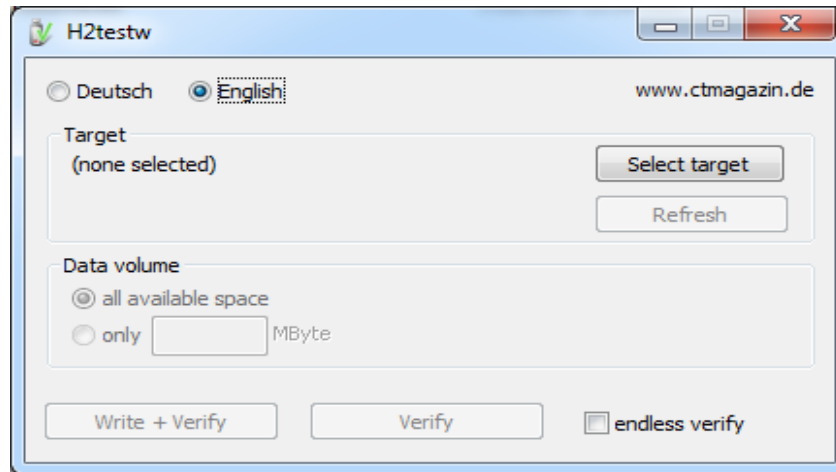
(While SDformatter was designed for SD-cards, it can format USB drives for error testing. For those who want a USB thumb-drive formatter; [HPUSBDISK.EXE](#) )

In most cases, SDFormatter will detect the SD-card or thumb-drive. A volume label is optional and the default options are fine.

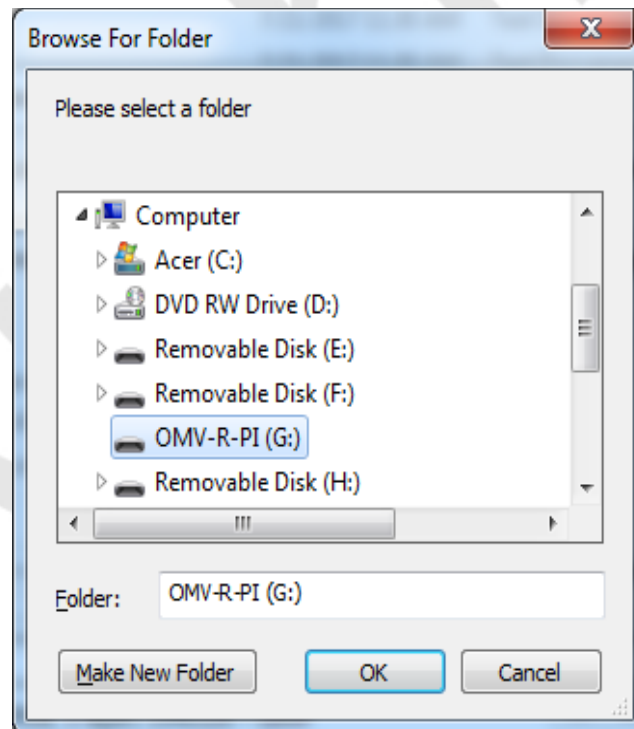


After the drive format is completed, open **h2testw** and select your language.

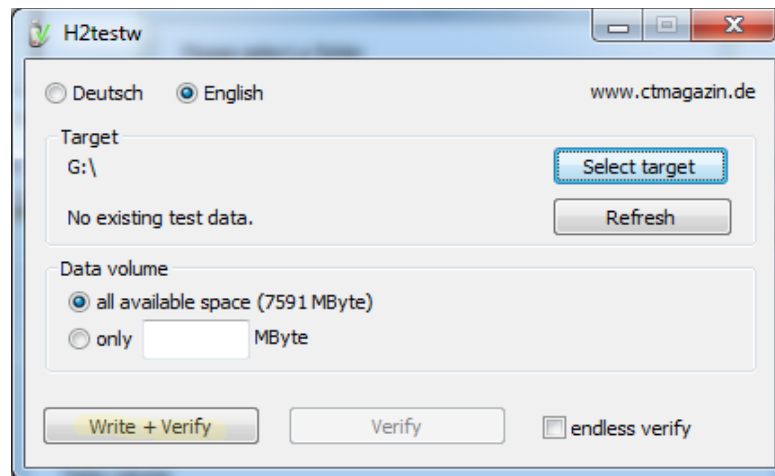
Then, click on **Select target**



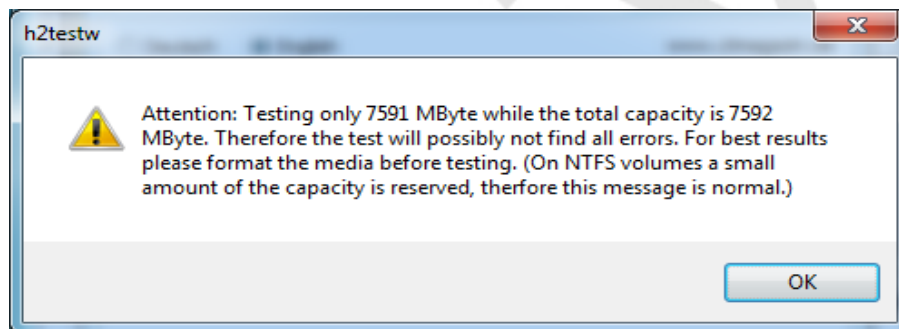
Under **Computer**, select the flash media previously formatted.



Select **Write+Verify**. (**DO NOT** check endless verify)

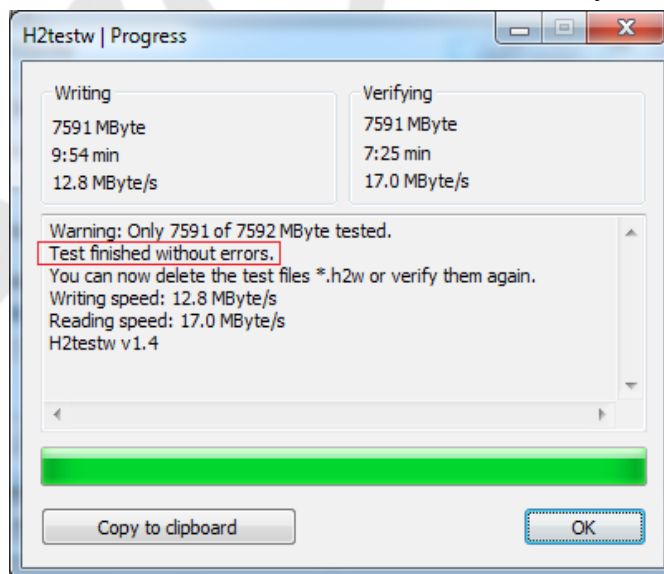


This dialog may pop up. Ignore it and click on **OK**.



**“Without errors”** is the desired outcome.

(If media tests with errors or is much smaller than is indicated by its labeled size, don't use it.)



After H2testw verifies the SD-card:

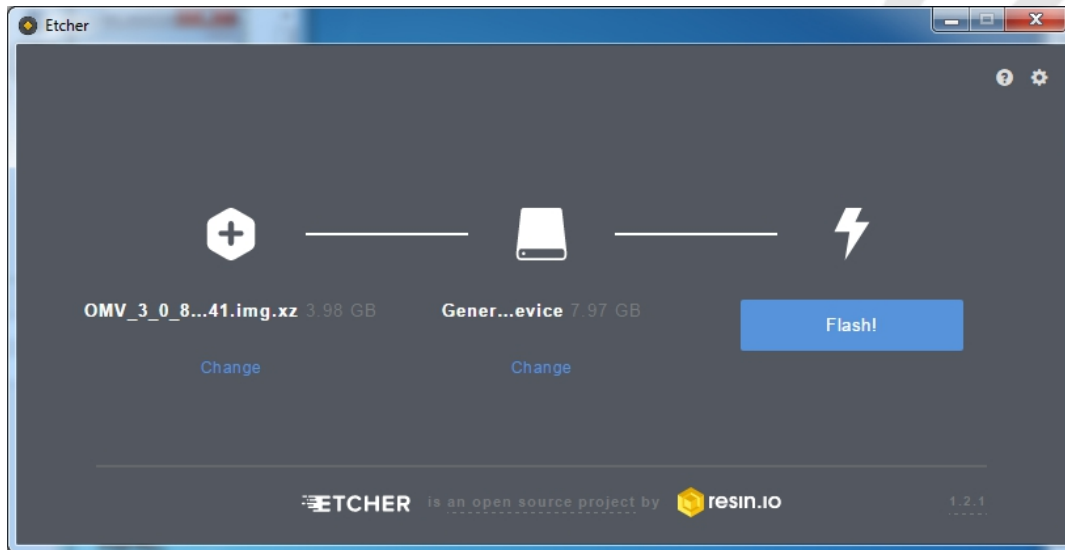
Do one more clean format, using SDFormatter, before flashing the card.

## ***Flashing OMV onto an SD-card***

### **Start Etcher:**

Etcher, in most cases will detect the SD card or a USB thumb-drive. Click on “**Select Image**” and navigate to the downloaded ARM image. Then click on **Flash!**

- A windows confirmation dialog may pop up. Click on **OK.**)
- Etcher will decompress and write the image, then verify it in one operation.



A “**Success**” flag will pop up when the job is finished and the Etcher window will display “Flash Another?”.

The flash operation is complete.








## SBC's: The First Boot

There are two potential paths for an ARM installation.

1. Insert the SD-card in the **SBC**, apply power, and **leave for an hour**.  
Since SD-cards can be a slow media type, and in consideration of the various internet connection speeds and package download times, the process may take a while.  
(Again, walk away and allow an hour for the process to complete.)
2. Attach a monitor, keyboard and mouse.  
**\*\*As previously noted, to install OMV on an ARM device, a wired Ethernet connection to the internet is required.\*\***

After one automatic reboot, the drive activity LED stops blinking and the device is ready.  
(Note that some ARM devices may not have a drive activity LED.)

If option 1 is used, the IP address to use for logging into the console is available from your DHCP server. In most cases, your DHCP server will be running on your LAN's router.  
(The following is an example.)

DHCP Clients				
Hostname	IP Address	MAC Address	Client Lease Time	Delete
raspberrypi	192.168.1.66	B8:27:EB:74:7B:4F	0 days 00:02:00	
Acer-Win7H	192.168.1.83	F8:0F:41:40:41:88	0 days 00:02:00	
TheaterPC	192.168.1.64	C8:9C:DC:FB:8B:3E	Static	
omv-server	192.168.1.55	6C:0B:84:DE:B4:59	Static	
*	192.168.1.80	C8:3A:35:42:88:10	0 days 00:02:00	
HOMELINE	192.168.1.50	6C:33:A9:36:D7:67	Static	
BUSINESSLINE	192.168.1.85	6C:33:A9:33:98:A3	Static	

- In the event that an address is not issued for your ARM device, reboot it. (In some cases this will mean unplugging and plugging the power supply back in.) Allow time for boot up (5 minutes) and check the DHCP server again.
- If an address is not issued or if the user doesn't know how to find the ARM device's IP address on their DHCP server, connect a monitor and keyboard to watch the boot process until it completes. If the IP address is not displayed, see the section [First Boot](#).

If option 2 is used, the DHCP assigned IP address will be available (on screen) after boot up is complete. (If the message “No Network Interface(s) available “ is displayed, see the X86/X64 installation, [First Boot](#).)

With the IP address noted, proceed to [OMV - Initial Configuration](#).

## Alternate i386 – 32bit Installations

Installing OMV on 32bit hardware is a two-step process.

### ***To install OMV 4.X (Current release):***

It will be necessary to download and install i386 Debian 9 ([stretch](#)).

The “**net install**” i386 version is sufficient for the purpose.

See the Note below, before installing.

After the installation is complete, shell scripts for installing OMV can be found [here](#).

### ***To install OMV 3.X (Deprecated Legacy release):***

It will be necessary to download and install i386 Debian 8 ([jessie](#)).

The “**net install**” i386 version is sufficient for the purpose.

**\*\*Due to archiving at the Debian project, the provided link is to a bit-torrent.\*\***

See the Note below, before installing.

After the Debian installation is complete, shell scripts for installing OMV can be found [here](#).

**\*\* Notes:**

1. During the Debian installation process, users will be prompted by the installer for software additions, add a desktop, a print server, etc. It is recommended that all are deselected, and that the **SSH server** is selected. With SSH enabled, after the installation is complete, using [PuTTY](#) to apply OMV's installation scripts is much easier. (PuTTY supports “paste” with a right mouse click.)\*\*
2. Debian installations do not allow root logins, by default. It will be necessary to login to the command line with the username and password, set during the install. Then use the following command, to switch to the root account for the script install: **su - root**

## OMV - Initial Configuration

**\*\*While users of the standard installers (X64 , X86) set their root password during the installation; ARM users may need to make a configuration change in the GUI, to be able to login as the root user on the command line, and change the root password.\*\***

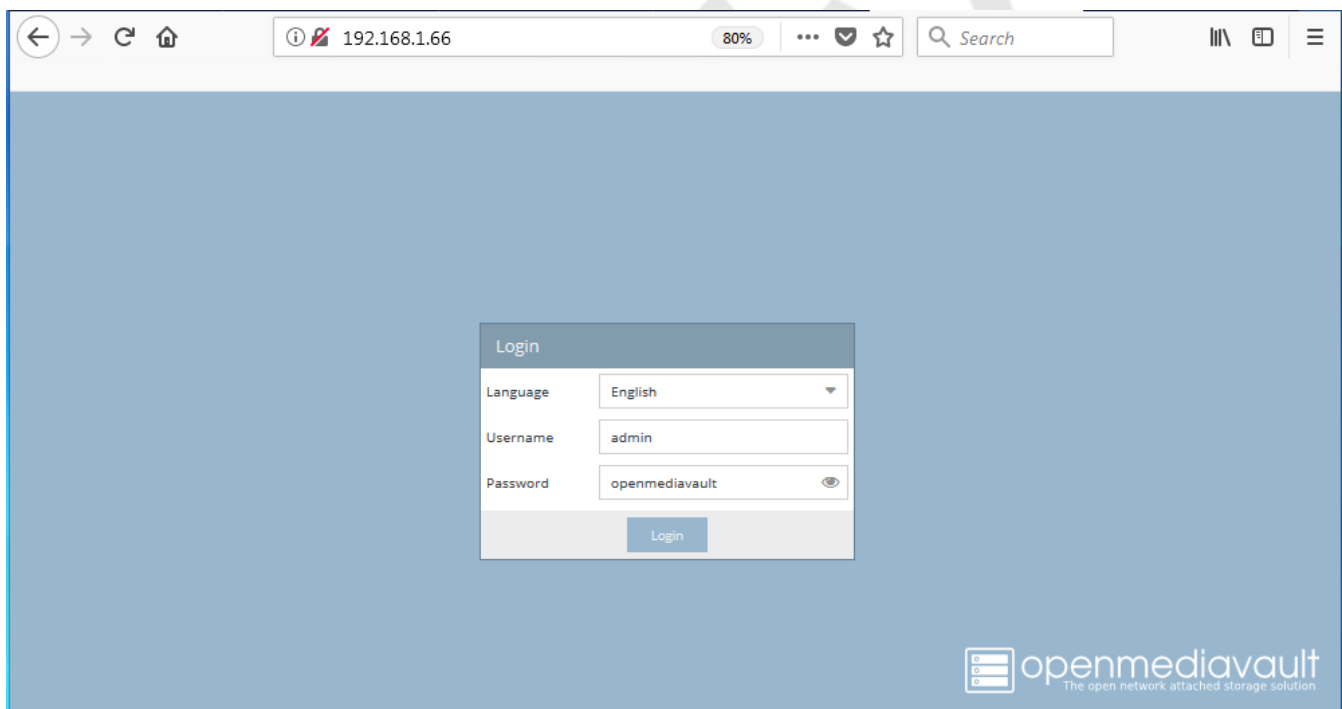
### ***Web console login:***

In a web browser, type in the IP address provided by the first boot screen:

Set the language of your choice.

The user name is **admin** and default password is **openmediavault**

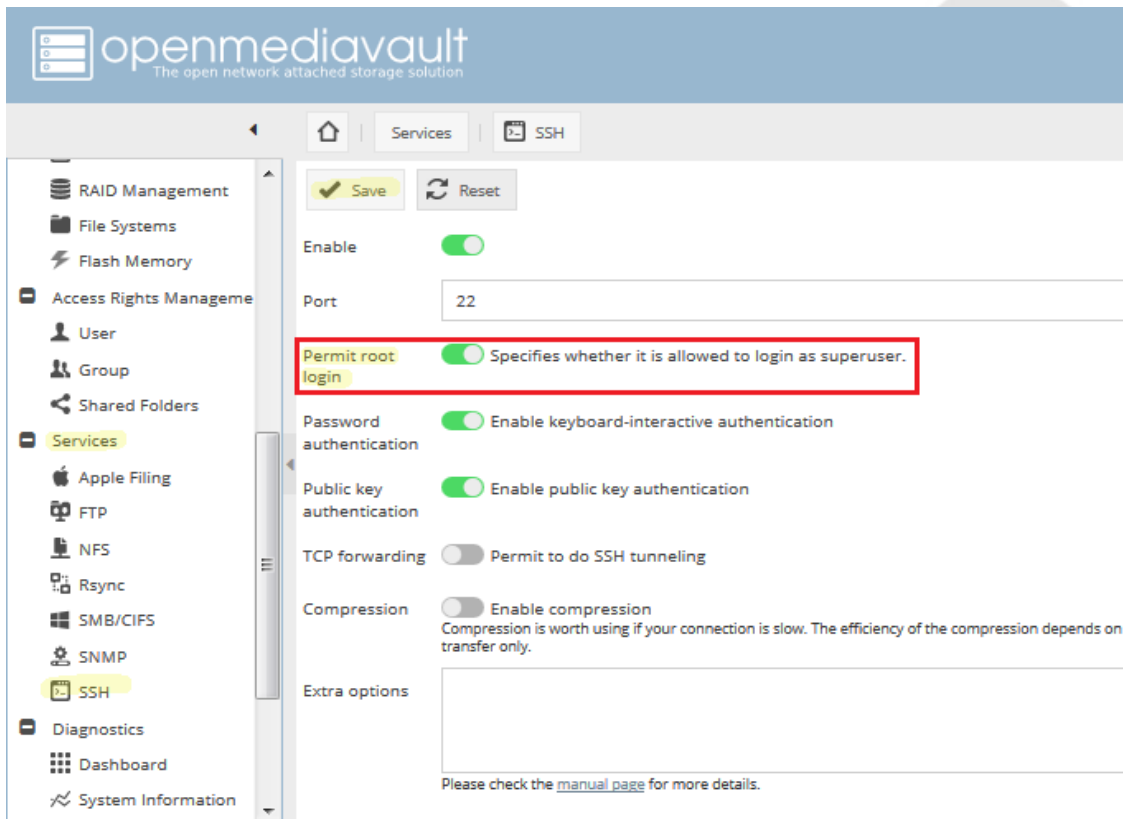
(In the following, by clicking on the **eye icon** , the default password is shown unmasked.)



## All Users:

Under Services, SSH, check that the toggle switch for “**Permit root login**” is ON (Green) and Save. After clicking on “**Save**” a yellow banner “**The configuration has been changed**” will appear. For the change to be applied, the **Apply** button must be clicked.

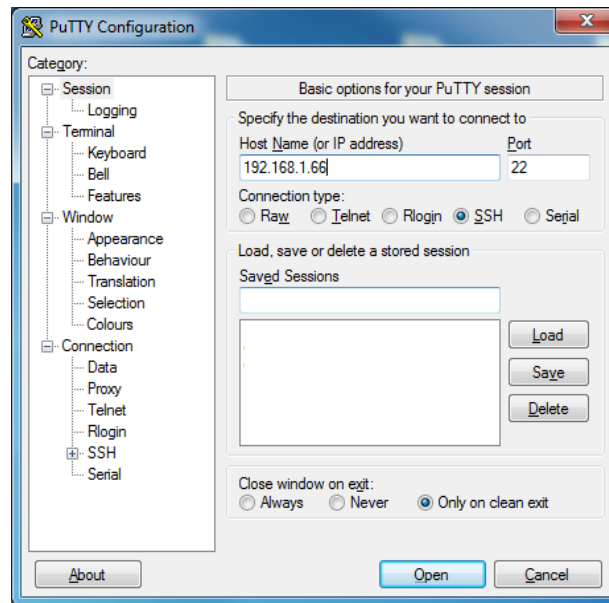
(Note: The yellow banner is a final “SANITY” check and, in most cases, is required to finalize changes.)





## ARM Users Only:

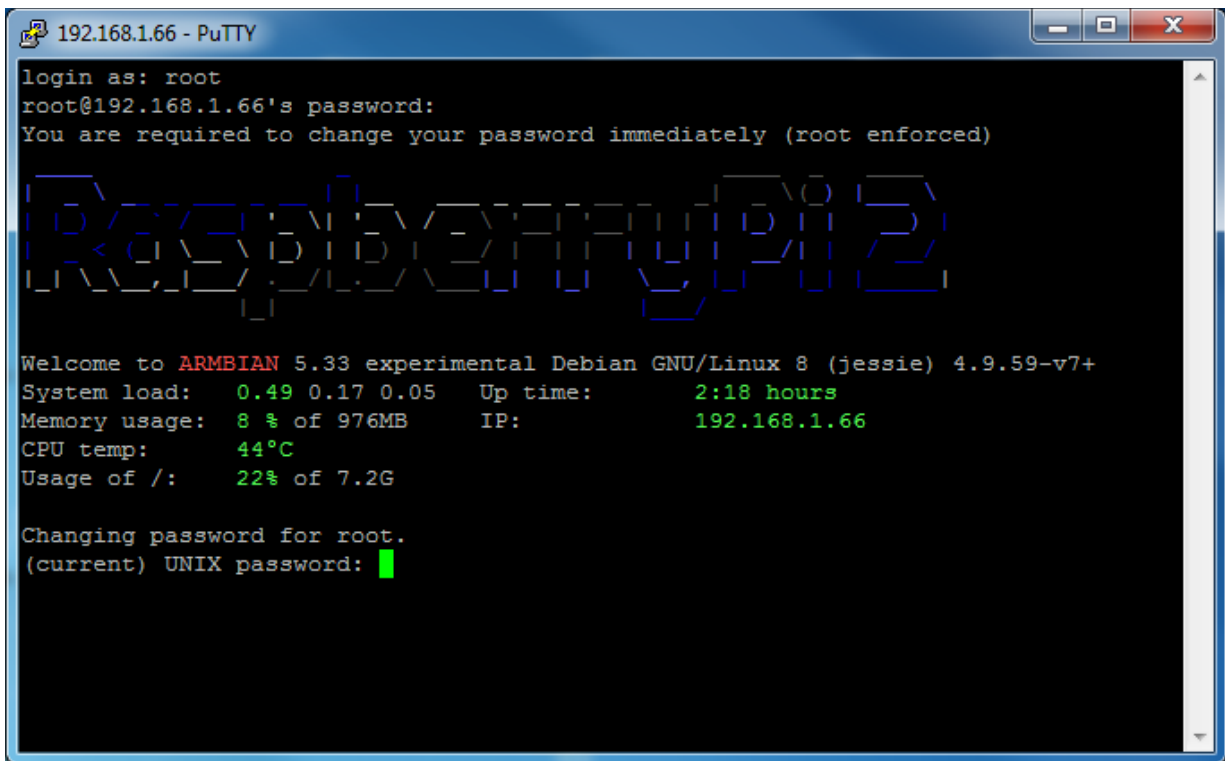
Open PuTTY and type in the OMV IP address



A PuTTY security alert will pop up on the first connection. Select **Yes**.

When the SSH window opens:

Login as: **root** The password is: **openmediavault**



```
192.168.1.66 - PuTTY
login as: root
root@192.168.1.66's password:
You are required to change your password immediately (root enforced)

Welcome to ARMBIAN 5.33 experimental Debian GNU/Linux 8 (jessie) 4.9.59-v7+
System load:  0.49 0.17 0.05  Up time:    2:18 hours
Memory usage: 8 % of 976MB    IP:        192.168.1.66
CPU temp:     44°C
Usage of /:   22% of 7.2G

Changing password for root.
(current) UNIX password: 
```

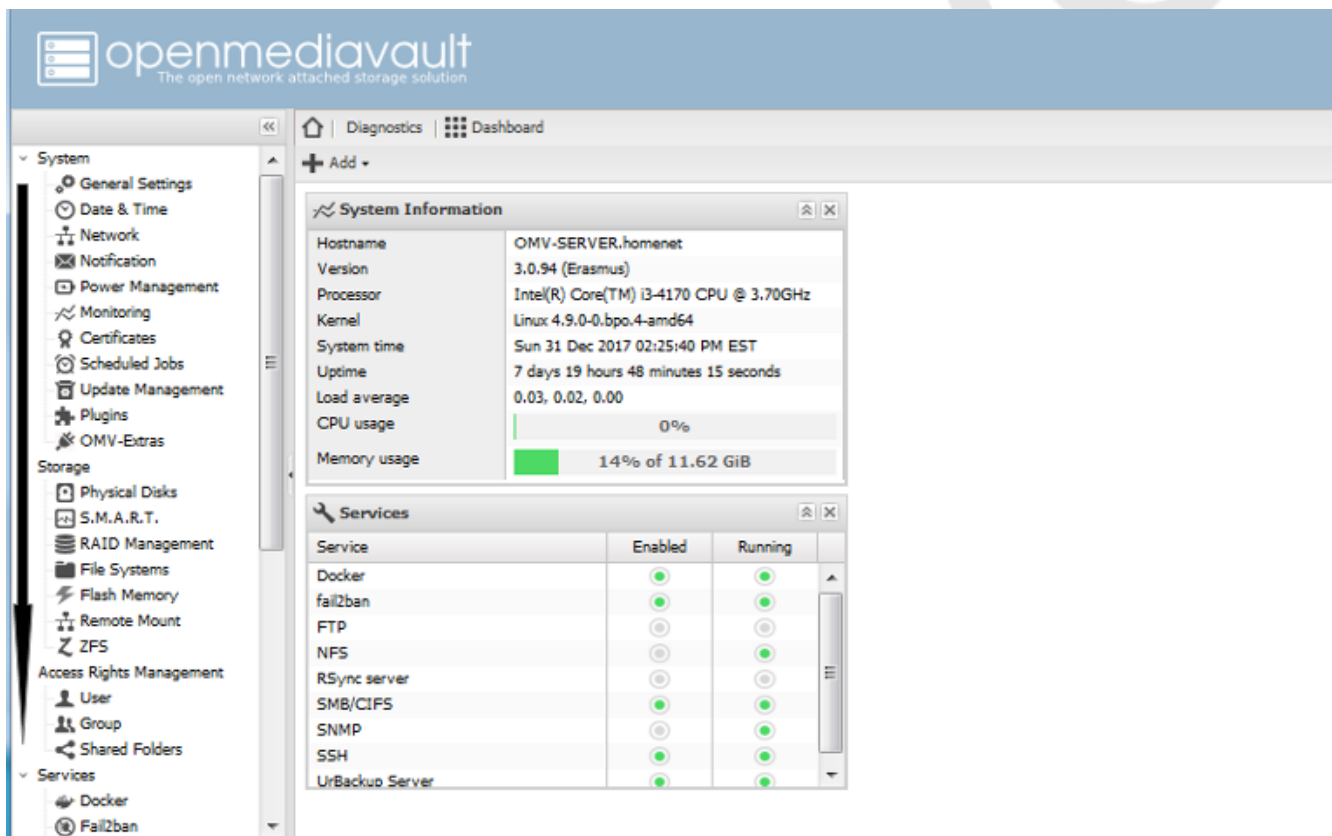
After logging in the first time you'll be required to change the root password. Re-enter the current password **openmediavault**, then follow the prompts to enter and confirm a new root password. (Remember this password.)

**\*\*Beginners Note\*\*:** This first time login password change is **required**. Without it, permission issues may result over time that would be logged as: **Authentication token no longer valid; new one required**.

---

## Quick Start Guide for Advanced Users:

- In the left hand column, start at the top with **General Settings**, and work your way down, choosing and activating the services and features you need for your use case.
- A static address for the OMV server and setting the address of a [public DNS server](#) is recommended.  
(As an example: Googles servers 8.8.8.8 and 8.8.4.4 support **DNSSEC** for better security, and “**Anycast**” which will direct DNS queries to a nearby server with low network latency. There are several choices for Public servers that support these features. [List of Public DNS Servers](#) .)
- For a browse-able network share, a minimum of one shared folder would need to be configured and that folder would need to be added to SMB/CIFS to be visible on the network.



## Basic OMV Configuration

This section will guide new users through the initial setup of OMV. It addresses how to add a plugin, enabling OMV-Extras, how to setup a shared folder and make it browse-able on the network with an SMB/CIF share.

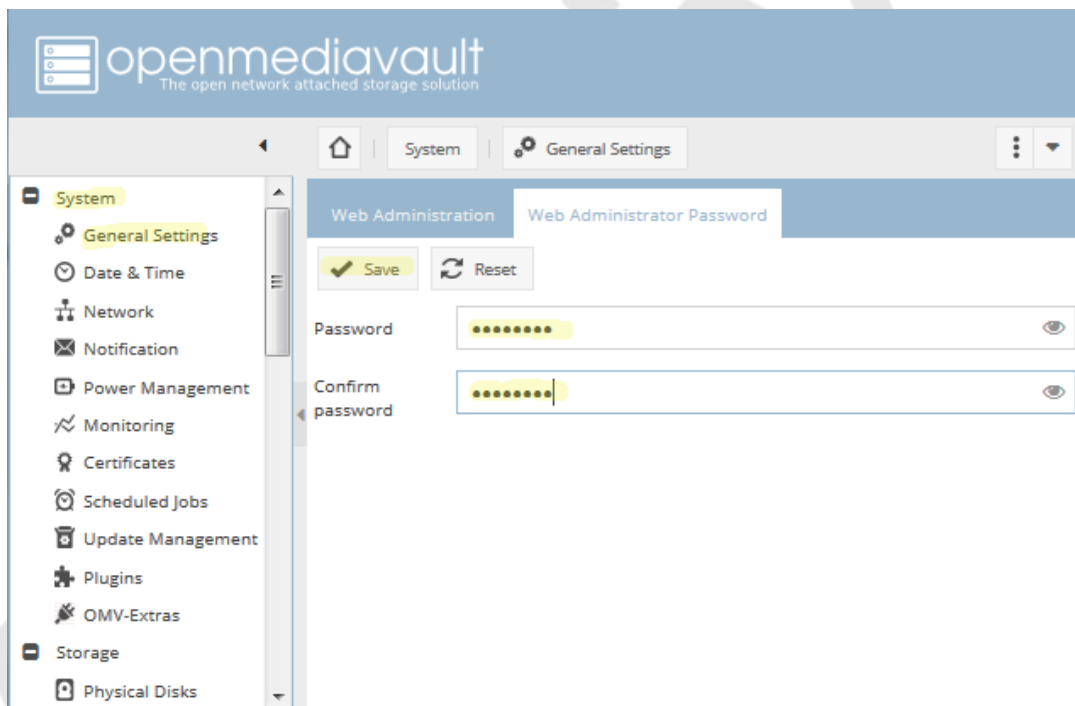
### System Settings

Under **System, General Settings**, in the **Web Administration** tab:

To allow a bit more time for configuration in the GUI, beginners should consider lengthening the automatic log out time. When the yellow banner appears, click **Apply**.

---

In the **Web Administrator Password** tab, enter a **strong password**, confirm it and **Save**. (This is one of a few instances where the yellow “confirmation” banner does not appear.) This setting changes the GUI login password. The user “**Admin**” will remain the same.



---

Under **System, Date & Time** (No Pic)

Select your **Time Zone** and “toggle ON” **Use NTP Server**. When OMV toggle switches are **ON** they're **green**, **OFF** is grey.

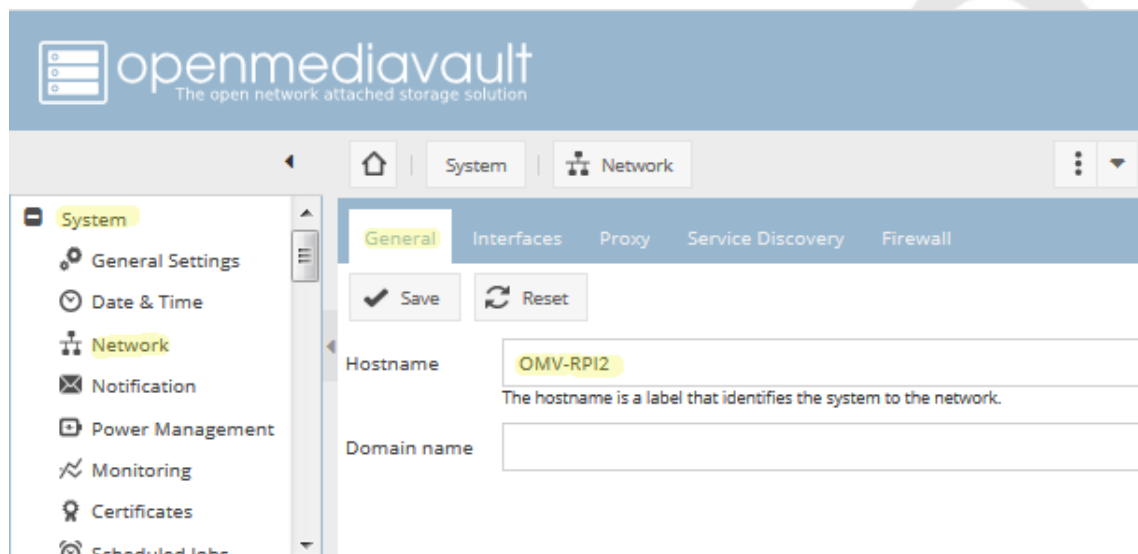
---

Under, **System, Network, General** tab.

**Hostname:** The hostname is the name that will appear on your network and on the command line.

**Domain name:**

- Very few users will use Full Qualified Domain Names. If needed, the Domain suffix is entered here.
- Most Windows users will have a workgroup. In the case of a peer-to-peer workgroup, leave this entry blank.

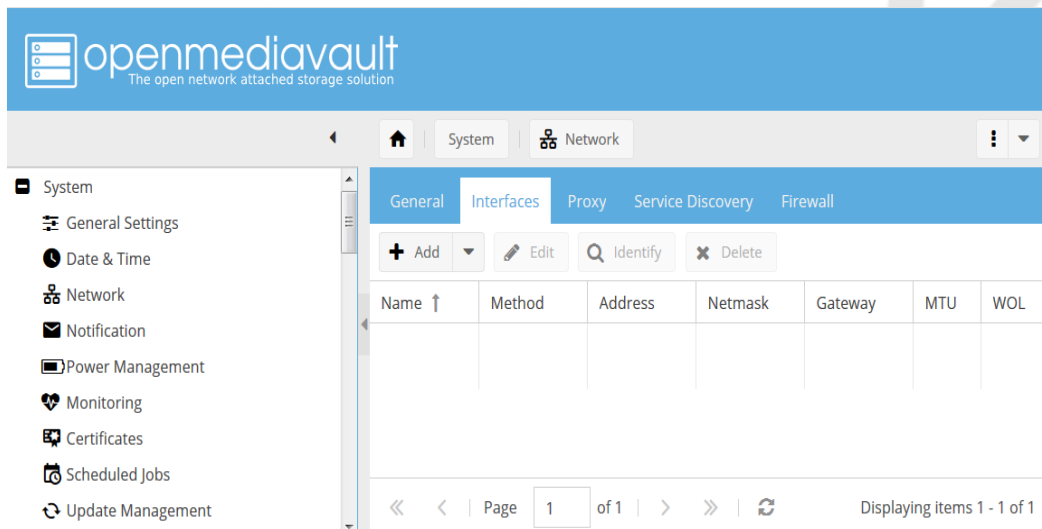


## Network Interfaces – OMV ver3 and 4 SBC Users Only

Beginning with OMV4, SBC images are configured to use Debian [NetworkManager](#) out of the box. Network Manager (NM) seeks to keep network interfaces up and running at all times, even if network faults are experienced.

However, it's important to note that NM does not handle interfaces found in `/etc/network/interfaces` which is why it's important not to configure an Ethernet interface. (If an interface is configured, in the GUI, NM is not longer in control.)

Navigate to **System**, **Network**, and select the **Interfaces** tab. SBC users will find the following screen, and it will be blank. This is normal – there's nothing wrong.



If an static IP address is needed:

Note that your SBC has been assigned an IP address by your LAN's DHCP server. (Typically, a router.) See your routers documentation for information on setting a “Static”, or “Reserved” DHCP lease.

## Network Interfaces – X86 Users

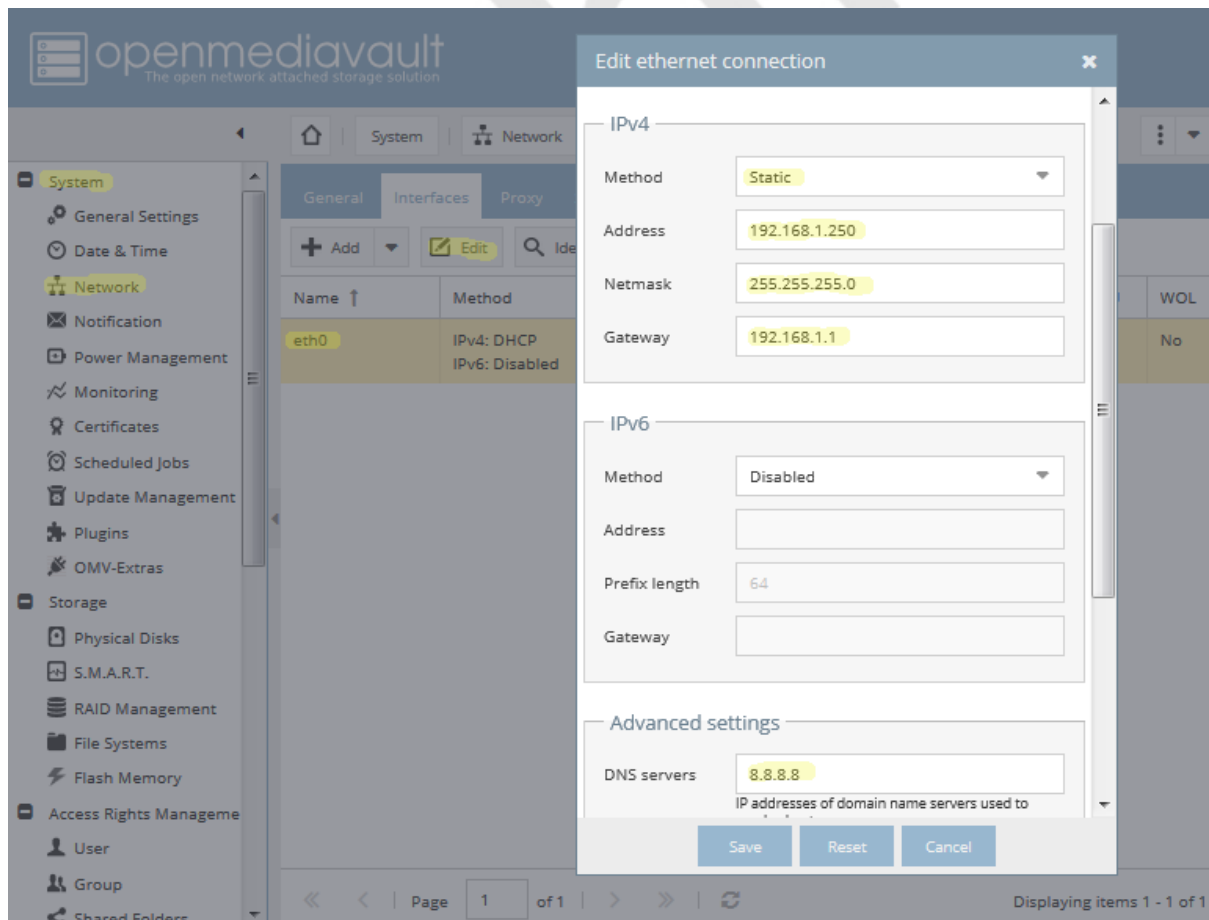
Under, **System, Network, Interfaces** tab:

Highlight / click on the **interface** found under the **Name** column, and click the **Edit** button.

(\*\*As of the release of **Debian 9/OMV4**, it's likely that the interface name will no longer be the traditional **eth0**. A variety of names may be found, such as **eno1** or others. Use the first interface line/name found.\*\*)

- It is recommended that users assign a **static IP address** to the new OMV server that is outside the range of their network's DHCP server.
- It is also recommended that users set a public DNS address.  
A list of public DNS servers is available [here](#). Use a server that supports **DNSSEC**, for better security, and **Anycast**, for low latency end point servers that are closer to user locations.
- The Netmask will be as shown, in most cases, and the Gateway address will be the address of the users router.

**\*\*Note\*\*** When saving a new static IP address, the user will be “**going out on a limb and cutting it off**”. Since the address provided by the network DHCP server is different from the static IP address chosen by the user, when the new address is changed, saved and applied, the GUI web page will stop responding. This is normal and expected. Type the new address, entered in the dialog box, into the URL line of your Web browser to reconnect.



(Optional)

### Under **System, Notification, Settings:**

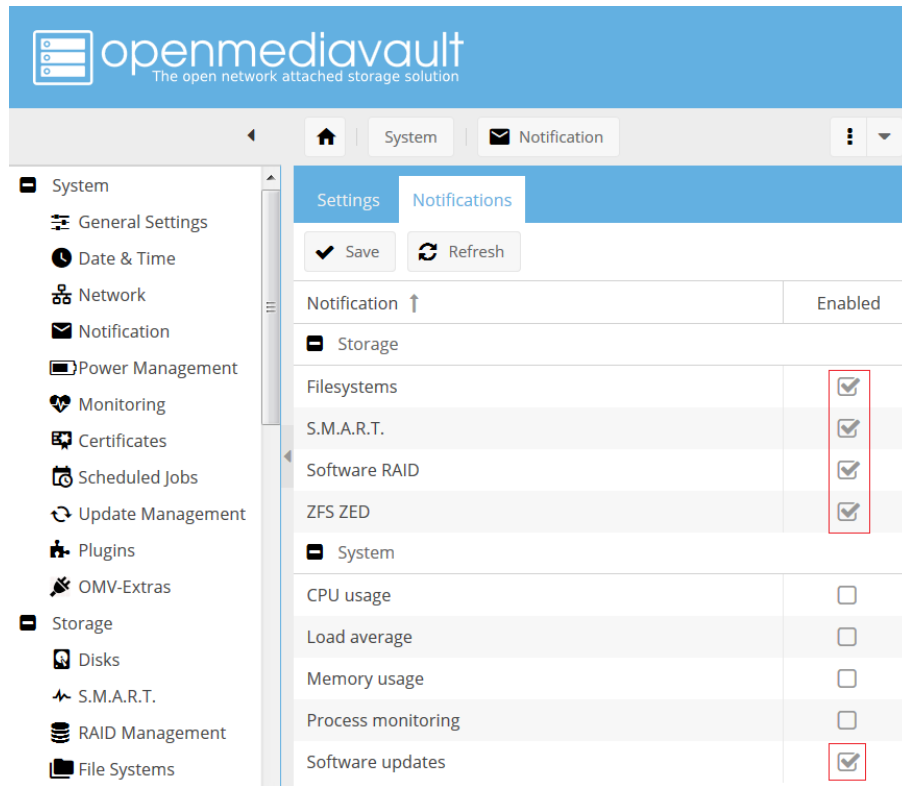
If enabled, E-mail entries in the **Settings** Tab are required if users want to take advantage of automated server notifications and reports. Other actions and scripts, in **Scheduled Jobs** for example, can use this information to E-mail a report of task execution or status, as users may deem necessary.

To gather the required information for entry in the **Settings** Tab, users should refer to the settings for their E-mail clients. Note that most ISP's are using **SSL/TLS** secured E-mail connections.

The screenshot displays the OpenMediaVault web interface. The top header shows the 'openmediavault' logo and the tagline 'The open network attached storage solution'. Below the header, there are tabs for 'System' and 'Notification'. The 'Notification' tab is active, showing the 'Settings' sub-tab. The interface includes a left sidebar with a navigation menu. The main content area is divided into sections: 'General settings' with an 'Enable' toggle switch; 'SMTP settings' with fields for 'SMTP server' (smtp.googlemail.com), 'SMTP port' (587), 'Use SSL/TLS secure connection' (toggle), 'Sender email' (omvuser@gmail.com), 'Authentication required' (toggle), 'Username' (omvuser), and 'Password' (masked); and 'Recipient' settings with fields for 'Primary email' (omvuser@gmail.com) and 'Secondary email'. A large grey arrow points from the bottom left towards the SMTP settings section.



The **Notifications** tab allows the selection of various functions for error reporting. If using a minimalist platform, such as older hardware or SBC's, E-mail's regarding system resources, memory, etc., may become bothersome. Unchecking **Enabled** boxes under **System** would eliminate excess E-mails, while maintaining **Storage** reports on hard drive health and file system errors.



### **\*\* Beginners Note\*\***

Using Storage Notifications is highly recommended. If SMART is **enabled**, under **Storage**, **SMART** and short tests are enabled on spinning drives in the **Scheduled tests** tab, the system may notify the user of hard drive errors *before* a hard drive fails completely.

(Optional)

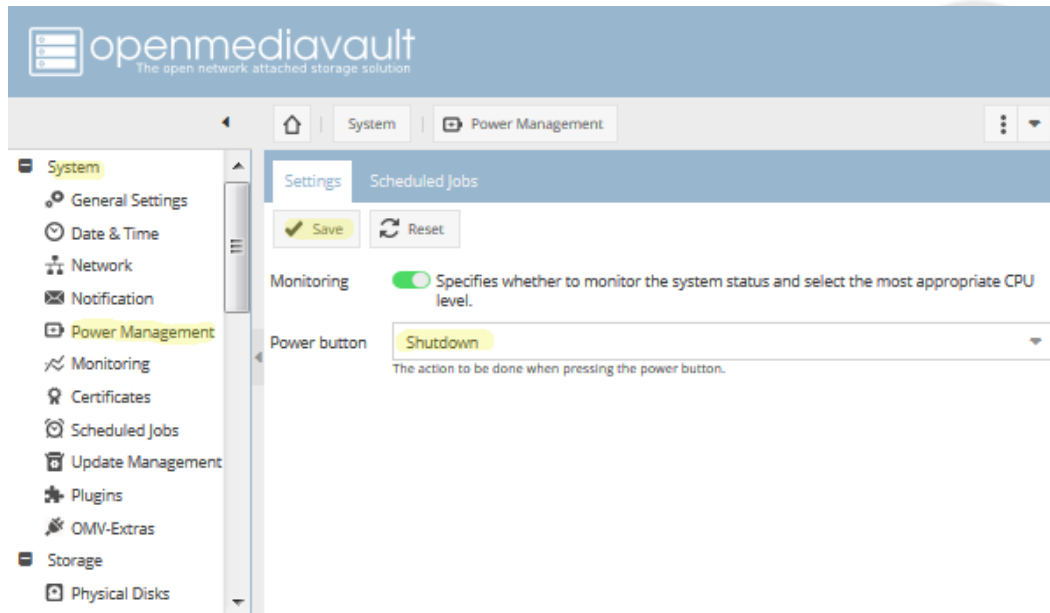
### Under **System, Power Management**

- In the **Settings** Tab, toggle **monitoring on** (recommended)

In the **Power button** drop down, x64 and i386 users should select the action preferred.

Since power buttons are not available on some ARM installations, ARM users may chose to select “Nothing”.

- The **Scheduled Jobs** tab allows for the automation of a various power related tasks.

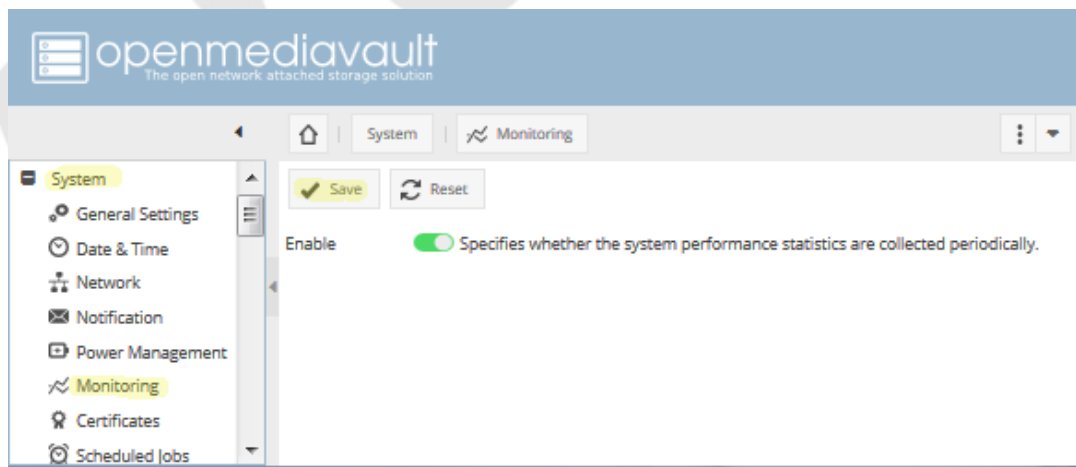


(Optional)

### Under **System, Monitoring**:

The initial recommended setting is **Enabled**.

(Information gathered may be of use in diagnosing potential problems.)

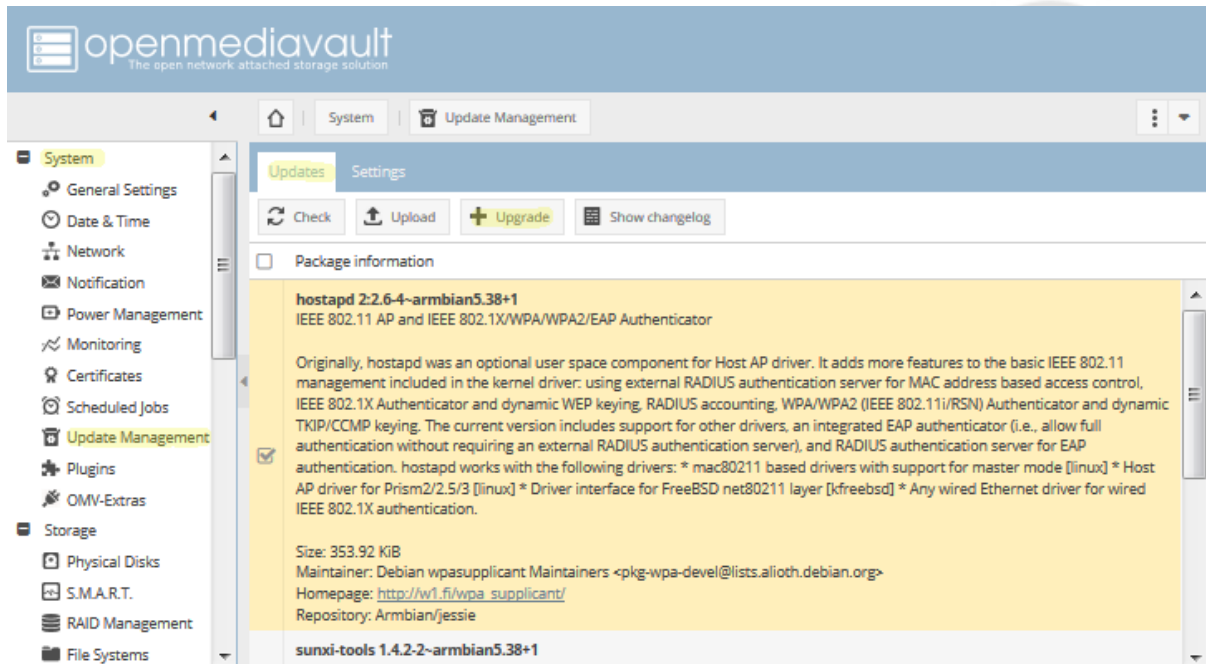


## Under System, Update Management:

Click on the **Check** button, to refresh available updates for your platform.  
(This may take a few minutes)

Users should update basic packages, selecting a group of 4 to 6 entries with check marks, clicking on **Upgrade**, and continuing until the installation is up-to-date. \*\*X64 and I386 users may be offered a list of “firmware updates”. Select only firmware updates that apply to your specific hardware.\*\*

Beginners should leave the 2<sup>nd</sup> Tab, **Settings**, with default settings.



## OMV-Extras

X64 and X86 users will have a basic set of plugin's appropriate for a basic NAS / File Server. While optional, to enable the full range of plugin's available on OMV, the installation of OMV-Extras is a prerequisite. For a preview of what is available visit <http://omv-extras.org> and select the version of OMV that's being installed.

For X64 and I386 users who installed OMV on SD-cards or USB thumb-drives, installing OMV-Extras is **required** to install the **flash-memory plugin**.

## Installing OMV-Extras

((The following does not apply to ARM installations. On ARM platforms, OMV-Extras is pre-installed.))

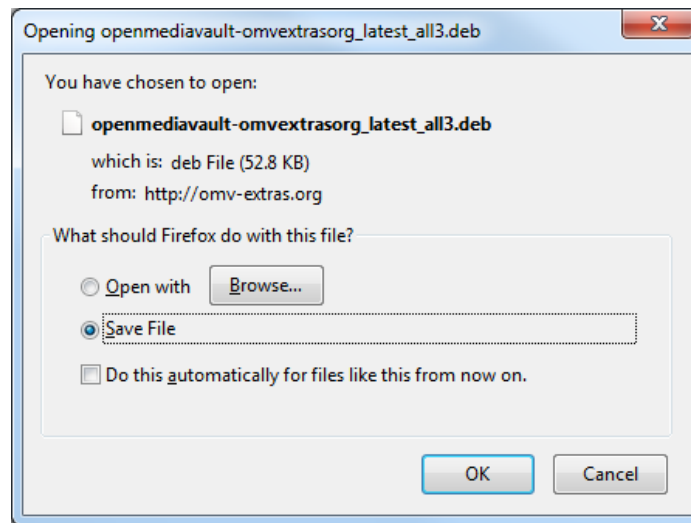
To enable OMV-Extras, a file is downloaded that will be used in the server console.  
Select one of the following links for your version of OMV and download the associated file.

OMV-Extras for OMV 4.X

[omv-extras.org/openmediavault-omvextrasorg\\_latest\\_all4.deb](http://omv-extras.org/openmediavault-omvextrasorg_latest_all4.deb)

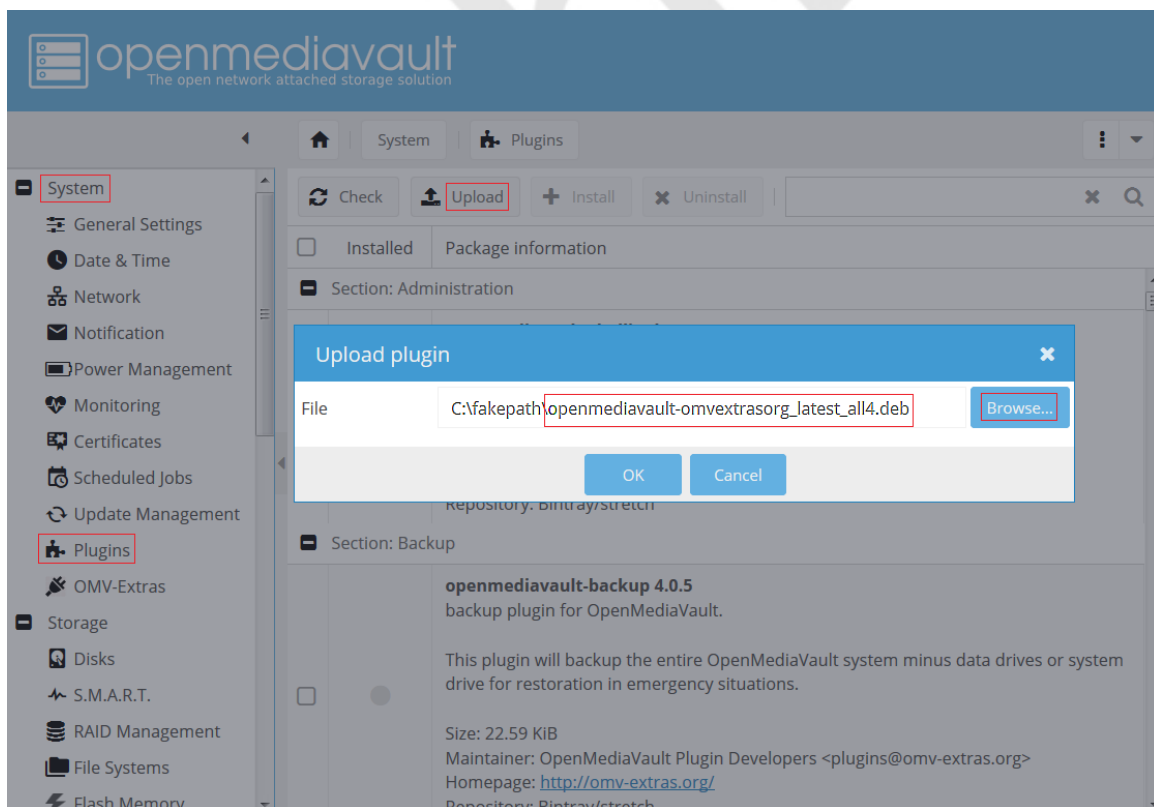
OMV-Extras for OMV 3.X

[omv-extras.org/openmediavault-omvextrasorg\\_latest\\_all3.deb](http://omv-extras.org/openmediavault-omvextrasorg_latest_all3.deb)



Save the file.

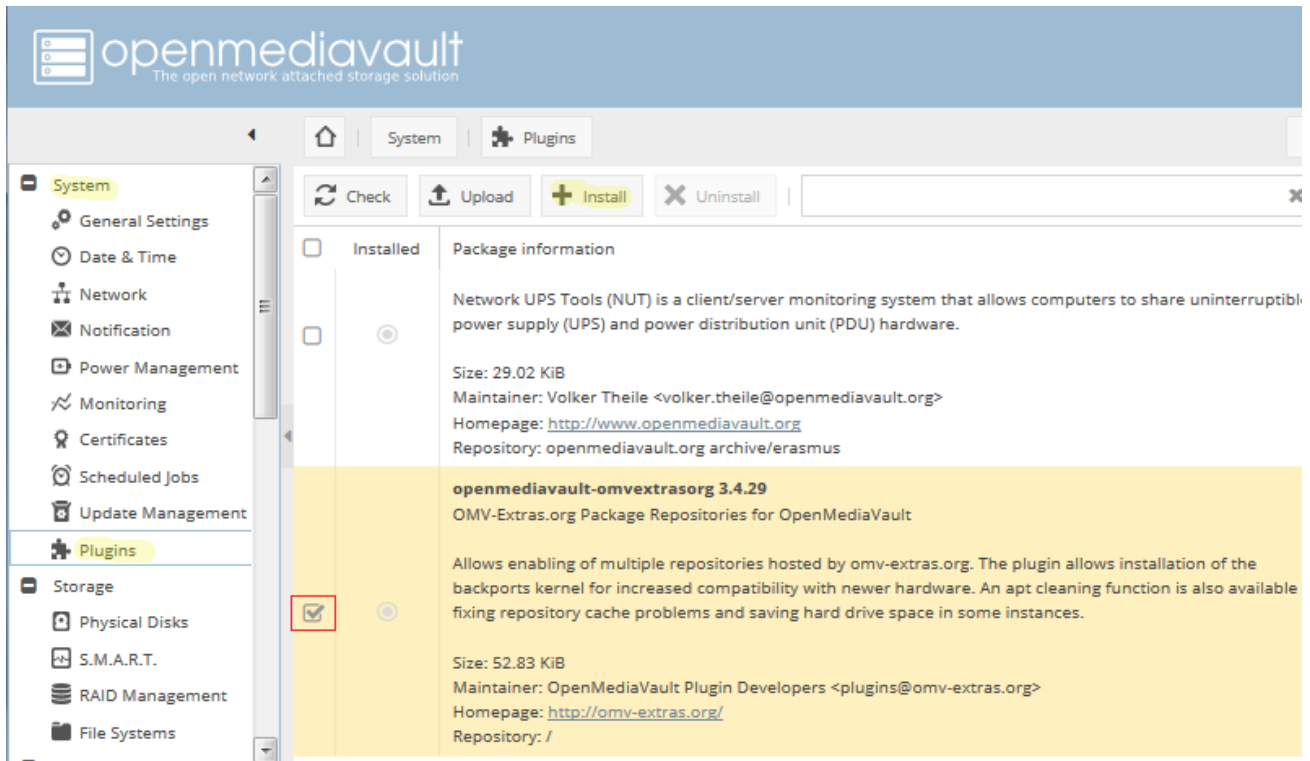
Under **System, Plugins**:



Click on the **Upload** button. **Browse** to the file downloaded. Select it and click **OK**.

A dialog window will popup that says, “Checking for Plugins”. (OMV-Extras is being added to the default plugin list.)

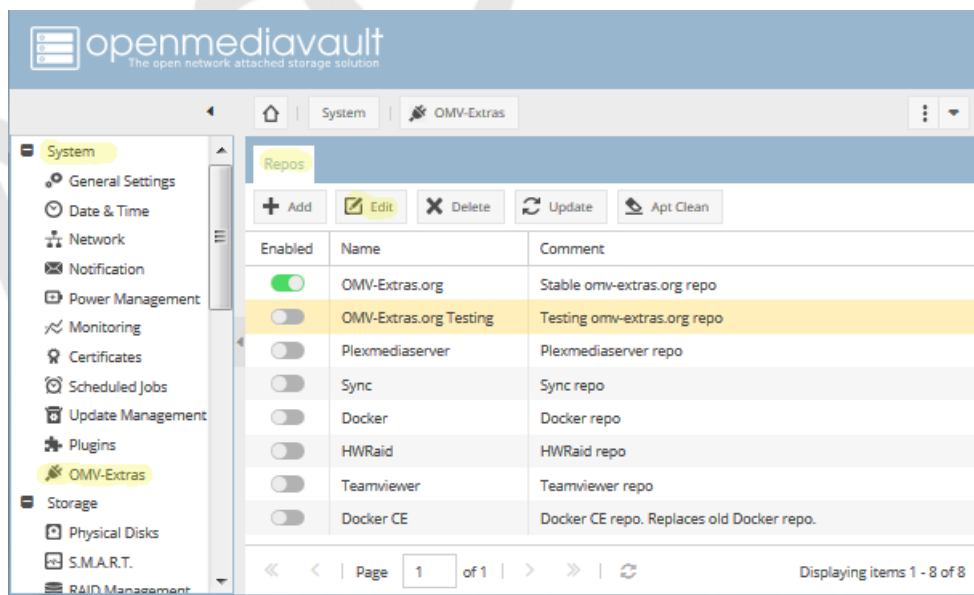
In the same window (**System, Plugins**) scroll to the bottom. Select **openmediavault-omvextrasorg** and click **Install**.



(Optional, but recommended)

Under **System, OMV-Extras**:

In the Repo's **Tab**, highlight **OMV-Extras.org Testing** and click **Edit**. **Enable** and **Save**.



To insure that all plugins are available, go back to **System, Plugins**, and click the **Check** button. This will refresh the page and fully populate it with plugins that may be missing.

## A Basic Data Drive

### General

OMV is capable of setting up basic Linux file systems in the GUI, up to, and including, modern “Copy on Write” file systems such as ZFS which combine check summed files, RAID functions, and Logical Volume Management into a single package. However, advanced file systems add complexity which can make administration of a NAS server a bit more challenging for a beginner.

Until some experience is gained, it is recommended that Linux/NAS beginners use single disks with a native Linux file system. In the processes described in the following, EXT4 will be used with a single data drive.

Some Windows users will want to use USB attached hard drives that are formatted NTFS. While this is possible, the drive would need to remain attached or, at a minimum, be connected to the server when OMV boots. It would be better to use a Linux formatted drive and create a Samba share (SMB/CIF) for Windows clients, as described in [Setting up a Shared Folder](#) and [Creating a SMB/CIF “Samba” share](#).

A Samba (SMB/CIF) network share understands the Windows file format and can be configured to accommodate DOS and extended file attributes. Samba serves as a transparent “translator” for Windows data storage.

### RAID+USB= Potential Problems

Setting up RAID of any type using “USB to drive” connections is discouraged. RAID over USB has known problems. The USB interface (there are several flavors) may filter some the characteristics of the drives, fail to pass SMART stat's and ATA drive commands, delay the assembly of a RAID array, etc. While USB may work in some RAID cases, it's not as reliable as using a standard hard drive interface. If RAID of any type is considered to be a requirement, drives should be connected with SATA or SAS ports.

If users choose to use RAID over USB connections, it is done at their own risk with the potential for the total loss of stored data. RAID issues involving ARM boards, USB connected hard drives, or USB RAID enclosures are not supported on the forum.

RAID is often confused with **backup** which is far more important. For more information, see the explanation of backup, in [Backups and Backup-strategy](#).

### Data Storage - Size matters

In general terms, beginners should do a rough calculation of their storage requirement. When selecting a data drive, the initial fill rate should be between 25 and 50%. As an example, if the calculated data to be stored on the NAS is 1TB, the selected drive should be between 2 and 4TB. With 50%+ drive free space (2 to 3TB) additional data can be accommodated, without the need to expand in the immediate future. When the fill percentage reaches 75%, it's time to plan for more storage.

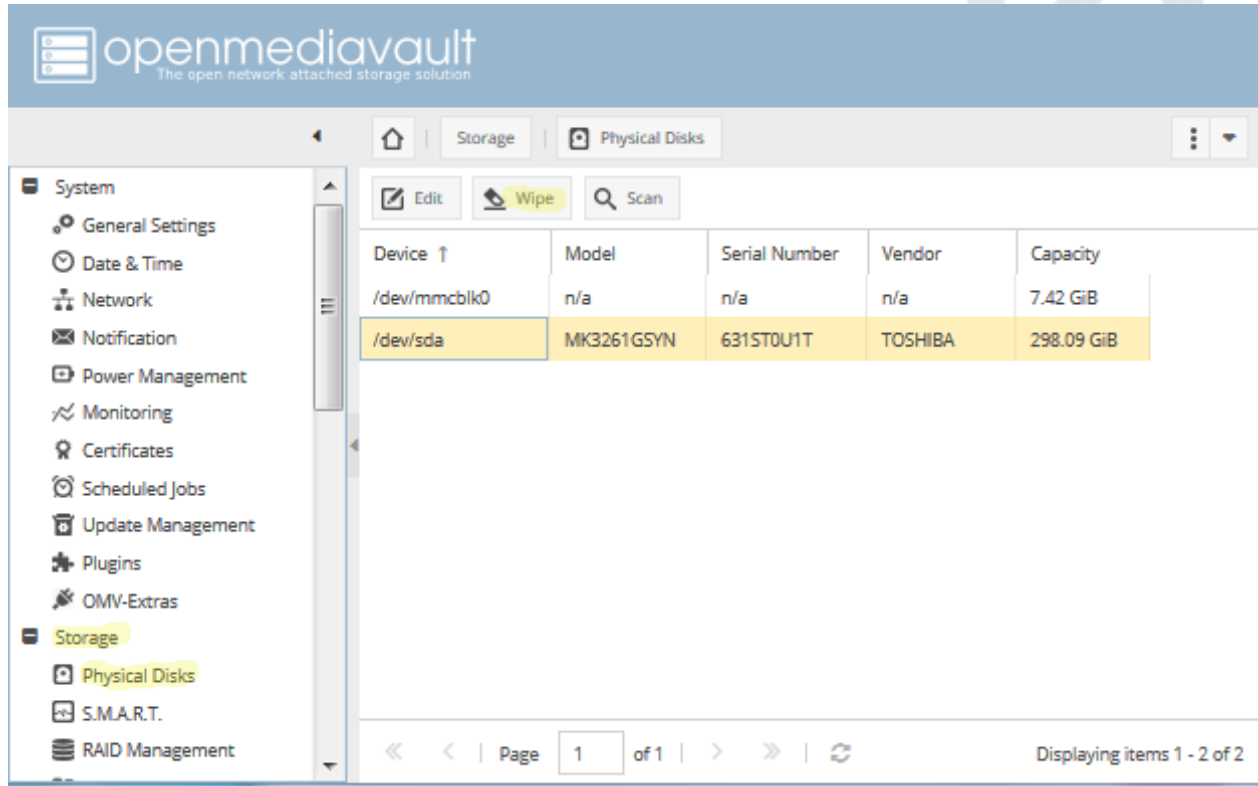
## Set Up

With a data drive installed or connected;

Under **Storage, Physical Disks**:

**Highlight the data disk** and click on **Wipe**. When prompted, click **Yes** and **Quick**.

(\*\*Reformatting a disk, with GPT formatting present, may result in an error. Simply re-run the wipe operation a 2<sup>nd</sup> time.\*\*)

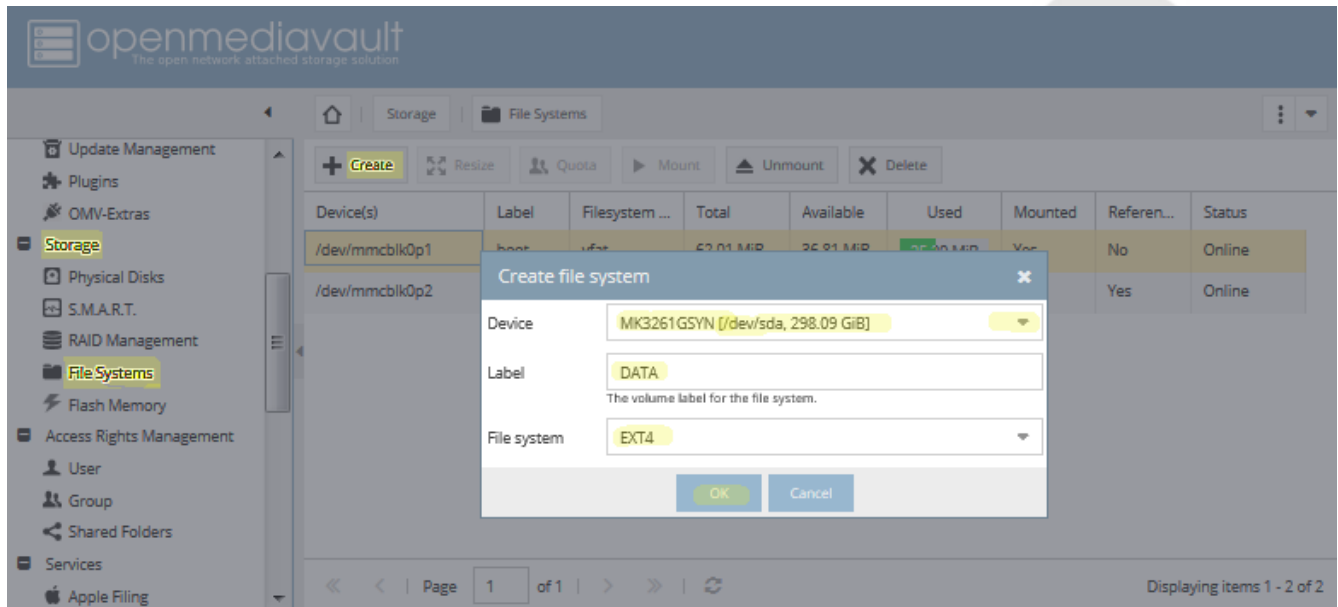


((The first device in the list is the boot drive. /dev/mmcblk0 is a flash device. In this case, OMV is installed on an 8GB SD-card.))

## Under **Storage, File Systems**:

Click on **Create**. In the Popup Window use the **drop down** to **select the drive** previously wiped. Provide a **Label** of your choice, accept the default File System **EXT4** and click on **OK**. Confirm the “format device” warning.

Allow a few minutes for the format to complete. When the message “**File system creation has completed successfully**” is displayed, click on **Close**.



In the same Window, click on the newly created file system line, and click on the **Mount** button. When the yellow confirmation banner appears, click on **Apply**.

The Data Drive is now prepared for a Shared Folder.



## Creating A Network Share

Network shares are the primary reason for setting up and running a NAS. While easy access to data provides convenience to users, storing and backing up data in centralized locations makes it much more manageable.

### Setting up a Shared Folder

The majority of the files and folders in a new OMV installation are controlled by the root user. One of the purposes of a **Shared Folder** is to set permissions that will allow regular users access to folders and files used for data storage. A shared folder could also be called a “base share”. The shared folder created in the following will be the foundation for creating a “**Network Share**”, covered later.

---

Under **Access Rights Management**, click on **Shared Folders**, then click on the **Add** button.

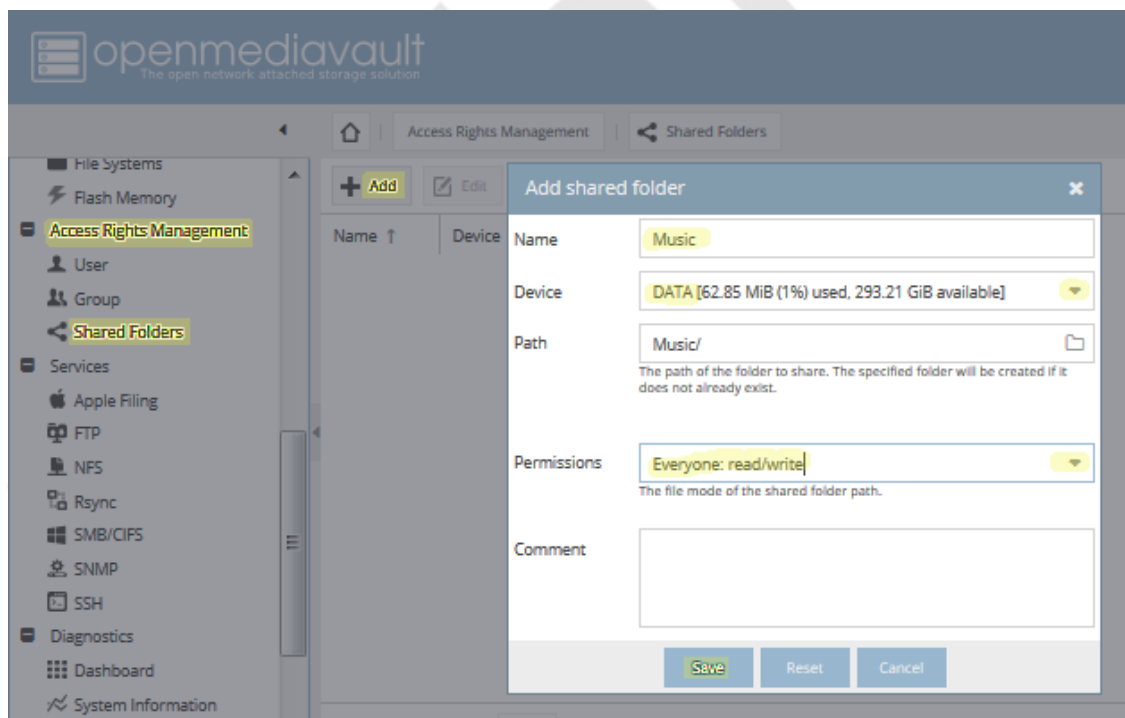
In the following example, next to;

**Name:** Add your new shared folders **name**.

**Device:** Click on the drop down and select the drive that was previously added and formatted.

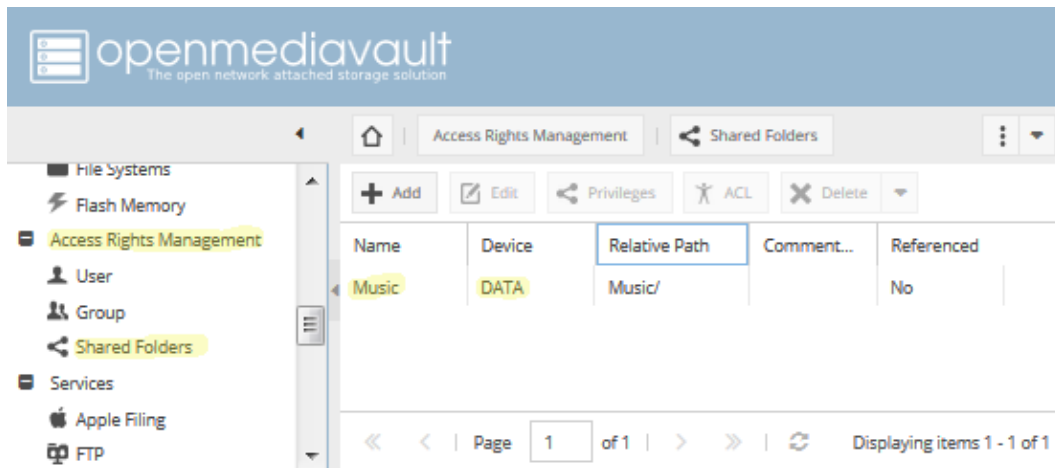
**Path:** Accept the default

**Permissions:** Click on the drop down and select **Everyone: read/write**



Click the **Save** button.

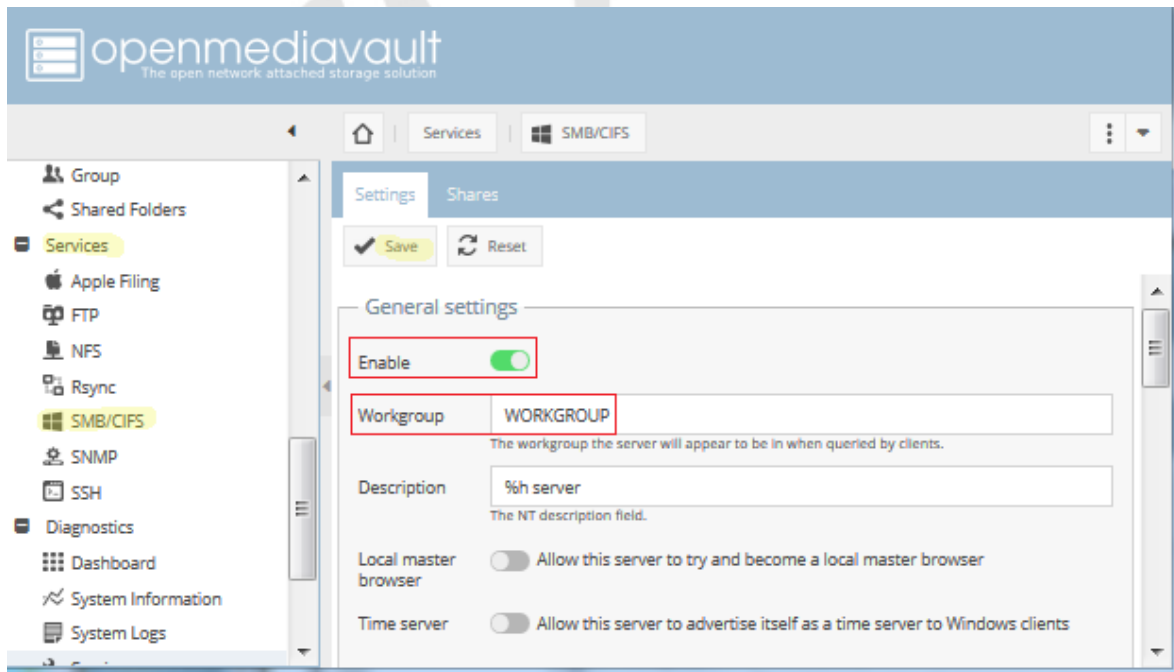
## The End Result:



### Creating a SMB/CIF “Samba” Network Share

In order to make your shared folder viewable in **Windows Explorer**, under **Network**, it's necessary to make it a Samba share using the SMB (Server Messaging Block) protocol. OMV makes setting up a Samba network share an easy task.

Under **Services**, click on **SMB/CIF**. In the **Settings** tab toggle **Enable** to **On** (green) and set your workgroup name. (In Windows, the default workgroup name is, WORKGROUP. Leave the remainder of settings in this tab at their defaults, and click on **Save**. (Confirm with “**Apply**” when the yellow banner pops up.)



Click on the **Shares Tab** and the **+Add** button.

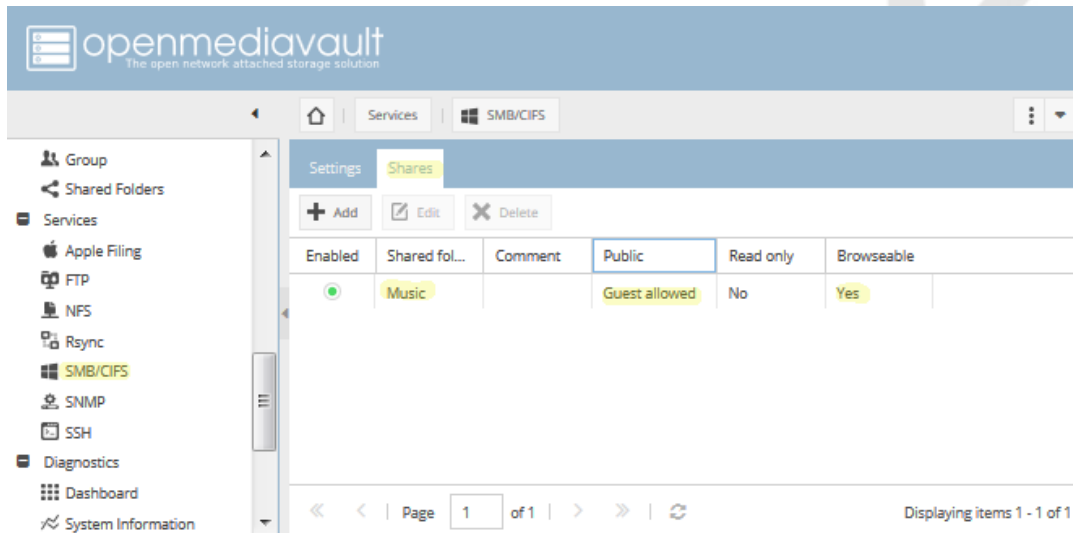
In the popup dialog box, set the following:

**Shared folder:** Click on the drop down and select **Music** (or the name for the shared folder previously created.)

**Public:** Click on the drop down and select the **Guests Allowed**

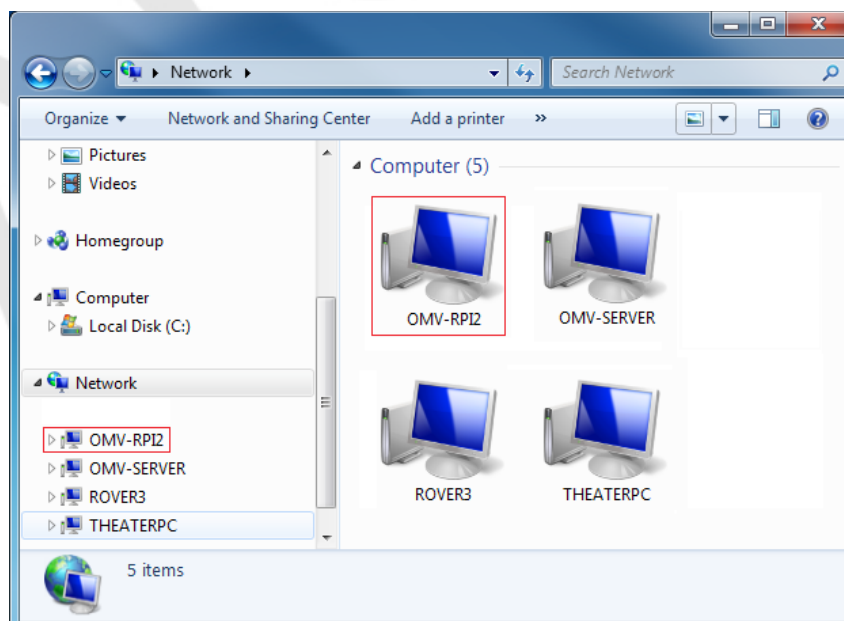
Scroll down with the right scroll bar and toggle **ON** (green), **Extended attributes** and **Store DOS attributes**. (Leave the remaining settings at defaults.)

Click **Save** and confirm with “**Apply**” when the yellow banner appears. The final result should appear as follows.



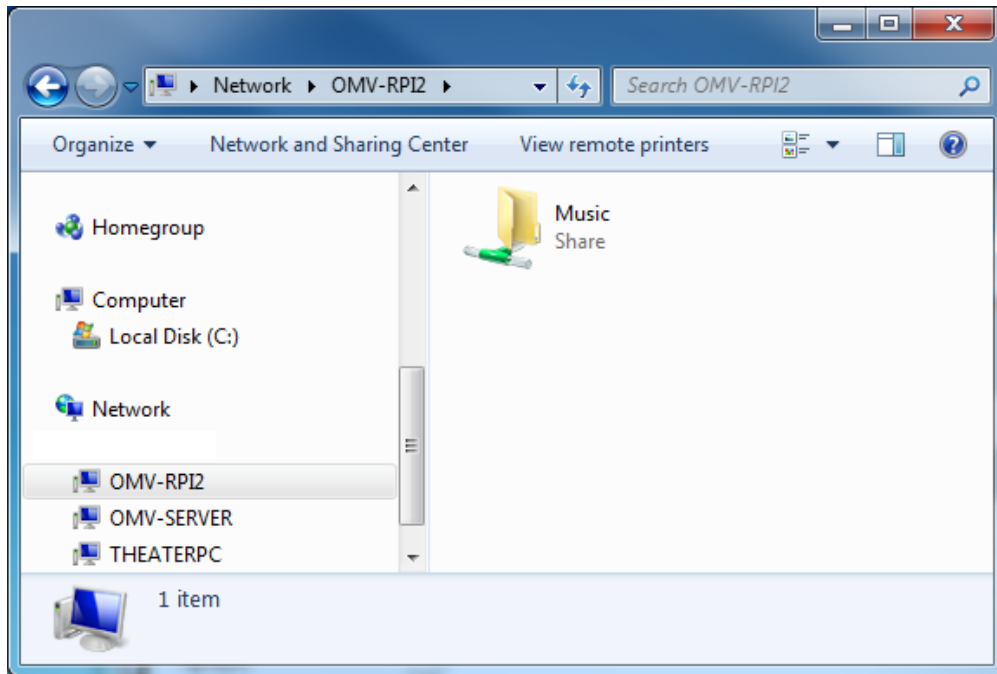
## Explore the New Network Share

You should now have a browse-able Server with a Network share named Music, so let's take a look. Open Windows explorer, scroll down to Network and click on it. There's the new server OMV-RPI2.

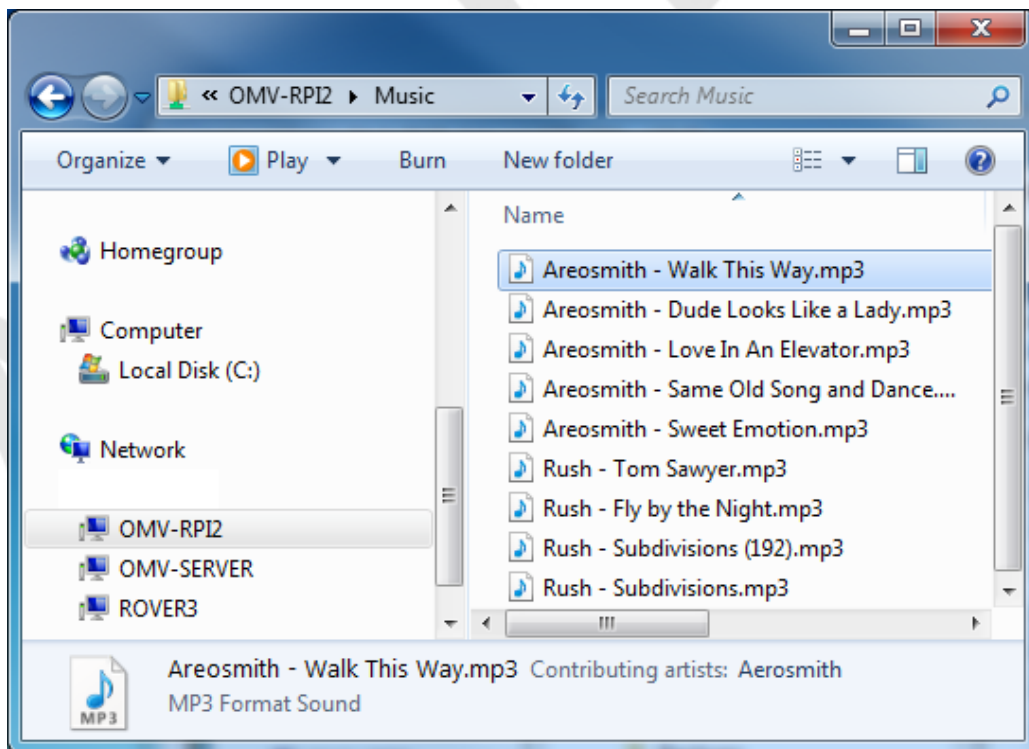


**\*\*A few minutes may be required for the Windows Network to “Discover” the new server. If users are using **Windows 10** PC's, and the server and share do not appear, see this networking [How To](#).\*\***

Now let's look at the servers new Samba share. It's there and browse-able.



This share is also write-able with a standard “Copy and Paste”



Congratulations! You now have a functional NAS that can be expanded to accommodate additional network shares. Simply repeat the processes in [Creating A Network Share](#) to create and make additional shares visible on your network.

## The Flash Memory Plugin - X64 and i386 users only

X64 or I386 users who installed OMV **on flash media** will need to install the flash memory plugin.

### ***Flash Media and Wear Leveling***

While modern flash media drive is solid state, its life is limited by the number of write cycles it can withstand before it goes “read only”. When a specified number of blocks refuse to erase, the device's controller will set it “read only”. At that point, the device's useful life is over.

To extend the life of flash media, most modern flash devices have **wear leveling** built into their controllers. If blocks are written, but not erased, they experience no wear. If blocks are erased, the next new write is set on adjacent blocks that have never been written before. As data is erased and written, blocks are used, starting at the beginning of the device's addressable storage range and proceeding in sequence, working toward the end. When the end is reached, the process starts at the beginning and cycles through again. This wear leveling process avoids writing a single location to failure, and spreads wear evenly throughout.

With wear leveling and two drives of the same type, a drive that is twice the size will last roughly two times longer than the smaller drive. While this is a strong vote for using a larger flash drive, when backups are considered, drives of twice the size also take twice as long to image and their image files are twice as large. (A practical trade-off should be considered in the suggested 16 to 32GB range.)

### ***The Purpose of the Plugin***

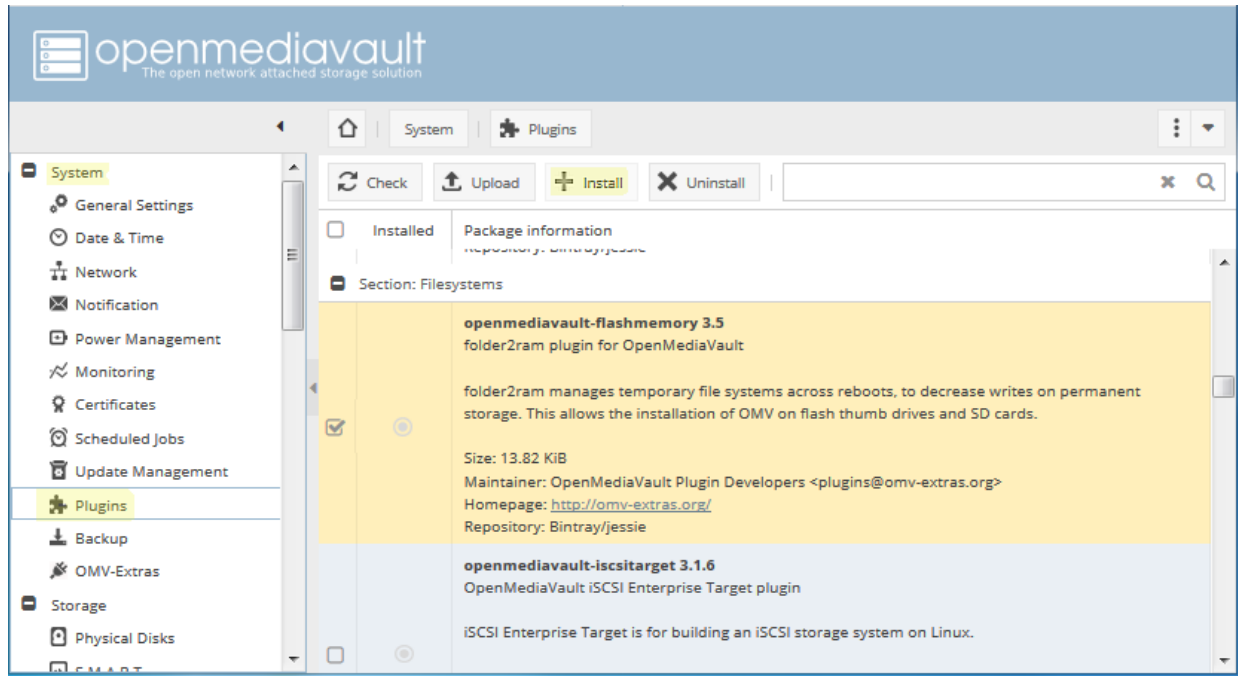
The primary purpose of the Flash Memory Plugin is to reduce the number of blocks written and the frequency of writes, to the Flash Device being used as the boot drive. The plugin can reduce the data written to Flash drive by an order of magnitude or, potentially, 1/10th the amount that would normally written. By extension, a drive of a given size might last up to 10 times longer than it would without the Flash Media plugin.

### ***Installing the Plugin***

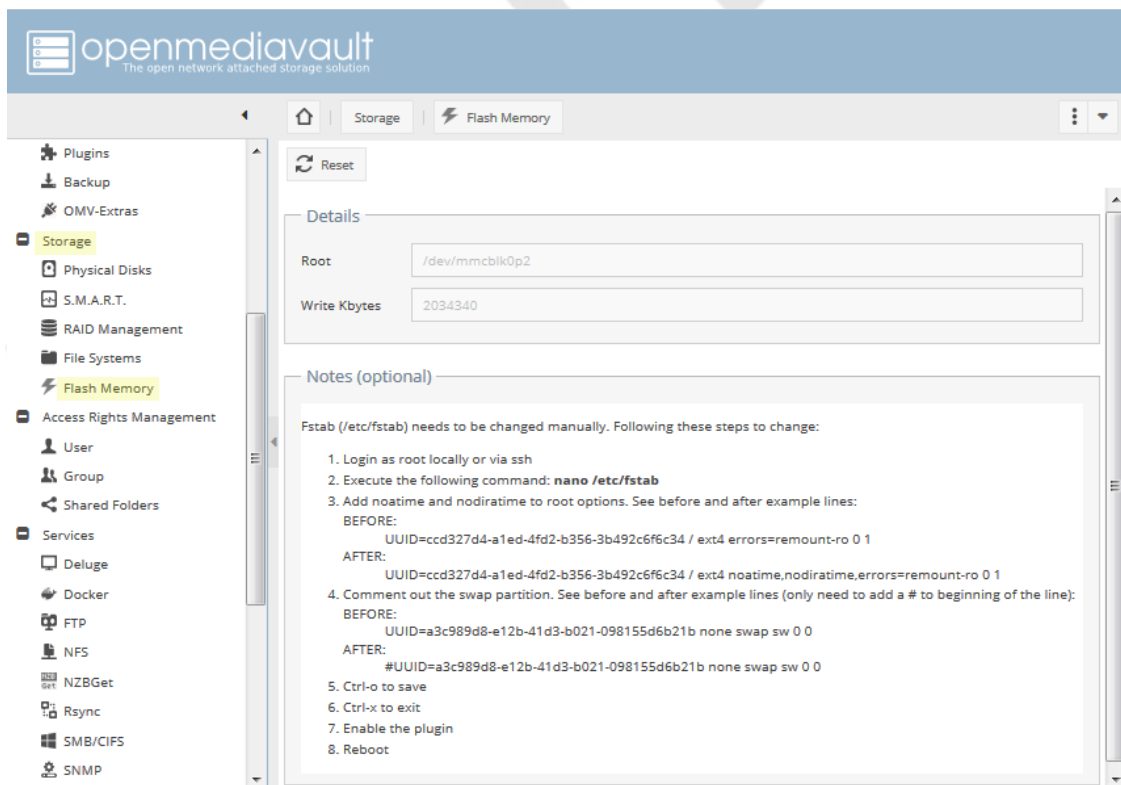
The prerequisite for installing this plugin is the installation of [OMVExtras](#). If OMVExtras is not installed, it is required to proceed.

Under **System**, **Plugins**, scroll down to **Section: Filesystems**.

Select **openmediavault-flashmemory** and click the **Install** button.



Under **Storage**, **Flash Memory**, the following screen is now available.



While the plugin will work as is, it is much more effective if the guidance under **Notes (optional)** is followed.

While the Notes guidance shows steps for nano, a Linux command line text editor (option 1); WinSCP and Windows Notepad can be used if WinSCP is installed (option 2).

## Option 1: Editing /etc/fstab with nano

The first example will use **nano**.

Using PuTTY, SSH into the server. Log in as root and enter the root password.

On the command line, type the following and hit enter.

**nano /etc/fstab**

**\*\*In nano, the mouse does not move the cursor. The cursor is moved with the keyboards arrow keys to the insertion point. Type to insert text and use the backspace key to erase text if need. If a mistake is made, exit without saving and go back in again.\*\***

From the plugin's **Notes, Step 3:**

First: We're going to add two statements, **noatime,nodiratime** to the **/** partition (the root partition) exactly as shown. The text addition is highlighted in green.

Second: Note the partition with **swap** in it. Per Step 4, we comment it out with a **#** at the beginning of the line. The **#** is highlighted in green.

```
192.168.1.88 - PuTTY
GNU nano 2.2.6      File: /etc/fstab

/etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options>      <dump> <pass>
# / was on /dev/sdb1 during installation
UUID=5111ffd4-47bd-4586-9077-edd65d21dae7 / ext4 noatime,nodiratime,errors=remount-ro 0 1
# swap was on /dev/sdb5 during installation
#UUID=c91cfa5d-f4ca-45e8-92f5-6357840f9c54 none swap sw 0 0
/dev/sr0 /media/cdrom0 udf,iso9660 user,noauto 0 0
tmpfs /tmp tmpfs defaults 0 0
# >>> [openmediavault]
/dev/disk/by-label/data /srv/dev-disk-by-label-data ext4 defaults,nofail,user_xattr,noexec,usrjquota=aquota.user,$
# <<< [openmediavault]
```

Use **Ctrl+o** to save, then **Ctrl+x** to exit

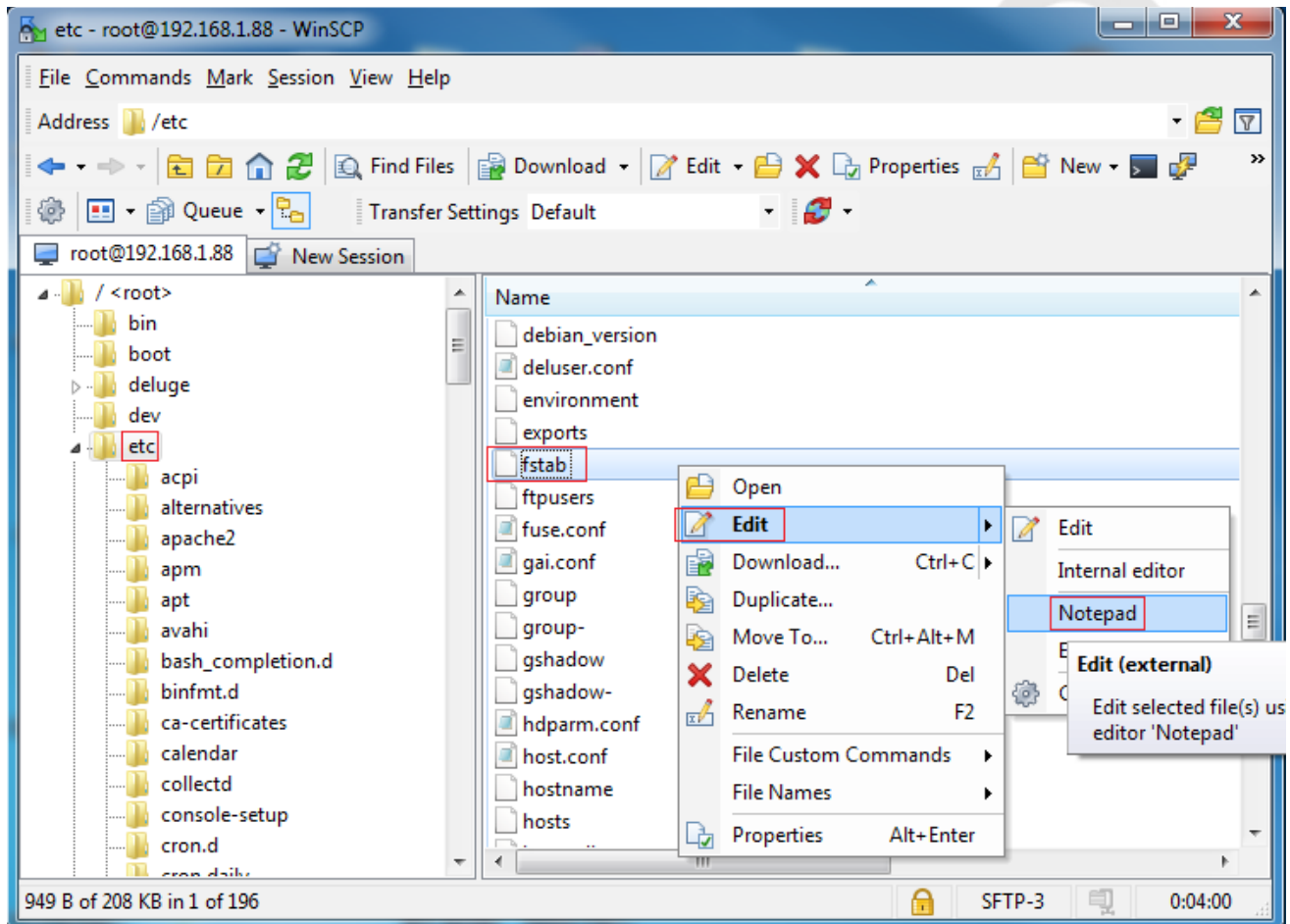
**Reboot.** On the command line, the following command can be used: **shutdown -r now**

**Done.**

## Option 2: Editing /etc/fstab with WinSCP and Notepad

Users who are not comfortable with editing fstab using nano can use WinSCP and Windows Notepad to make the needed changes. If not installed, this doc-link to [\(WinSCP\)](#) will describe the process for installing WinSCP and logging into the server for the first time.

When logged in, click on **/etc** in the left pane. In the right pane, “right” mouse click on **fstab**, select **Edit** and **Notepad**.

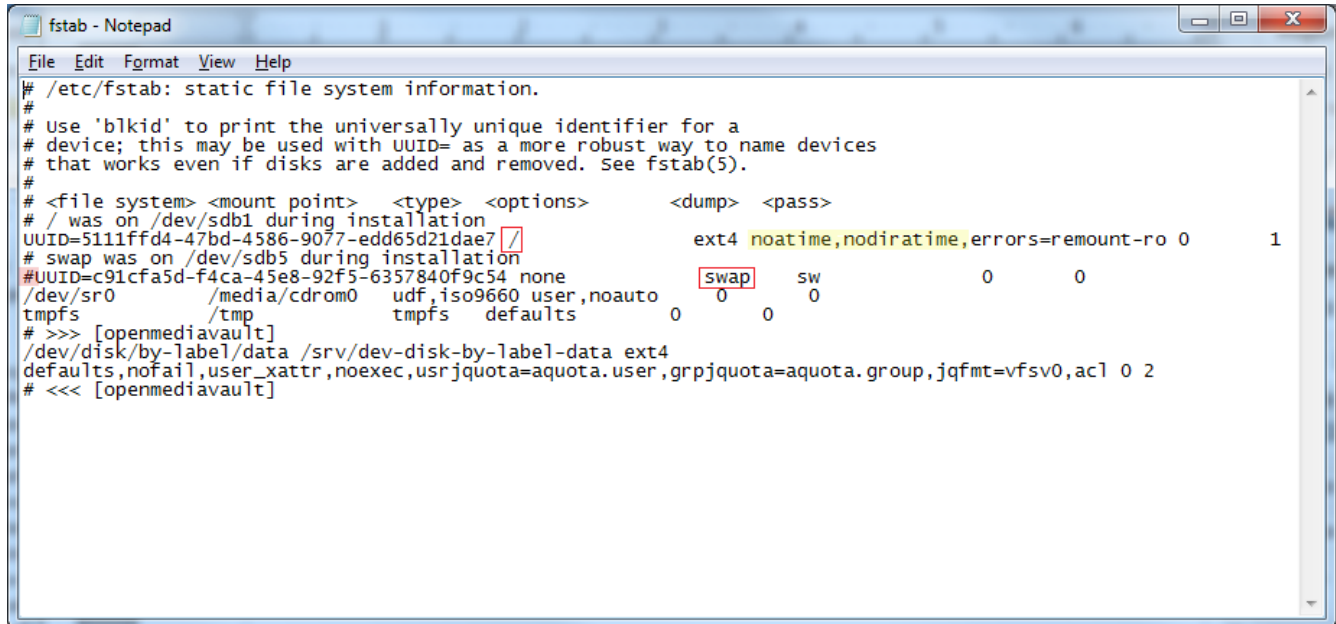




Notepad will open the fstab file.

Find the root partition - it's the line with `/` and insert **noatime,nodiratime**, after **ext4** and one space as shown.

Find the swap partition – it's the line with **swap** and insert a **#** at the beginning of the line as shown.



```
# /etc/fstab: static file system information.
#
# use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options>          <dump> <pass>
# / was on /dev/sdb1 during installation
UUID=5111ffd4-47bd-4586-9077-edd65d21dae7 /                ext4 noatime,nodiratime,errors=remount-ro 0    1
# swap was on /dev/sdb5 during installation
#UUID=c91cfa5d-f4ca-45e8-92f5-6357840f9c54 none                swap 0                0
/dev/sr0          /media/cdrom0      udf,iso9660 user,noauto       0    0
tmpfs             /tmp               tmpfs defaults          0    0
# >>> [openmediavault]
/dev/disk/by-label/data /srv/dev-disk-by-label-data ext4
defaults,nofail,user_xattr,noexec,usrjquota=aquota.user,grpquota=aquota.group,jqfmt=vfsv0,ac1 0 2
# <<< [openmediavault]
```

Do **File, Save**. Close Notepad.  
Exit WinSCP.  
Reboot the server, from the GUI.

**Done**

---

## Final Installation Notes:

1. Permissions to the shared folder created in this guide, and the SMB network share layered on top of it, are completely open. While these permission settings are OK for home environments, the server shouldn't be exposed to the Internet by forwarding port 80 or 443. As users gain knowledge and experience, they should consider tightening up permissions on the underlying Shared Folders and SMB network shares.
2. **\*Important\*** Put your new server on a good surge suppression power strip, at the absolute minimum. An UPS is **preferred** and is best practice. In consumer electronics, the majority of failures are related to power supplies and adverse conditions created by line power. The prime causes of power issues and failures are short duration surges, high voltage spikes, brown-outs, and sustained over-volt or under-volt conditions. A good UPS system is designed to counteract these problems. Further, the file system on the boot drive is at risk of corruption from sudden (dirty) shutdowns. An UPS minimizes these risks.

## Utilities to Help With OMV Management

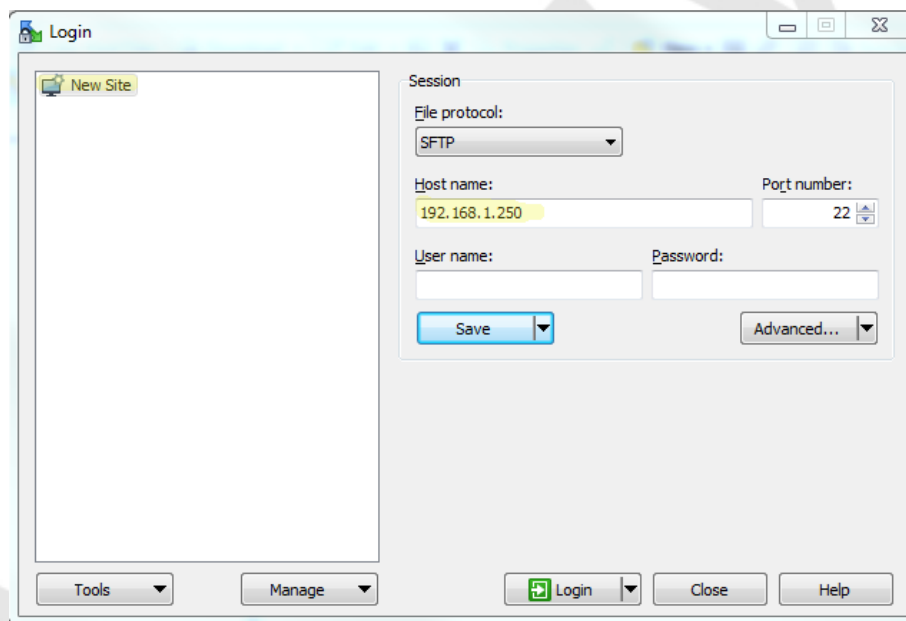
Being able to work from the command line would be very useful to users, who may need to gather detailed information on the OS and platform hardware, for troubleshooting and for an occasional edit to a configuration file. Much can be learned with the following utilities that allow users to look at OMV “under the hood”.

### WinSCP

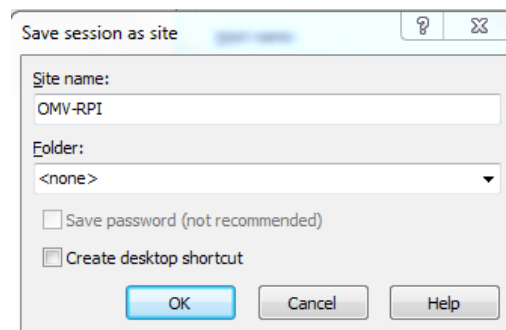
WinSCP allows users, beginners and experienced alike, to visualize the Linux file structure in a manner similar to Windows Explorer. It can be downloaded here. [WinSCP](#)

One of the more useful features of WinSCP is that it gives users the ability to edit Linux configuration files with familiar editors like Notepad. For experienced Linux Desktop users, (Linux Mint, Ubuntu and others) WinSCP will also run from **WINE**.

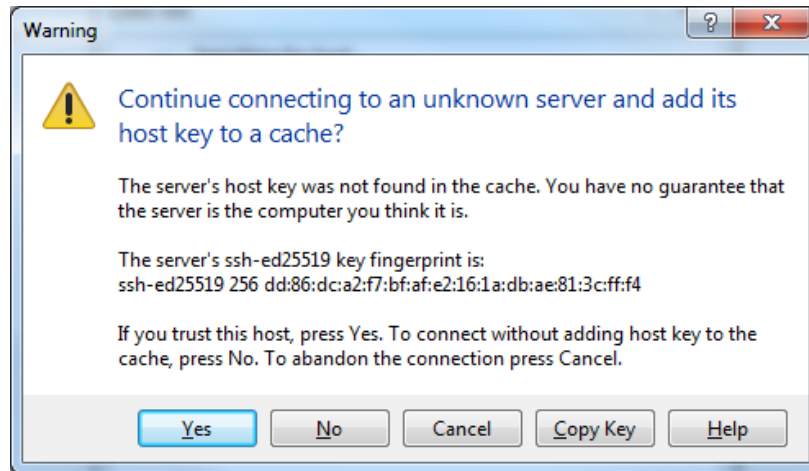
Installing WinSCP. (\*\*During the installation process, if prompted, select the **Explorer Interface**. This display shows the remote file system only.\*\*) On the first run, the login screen is presented. Click on **New Site** and type in the **IP address** of the new server. Click on **Save**.



In Site name: The server's IP address is displayed. Optionally, the site name can be changed. If using WinSCP for a single server, a desktop short cut may be useful. Click on **OK**.



The **login screen** will come back. Double click on the new site name. The following is normal for the first SSH connection to any client or server. Click **Yes**.

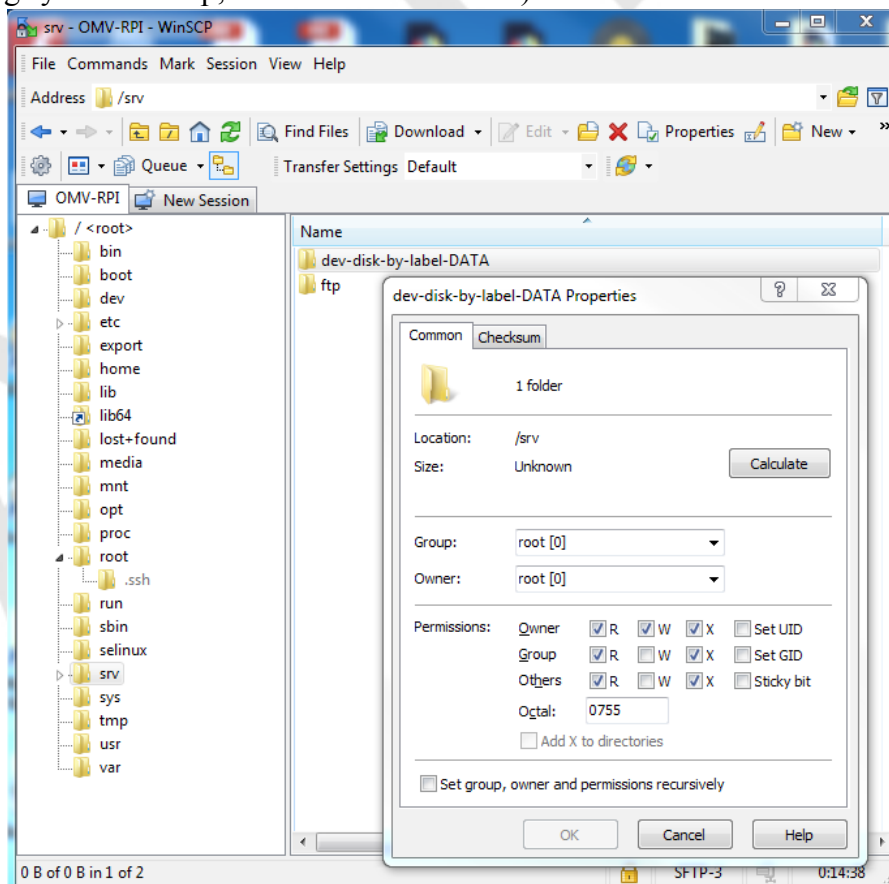


The first prompt is for the username. Enter **root**

The second prompt is for the root password. Enter the root **password**.

---

WinSCP opens with a two pane window. Selections are made in the left pane; operations are done on the right. The folder **srv** was selected on the left. **dev-disk-by-label-DATA** was highlighted on the right. A right click of the mouse brings up an operations menu. **Properties** was selected. In this particular popup, permissions could be changed. (This is NOT a recommended action for beginners, without operating system backup, which is covered later.)



In a similar manner, a configuration file can be highlighted in the right pane. A right click of the mouse brings up the menu, select **EDIT** and Windows notepad, or the internal editor can be used for editing configuration files. Either choice is much easier than using **nano** or **vi** on the Linux command line.

While they can be done in WinSCP; very large file copies, moves, or deletes are best done using **Midnight Commander**.

## ***PuTTY***

PuTTY is similar to Window's command prompt in that it allows users to work from OMV's command line. If PuTTY was not installed as part of your installation process, install it on a Windows PC. It's available here. -> [PuTTY](#)

Screen shots for the first of use of PuTTY are available in the, OMV - Initial Configuration, [ARM Users](#) section.

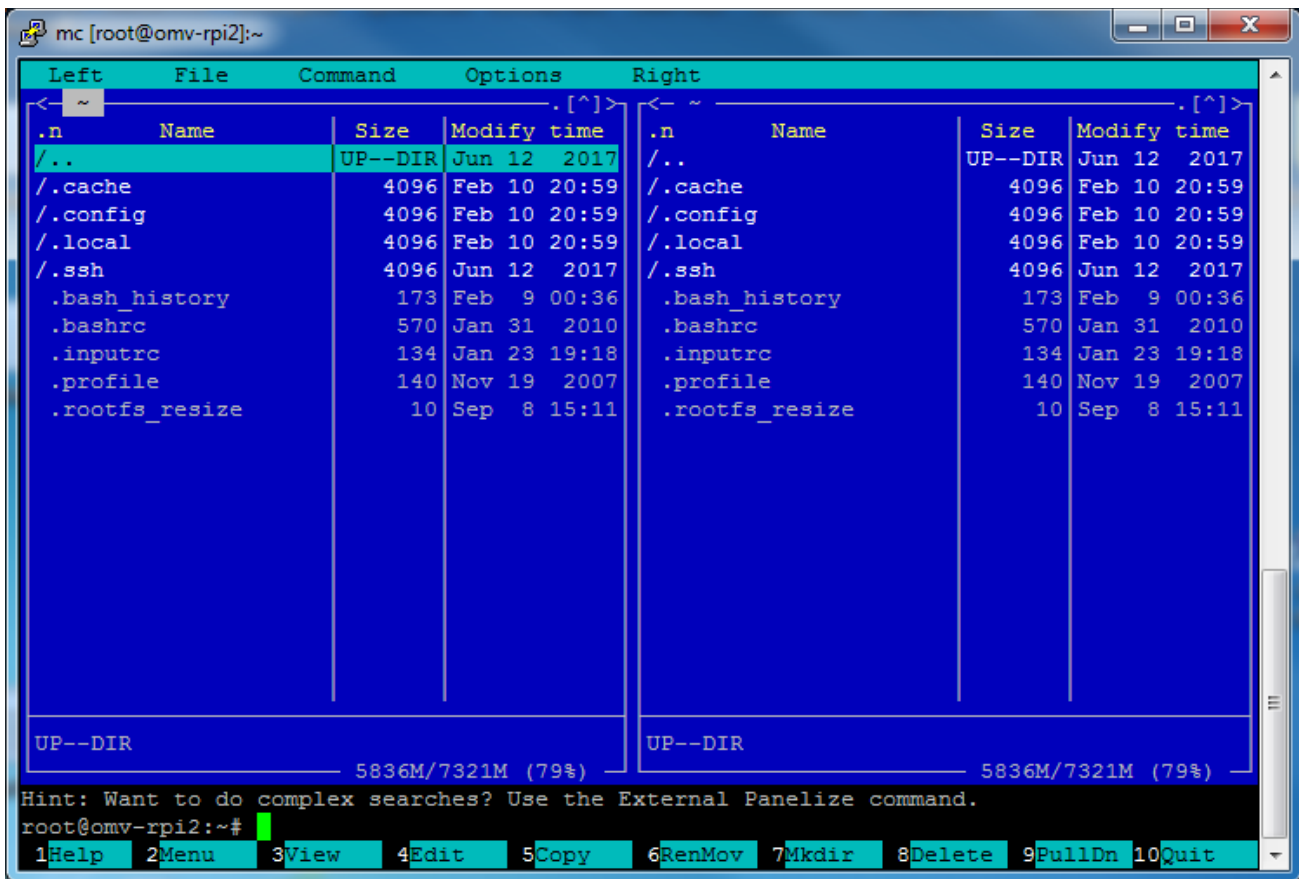
## ***MC (Midnight Commander)***

Midnight Commander is a command line file utility that utilizes a very cleverly created graphical environment. It's very useful for navigating through OMV's directory structure. It excels in efficient copying, moving, and deleting folders and files.

The installation process:

- Use **PuTTY** to get to OMV's command line.
- Log in as **root**.
- On the command line type the following; **apt-get install mc**
- When prompted continue with “**Y**”

When the installation finishes, on the command line, type **mc**



Midnight Commander is a two pane window where the source is the left pane and the destination is the right pane. Copies and moves are done, left to right. Since it's possible to navigate to any location on the OMV host, in either pane, the source and destination can be set for any location.

A mouse works in MC. Click on the various menu items at the top and bottom, to select them. Similarly, files or folders can be selected by clicking on them. To level up click on the `../` at the top left of either window.

**\*\*Beginners Note:\*\*** Midnight Commander is powerful and potentially dangerous. MC does not have “Undo”. A careless operation on the boot drive, such as accidental file “Move” or “Delete”, can ruin your installation. Work with MC carefully and before doing anything extensive with it, the appropriate backups are recommended. [Operating System Backup](#) – [Data Backup](#).

## **Win32DiskImager**

Win32DiskImager is a utility that's designed to write raw image files to SD-cards and USB drives. What makes it stand out from similar utilities is that it can “read” a flash drive and create an image file from the contents of the device. If users decide to use an SD-card or a USB thumb-drive as a boot drive; the ability to read flash devices makes [Win32DiskImager](#) useful for cloning booting drives.

**\*\*There is a [known bug](#) in Win32DiskImager V1.0.0\*\***

While the exact cause of the bug has yet to be determined, the scope of affected users is small. However, this bug requires the use of the **Verify Only** button after every operation. If the Verification hash is successful, the operation is good. If Verification fails, the read or write has failed and the image file or flashed drive cannot be used.\*\*

## **Virtual Box**

Virtual Box is a cross platform virtualization platform that will work with both servers and clients. For learning about OMV, there simply is no better tool than working with an OMV Virtual Machine (VM). An OMV VM can be built, configured, and put on the local network complete with shares, in the same manner as real hardware. VM's can be created, cloned, used for test beds, and destroyed without consequence. Many advanced OMV users fully test upgrades, new Docker's, plugin's, server add-ons and changes in configuration, in OMV VM's before upgrading or reconfiguring their real-world servers.

If users have a Windows client with at least 6GB RAM and plenty of hard disk space, installing Virtual Box is highly recommended. → [Virtual Box](#)

## Backups and Backup-strategy

It's important to understand the concept of backup and why backup is important. In understanding the concept of backup, an automotive analogy may be helpful.

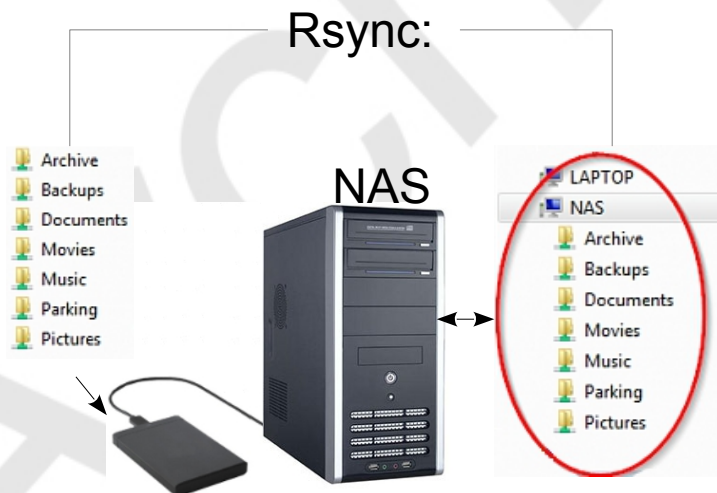
If one has a car and that car has a spare tire, is the “car” backed up? The answer is “No”. There are a great number of things that can happen to a car that can disable it, until parts are replaced or the car is otherwise repaired. These items would include the battery, alternator, any component of the ignition system, the transmission, the cooling system, etc., etc. To backup the car, a second car is needed. This is why using RAID, of any type, is not backup. At best RAID could be thought of as a “spare tire” for a PC.

Where the automotive analogy fails, generally speaking, is if a car fails it can be repaired. In computing, if a user's personal data is lost without backup, it's permanently lost. There are many possible events where data may be corrupted beyond recovery (viruses, ransomware) or is completely lost due to drive failures, a failing drive controller, or other hardware failures. This is why real data back up is far more important than the computing equivalent of a spare tire (RAID).

---

### Backing Up Data

First Level Backup:  
Replication To an External Drive



The scenario depicted in this graphic represents true backup. There are two full copies of data. With two separate copies, this backup strategy is superior to traditional RAID1 for home or small business use cases for a couple reasons.

- Rsync can be used with most USB connected hard drives where RAID1, when used with USB connected drives, is notably unreliable.
- If there's a drive error, an accidental deletion, a virus, or other data related issue; in RAID1 the effects are instantly replicated to the second drive. With Rsync, both drives are independent and, in most cases, the second disk will be available after the source disk fails. In any case, the Rsync replication interval allows time for admin intervention before the second disk is affected.

## Full Disk Mirroring / Backup with Rsync

While individual shared folders can be replicated using **Services**, **Rsync**, a more efficient approach is using an Rsync Command line, in a scheduled job, under **System**, **Scheduled Jobs**. This method allows for replicating the file and folder contents an entire data drive, to an external drive or a second internal drive of adequate size.

- To implement something similar to the following example; it's necessary to add and **mount** a destination drive, in accordance with the section labeled [A Basic Data Drive](#).
  - When formatted, the hard drives used in this example were labeled to indicate their function. This is a good practice that will help new users to easily identify drives and avoid admin mistakes.\*\*
- 

The following Rsync command line is an example of how a data drive can be mirrored onto a second drive.

```
rsync -av --delete /srv/dev-disk-by-label-DATA/ /srv/dev-disk-by-label-RSYNC/
```

The source drive is on the left (**green**) and the destination is on the right (**blue**). In this example, the entire contents of **dev-disk-by-label-DATA** would be copied to **dev-disk-by-label-RSYNC**

The switches are:

**-a Archive Mode.** Archive mode adds an array of options to an Rsync command. It's the equivalent of switches -r -l -p -t -g -o and -D which copies files and folders recursively, copies links and devices, preserves permissions, groups, owners and file time stamps.

**-v Increase Verbosity.** This can be useful when examining Rsync command output or log files.

**--delete Deletes files in the destination drive that are not in the source.** If accidental deletion protection is desired, this switch could be left out of the command line. However, from time to time, it would necessary to be temporarily re-added the **--delete** switch to purge previously deleted and unwanted files from the destination drive.)

---



To find the appropriate Rsync command line entries for the user's server, under **Storage, File Systems** click on **down arrow** at the top right edge of a column. On the pop down menu, select **Columns** and check the **Mount Point** box.

Under the **Mount Point** column (red boxes) are the full paths needed for the source drive (in this example **/srv/dev-disk-by-label-DATA**) and the destination drive (in this example **/srv/dev-disk-by-label-RSYNC**).

Device(s)	Label	Filesystem Type	Used	Mounted	Mount Point	Referenced	Status
/dev/mmcb	Sort Ascending		21.52 MiB	Yes	/boot	No	Online
/dev/mmcb	Sort Descending		1.26 GiB	Yes	/	Yes	Online
/dev/sda1	Columns		515.00 MiB	Yes	/srv/dev-disk-by-label-DATA	Yes	Online
/dev/sda2	RSYNC	ext4	514.99 MiB	Yes	/srv/dev-disk-by-label-RSYNC	No	Online

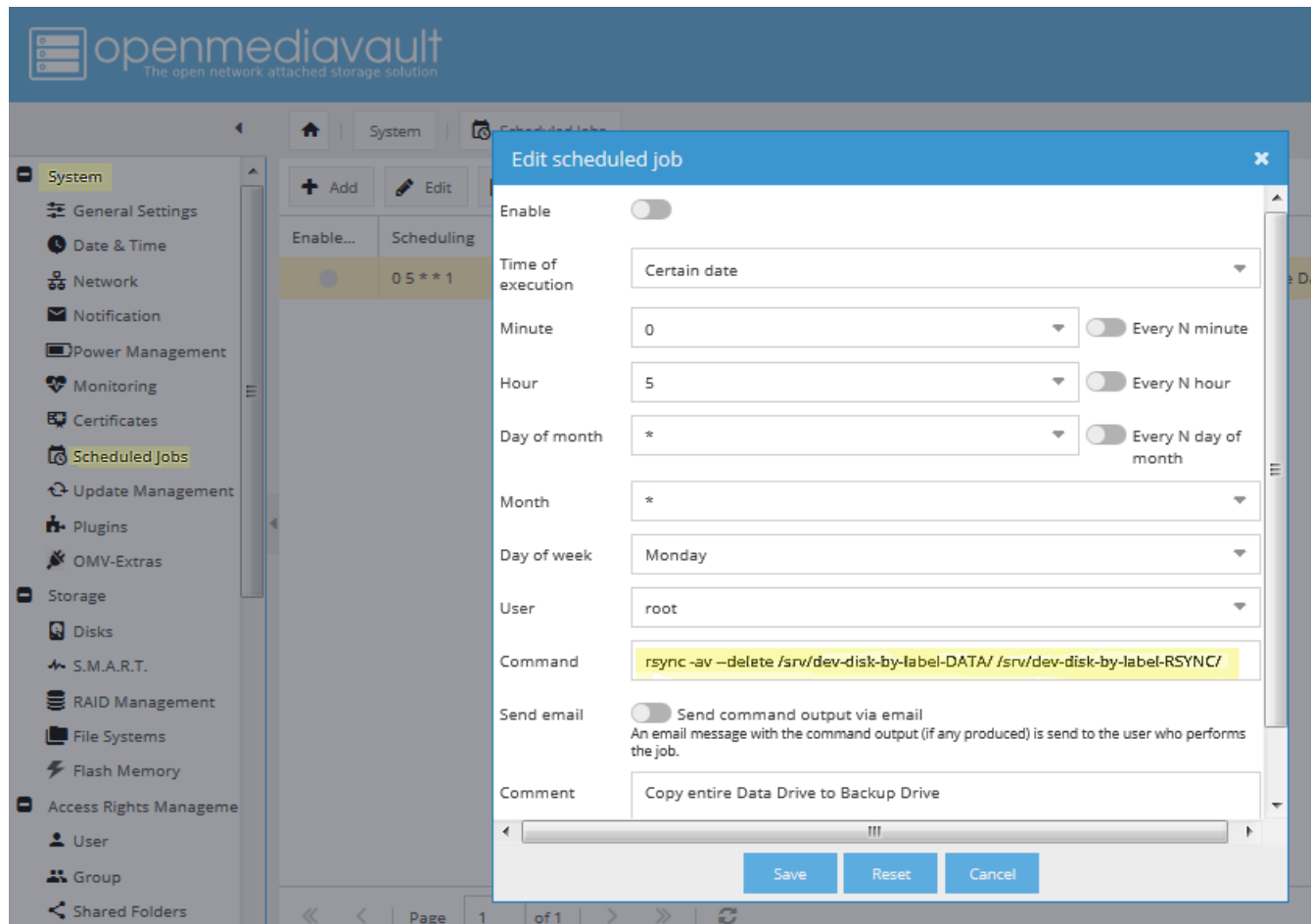
To construct the appropriate command line, add a **slash “/”** after each drive path, in the full command line as follows:

**rsync -av --delete /srv/dev-disk-by-label-DATA/ /srv/dev-disk-by-label-RSYNC/**

### **\*\*Beginners Note, Warning, and Sanity Check\*\***

- Getting the source (left) and destination (right) in the correct order, in the command line, is **crucial**. If they're accidentally reversed, the empty destination drive will delete all data on the source drive.
- The safest option would be to leave the switch **--delete** out of the command line until two full copies are confirmed.

As previously mentioned, this Rsync operation can be manually run or automated under: **System, Scheduled Jobs**, as shown in the illustration. Copy and paste the Rsync command line into the command box and select scheduling parameters as desired.



#### User Options for Backup:

- Automated:  
As configured above, and **ENABLED** (green), this Scheduled Job will run the Rsync command line once a week, on Monday, at 05:00AM. After the first run of the command, which may take an extended period to complete, a week or more would be a good backup interval. Generally speaking, the backup interval should be long enough to allow for the discovery of a data disaster (drive failure, a virus, accidentally deleted files, etc.), with some time to intervene before the next automated backup replicates the problem to the 2<sup>nd</sup> drive. This is also a drawback of using automation; if data loss or corruption is not noticed by the user, those problems will be replicated to the back up drive during the next Rsync event. Longer backup intervals allow more time to discover issues and disable replication.
- Manual Run:  
If the job is **disabled** (the **ENABLED** toggle switch is gray), the job won't run automatically. However, the job can be run manually, at any time, by clicking on the job and the **Run** button. This may be the best option for users who do not check their server regularly.

– Delete Protection:

Removing the **--delete** switch from the command adds user delete protection, and may allow the retrieval of files accidentally deleted from the source drive. As previously noted, to clean up the destination drive of intentionally deleted and unwanted files, the **--delete** switch could be manually entered into the command line, from time to time, as may be deemed necessary.

The Bottom Line: The additional cost for full data backup using Rsync is the cost of an external drive, or an additional internal drive, of adequate size. For the insurance provided, the additional cost is very reasonable.

**\*\*Keep in mind:** In the event of a failing or failed data drive it is **crucial** that the drive-to-drive Rsync job – if automated – is turned **OFF**. Similarly, do not run the job manually.**\*\***

## Recovery from a Data Drive failure - Using an Rsync'ed backup

### General:

**\*\*Again, as a reminder, when the NAS primary drive is failing or has failed, it's crucial to turn **OFF** an automated drive-to-drive Rsync command line.\*\***

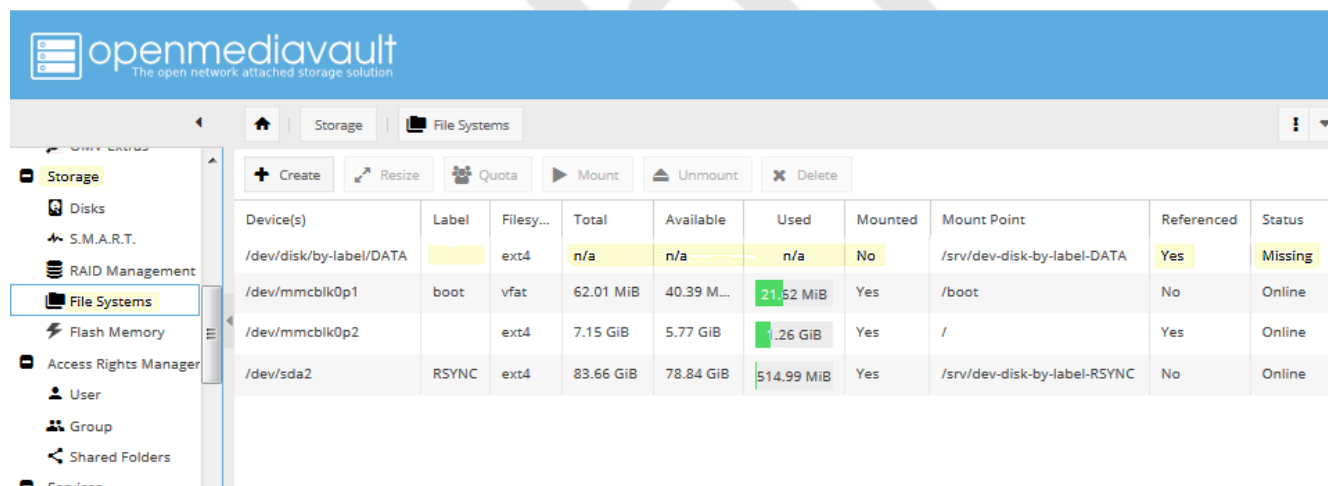
There are two basic options for restoring data with an Rsync'ed backup drive - they are “with” or “without” a replacement for the source data drive.

### Restoration Without a Replacement Drive:

Without a replacement drive on site, which would be the most likely case for most home users and small businesses, the backup Rsync'ed “destination” disk can become the data source for network shares. This involves repointing existing shared folders, from the old drive location, to the backup drive. All simple services layered on top of the shared folder, to include SMB/CIF shares and other share folder services, will follow the shared folder to the new location on the back up drive.

### Repointing a Shared Folder:

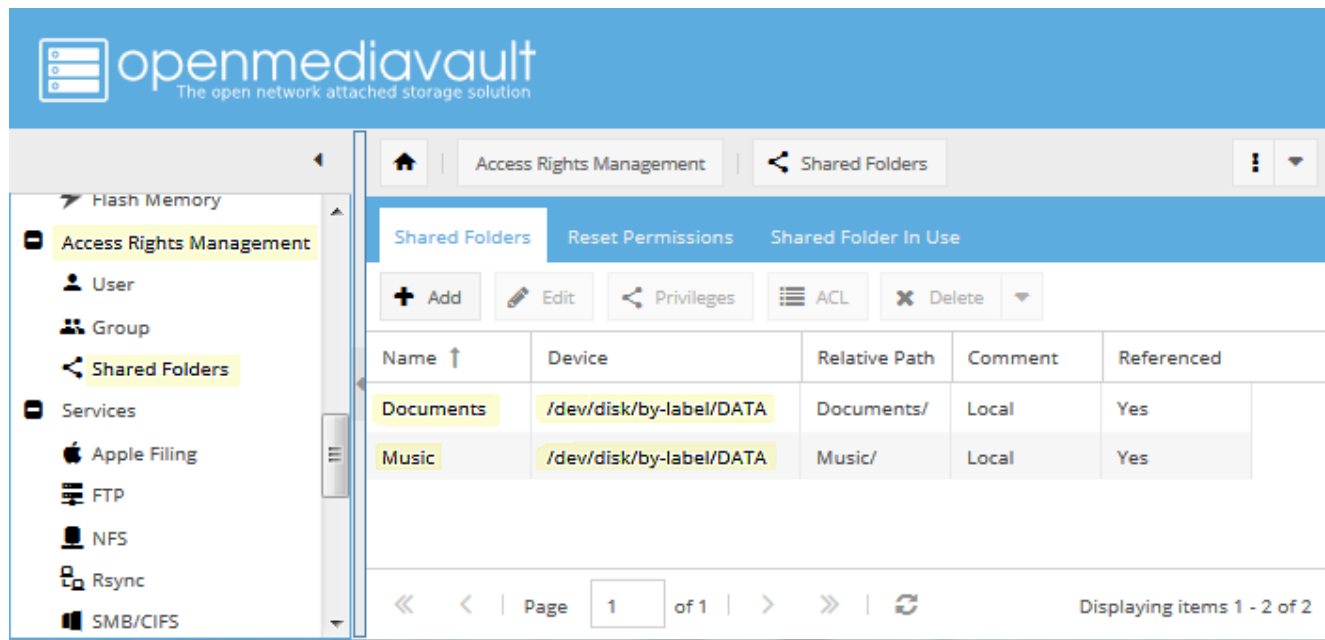
In the following example, the data drive has failed and it's been determined that it's not repairable. Under **Storage, File Systems** we have a **missing** source drive (labeled DATA) that's **referenced**.



Device(s)	Label	Filesystem	Total	Available	Used	Mounted	Mount Point	Referenced	Status
/dev/disk/by-label/DATA		ext4	n/a	n/a	n/a	No	/srv/dev-disk-by-label-DATA	Yes	Missing
/dev/mmcblk0p1	boot	vfat	62.01 MiB	40.39 M...	21.52 MiB	Yes	/boot	No	Online
/dev/mmcblk0p2		ext4	7.15 GiB	5.77 GiB	1.26 GiB	Yes	/	Yes	Online
/dev/sda2	RSYNC	ext4	83.66 GiB	78.84 GiB	514.99 MiB	Yes	/srv/dev-disk-by-label-RSYNC	No	Online

**\*\*Note that there may be **Error** dialog boxes regarding the failed mount of existing shared folders. With a missing and referenced drive, this is to be expected.\*\***

The actual references to the failed DATA drive are the **Shared Folders** assigned to the drive, named **Documents** and **Music** as follows:



The screenshot shows the OpenMediaVault web interface. The left sidebar contains a navigation menu with the following items: Flash Memory, Access Rights Management (selected), User, Group, Shared Folders (selected), Services, Apple Filing, FTP, NFS, Rsync, and SMB/CIFS. The main content area is titled 'Shared Folders' and includes a sub-header 'Reset Permissions' and 'Shared Folder In Use'. Below this is a toolbar with buttons: Add, Edit, Privileges, ACL, and Delete. A table lists the shared folders:

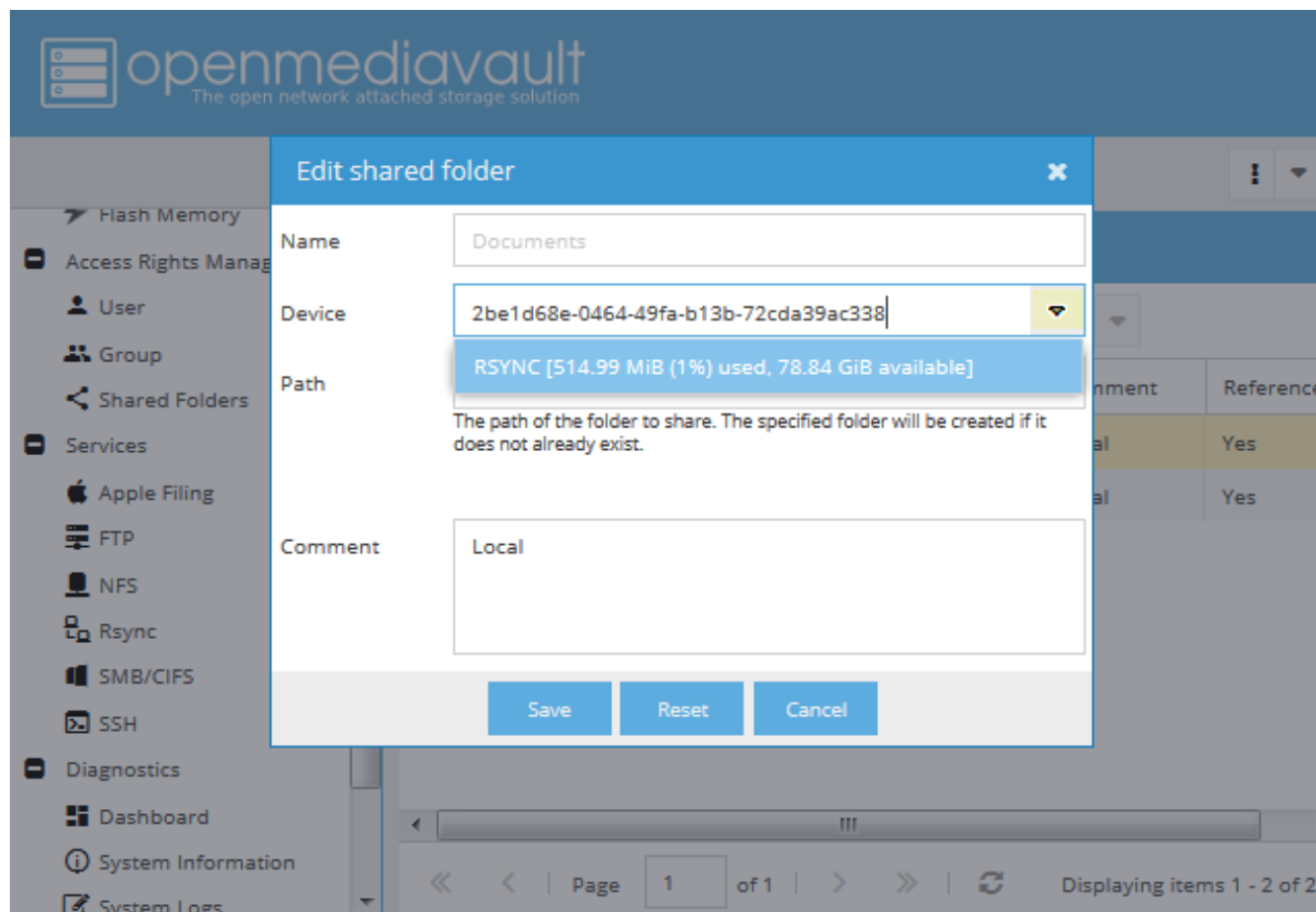
Name ↑	Device	Relative Path	Comment	Referenced
Documents	/dev/disk/by-label/DATA	Documents/	Local	Yes
Music	/dev/disk/by-label/DATA	Music/	Local	Yes

At the bottom of the table, there is a pagination control showing 'Page 1 of 1' and a refresh button. The text 'Displaying items 1 - 2 of 2' is also present.

Since the DATA drive no longer exists and there's an exact duplicate of all folders and files on the backup drive, we'll repoint the shared folder named **Documents** to the RSYNC backup. Click on the **Documents** Shared Folder, above, and the **Edit** button.

In the **Edit Shared Folder** Dialog Box, click the **drop down button** on the **Device** Line and select the destination / backup drive. (In this example the drive labeled RSYNC is the backup.) A confirmation dialog box will prompt “**Do you really want to relocate the shared folder?**” Click “**Yes**” and “**Save**”.

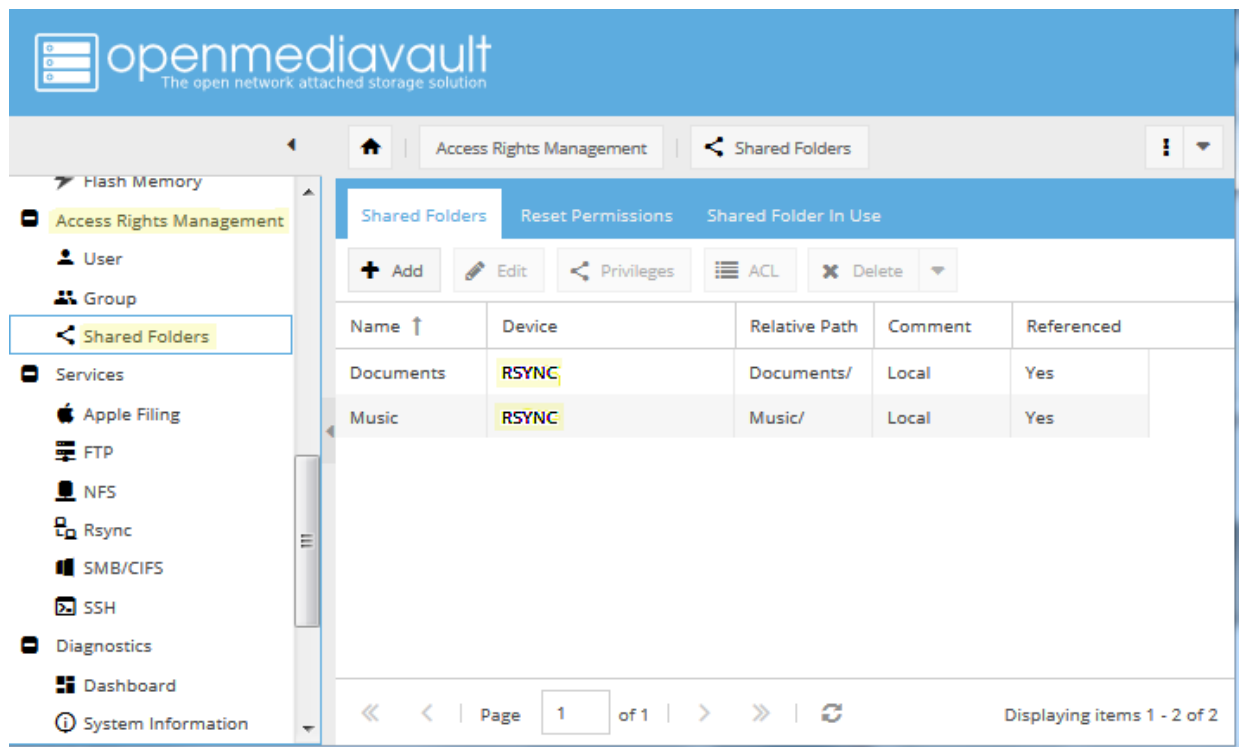
(Remember that all contents of the now missing source drive and the destination drive were identical as of the last backup, to include the path statement. Changes are not necessary – repointing the share is just a matter of selecting the backup drive.)



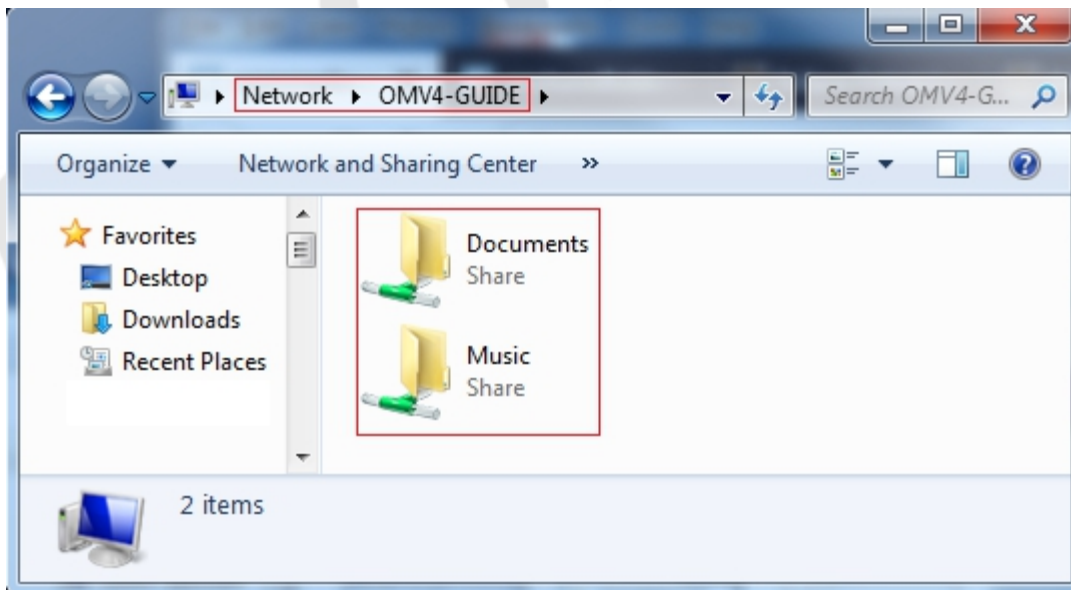
Do the same for all remaining Shared Folders. (In this example, Music was repointed as well.) Again, error dialog boxes may appear during the process. Acknowledge them (with **OK**) but do not revert, or back out of change confirmations. When all Shared Folders are redirected to the backup drive and saved, the error dialog boxes will end.

In the final result:

With one operation per shared folder, all shared folders have been redirected to the backup drive labeled RSYNC.

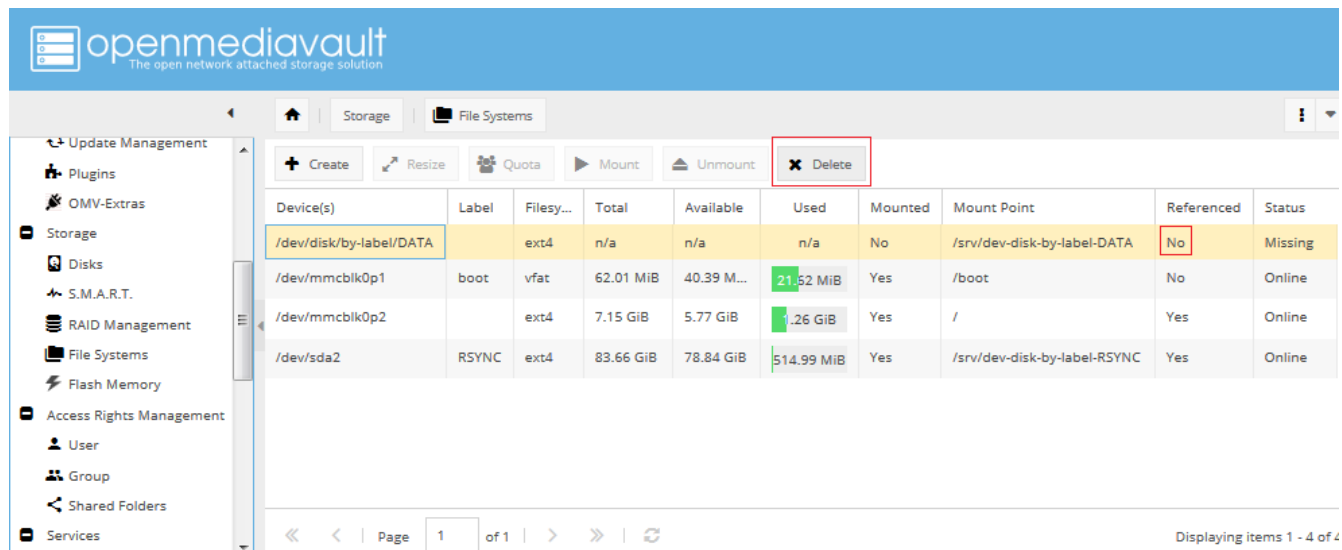


In this case there were SMB network shares layered on top of the Shared Folders above. The SMB network shares followed their associated Shared Folders, without additional configuration, so SMB shares are up and running on the Network.



In addition, most simple services that are applied to these shared folders, would follow the shared folder when it is repointed to the backup drive.

One last operation is needed to completely remove the failed DATA drive. Go to **Storage, File Systems** and note that missing drive DATA is no longer referenced. When clicking on the failed drive, the **Delete** button is now active. **Delete** the drive.



The screenshot shows the OpenMediaVault web interface for managing file systems. The left sidebar contains navigation options like Update Management, Plugins, OMV-Extras, Storage, Disks, S.M.A.R.T., RAID Management, File Systems, Flash Memory, Access Rights Management, User, Group, Shared Folders, and Services. The main panel is titled 'File Systems' and includes action buttons: Create, Resize, Quota, Mount, Unmount, and Delete (highlighted with a red box). Below these buttons is a table listing file systems.

Device(s)	Label	Filesy...	Total	Available	Used	Mounted	Mount Point	Referenced	Status
/dev/disk/by-label/DATA		ext4	n/a	n/a	n/a	No	/srv/dev-disk-by-label-DATA	No	Missing
/dev/mmcblk0p1	boot	vfat	62.01 MiB	40.39 M...	21.52 MiB	Yes	/boot	No	Online
/dev/mmcblk0p2		ext4	7.15 GiB	5.77 GiB	1.26 GiB	Yes	/	Yes	Online
/dev/sda2	RSYNC	ext4	83.66 GiB	78.84 GiB	514.99 MiB	Yes	/srv/dev-disk-by-label-RSYNC	Yes	Online

At the bottom, there is a pagination bar showing 'Page 1 of 1' and a status message 'Displaying items 1 - 4 of 4'.

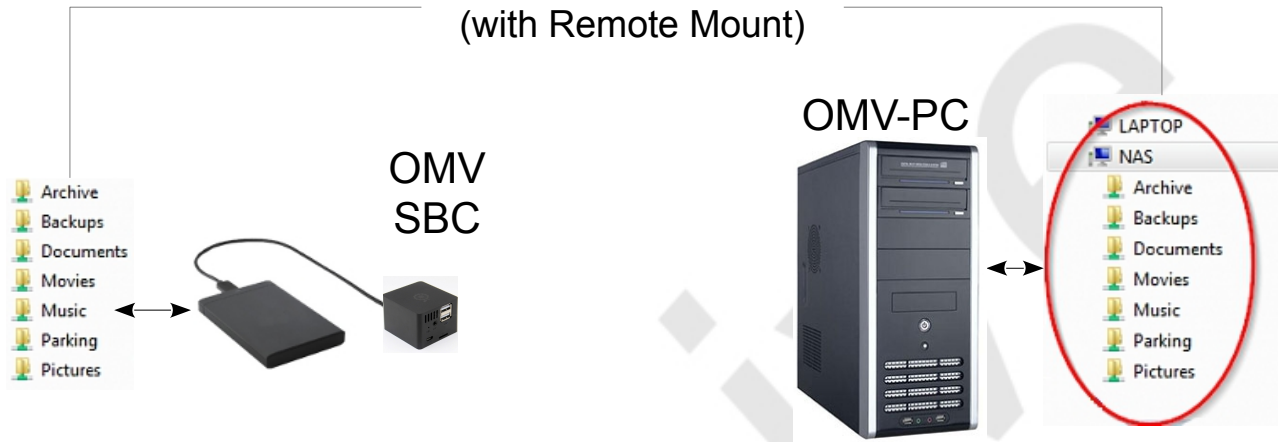
At this point, all shares in this example have been successfully redirected to the backup drive and the server is fully functional again.



## Second Level Backup: Replication To a Second Host

### Rsync:

Local Job  
(with Remote Mount)



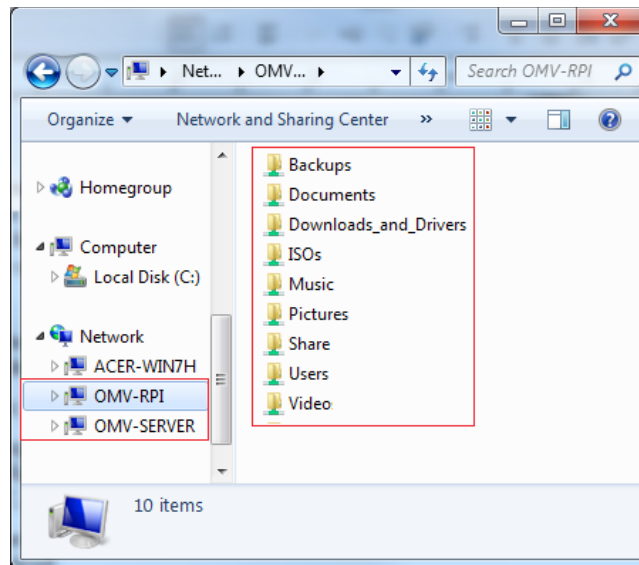
The first item to note, is that this scenario can be accomplished using a LAN client, as the second host, and it could be a Windows client. The additional cost would be the price of a second drive of sufficient size (internal or external) to house the second copy of data, attached to a remote host. The Remote Mount Plugin can mount a Windows share (a user name and password with write access is required) and Rsync can be configured to replicate NAS data to the Windows share.

As illustrated above, the second host could be a low cost SBC. This scenario can be designed with a number of desirable features.

- First, if backing-up to a second server platform, two fully independent copies of data are possible.
- When using an SBC with OMV installed:  
If the primary server failed completely, the second platform can be configured to take over as a backup file server. With all data backed up and resident on the SBC, this data can be made available, to the network, with SMB shares.
- Other than re-homing clients to the shares on the backup device, there's no recovery time and no “crisis” involved in getting data back on-line. It's already there.

The costs for this level of backup are very reasonable, with the cost of a hard drive of adequate size and an SBC. Good performing SBC's are available for \$50 USD or less. Older PC platforms or laptops could be configured as a backup server, for this purpose, as well.

As an illustration of the backup server concept, the following is a File explorer example of an OMV NAS-server and a SBC used for backing-up the main server's files.



While a Raspberry PI is among the lowest performing of the SBC's available, it will run OMV and is capable of replicating data shares in the background, albeit very s-l-o-w-l-y. This particular R-PI (OMV-RPI) is replicating all of the data shares of the OMV-SERVER and is re-sharing the same data to the network. Again, Rsync replication jobs of individual shares can be scheduled as desired, or triggered manually.

**\*\* The Practical details for setting up Primary Server to Backup Server share replication, using Remote Mount and Local Rsync Jobs will be covered in a future version of this guide.\*\***

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While replication to an independent host is an excellent method of avoiding data loss catastrophes, there are other potential events which can threaten irreplaceable data. Fires, roof or plumbing leaks and other unforeseen events can result in the loss of data, even on two independent hosts. For these reasons, backup professionals and experienced server administrators recommend an off-site copy. While this may seem extreme, it's actually fairly easy to accomplish. It can be done with an SBC or an old laptop, connected wirelessly, and housed in a utility shed with AC power. Some users set up a backup host in a family members' house, and replicate changed data over the internet.

In the bottom line, if users want to keep their irreplaceable data, an absolute minimum of two full copies is recommended, with a 3<sup>rd</sup> off-site copy preferred. As previously noted, effective backup strategies do not have to be expensive and are relatively easy to set up.

For further information on Backup concepts and best practices, an excellent explanation of Backup is provided by [Backblaze.com](http://Backblaze.com).

## Operating System Backup:

By design, the OMV/Debian operating system installs on its own partition, segregated from data. This makes copying or cloning the OMV boot/OS drive an easy process. So, one might ask, why is a clone or a copy of the operating system important?

Building OMV, from scratch, using the installer ISO is a 15-minute proposition, give or take. While it takes longer, roughly an hour, the actual hands-on portion of an ARM build is even less.

As users configure their servers, add services, reconfigure shares, move their data around, tweak access controls, etc., servers tend to become “works in progress”. Configuring a server to the user's preferences can be an evolution that may take weeks or even months. If a complete server rebuild is required, the customization, add-ons, and the collection of various user tweaks may take several hours to recreate. It is this time and effort that Operating System Backup will preserve.

There are several ways to duplicate an operating system boot drive, but many can be technically involved; requiring network access to remote servers, boot-able utilities and somewhat complex processes.

Given the low cost of flash media and with sockets mounted on the *outside* of a PC case, SD-cards and USB thumb-drives lend themselves to **cloning** and very quick recovery.

### ***The Benefits of Maintaining Operating System Backup***

In accordance with “[Murphy's Law](#)”, users may encounter issues where things go wrong. As examples, users may test software on their active server or try new settings. On occasion, installing an add-on may have unintended consequences. Trying new settings or working on the command line, may break OMV in a way that might not be recoverable. In other cases, there may be instances where a software update goes south – the source repository may go off-line in the middle of an update resulting in broken packages.

In all of these cases, having a confirmed working clone of the boot drive will allow users to “drop back” to a known good state. The “FIX” would be as simple as shutting down and booting the server on a known working clone.

The advantages of maintaining operating system backup are obvious. Beginners, with very little knowledge of Linux, can work with their servers without fear, which facilitates learning. If a Linux update causes ill effects, it's possible to drop back and selectively install packages to isolate the exact cause of the problem. If an add-on update doesn't work (direct installed software, a plugin, Docker, etc.), the user can gracefully back out of the update and leave the older (but working) software package in place.

It's the easiest, quickest, and most effective fix, for resolving problems with OMV and the underlying Debian Operating System.

### **The practical issues of maintaining boot drive clones – when to update and rotate?**

1. It makes sense to apply Linux Operating System updates and wait a week or so, to insure that all is working and that there are no ill effects. If all is well, update the backup and rotate.
2. The above would also apply to add-on packages, Docker, or plugin upgrades. (Plex, Urbackup, Pi-Hole, etc.)

3. If a network share is added, deleted, or any aspect of the NAS is reconfigured that changes the operation of the NAS; the backup would need to be updated. (Otherwise, the configuration of the previously cloned boot drive would not mesh with the configuration and contents of data storage.)
4. If a cloning mistake is made (let's respect Murphy's Law), a 3<sup>rd</sup> clone could become a “fallback of last resort”. Given that Linux package upgrades and OMV sub-version upgrades have little to no effect on network shares or the high level configuration of the NAS, a 3<sup>rd</sup> clone can be maintained that is updated only when the NAS configuration is changed.

### **\*\*A Last Important Note About Backing Up your OS\*\***

Just as it is in the commercial world, where support for a product may be discontinued, the open source community is constantly moving forward as well.

Users may believe that an ISO file, or image, contains all the software needed for a build. In some current build cases, that assumption would be incorrect. Linux distro's, during the initial build and to finalize the installation, may depend on on-line software repositories. After the installation is complete, patches and updates may be applied which rely on on-line repositories as well.

Can it be assumed that those same software repositories and resources will be available on some future date, exactly as they were at the time of a current build? The answer is “no”. Builds of a specific version, fully patched and updated, can be performed for a limited time.

Therefore, if users have extensively configured builds, are using specialty hardware (such as SBC's) or are using OMV to serve a critical function; it would be wise to backup the boot drive to an image file, or Clone the fully configured working installation to separate flash media, and save a copy for future use.

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### ***Cloning Flash Media***

To avoid issues that can result from dissimilar sizes, it's best to clone images from/to identical SD-cards or USB thumb-drives. Otherwise, it's easier to clone if a new drive is slightly larger than the working drive.

(And while it's an advanced technique, [Gparted](#) can be used to slightly shrink flash drive partitions, to fit on the smaller of the two flash drives. Also of note is that Gparted can be used to expand partitions on larger flash media to take advantage of unused space.)

### **The Cloning Process for USB thumbdrives and SD-Cards**

- Install [Win32Diskimager](#) on a Windows PC.
- Format the new SD-Card or USB thumb-drive with [SDFormatter](#)
- Test the new card or USB drive with [h2testw1.4](#). One test is enough. (Do **NOT** select endless verify.)

If the device registers errors, or does not have the capacity that's marked on the label (a fake), throw it away.

**\*\*At this point you should consider marking your working SD-card (with permanent marker?) to make sure you don't mix it up with the new one. Otherwise, you might read a “blank card” and use the blank image to “overwrite” your working card.\*\***

- Insert your working card and start Win32Diskimager

**SANITY Check**, make sure you inserted your working SD-card / USB thumb-drive at this point.

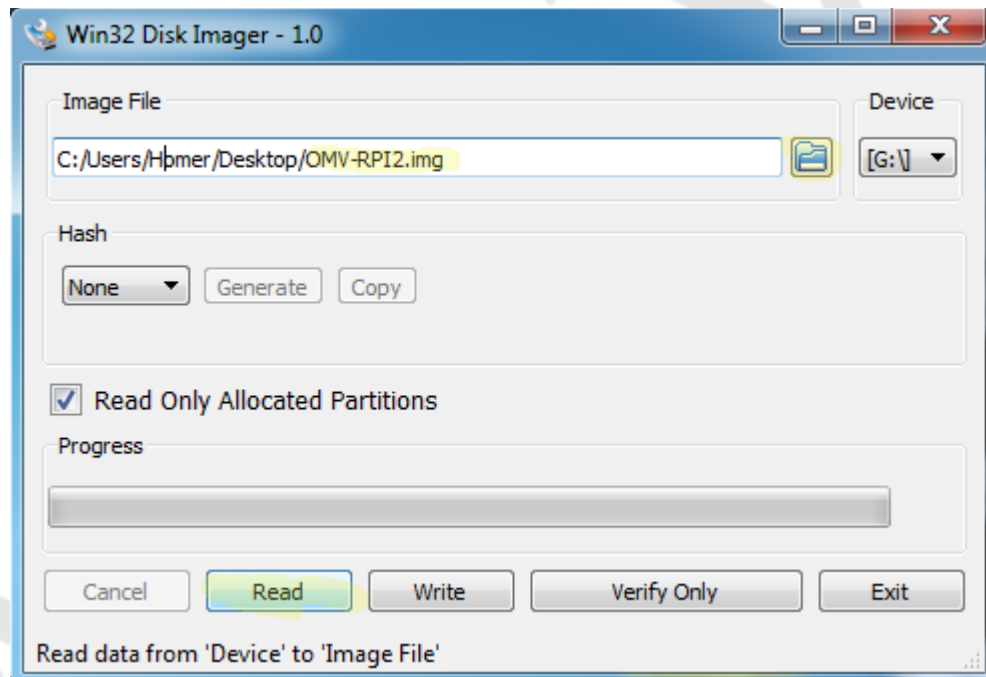
**\*\*Note:** Windows will not be able to read the format of the partitions on the working boot drive and offer to format it for you. **DO NOT** format the drive. Close the dialog box with the **X**.

- In most instances, Win32Diskimager will detect USB thumb-drives and SD-cards, and set the Device drive letter. However, it would be prudent to check the letter Windows assigns the drive with Windows Explorer.

- First click on the folder ICON and navigate to the location where you'll store your image file. Type a name in the file line. (OMV-RPI2.img was used for this example, but users can **add a date** to the name as well, such as OMV-04-30-2018.img)

- Check the box for "Read Only Allocated Partitions". (With larger drives, this option avoids imaging unused space which saves significant time when reading a drive to a new image and, later, when writing the image to another drive.)

- Click **Read**.



- When the read is done, **this is crucial**, click the **Verify Only** button. This will compare the image file just created, to the boot drive. **DO NOT SKIP Verification**. (Win32Diskimager has a known bug which affects some use cases.)

- If verification passes, pull the working boot drive and store it close by. If verification **FAILS**, the image file is corrupt and cannot be used.

**\*\*If the user/admin is running a business or is in another time sensitive scenario, where the NAS server can not be out of service for an extended period; the server can be booted on the source drive while the clone is being written. Thereafter, the drive swap could be accomplished during a low use period.\*\***

While the resultant image file may be quite large, if the file is retained, it can be written again at a later date. In such a case, the image file itself is an additional backup.

- Insert the new flash drive and start [Etcher](#). (Etcher typically detects flash drives as well.)
- Select the image file previously created, verify the destination flash media drive, and click the FLASH! button.

One of Etcher's features is that it writes the image and verifies it in a single operation. If the operation is successful, the working boot drive has been cloned. Insert the new clone into the server and boot it up. With a successful boot up on the clone, user/admin's will have to two verified copies of their server's boot drive.

**\*\*Note** – Win32diskimager will write an SD-Card or USB drive, but verification is required and it's a second operation. Etcher combines the write and verification in a single process. If users walk away, during the write operation, which can a long of time, Etcher is the best choice for writing flash media.



# Add-on's – Adding Value to Your OMV server

## General

The [OMV Forum](#) has an extensive [Guides](#) section. Whether a users preference is videos or printed text, there's something for everyone among the numerous “How-To's”. Beginners and Advanced users alike should take a few minute to familiarize themselves with the content in Guides section of the Forum.

## OMV's Plugin's

OMV has numerous plugin's. Some are integrated into the base package, by the OMV developer Volker Theile. Examples are iSCSItarget, usbbackup, among others.

Still more were created by OMV plugin developers, such as Remote Mount, flash-memory, downloader, and more.

Many plugins are integrations of third party software such as Plex, Emby, SNAPRAID, etc. While questions or issues regarding the **integration of plugin's**, into OMV, are of interest to OMV's developers, questions on the **operation of plugin's** are best directed to the applications supporting web site.

## Dockers - General

While Dockers are an avenue toward adding *extensive* functionality to OMV, they are an advanced topic that may prove to be frustrating for beginners. To get started, beginners should consider installing the Docker Plugin and use one of several [Docker - How To's](#) found on the OMV forum.

While it's command line oriented, this [Docker Tutorial](#) is very helpful for understanding basic concepts.

## What is a “Docker”?

Dockers are a type of Virtual Machine (VM) that share the Linux kernel and memory spaces with the host. A Docker is spawned from a Docker image. The resultant VM equivalent, that's built from a Docker image, is referred to as a “container”. A container is fully self-sufficient, bare-bones, Linux operating system. The idea behind a Docker image is to create a Linux installation, that is as small and as lean as possible, that includes all necessary dependencies required to run the Docker application. Since these containers tend to be very small, they can be constructed and destroyed in short order. (After downloading, usually, in a matter of seconds.)

Dockers are more resource efficient when compared to running a full VM in a hypervisor, due to direct allocation of hardware resources. Typically, VM hypervisors provision fixed blocks of memory and may require access to dedicated hard disk space. Whether these dedicated resources are used by the VM or not, they're no longer available to the Host operating system or other VM's. A Docker, on the other hand, uses the needed memory space to run its processes and the host's hard drive for storage, without wasted resources. Resource management is tight and lean, allowing more Docker containers to run concurrently with greater efficiency.

## **Dockers - It's about choices**

While there are over 100,000+ Dockers, available on the [Docker Hub](#), all are not created equal. The offerings, from Docker authors, range from a one off experiment with no documentation (users are on their own) to organizations like [Linuxserver.io](#) that specialize in building Docker images. Linuxserver.io offers Dockers that have been thoroughly tested, they support multiple architectures, they provide detailed container setup instructions, their offerings are “Tagged”, and they retain inventories of their older images.

## **Selecting a Docker - Primary Considerations**

### **First:**

When installing a Docker, for the greatest chance of success, it is suggested that users follow the guidance provided in [Guides Section](#) of the OMV forum.

### **Second:**

Potential Docker users should first look for Dockers that support their **architecture**. The three primary architectures supported by OMV are **ARMHF** or **ARM64**, **X86**(32 bit), and **X64**(64 bit). In most cases, 32bit Dockers will run on 64bit hardware.

**\*\*While there may be exceptions, X86 and X64 Docker images may not run on ARM platforms.**  
**“Multi-arch”** (multiple architecture) Docker images are more platform flexible.\*\*

### **Third:**

To increase the chance of success, when attempting to install a Docker without a guide, look for the more popular Dockers with the highest number of “**pulls**” on the Docker Hub. ([hub.docker.com](https://hub.docker.com)) There are good reasons why these Dockers are broadly popular – they tend to work.

### **Forth:**

In the vast majority of cases, Dockers that fail to work won't have anything to do with OMV or the Docker Plugin. Their issues tend to be with selecting the **wrong architecture**, selecting the **wrong network mode** (host, bridged, macvlan) for the application, other configuration issues (such as port 80 OMV/Docker conflicts), or the Dockers themselves.

Since most Dockers share Network ports with the host (OMV), it's important to use ports that are not currently in use. To get a better understanding of network ports and for commands that will reveal ports that are in use, refer to this forum post for more information:

[\[How-To\] Define exposed ports in Docker which do not interfere with other services/applications](#)

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## When things go wrong

First take note of any error dialog boxes. On most Windows and Linux machines it's possible to copy and paste the text out of a dialog box by holding down the left mouse button and dragging the mouse pointer over text, to highlight it. Then use the keys with Cntrl+c (to copy), then click in a NotePad document and use Cntrl+v (to paste). This basic information will be helpful, in searching out the details related to the problem.

### ***The First Resource – The Internet***

Users should search the internet first. The solutions for many generic problems can be found with [duckduckgo](#), [google](#) and other search engines. In searching on key words that match the problem users may be having, in some cases, answers can be found quickly in real time. This is the fastest and often the best way to learn how to fix server problems. Since OMV is based on “**Debian**”, it may be a useful search term.

While the search function of the OMV forum site will produce “hits” on search criteria, it is by no means all inclusive. If **OMV** is included in search criteria, a Google search may generate more result hits on information found on the OMV forum, than forum's integrated search function.

With information from searches, users should make an effort to address their own issues. This approach tends to be the path to the fastest answers and facilitates the learning process.

### ***The OMV Forum***

When coming to the forum for help:

First search the forum. In many cases, user problems can be resolved with a few searches and a bit of reading. However, look at the dates of posts and the version of OMV referenced. Posts that are 3 or more years old may not apply to the current OMV version.

If posting a problem on the forum, start at the [forum index](#), and look for the category that looks to be appropriate for the post. Along with an explanation of the the issue; the OMV version, the appropriate logs and command line output, if known, and the hardware platform in use are the absolute minimums required. Realize that, without information, even the most experienced users, Moderators, and / or Developers will not be able to provide assistance.

- While OMV's forum is known for responsiveness, it's unrealistic to expect answers in real time. It may be a matter of days before a forum member, who is familiar with the described problem, will read and respond to a post.
- When looking at answers, try to focus on the information presented, not the perceived tone. Remember that support is provided “**gratis**”, so act accordingly.
- Be open-minded. The reason why users post on the forum should be because they couldn't solve a problem on their own. With that in mind, when an experienced forum user replies, taking the time to make a suggestion or requesting more information, forum users should follow up and post the result. Whether the issue is fixed or not, user posts help other users with the same or a similar problem.
- If a forum post or a “How To” fixes your problem, or gets you through a configuration issue,

consider giving the author a “Thumbs Up” □ □ The gesture is free and it's an indicator to other users who may have the same problem. In essence, you'd be saying “I agree” or “this worked for me”.

- When users are experiencing problems with their data store (a file system issue, a hard drive, array, etc.) the working assumption on the part of experienced forum users and moderators will be that **users have full data backup**. Accordingly, recommendations for correcting file systems, hard drives, and RAID array issues may result in the loss of data. **Keep this in mind.**

Archive

## Common Problems:

**Problem:** After a reboot, the web page is not available. (Bad Gateway or 404 error.)

**Solution:** This may happen on an odd occasion. Instead of doing a dirty shutdown, SSH in with PuTTY, and issue the command: **reboot**. The system will reboot. Login.

**Problem:** Web interface has missing fields and/or items showing that have been uninstalled.

**Solution:** Clear your browser cache and, always, login to the Web console using the user, **admin**.

**Problem:** I mounted the drive using the command line and I can't select that drive in the shared folder device dropdown.

**Solution:** Never mount a drive with anything other than the OMV web interface. This creates the necessary database entries to populate the device dropdown.

**Problem:** I only see a few items in the web interface like the user section of Access Rights Management.

**Solution:** You did not login as the **admin** user. This is the only user that can access everything.

**Problem:** I get an error every time I post in the forum especially if it is a long post and/or has links to external pages.

**Solution:** The error is deceiving. Please don't keep trying to post. The spam filter has flagged your post and it will need to be approved. Please be patient.

**Problem:** Samba is slow.

**Solution:** Read these threads - [Tuning Samba for more speed](#) and [Tuning Samba for more speed 2](#) (\*\*This does not apply to SBC images – Samba has already been optimization on these platforms.\*\*)

**Problem:** You see an error where a domain name/host could not be resolved

**Solution:** You probably need to set your DNS server in **System -> Network -> Interfaces**

**Problem:** "No Network Interfaces" when looking at the console, after boot up.

**Solution:** Most of the time, this is caused by the system taking too long to get a DHCP IP address before the message is written. The adapter's address can be checked by logging in with any user (root is a good choice) and typing `ip addr`

**Problem:** I have an ARM device and I'm having trouble with RAID. (OR) I have a USB connected RAID array or enclosure.

**N/A:** USB RAID is not supported.