Instructions for creating a Synology NAS from an old PC

Today I will guide you to build a NAS (Network Attach Storage) which roughly translates as Network Attached Storage Drive.

Whatever the function of Synology NAS is, the name alone probably says it all. Those who don't know can take advantage of old computers available to do it, and those who already know can join the discussion for fun. Let's get to the point.

PART I: PREPARATION STEPS?

Hardware:

Here I took advantage of an Acer EL1600 Emachine. With the following configuration:

1. CPU: Atom 230 1.6Ghz
2. Ram: DDR2 1Gb 800Mhz
3. HDD: WD Green 2TB x2

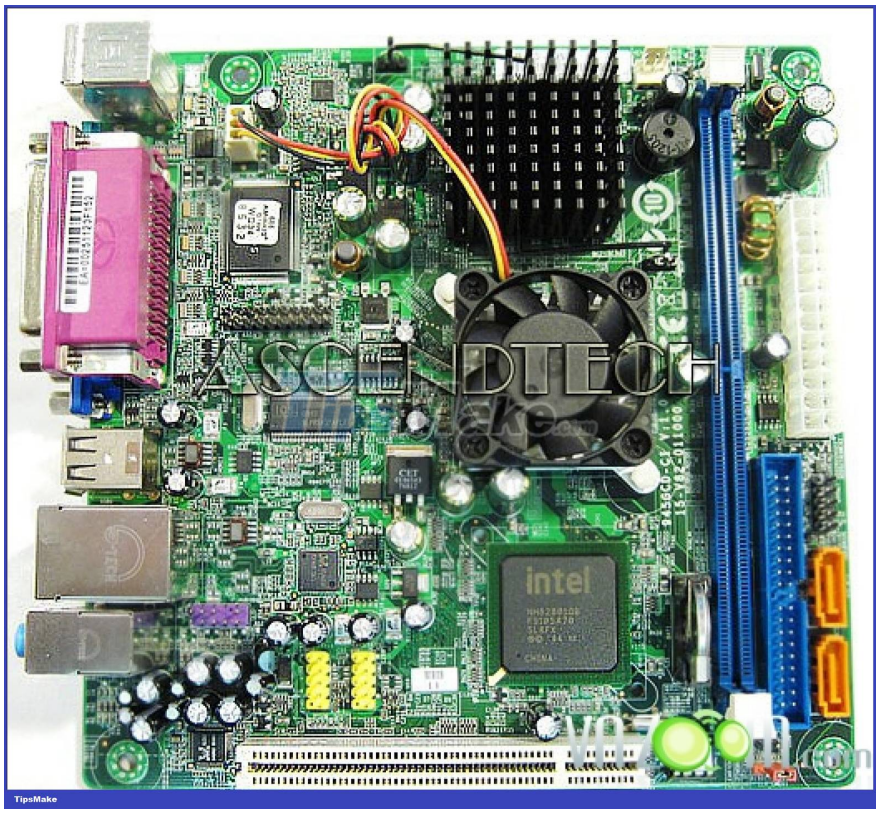
Some other necessary tools:

1. USB: 8GB (Minimum 2Gb to store NAS OS)
2. 12cm fan to increase the heat load of the machine, because the case is quite small, I have 2 more hard drives installed so I have to use an additional fan.

Note:

1. 1. The Onboard network card of this machine is only 100Mbps, so when copying files between computers on the LAN, it will be a bit slow (I will test to show you more clearly). I plan to find a 1Gbps network card to add to the PCI slot (a dwarf card because this case is quite small). I can't find it yet so I'll figure it out later.
2. 2. This machine only has 1 RAM slot and can increase the RAM to a maximum of 4Gb. If you need to use this NAS to store CCTV cameras, you should pay attention. Here I only use it to save data, download torrents, and use the simple ftp protocol so it doesn't need much RAM.

Below is a picture of her:



Software:

You can download all the necessary software here:

1. Win32 DiskImager.
2. Synology Assistant (Download the version suitable for your device)
3. NanoBoot 5.0.4.1
4. DiskStation Manager 5.0

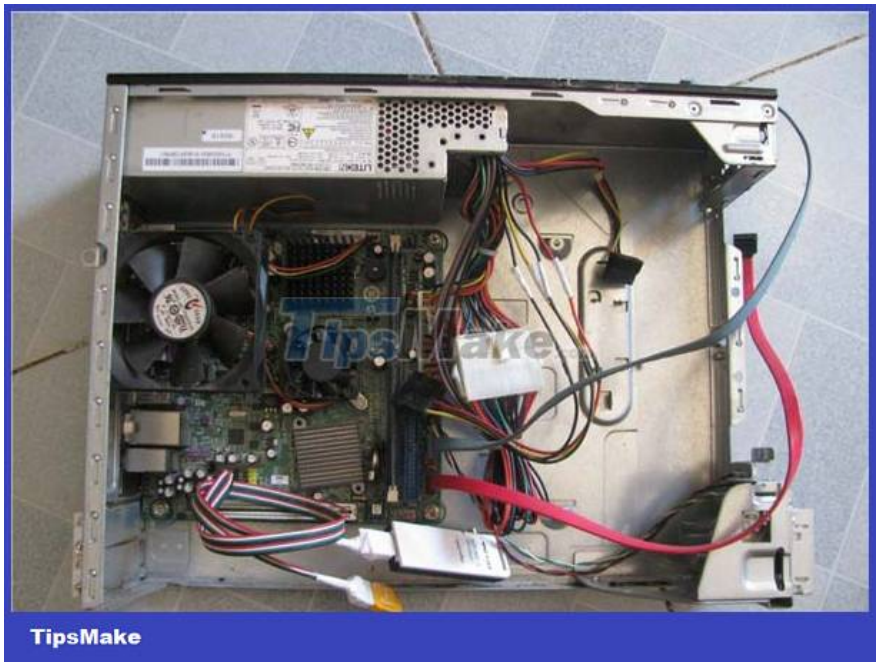
PART 2:?

Let's start building the hardware:

After editing, assemble everything together. This is also simple, just need to arrange the components accordingly and it will be fine. (This is mainly to show off the top, so I won't go into this part.

Install the hard drive into the tray.

Adding fans, perfecting the product.



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Here I use an additional 150Mbps USB wifi to connect wirelessly, for those who want to connect wirelessly without any hassle. However, I still prefer to use a network cable to ensure stable speed. After installing all the necessary parts, connect the keyboard, screen, network cable, start the computer, and set up the parameters. necessary numbers in the BIOS for the NAS to run optimally.

PART 3:?

1. Set up BIOS

Set up NAS to boot from USB. This is on my device, it may be different from other models, however, you can just do the same.

Set the NAS to start automatically if there is a power outage. In BIOS this option allows the NAS to automatically turn on if there is a sudden power outage. This option is for those who want the NAS to run 24/24.

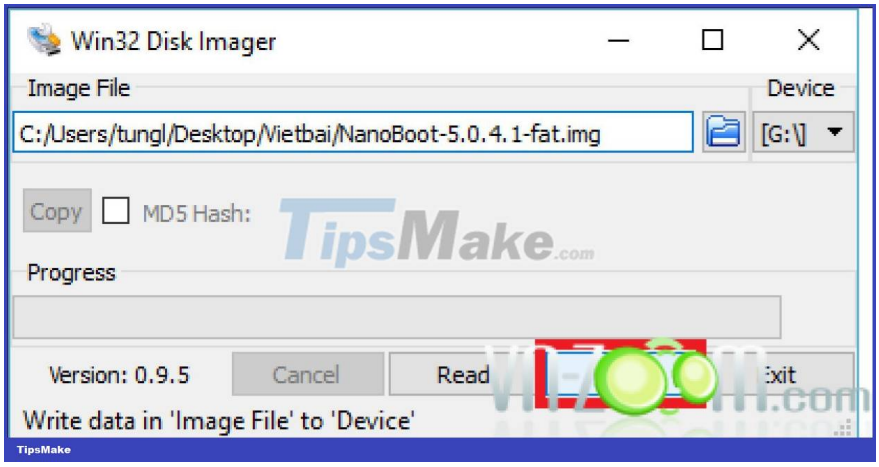
Set up Remote NAS Boot:

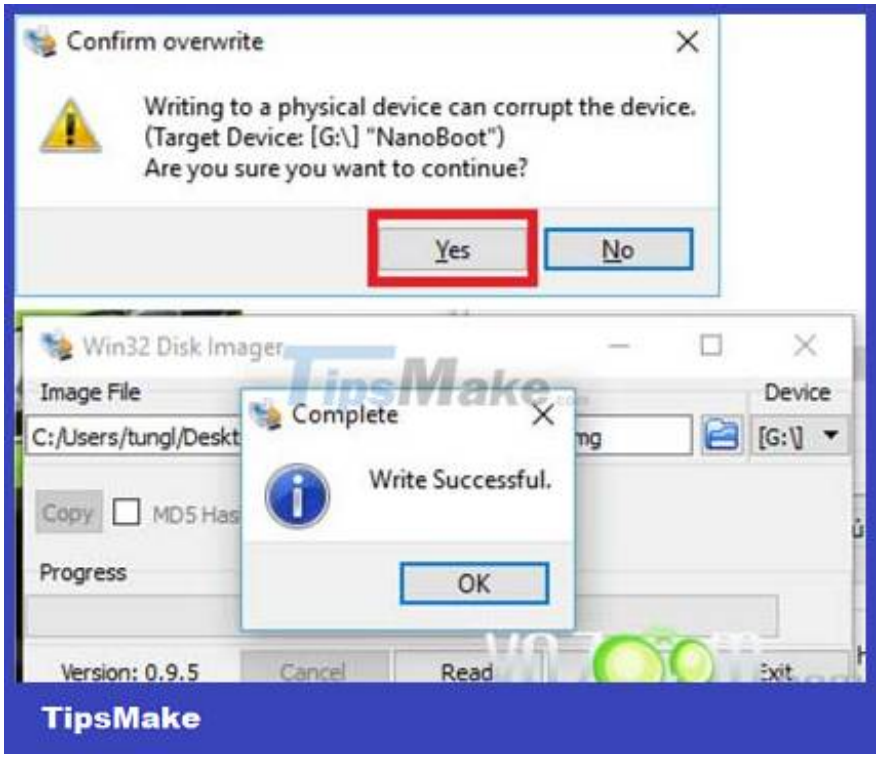
If your NAS is on the 7th floor, your work computer is on the ground floor. But you don't want the NAS to operate continuously to save power and increase the life of your computer. Is it true that every time you want to turn on the NAS, you have to run to the 7th floor to turn it on, then go down to the 1st floor to work. If you do it ten times a day, remember to bring an oxygen tank to breathe.) Luckily, my computer has the Wake Up On LAN (WOL) feature. If your computer has this feature, you should turn it on.

2. Proceed to install the software.

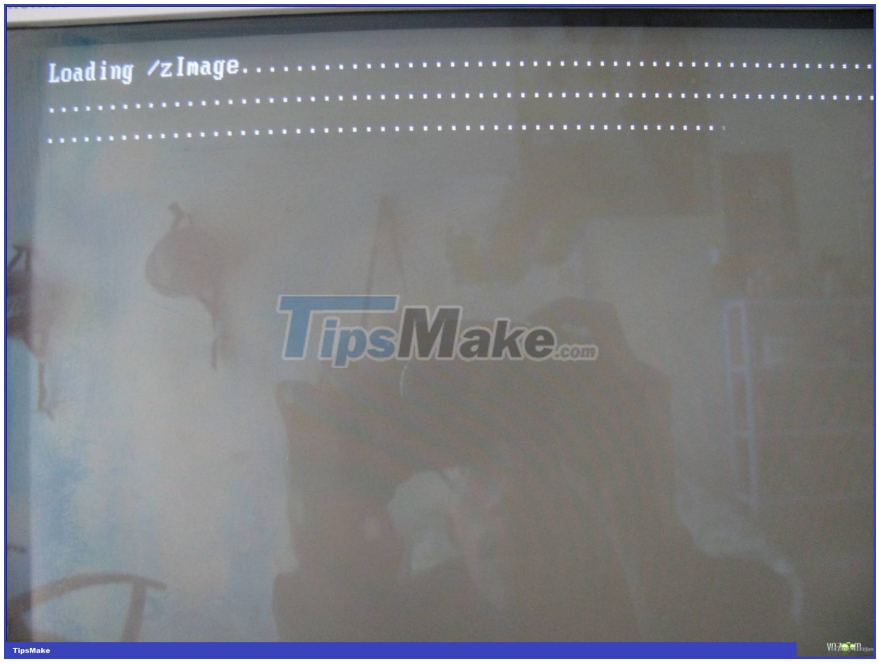
Install the software you downloaded above. I will skip the installation part, because this is too simple.

1. Win32 DiskImager.
2. Synology Assistant
3. DiskStation Manager 5.0
4. Burn file NanoBoot-5.0.4.1-fat.img to USB using Win32 DiskImager software.





Once completed, plug the USB into the NAS and start it up. Remember to set up boot from USB as the steps I instructed above. And here after completing the boot:


Loading /zImage.....
.....
.....
TipsMake.com
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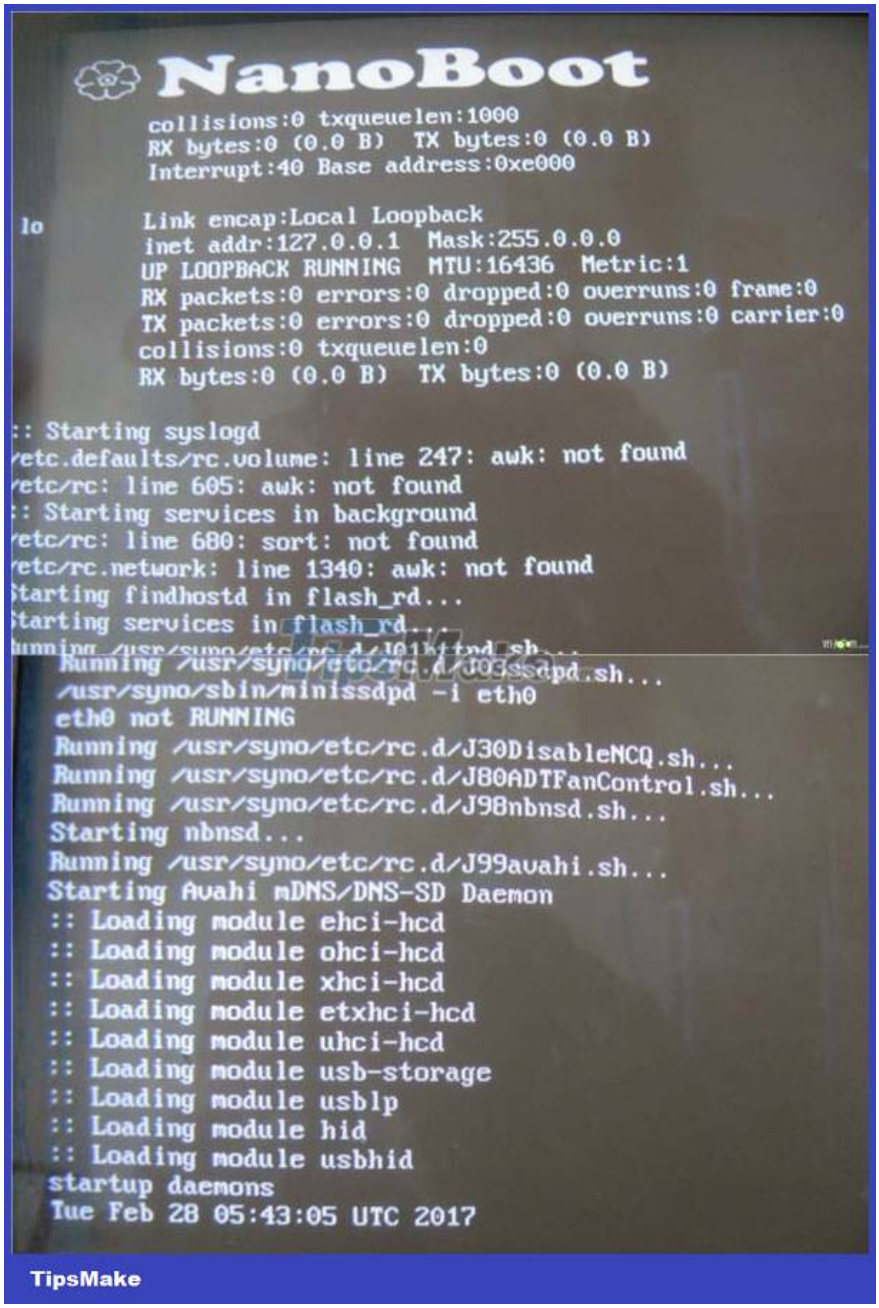
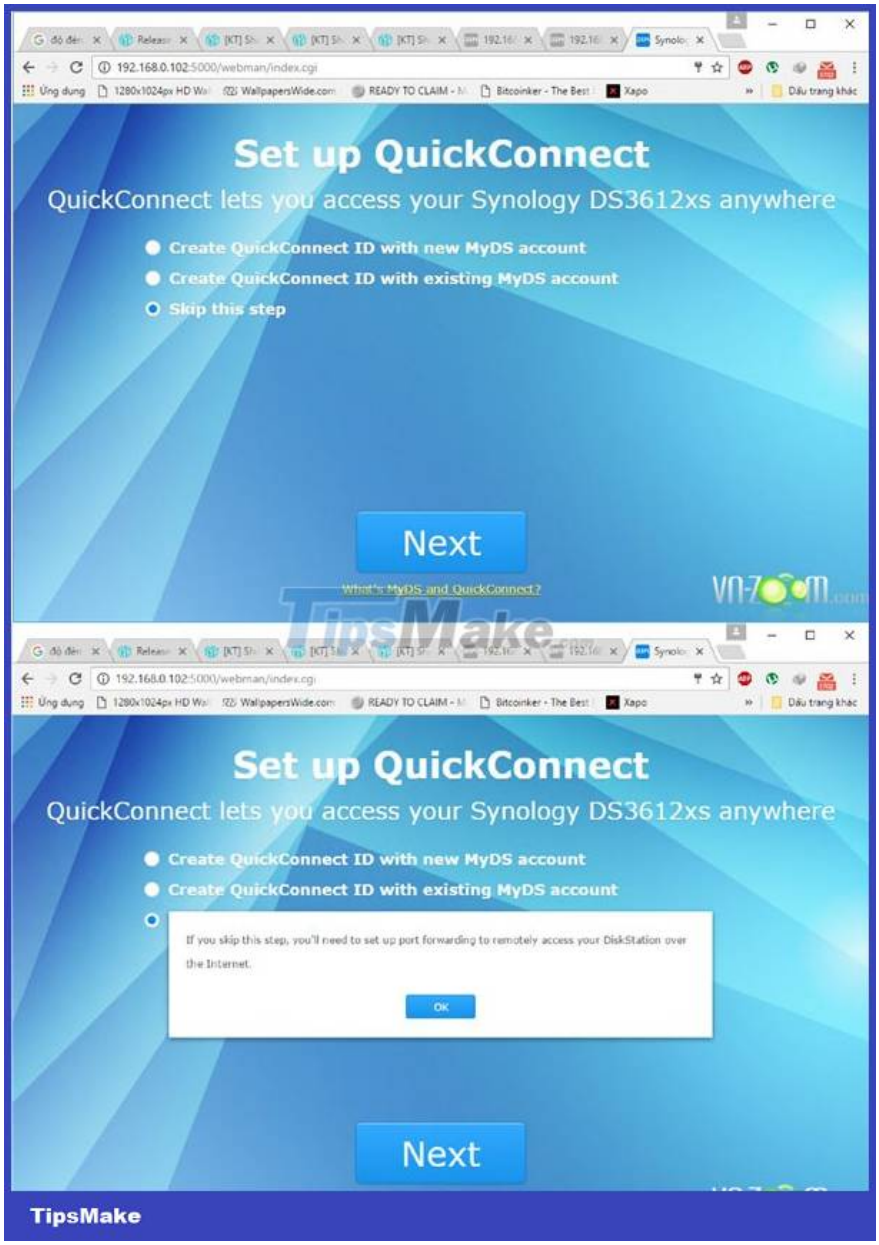


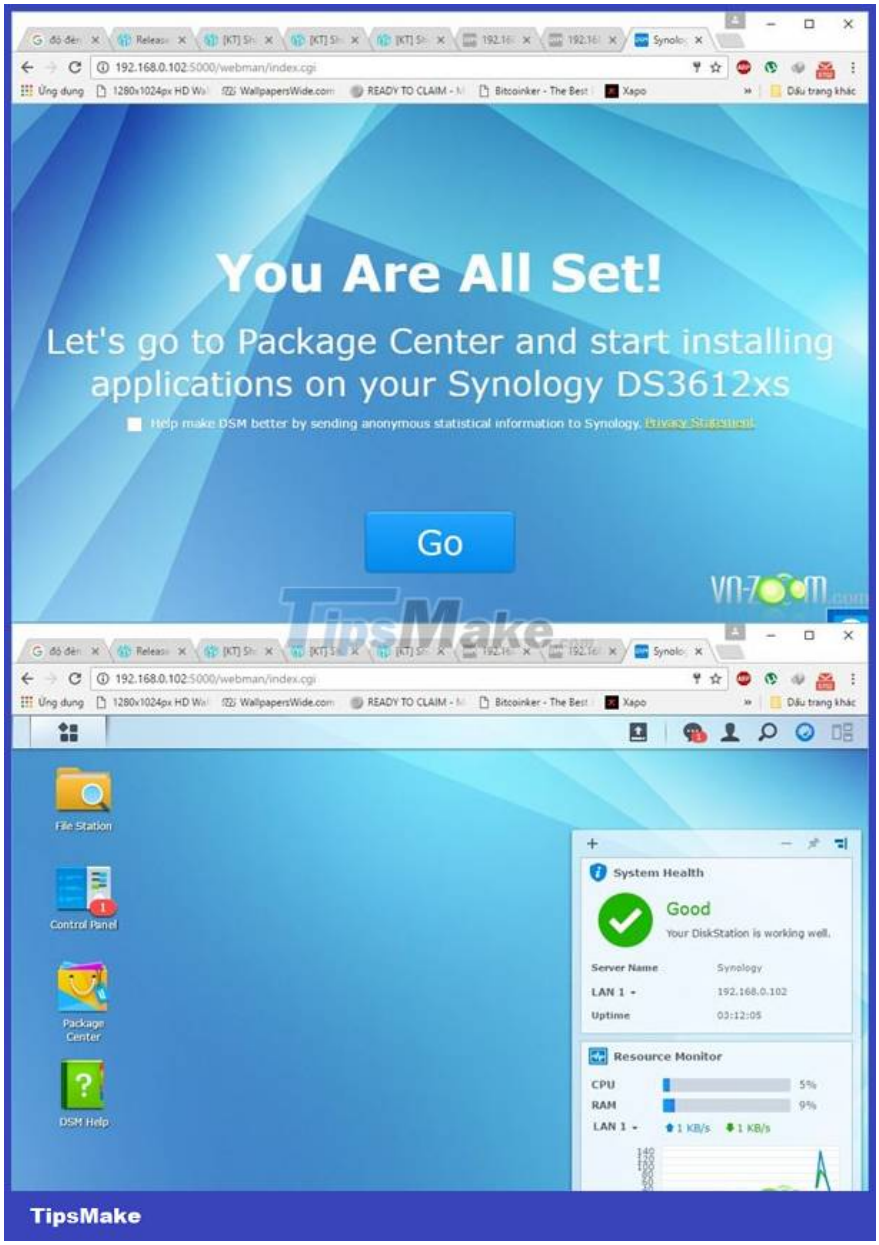
As above, the boot has been successful.

Install NAS OS

Finished. Now comes the part of installing NAS OS. Simply put, it is just an Operating System, like on a computer you install windows, linux. so.

Open Synology Assistant to search and start installation. When you open the software it starts searching for the NAS and automatically opens the browser for configuration. Just follow the steps below. I will explain each specific step for you to understand.


192.168.0.102:5000/webman/index.cgi
Set up QuickConnect
QuickConnect lets you access your Synology DS3612xs anywhere
Create QuickConnect ID with new MyDS account
Create QuickConnect ID with existing MyDS account
Skip this step
Next
What's MyDS and QuickConnect?
If you skip this step, you'll need to set up port forwarding to remotely access your DiskStation over the Internet.
OK
TipsMake



Finished. So you have finished installing NAS OS for your beloved NAS. At this point, it is considered that the basic assembly and installation part has been completed. In the following, I will guide you through configuring some basic things. For example: Share folders for multiple computers on the LAN, create and assign permissions to each user, simple file sharing protocol ftp over the internet, connect peripheral devices to NAS (USB Wifi, Hard Drive mobile.), torrent download application, and many more things waiting for you to discover.

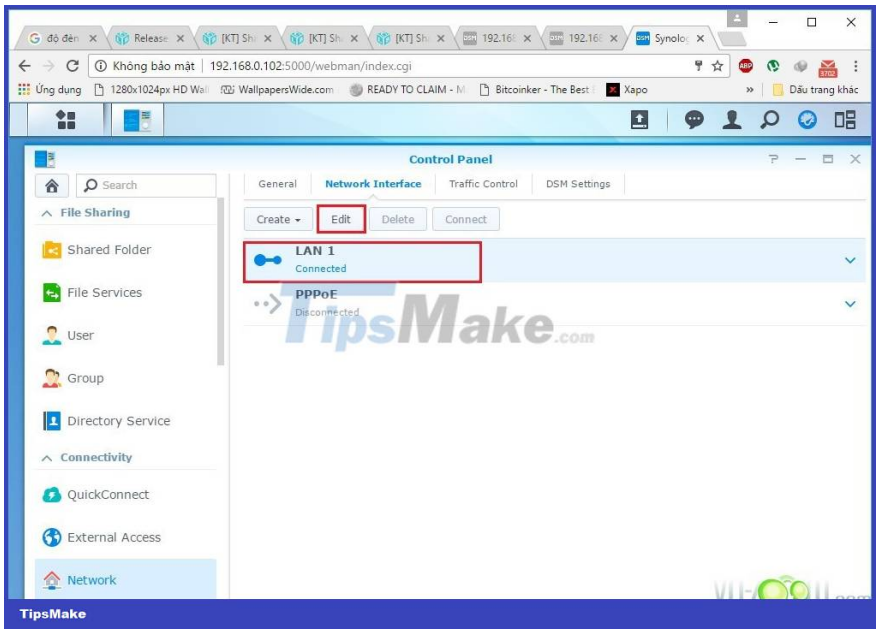
PART 4: Basic configuration.

Here I will only guide you through the most basic functions that I often use. You can learn more yourself. However, you can still ask here, I will help you as best I can, as long as it is within my understanding.

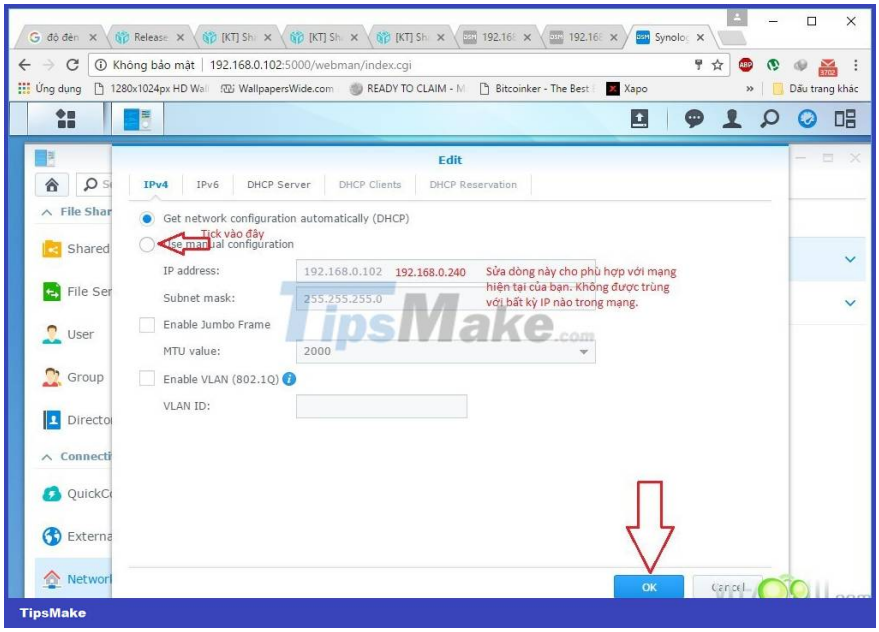
1. Set a static IP address for the NAS:

By default, the NAS is configured to receive a dynamic IP. However, for convenience in opening ports and accessing the NAS on the internal network, I recommend that you set a static IP for the NAS.

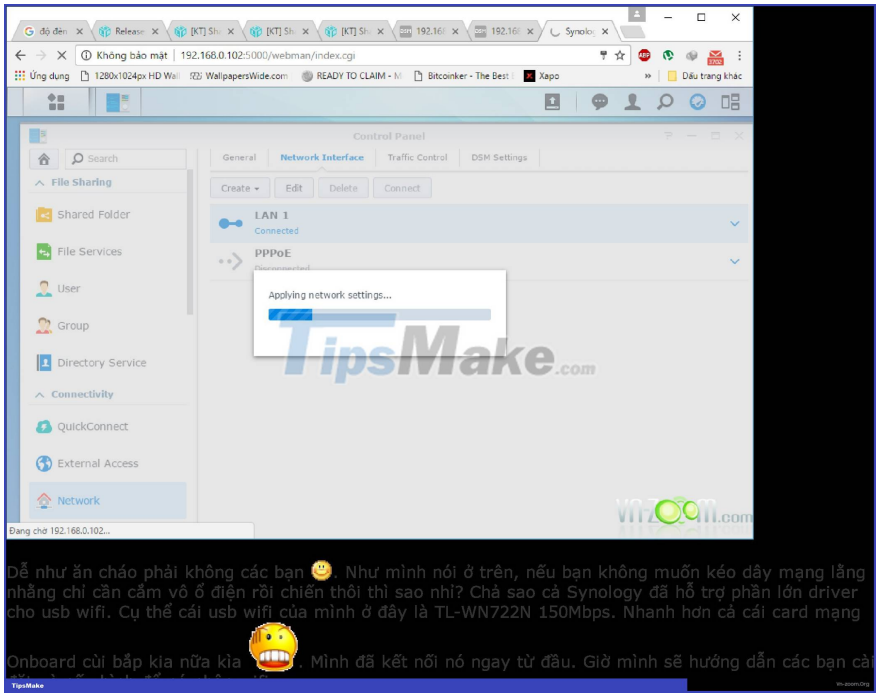
Go to Control Panel -> Network -> Select the Network Interface tab -> Select LAN1 -> Edit



Configuration is as follows:



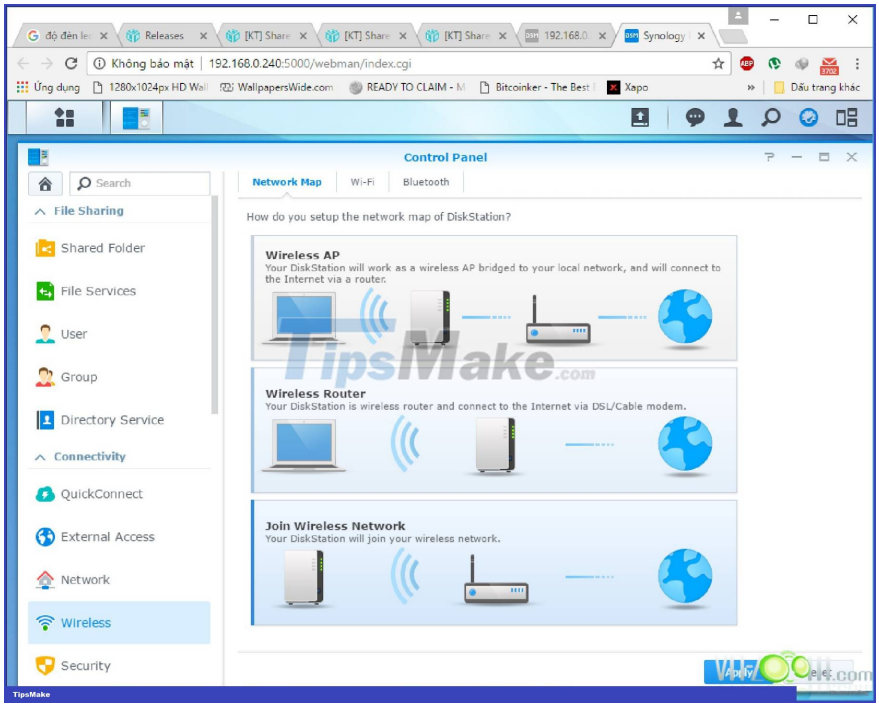
Click OK and wait a moment for the NAS to update the new IP:



It's as easy as eating porridge, isn't it? As I said above, what if you don't want to drag around the network cable, just plug it into the power outlet and start playing? No problem, Synology already supports most USB wifi drivers. Specifically, my wifi usb here is TL-WN722N 150Mbps. Faster than that crappy Onboard network card. I connected it from the beginning. Now I will guide you to install and configure it to receive wifi.

2. Install and configure USB wifi:

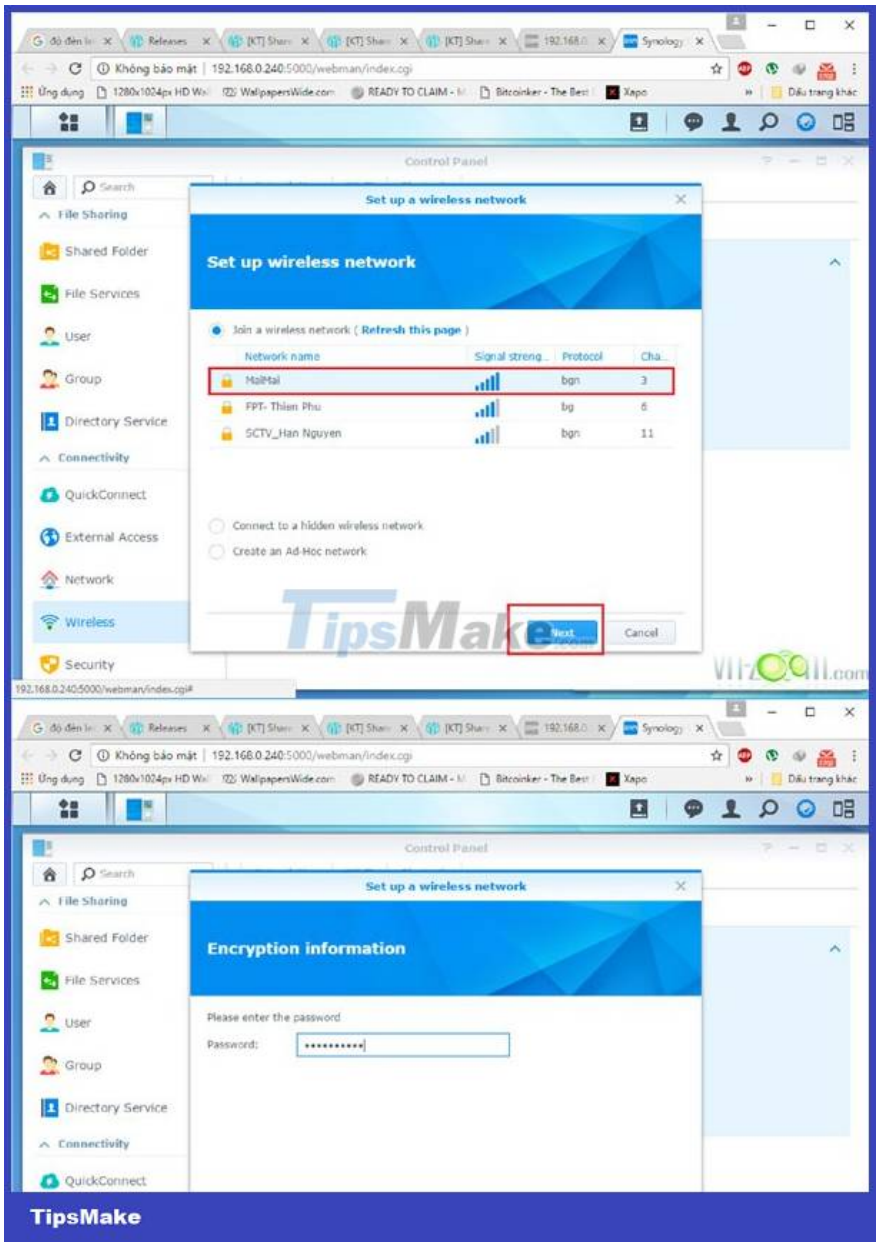
Go to Control Panel -> Wireless

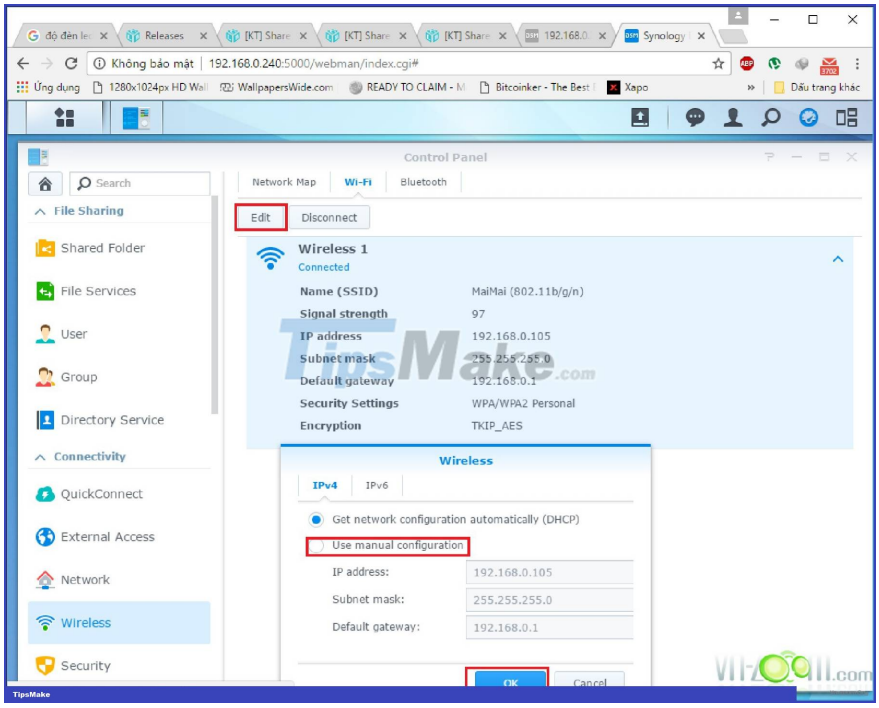


Here you have 3 options:

1. Wireless AP: At this point, the NAS works like an Access Point, attaching a network cable and broadcasting Wifi. This is convenient for broadcasting Wifi with only a network cable.
2. Wireless Router: At this point, the NAS acts like a Wifi Modem Router.
3. Join Wireless Network: Connect to an available wifi network. (This is the feature I need)
   After choosing the right feature, here I choose Join Wireless Network, then click Apply.

Switch to the Wi-fi tab -> Set up a wireless network



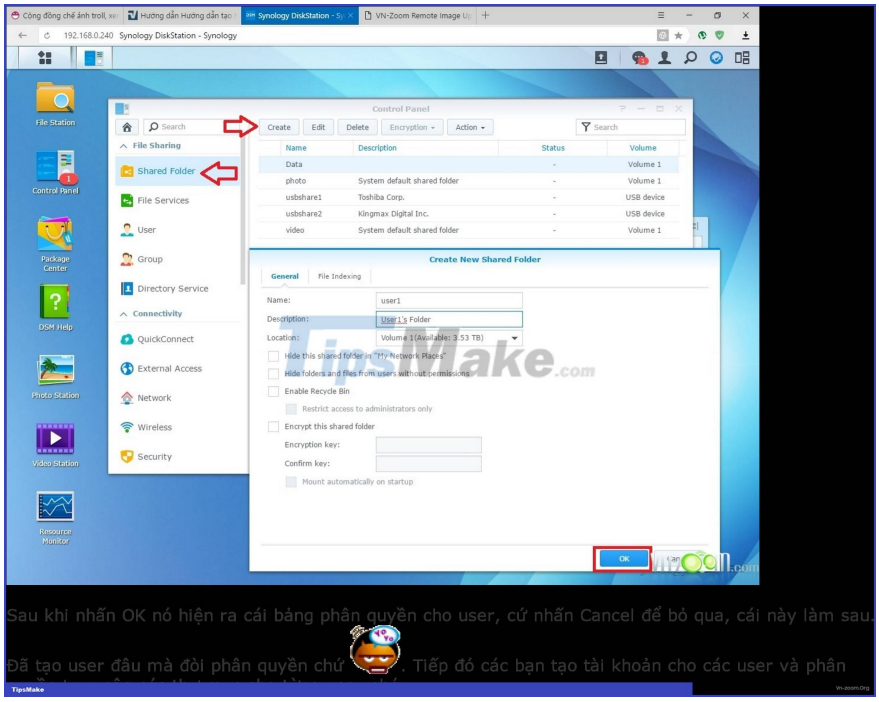


After connecting successfully. You can also change from dynamic IP to static IP by clicking the Edit button and doing the same as configuring the wired network card.
Finish the IP configuration section.

3. Set up, assign permissions to users and share folders:

Suppose, in your family there are 3 people who need to access this NAS. You are the administrator and have access to all folders. user1 can only access the user1 folder, the disk space limit for user1 is 60GB. user2 can only access the user2 and data folders, the capacity limit for the user2 folder is 120GB. You do the following:

Go to Control Panel -> Shared Folder -> Create. Create 3 folders user1, user2 and data respectively. In the picture, because I have installed some more applications, it automatically creates some other folders, you don't need to worry about this.



After clicking OK, a table of permissions for the user will appear. Just click Cancel to skip. This will be done later. Where did I create a user to ask for permissions? :rap:. Next, create accounts for users and assign permissions to access folders for each user.

Go to Control Panel -> User -> Create. Create user1 and user 2 respectively.


User Creation Wizard
Assign application permissions
Allow the user to access following
Assign application permissions
Name
Grant
File Station
FTP
Network Backup Destination
WebDAV
Video Station
Back
Next
Cancel
User Creation Wizard
User Speed Limit Setting
Assign speed limit to the user. 0 means unlimited (Unit: KB/s).
User Speed Limit Setting
Customize
Protocol
Upload Limit (KB/s)
Download Limit (KB/s)
Speed limit
File Station 0 0 Apply group settings
WebDAV 0 0 Apply group settings
FTP 1024 1024 Apply group settings
Network Backup Destination 0 0 Apply group settings
Back
Next
Cancel

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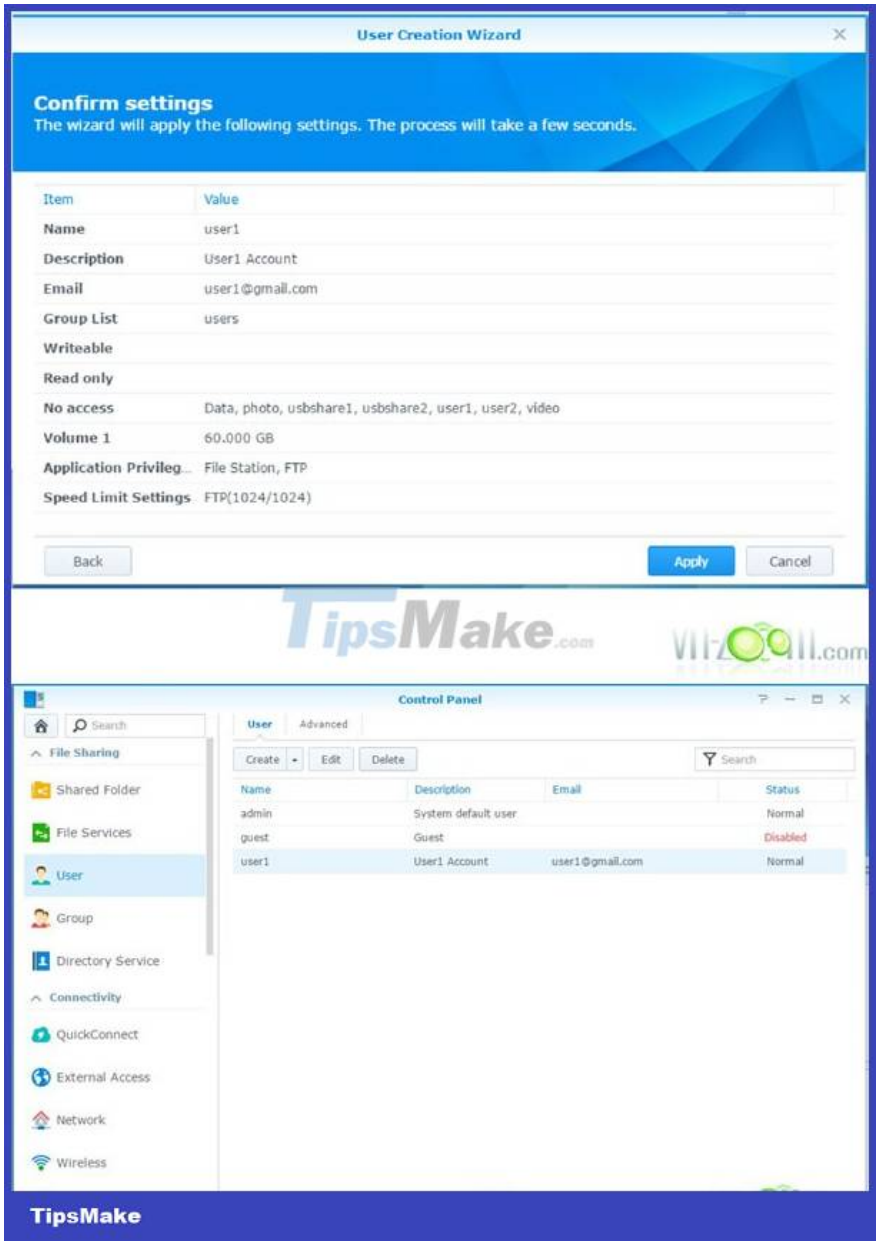
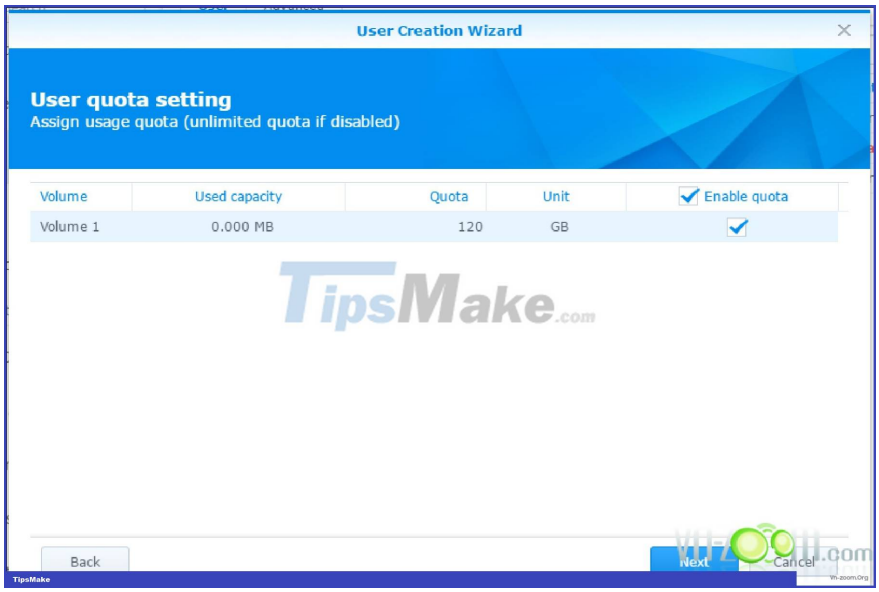
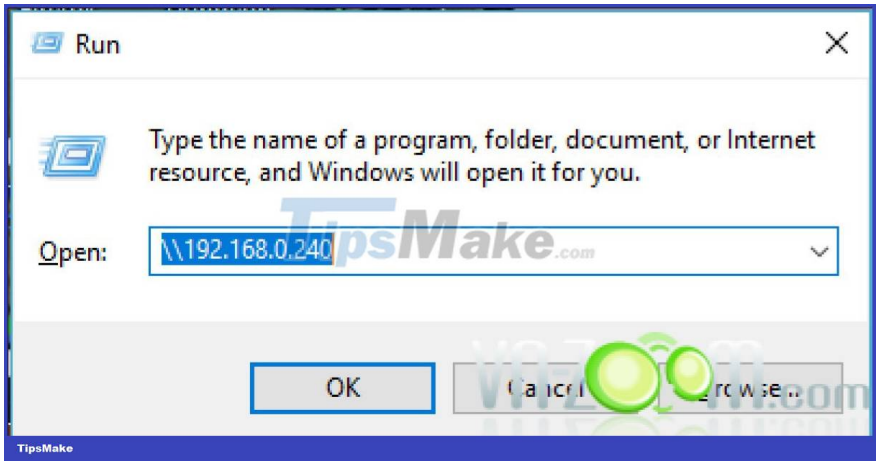


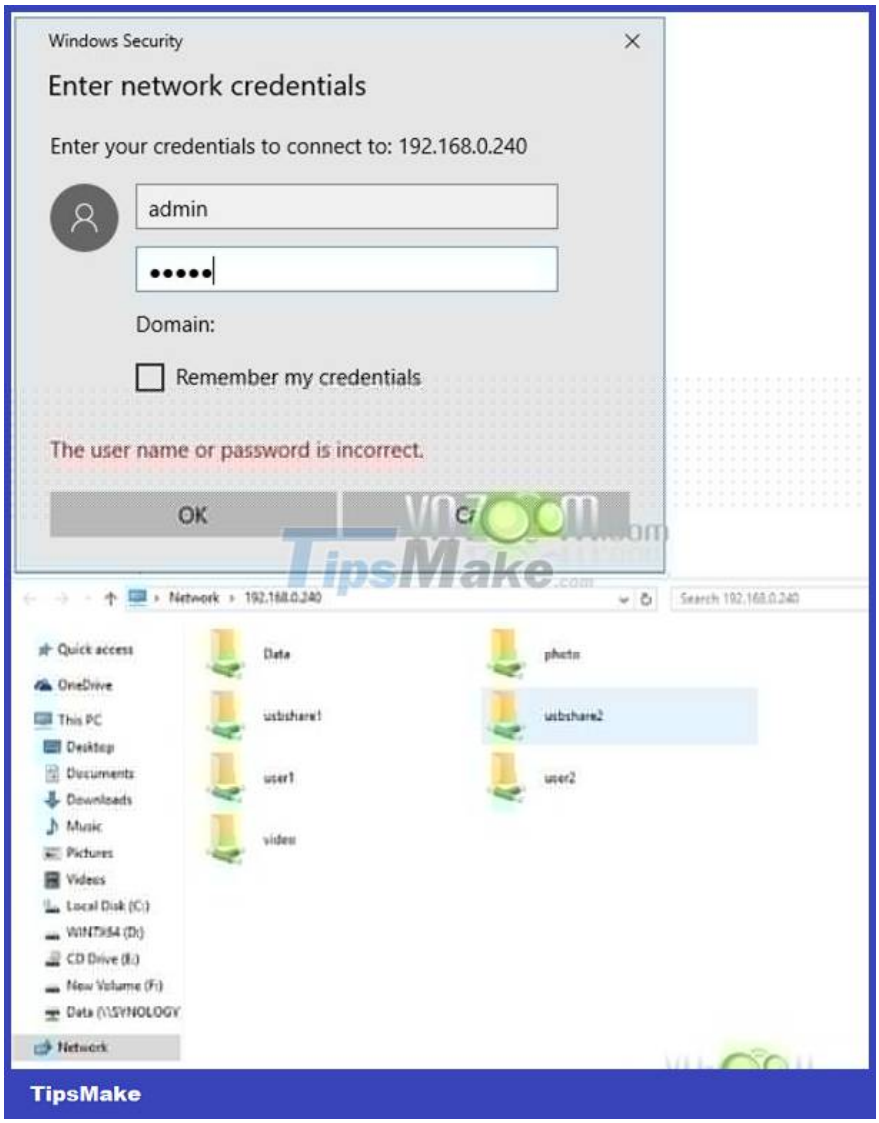
Finally finished user1 part. For user2, you do the same, but for the capacity limit you just need to choose 120Gb and you're done.


User Creation Wizard
User information
Fill in the following fields
Name *:
user2
Description:
User2's Folder
Email:
user2@gmail.com
Password:
Confirm password:
Send a notification mail to the newly created user
Display user password in notification mail
Disallow the user to change account password
* This field is required.
Next
Cancel
User Creation Wizard
Assign shared folders permissions
Set the access rights to shared folders
Name
Preview
Group permissions
Read only
Read/Write
No access
Data
Read/Write
-
photo
No access
-
usbshare1
No access
Read/Write
usbshare2
No access
Read/Write
user1
No access
-
user2
Read/Write
-
video
No access
-
Permissions priority: NA > RW > RO
TipsMake


User Creation Wizard
User quota setting
Assign usage quota (unlimited quota if disabled)
Volume
Used capacity
Quota
Unit
Enable quota
Volume 1
0.000 MB
120
GB
Back
Next
Cancel



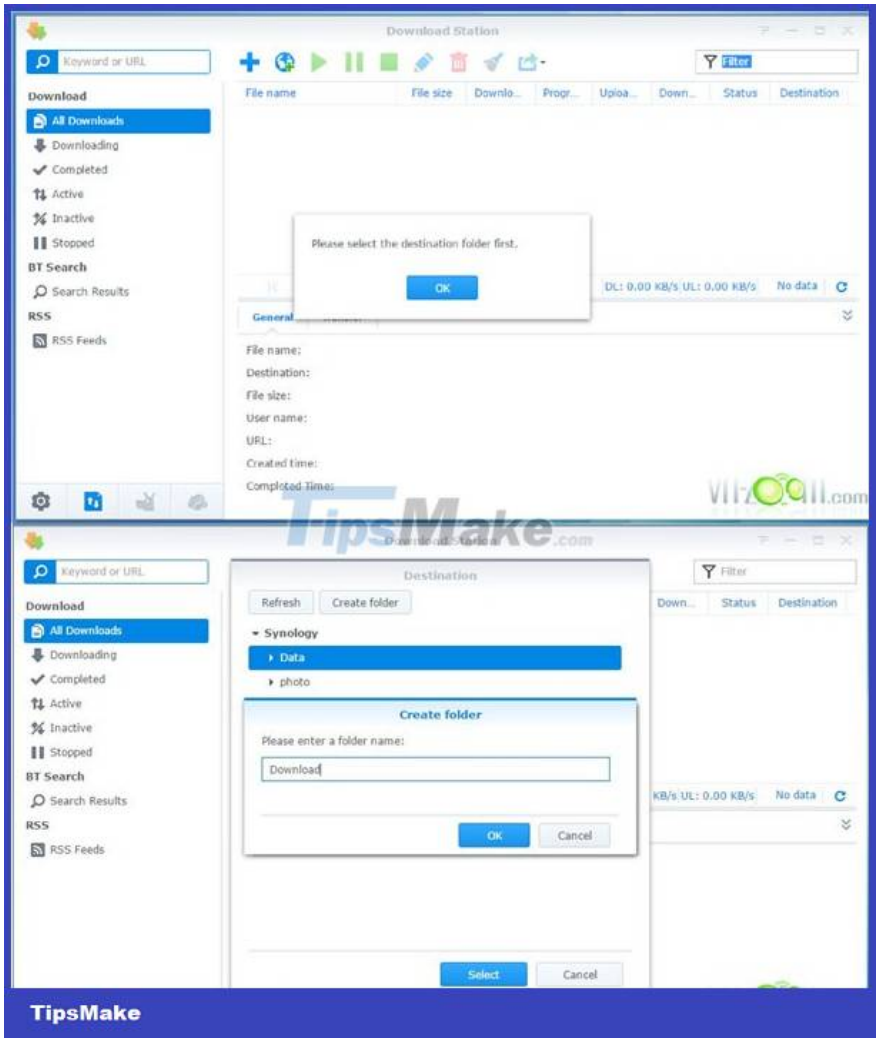
At this point it's okay, try using your computer to access it and see if it works. Go to Run. type /OK. If it appears as a login request, it's OK. Now you log in with the declared account.

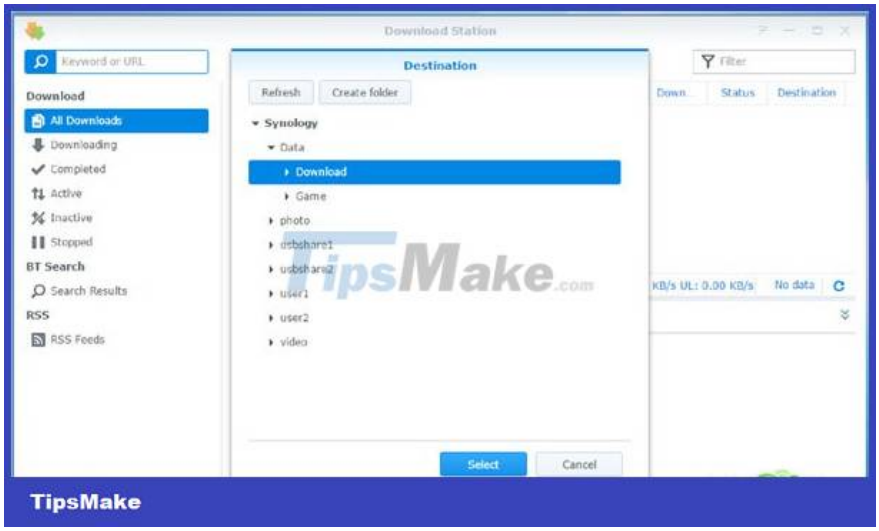


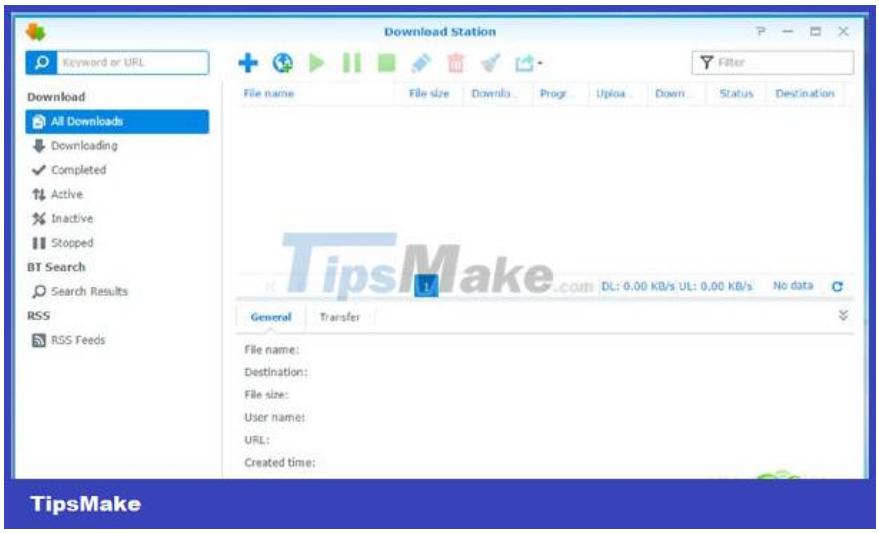
Complete the configuration part. Assign permissions to users and share folders.

Install some basic applications:

Here, the NAS has supported some quite useful software for users in the Package Center section. You just need to select it and Install. Here I will guide you to install Download Station. A software to manage downloads directly to the NAS, supporting torrent downloads.
Please follow as shown in the picture.



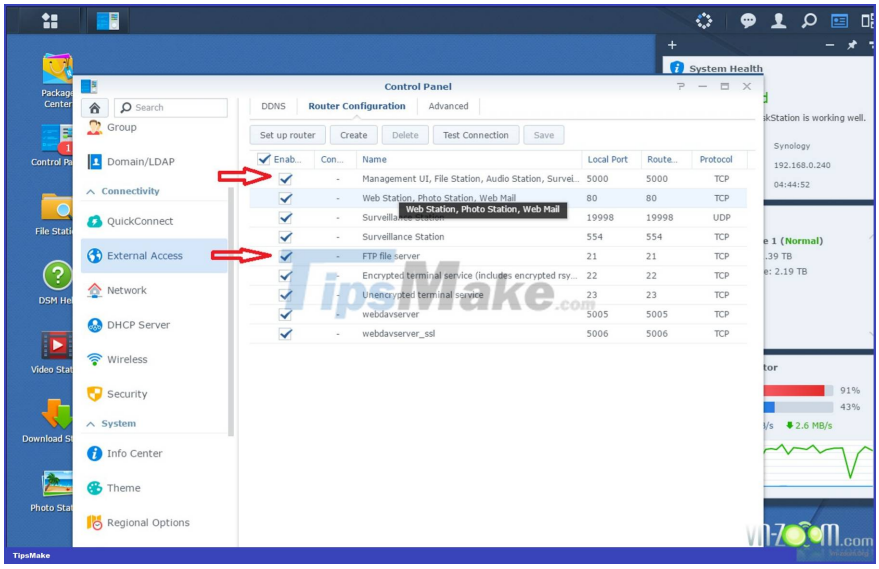




When creating a folder, you can create your own folder or make it a subfolder of an existing folder.

PART 5: Open port for NAS for remote access via the Internet

Your important data is stored in the NAS. One bad day, if you go to work or are not at home and want to retrieve data from your beloved NAS, what should you do? Why run home and copy it? :gach: Or you have a good movie or game you want to share with others but can't come to your house to copy it. How to do this :rap:. Let's proceed, why not?
Step 1: Determine the ports that need to be opened for the NAS.



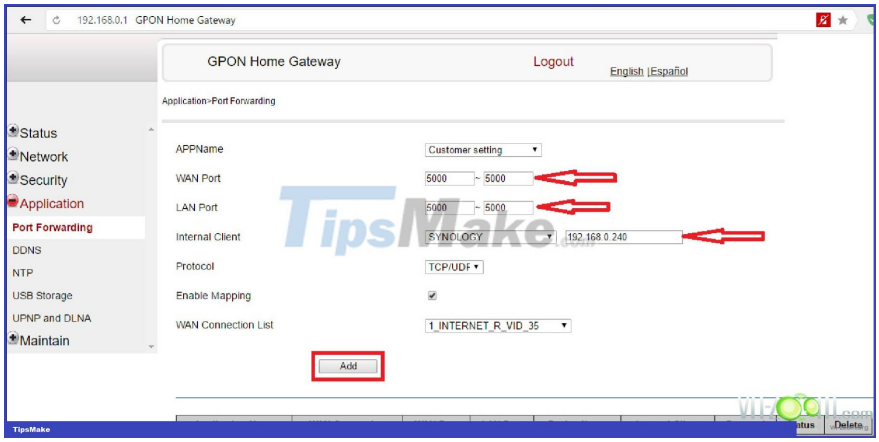
Here I just need to open port 5000 to access the nas remotely. And port 21 is for sharing files according to the FTP protocol. If you want to open another port, just do the same. Mandatory requirement: You must set a static IP for the NAS, I have instructed you above on how to set it. My NAS IP is 192.168.0.240

(Can be skipped): Here I would like to tell you a little more for you students: What is Port?
In TCP and UDP protocols, port is a 16-bit integer inserted into the header of each packet. For example, the user (client) can request a server on the Internet to provide file sharing services via an FTP server. To meet this requirement, the TCP software layer on your computer must recognize port number 21 (pre-registered for FTP service) among the 16-bit integer ports assembled according to your request packet. At the server, the TCP layer will read port 21 and forward the request to the FTP server.

In other words, with an IP address, we can only identify a single computer on the network, but when a computer runs many different services, they must be distinguished by the concept of port. For example, server A (Server A) has web services, DNS and FTP server, with IP address 210.245.126.14. When other computers want to reach Server A, they need an IP address (or domain name), but to distinguish whether the service is web, DNS or FTP, a port needs to be determined. For example, when machine B wants to access the web service on server A, in the sent packet, the destination IP will be 210.245.126.14 and the destination port will be 80. At the same time, machine C accesses the DNS service on the server. A, in the sent IP packet, the destination IP is still 210.245.126.14 but the destination port will be 53. Similarly, machine D accesses the FTP service on server A, the destination IP will be 210.245.126.14 and port is 21.

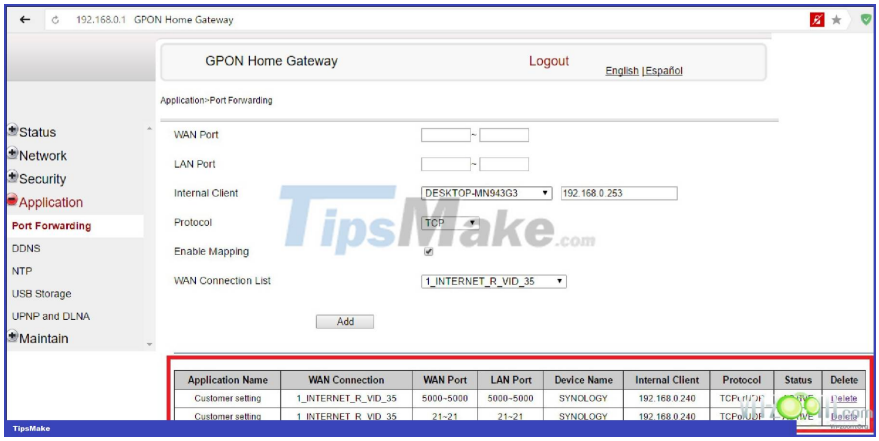
There are a total of 65,535 ports and are divided into 3 segments: Well Known Port (WKP), Registered Port (RP) and Dynamic/Private Port (D/PP). WKP includes ports from 0 to 1023 and is kept for popular applications such as web (port 80), mail (port 25), ftp (port 21). RP includes ports from 1024 to 49151. And D/ PP are ports from 49152 to 65535. IANA requires that WKP and RP must be registered with IANA (iana.org) before use.

Next: Log in to the modem to open the port. This depends on what type of modem you have, the interface may be a little different, but the principle is the same. Or post your modem model here and I will guide you. If you post pictures, even better. This is my home modem.

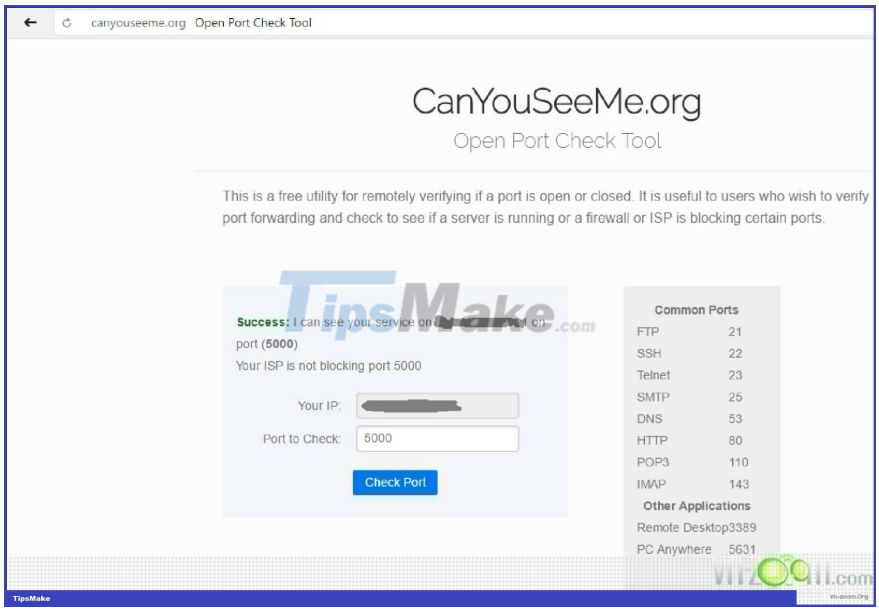


Do the same for other ports

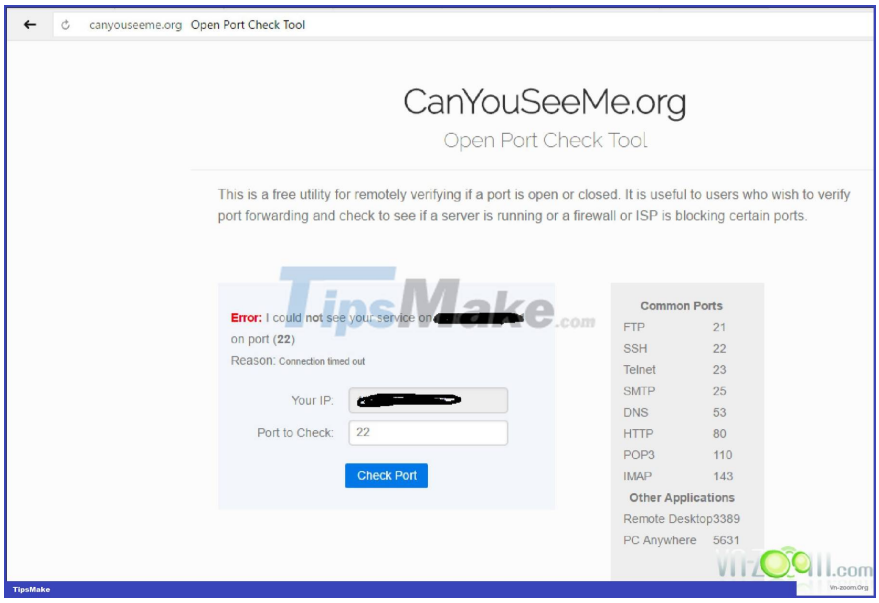
And this is the result.



Check to see if the ports that need to be opened can go out to the internet. Go to canyouseeme.org and check the port. If it says success, it is successful. If you receive an Error, please carefully check the steps above.



Successfully opened port 5000. Please try to check port 21 to see if it is open.



This is my mistake. Because I haven't opened port 22 in the modem yet. I don't need to use the port so I don't open it. Add an example so you know how to open the port.

So now you can access your NAS from the internet. By opening a web browser and typing the address: :5000. or: ftp://:21. Wow, the sun is really wonderful, isn't it?.

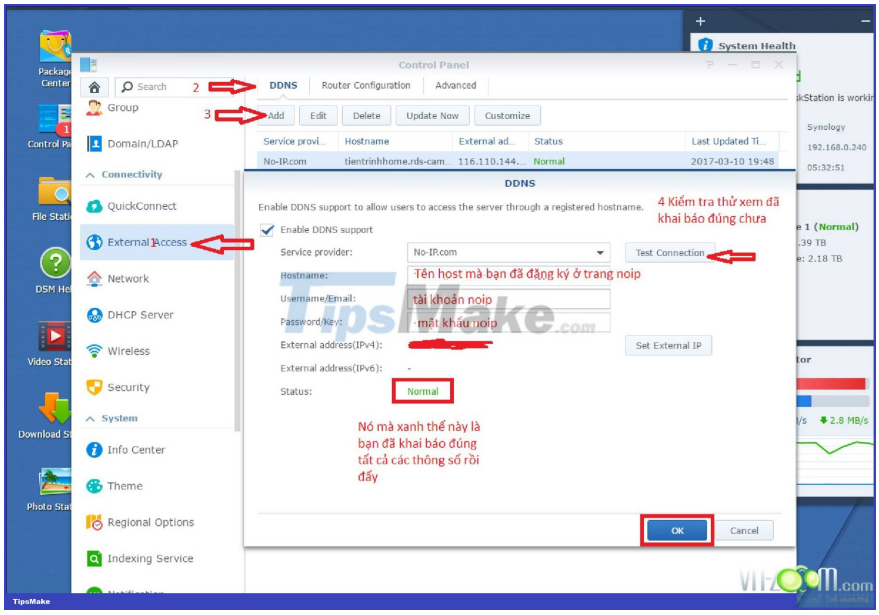
Question: Why is it that every time my house has a power outage, the IP wan is different from the last time? Your house also had a power outage but the IP wan didn't change?? What are you playing?

Answer: My home network uses a static IP, so even if there's a power outage or something else, it won't change. Before and after. As for your home network, it's natural for you to use a dynamic IP, so why wonder?

A new problem has arisen. So every time the power goes out, or the modem is restarted, what happens when the modem's WAN IP changes to a different number? Run home to check your IP, please ask someone at home to check it for you :ah: It's too inconvenient, sometimes it's impossible. Then there's that confusing wan IP number, 116.110. Who can remember something? Is there an easier way to remember? Please say yes. DDNS service was born to meet that requirement. Please explain more about what DDNS is. It's late, I'm sleepy, so I'm too lazy to write again. I hope you understand.

Next, you sign up for a free ddns account (or if you are a luxury player, buy a paid one) that nas supports. You can see the list of free DDNS service providers in the DDNS section of Nas. Here I use NO-IP because this guy gives it for free. You sign up for an account, then add a host. If you don't know this, please search hard. There are many instructions online, so I won't repeat them again.

Declare:



Finished. Please declare as shown in the picture. Then connect to the address you just created from an external network to enjoy the results.

Part 6: External hard drives - External Devices

Go to Control Panel > External Devices > External Devices to see the list of external devices connected to Synology NAS.

External hard drive

By connecting an external hard drive to the system, you can share that hard drive through a shared folder created by the system, such as usbshare[number] (for mounted drives). via USB port) or satashare[number] (for hard drives attached via eSATA port - my computer doesn't have this, but if your computer has it, it will appear). The shared folder will be automatically deleted when the external hard drive is removed from the system.
Synology NAS accepts the following hard disk formats: ext3, ext4, FAT, FAT32, exFAT, HFS, HFS Plus, and NTFS. Any other formatted drive will be required to reformat before use.

Note :

1. 1.If your hard drive is in exFAT format, you need to install exFAT Access from Package Center so that the NAS supports exFAT.
2. 2. Remember to eject the external hard drive or Shutdown the system before removing the external hard drive, otherwise you will have to endure the error.

Hard disk format:

Click Format and follow the instructions. You should format the mounted hard drive in ext4 or FAT32 format. Remember to back up your data before formatting because the data will be deleted during the formatting process and will be difficult to restore. So be careful, I can't bear any fate

When formatting a disc in ext3 or ext4 format, if you attach it to a computer running Windows or Mac, it will not be readable, so it is best to format it in FAT32 format.

After formatting is complete, the NAS will create a shared folder as I said above, you can access and operate like an internal drive. Wish success.

Epilogue:

So you have installed and basically configured a PC, Nas, as a NAS. This article is considered complete. I will try to write some more applications that this NAS supports. You can research more yourself.

This article is mainly based on the spirit of learning, and is also for those who want to experience Synology NAS before deciding to buy a real Synology NAS. It's possible that the article still has many shortcomings, so I will add them later. Any questions I will answer as soon as possible. Those who have experience using this tool, please leave comments so I can add it later. Thank you very much for caring.