FreeNAS

FreeNAS Setup and User guide

(for release 0.684)
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1 Introduction

1.1 Hardware Requirements

- A PC with a minimum of 96Mb of RAM, a bootable CD Rom Drive plus either:
  - A Floppy Disk (for configuration storage) and one or more Hard Drives (for storage)
  - A Bootable USB or CF drive and one or more Hard Drives (for storage)
  - A Bootable Hard Drive and one or more Hard Drives (for storage)
  - A Bootable Hard Drive (The drive will be partitioned for FreeNAS and Data)
- Or a virtual PC emulator such as VMware/QEMU, configured as above.

**Note** – Where FreeNAS is installed on a bootable USB Drive, CF Drive or Hard Drive, the bootable CD Rom should be removed once FreeNAS is installed. At this time installing FreeNAS from CD-rom is the only supported method.

1.2 Important: Limitations and Interactions

Here are some limitations and interactions of Release 0.684b of FreeNAS:

Local User/Password feature is covered in this document. Additional notes are available in the change-log on the FreeNAS website.

- UFS formatted Storage drives are supported and will work with MS Windows across the LAN.
- UFS is the native FreeNAS filesystem: Using other filesystem for data storage is not recommended.
- FAT, NTFS and EXT2,3 can be used to transfer bulk data to an UFS formatted drive ONLY.
- SCSI, PATA (IDE), SATA, CF and USB drives are supported.
- You cannot use any portion of the FreeNAS boot drive as a part of a RAID array. Only whole disks can be used to form a RAID array.
- USB Drives can be HOT-PLUGGED, but new External USB drives will need to be ADDED and MOUNTED, before using as described elsewhere in this guide.
- Any drives (USB, ZIP, CD-ROM) MUST be un-Mounted first and removed after. A reboot can occur otherwise.

Major FreeBSD (underlying OS of FreeNAS) old bug:

Do not write or access to a FAT32 drive across CIFS (Samba) Protocol: It will corrupt some of your file!

*(Message for FreeBSD committer/guru... Can you fix this problem please?)*
1.3 Getting Help

For your technical questions please consult the following links in order:

1. Try to find an answer by reading this manual (good point: you are reading it!).
   http://www.freenas.org/downloads/docs/user-docs/FreeNAS-SUG.pdf

2. Try to find an answer by reading a FAQ.

3. Try to find an answer by reading the Knowledge base (The FreeNAS advanced user Bible!)
   http://freenas.bcapro.com/kb/

4. Try to find an answer by searching the archives of the forum (FreeNAS):
   http://sourceforge.net/search/?group_id=151951&type_of_search=forums
2 Installation and Configuration Overview

FreeNAS installation and configuration involves three steps, these are:

1. **Initial Configuration, via the FreeNAS Console Setup Menu on the FreeNAS PC.**
   After this stage FreeNAS will be installed in and run from your drive.
   However you still need to complete the second step to make FreeNAS operational.
   This step is optional: You can run FreeNAS from a CDROM and a MS DOS floppy disk.

2. **Basic Configuration via the Web GUI.**
   After this stage your FreeNAS server will be operational having a basic configuration.

3. **Advance configuration via Web GUI and Command Shell.**
   This stage is not covered by this manual. It is up to you to read and understand the various options and features offered by FreeNAS and to decide How-to and What-to-do base on your own requirements.

Further customization, such as RAID configuration and localising to your environment can then be performed.
3 Initial configuration

3.1 Using FreeNAS with the CDROM and a removable disk

You can use FreeNAS with the CDROM and an **MSDOS formatted** floppy disk or USB key.
- The floppy disk or USB key must be already MSDOS formatted (FreeNAS will not format it) and empty.
- FreeNAS will use this media to save its configuration file.

*This description assumes the FreeNAS PC hardware is capable of booting from a CD Rom and has a floppy drive and one or more Hard Drives for storage.*

**Ensure your computer’s BIOS is configured to boot from “CDROM”**.

Insert the CDROM on the CD/DVD drive, and boot your PC.

After FreeNAS has booted with no error message concerning ‘no floppy disk found” you can skip the section 3.2 for the section 3.3 directly.

3.2 Install FreeNAS on disk (optional)

*This description assumes the FreeNAS PC hardware is capable of booting from a CD Rom and has a boot Hard Drive (than can also be an USB key or CF card) and may have one or more Hard Drives for storage.*

- Download the FreeNAS ISO and burn the image onto a CD Rom.
- Place the FreeNAS CD in the CD Rom and reboot from CD.
- Wait until the FreeNAS Console Setup Menu comes up and select option 9 to install FreeNAS on your HDD

```
"Console setup"
"*************************
1) Assign Interface
2) Set LAN IP address
3) Reset WebGUI password
4) Reset to factory defaults
5) Ping host
6) Shell
7) Reboot system
8) PowerOff system
9) Install to a hard drive/memory drive/USB Pen, etc.
```

FreeNAS console setup Menu
You can select to have a single HDD installation, that is - have a FreeNAS boot partition and on the same HDD, have the remainder as Storage(DATA).

"Install"

"*********************"
1) Install on HD, CF or USB key: Create 1 UFS partition
2) Install on HD: Create 2 UFS partitions (OS and DATA)
3) Upgrade existing installed version from CDROM
4) Return to main menu

FreeNAS Install options

If you select 1:
This installs FreeNAS on a drive entirely dedicated for OS (this drive cannot be used for storage).
It's the recommended option if you are using CF card or USB Key
- Select the Source CD drive (acd0 for example if you have one ATA CDROM drive).
- Select the Destination HDD that you want to install and boot FreeNAS from (da0 for example if you want to install it on a USB key).

If you select 2:
This installs FreeNAS on a drive and the remainder of the drive will be UFS formatted for being used for storage by creating two partitions on the drive
- Select the Source CD drive (acd0 for example if you have one ATA CDROM drive).
- Select the Destination HDD that you want to install and boot FreeNAS from (ad0 for example if you want to install it on the master hard drive on the ATA channel 1).

In both cases, once FreeNAS is installed, follow the instructions and remove the CD and when the menu comes up again
- Select 4 to exit to the main menu
- Select 7 to reboot the computer.

Use the option “3) Upgrade an existing release from CDROM”

If you have installed it on a USB key:
Ensure your computer’s BIOS is configured to boot from “USB hard drive” – not all BIOS support this (“USB FDD” or “USB ZIP” should be tested).
After the first boot:

- Check that the menu option 9) is not present: If it’s the case, then you are still booting from the CDROM.
- Go to the LAN Interface and IP configuration section of this document.

**Advanced notes:**

FreeNAS use FreeBSD as underlining OS, and FreeBSD in not Linux!!!!

The disk convention name under FreeBSD is:

/dev/ad0 : Is the First ATA hard drive on the ATA channel 1
/dev/ad1 : Is the Second ATA hard drive on the ATA channel 1
/dev/ad2 : Is the First ATA hard drive on the ATA channel 2
/dev/acd0: Is the first ATA CD/DVD drive detected
/dev/da0: Is the first SCSI hard drive. USB key device under FreeBSD are using an SCSI driver, then this name can link to your USB key/drive too.

**WARNING:** *FreeNAS is a standalone Operation System (OS) and NAS appliance.*

*Installing FreeNAS wipes the existing configuration of the boot disk. ALL Existing files will be deleted as part of the installation process.*

*The install process of FreeNAS doesn’t support Dual OS booting.*
### 3.3 LAN interface and IP configuration

Once you have installed FreeNAS on a CF, HDD or USB drive and the computer has rebooted from that device, and when the menu is up again,

```
"Console setup"
"***************************"
1) Assign Interface
2) Set LAN IP address
3) Reset WebGUI password
4) Reset to factory defaults
5) Ping host
6) Shell
7) Reboot system
8) PowerOff system
```

The default configuration of FreeNAS is to use the first detected NIC (Network Interface Card) with the IP address set to 192.168.1.250.

- Select 1 and enter the name of your Ethernet Interface (fxp0 in my case, yours may be different)
- Press <Return> at the Optional 1 Interface prompt, select ‘y’ and reboot the PC.
  
  *(This reboot step is an m0n0wall heritage; it should be possible to skip it).*

- Once the computer has rebooted and the menu is up again, select 2 and choose to use or not to use the DHCP client. If not, enter your IP Address settings (192.168.8.128 and /24 in my example).
- Once the menu is up, select 5 and ping another device on the subnet and ensure network connectivity is OK (remember that it is not possible to ping a computer protected by a personal firewall). Disable the firewall first.

**Advanced notes:**

FreeBSD doesn’t use generic network interface name as Linux *(eth0 for example)*.

The network interface name is dependant of the drivers used:

* fxp0 : For the first Intel EtherExpress chipset NIC found
* fxp0 : For the second Intel EtherExpress chipset NIC found
* bge0: For the first Broadcom BCM570XX Gigabit NIC found
* nve0: For the first nVidia nForce MCP chipset found
* etc...

*fwip0* is a firewire port. If you see *fwip0* on your port list don’t us it.
4 Basic Configuration

4.1 Default login name and password

If you can ping another device from the FreeNAS PC, then from another PC on the same subnet, point your Web Browser at the FreeNAS PCs IP Address (http://192.168.8.128 in this example). You should be presented with a login/password dialogue box like that shown here. At the login/password dialogue

Enter:
- Default Username as **admin**,
- Default password as **freenas**
- Select OK

*Hint - The FreeNAS team strongly recommend that the default User name and Password be changed before putting FreeNAS into production.*

You should be presented with the FreeNAS Web GUI System Status page as shown on the next page.

The currently loaded version of FreeNAS is displayed on this page as well as other useful information.
4.2 WebGUI Layout

FreeNAS web pages are configured with the *Navigation Tree* in the Left Hand side of the page and the Display and Data entry area to the right of the Navigation Tree.

The FreeNAS Host name is displayed on this and all other FreeNAS WebGUI pages. This is useful when more than one FreeNAS will be administered.

**Note:** The FreeNAS host name can be administered on the General setup page.

![FreeNAS Host name](image)

Within the Display and Data Entry areas of WebGUI pages, some displays have additional controls such as those shown here.

- controls Adding another element
- controls deleting or removing an element
- permits the user to edit the attributes of an element.
4.3 Disks

Disks must be added before they can be formatted and mounted or configured in a RAID array.

All disks that you wish to configure in FreeNAS should ideally be connected when FreeNAS boots up, although external USB drives may be connected once FreeNAS is running.

**Note:** Do not remove USB drives once mounted in FreeNAS otherwise a reboot may occur.

The High-Level process flow for configuring a visible share in FreeNAS is:

1. Add Disks
2. Format Disks (if required) in UFS filesystem
3. Add Mount Point
4. Enable Services (CIFS, FTP, etc.)

To remove a disk, you must delete the Mount Point first and remove the disk after.

**Note:** Please ensure you add disks and test each of them before attempting to configure disks in any RAID configuration.
4.3.1 Adding a disk or CD/DVD drive

To add a disk, open the **Disks/Management** page and click the on the right hand side of the Display area.

In the drop down, select a disk drive. In this example, we will select ad0.

**Note** – FOR USB OR COMPACT FLASH INSTALLATIONS (ref section 3.2) Do not add the FreeNAS boot drive (in this example ad0)

Adding the FreeNAS Boot drive WILL affect the operation of FreeNAS, and also incorrectly permits the boot drive to be formatted and mounted, which is then not accessible as a share. (In this example ad0 is the FreeNAS boot drive)

**Note:** You can add the boot hard-drive ONLY if you need to take advantage of FreeNAS power saving configuration.
**FOR TWO PARTITION HARD DRIVE INSTALLATIONS**, where you want to share the capacity of a single hard drive between FreeNAS and storage, you can add the FreeNAS boot drive (*ad0* in this example)

For information about the Hard Disk Standby Time, Advanced Power Management and Acoustic Level setting, please refer to section 5.4. For the moment, leave these as default.

For the ‘Preformatted FS”: Leave it as default for new disk, or set it to NTFS/EXT2 or FAT for existing disk. Anyway, it’s an information field that don’t impact the comportment of FreeNAS.

Click the *Add* button. Continue to add additional disks as required. The Disk/s should appear in the table and the Status should show *ONLINE* as illustrated below.

![Disks Management](image)

Click the *Apply Changes* button and if successful, the following message will be displayed.
4.3.2 Formatting a Disk

IMPORTANT NOTE
If you have an existing disk with existing data on it - **DO NOT FORMAT THE DISK**, it WILL erase all the data. If you have a disk that you want to clean out and format for Read/Write Access, Initialise the disk, as described next.

For two partition hard drive installations, where you want to share the capacity of a single hard drive between FreeNAS and storage, **you do not have to format the disk**, this was already done for you back in the console setup. The storage partition is already formatted as UFS.

Click on the **Disks/Format** page and in the dropdown; select the drive you want to format.

**Note:** Only Disks that you have added appear in the drop down list

In this example we will configure the disk for normal use using the native FreeBSD UFS filesystem.

Leave the File system setting as **UFS (GPT and Soft Updates)** and leave the minimum free space at the default value.

Then, answer OK at the confirmation popup:
In the Display area, information similar to the following should be displayed. The amount of data and the content will different in your case.

<table>
<thead>
<tr>
<th>Erasing MBR and all partitions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destroying old GPT information:</td>
</tr>
<tr>
<td>Creating GPT partition:</td>
</tr>
<tr>
<td>/dev/ad1p1 added</td>
</tr>
</tbody>
</table>

Creating filesystem with 'Soft Updates':
/dev/ad1p1: 100.0MB (204732 sectors) block size 16384, fragment size 2048 using 4 cylinder groups of 25.00MB, 1600 blks, 3200 inodes.
with soft updates
super-block backups (for fsck -b #) at:
160, 7150548, 7527200, 7903552, 8279904, 8656256, 9032608,
9408960, 9785312, 10161664, 10538016, 10914368, 11290720, 11667072, 12043424,
12419776, 12796128, 13172480, 13548832, 13925184, 14301536, 14677888,
<= TEXT REMOVED =>
813296832, 813673184, 814049536, 814425888, 814802240, 815178592, 815554944,
815931296, 816307648, 816684000, 817060352, 817436704, 817813056, 818189408,
818565760, 818942112, 819318464, 819694816, 820071168, 820447520, 820823872,
1045506016, 1045882368, 1046258720, 1046635072, 1047011424, 1047387776,
1047764128, 1048140480, 1048516832
Done!

If you have previously added other disks, then select the additional disks and format them as well, if required.

Note:
- **Formatting hardware RAID may require you select: “don’t erase the MBR”** (Some hardware RAID controllers store information’s on the disks MBR)
4.3.3 Mounting a disk

Once a disk is formatted it needs to be mounted before it can be used.

Go to the **Disks/Mount Point** page and Click the on the right hand side and in the **Disk** drop down, select the drive that you previously added and formatted (ad1 in this example).

**Disks: Mount Point: Add**

<table>
<thead>
<tr>
<th>Disk</th>
<th>ad0: 100MB (QEMU HARDDISK/0.9.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partition</td>
<td>EFI GPT</td>
</tr>
<tr>
<td>File system</td>
<td>UFS</td>
</tr>
<tr>
<td>Share Name</td>
<td>100MB_drive</td>
</tr>
<tr>
<td>Description</td>
<td>Drive used for Divx</td>
</tr>
<tr>
<td></td>
<td>Add</td>
</tr>
</tbody>
</table>

**Partition:**
- EFI GPT: It’s the default FreeNAS method when initializing a drive since release 0.684b. This method permits support for volumes bigger than 2TB.
- 1: For MBR partition n°1 or for software RAID array (created with FreeNAS release newer than the 0.68);
- 2: For MBR partition n°2 (*If you used the same drive for FreeNAS and for the DATA, don’t forget to select the partition 2*);
- 3-4: For MBR partition n°3 to 4: To be used only for adding existing disk to FreeNAS;
- CD/DVD : For CD/DVD ROM (no partition)
- Previous software RAID: Used to mount Software RAID array created with FreeNAS releases older than the 0.68

**File system:**
- UFS: FreeNAS (FreeBSD) native disk
- FAT: FAT16 or FAT32 drive
- CD/DVD: Used for CD/DVD ROM with the cd9660 filesystem
- EXT2: For Linux EXT2 or EXT3 drive.

**Share Name:** Name that you want to appear on the network (**500GB_drive**, in this example). Supports Linux standards, a-z, A-Z, 0-9, - (dash), _ (underscore) characters.

**Description:** Enter a description for the share (used by some services as CIFS).

Click **Save** and the disk should appear in the table with a **Status** of **Configuring**.

If you have additional disks you have previously Added and Formatted, then you can also mount these now.
Click **Apply Changes** and a 'Changes have been applied successfully' message should be seen. Drive **Status** should now show **OK**

**Note** - Depending on the size of the Disk/s, mounting may take some time to complete. During ‘Applying Changes’, **ALL shares are temporarily offline.**
4.4 Services

The proper operation of FreeNAS is controlled and provided by small programs running in the background, named services or daemon.

If a service is provided by FreeNAS it is because:

- The service was properly configured from WebGUI.
- The service was properly started.
- The service operates properly.

If the service is not provided by FreeNAS it is because:

- The service didn’t start.
- The service was not properly configured.
- The service was stopped (manually or automatically).

The last step to permit the mounted drives to be visible across the network is to enable some services.

You can enable(start) any or all of the services listed here: CIFS, FTP, NFS, RSYCD, SSHD, Unison, AFP, UPnP or the special iSCSI Target.
4.4.1 CIFS (Samba)

CIFS is the protocol used under Microsoft Environment. It’s this protocol that is used when you select ‘Network neighbourhood’ under Windows.

If you have a MS Windows computer that needs to access your FreeNAS, it’s the protocol to use. Open the *Services/CIFS* page and click and select the *enable* check box on the right hand side.

Leave all other fields as their Default values for the moment, you can tweak things later. Click the *Save* button.

**Note:** DO **NOT** select a *Security* setting of *User* at this stage, Refer to the User Authentication section for more information’s on this feature.
4.4.2 FTP

**File Transfer Protocol** is used to connect two computers over an IP network so that the user of one computer can transfer files and perform file commands on the other computer.

**Note:** *FTP is an insecure standard for transferring files over the Internet, use it only if you want to share some of your files across the Internet without strong security.*

If you wish to permit FTP access to the FreeNAS Storage Drive/s you can enable the FTP Service.

Similar to the CIFS page, Open the **Services/FTP** page and click and **enable** the check box on the right hand side and click the **Save** button.

<table>
<thead>
<tr>
<th>FTP Server</th>
<th>Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP port</td>
<td>21</td>
</tr>
<tr>
<td>Default is 21</td>
<td></td>
</tr>
<tr>
<td>Number of clients</td>
<td>5</td>
</tr>
<tr>
<td>Maximum number of simultaneous clients.</td>
<td></td>
</tr>
<tr>
<td>Max. conn. per IP</td>
<td>2</td>
</tr>
<tr>
<td>Maximum number of connections per IP address (0 = unlimited).</td>
<td></td>
</tr>
<tr>
<td>Timeout</td>
<td>5</td>
</tr>
<tr>
<td>Maximum idle time in minutes.</td>
<td></td>
</tr>
<tr>
<td>Permit root login</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Specifies whether it is allowed to login as superuser (root) directly.</td>
<td></td>
</tr>
<tr>
<td>Anonymous login</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Enable anonymous login.</td>
<td></td>
</tr>
<tr>
<td>Local User</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Enable local user login.</td>
<td></td>
</tr>
<tr>
<td>Banner</td>
<td></td>
</tr>
<tr>
<td>Greeting banner displayed by FTP when a connection first comes in.</td>
<td></td>
</tr>
<tr>
<td>FXP</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Enable FXP protocol. FXP allows transfers between two remote servers without any file data going to the client asking for the transfer (insecure).</td>
<td></td>
</tr>
<tr>
<td>NAT mode</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Force NAT mode. Enable this if your FTP server is behind a NAT box that doesn't support applicative FTP proxying.</td>
<td></td>
</tr>
<tr>
<td>Resume</td>
<td><strong>on</strong></td>
</tr>
<tr>
<td>Enable resume mode. Use this option to enable resuming broken transfers at the point of interruption.</td>
<td></td>
</tr>
</tbody>
</table>
If you want to use FreeNAS behind a NAT box (router or firewall) that does not support FTP you should:

1. Configure your NAT box (router or firewall) to forward port (TCP 21 and a RANGE TCP port) to your FreeNAS
2. Add your public IP address on the ‘Passive IP address’ field
3. Add your lower TCP port of your configured range on the ‘pasm_min_port’ field
4. Add your high TCP port of your configured range on the ‘pasm_max_port’ field
5. Enable ‘NAT Mode’
4.4.3 NFS

NFS is the CIFS equivalent for UNIX/Linux World.

If you have a Linux machine that needs access to FreeNAS, it’s the protocol to be used.

If you wish to permit NFS access to the FreeNAS Storage Drive/s you can enable the NFS Service.

Open the Services/NFS page:

1. Click on enable
2. Click on the icon for add Authorized network (usually your FreeNAS IP Subnet)
3. Set subnet mask (usually 24)
4. Click the Save button.
4.4.4 RSYNC

4.4.4.1 Server

RSYNC is a multi-platform incremental copy over network utility that can be used for backup. If you want to backup some of your files regularly, it’s the protocol to use: The incremental sync process permits a copy of the differences in the files across the link, from the last backup.

There are some tools under windows that support RSYNC:

- DeltaCopy ([http://www.aboutmyip.com/AboutMyXApp/DeltaCopy.jsp](http://www.aboutmyip.com/AboutMyXApp/DeltaCopy.jsp))
- NasBackup ([http://www.nasbackup.com](http://www.nasbackup.com)) is an open source backup solution. It is a high-performance, enterprise-grade system for backing up MS Windows desktop PCs, laptops and servers to network disks.

4.4.4.2 Client

This option permits you to synchronize files between a FreeNAS ‘server” and one or more FreeNAS ‘client’.

On the FreeNAS ‘server’, you must just enable RSYNCD Server (with ‘read only’ box to “No”).

On the FreeNAS ‘client’:

Click on the icon for add a new client entry and:

1. Select your local configured share. Warning it will be the ‘destination’ share
2. Enter the Remote Share name configured on the RSYNCD Server
3. Enter the IP address of the RSYNCD Server
4. Set the synchronisation time

At the given time, the FreeNAS ‘client’ will do a rsync (incremental copy) from the FreeNAS ‘server’ share to the FreeNAS ‘client’ share.

You can check the detected share name of the RSYNCD Server configured by using the Diagnostics: [Information: RSYNC Client](#) page.

4.4.4.3 Local

It’s the same as ‘client’ but with local share only.

Very useful for local backup “drive to drive” can be an alternative solution for drives mirroring.

**Note:** If you change the rsync user on Web GUI you must restart(disable/enable) this service for changes to take effect.
4.4.5 SSHD

SSH (Secure Shell) permits an alternate and highly secure form of FTP access to the FreeNAS storage. SSH is enabled via the Services/SSHD page.*

It will permit the use of:
- SFTP file transfer
- SCP File transfer
- SSH access and remote commands execution.

Click the Enable check box, and click Save for a simple Read only default SSH implementation. Modify the SSH settings if required.

**Services: SSHD**

<table>
<thead>
<tr>
<th>SSH Daemon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read only</td>
</tr>
<tr>
<td>TCP port</td>
</tr>
<tr>
<td>Permit root login</td>
</tr>
<tr>
<td>Enable TCP Forwarding</td>
</tr>
<tr>
<td>SSH key</td>
</tr>
<tr>
<td>Private Key</td>
</tr>
</tbody>
</table>

**Note:** If you enable the option “Permit root login”, the root password is the same as the WebGUI password.
Using WinSCP ([http://www.winscp.com](http://www.winscp.com))

Once SSH is configured, login via SSH is enabled, and you can use SCP protocol for file transfer.

Here is an example with WinSCP:


If your user settings are configured with the ‘full shell’ option, you can connect with a SSH client to a remote terminal on FreeNAS: here is an example PuTTY interface shown below.

For a console mode to FreeNAS, the SSH access is preferred over direct screen/keyboard method:
The system PATH is more complete with an SSH access.
4.4.6 Unison

Unison is a multi-platform file-synchronization tool. Unison can synchronize changes to files and directories in both directions simultaneous, there is no ‘source’ and ‘destination’ and at the end of the process both sides should be in the same state.

Dan Mershi has done a Graphical Frontend for using as a Unison client under Windows XP that you can download here: http://freenas.bcapro.com/unison/

SSHD must be enabled on FreeNAS and the user must have ‘full shell’ access. Unison will make the transfer over SSH.

4.4.7 AFP

AFP permits Apple MacOSX users to access the storage resources of FreeNAS. From Appleshare:
Guest mode:   afp://guest;AUTH=No%20User%20Authent:password@FreeNASip/share

4.4.8 UPnP

UPnP enables the UPnP file server (Works great with the media player GeeXboX for example): http://www.geexbox.org/

Click on the ‘enable’ button choose a UPnP server name, and select the interface where to enable this service.
Then click on the ☀ for add directory to share using UPnP:

Notes: New added files on the share are not updated automatically. You must restart(disable/enable) this service to rebuild the new file list.
4.5 Verify and Use the Share

From another PC on the FreeNAS subnet (in this example I am using XP Pro). Select **Start** and **Run** and enter `\` followed by the FreeNAS PC IP Address (`\10.19.2.5` in my example).

Click OK and the mounted Share should appear complete with the *Share name* you entered in the Mount process.

![Mounted Share](image.png)

This Share is available to the network for Read/Write access and you can map a local drive to the share.

Test it by copying some data to it.

If you have ‘*show hidden files and folders*’ enabled in your Explorer settings, you will see a hidden and read only folder in there called `.snap` - ignore it.

**Note:** If you are using a PC which normally logs into a Domain that is different from the WORKGROUP name configured in FreeNAS, you may possibly get one or more Login dialogue boxes. If so, leave the password blank and select OK.

This concludes the Basic Configuration set up for FreeNAS. Additional settings including configuring RAID follow.
4.6 Software RAID configuration with geom modules

FreeNAS supports Software JBOD, RAID 0, 1 and 5 configurations as well as Hardware RAID. This section describes configuring Software RAID 5. The process is virtually identical for all the others with the exception of using geom. Vinum (unstable).

Here is the FreeBSD module name and equivalent:

- JBOD: Geom concat
- RAID 0: Geom stripe
- RAID 1: Geom mirror
- RAID 5: Geom RAID5 *(Thanks to Arne for developing this non official FreeBSD module!!)*

All disks must be the same size for all RAID types with the exception of JBOD and Geom RAID5 (it will be based on the smallest disk).

*The FreeNAS team recommends configuring each of the RAID Disks as standalone Storage Disks first to ensure they are fully functional and supported under FreeNAS. Once confirmed, remove any of the mount points and Disks for the RAID drives to ensure a clean start. The following description assumes that the drives have been confirmed as functional.*

The High-Level process flow for configuring a simple RAID array is:

1. Add Disks
2. Format Disks for “Software RAID”
3. Create the RAID array using the previously formatted for “Software RAID”
4. Format the newly created RAID array in UFS filesystem
5. Add Mount Point
6. Enable Services (CIFS, FTP, etc.)

To remove a RAID array, remove the mount point first and delete the RAID.

In this example, we will show how to create a software RAID 5 array with 3 500GB hard drives.
4.6.1 Add the Disks

Follow the Add Disk process as described above to *add* each of the Disks to be used in a RAID array. In the example below, I have added 3 identically sized hard drives.

![Disks: Management](image)

<table>
<thead>
<tr>
<th>Disk</th>
<th>Size</th>
<th>Description</th>
<th>Standby time</th>
<th>File system</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ad0</td>
<td>102MB</td>
<td>VMware Virtual IDE Hard Drive/00000001</td>
<td>Always on</td>
<td>UFS</td>
<td>ONLINE</td>
</tr>
<tr>
<td>ad1</td>
<td>512000MB</td>
<td>VMware Virtual IDE Hard Drive/00000001</td>
<td>Always on</td>
<td>Unknown or unformatted</td>
<td>ONLINE</td>
</tr>
<tr>
<td>ad2</td>
<td>512000MB</td>
<td>VMware Virtual IDE Hard Drive/00000001</td>
<td>Always on</td>
<td>Unknown or unformatted</td>
<td>ONLINE</td>
</tr>
<tr>
<td>ad3</td>
<td>512000MB</td>
<td>VMware Virtual IDE Hard Drive/00000001</td>
<td>Always on</td>
<td>Unknown or unformatted</td>
<td>ONLINE</td>
</tr>
</tbody>
</table>

Note: First configuration step: Add your hard drive to the disk list.

Ensure the drives are in an *ONLINE* status.

**Note:** You cannot use the 2nd partition of a FreeNAS boot drive as a part of a RAID array. Only whole disks can be used to form a RAID array.
4.6.2 Prepare (format) the disks

Open the Disk: Format TAB, select each of the Disks in turn and ensure the File system is changed to Software RAID, click the Format Disk button and confirm your action.

![Disks: Initialize](image)

Repeat for all Disks to be used in the RAID array.

The result should be for example:

```
Erasing MBR and all partitions:
Creating one partition:
****** Working on device /dev/ad1 ******
Initializing partition:
Destroying old GMIRROR information:
Done!
```

4.6.3 Create the Software RAID array

Open the Disks/Software RAID page and choose your Software RAID type.

For our example, we select ‘Geom RAID5’:

![Disks: Geom Raid5: RAID](image)

Click the icon on the right hand side to Add a new RAID 5.

Enter a RAID name for the RAID.

Click and select each of the drives to be used in this RAID array.
**Note:** Drives will not appear here unless they have previously been formatted as **Software RAID**

Click the *Add* button and when prompted, click the *Apply Changes* button.

Creating a RAID 5 array can take a long time:
**But you can use your raid during the building process! (even if it’s in ‘REBUILDING state).**

The status field will not immediately update.
4.6.4 Format the software RAID array

When the Status is up or rebuilding, then the RAID array must be formatted.

Open the Disk: Format menu and choose the newly created RAID array:

<table>
<thead>
<tr>
<th>Disk</th>
<th>BigDisk: (Software raid5 RAID 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>File system</td>
<td>UFS (GPT and Soft Updates)</td>
</tr>
<tr>
<td>Minimum free space</td>
<td>Specify the percentage of space held back from normal users. Note that lowering the threshold can adversely affect performance and auto-defragmentation.</td>
</tr>
<tr>
<td>Don't Erase MBR</td>
<td>Don’t erase the MBR (useful for some RAID controller cards)</td>
</tr>
</tbody>
</table>

Leave the Type as UFS (GPT and Soft Update), click the Format Disk button and confirm.

A display similar to this should be output (example when the RAID 5 was in state ‘rebuilding’):

```
Erasing MBR and all partitions.
Destroying old GPT information:
Creating GPT partition:
/dev/raid5/BigDiskp1 added
Creating filesystem with 'Soft Updates':
/dev/raid5/BigDiskp1: 199.7MB (409020 sectors) block size 16384, fragment size 2048
using 4 cylinder groups of 49.94MB, 3196 blocks, 6400 inodes.
with soft updates
super-block backups (for fsck -b #) at:
 160, 102432, 204704, 306976
Done!
```

(You should have lot’s of more line as this example! On this example the drive was a small 200MB)
4.6.5 Create the mount point

Once the RAID array is formatted, all that is left is to mount the array.
Open the Disk/Mount Point page and click the icon on the right hand side.

From the Disk drop down, select the RAID disk. The RAID name you previously configured is visible.

Change the Partition to EFI – GPT

Enter a useful Share name and click the Add button.

The Status should display as configuring, and then click the Apply Changes button and the Status should update to UP.

Your Geom RAID5 array is now ready for use. If you have already enabled CIFS, FTP or NFS, then the array, with the defined Share name, will be visible across you network.
4.6.6 Software RAID array status

You can verify the status of your RAID array from:

- Status/Disks page and select the Information Tab
- Disks/Software RAID/geom used page and select the Information Tab.

Both locations provide the same view.

A healthy RAID array will show all the State: values as **UP or COMPLETE**.

*Important Note – RAID 1 and RAID 5 arrays may take some time to synchronise completely, be patient and monitor the status of the RAID synchronisation by continuing to refresh the Information page.*
4.6.7 Replacing a failed hard drive on a gmirror array

In the case of a failure on one hard drive, your RAID array is in the ‘DEGRADED’ state:

Here is an example with the RAID 1 array named “mirroire” in “DEGRADED” state with a missing hard drive:

<table>
<thead>
<tr>
<th>Disks: Geom Mirror: RAID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Name</td>
</tr>
<tr>
<td>mirroire</td>
</tr>
</tbody>
</table>

And we can check that the disk is missing in the Disk/Management page:

<table>
<thead>
<tr>
<th>Disks: Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>ad0</td>
</tr>
<tr>
<td>da0</td>
</tr>
<tr>
<td>da1</td>
</tr>
</tbody>
</table>

We can see that in our example, the disk da1 is missing.

4.6.7.1 First Step

For replacing this disk: Stop FreeNAS and replace this disk with a new one (in the same place on the ATA or SCSI channel). And restart FreeNAS.

After restarting FreeNAS, the Disk/Management should display it back (ONLINE if it’s the same, or CHANGED if it’s a different disk).

The Software RAID 1 status is still ‘DEGRADED’, we must add this new disk:
4.6.7.2 Second Step

Open the *Disk/Software RAID/Geom mirror/Tools* page and select your DEGRADED RAID array and action “forget” (*The Disk field is not used on this first action*).

![Disk Mirror: Edit](image)

4.6.7.3 Third Step

Still on this *Disk/Software RAID/Geom mirror/Tools* page, re-select your DEGRADED RAID array, the select the newly replaced Disk, and choose action “insert”:

![Disk Mirror: Edit](image)

You can now check your RAID status (*Disk/Software RAID/Geom mirror*): It should be ‘REBUILDING’ or “COMPLETE” (the time needed for rebuilding depend of your disk size).

![Disk Mirror: RAID](image)

You should check the Disk/Mount Status too, as sometimes needs a remount.
4.6.8 Replacing a failed hard drive on a raid5 array

In the case of a failure on one hard drive, your RAID array is in the ‘DEGRADED’ state.

Here is an example with the RAID 5 array “bigdisk” with a missing hard drive:

And the disk is missing:

4.6.8.1 First Step

For replacing this disk: Stop FreeNAS and replace this disk with a new one (in the same place on the ATA or SCSI channel). And restart FreeNAS.

After restarting FreeNAS, the Disk/Management should display it back (ONLINE if it’s the same, or CHANGED if it’s a different disk).

The Software RAID 5 status is still ‘DEGRADED’, we must add this new disk:
4.6.8.2 Second Step

Open the Disk/Software RAID/Geom Raid5/Tools page and select your DEGRADED RAID array, the replaced Disk name and action “insert”.

You can now check your RAID status (Disk/Software RAID/Geom raid5): It should be ‘REBUILDING” or “COMPLETE” (the time needed for rebuilding depends on your disk size).

You should check the Disk/Mount Status too, as sometimes needs a remount.
4.7 Software RAID configuration with geom vinum

Geom Vinum is all in one module permits you to create a software RAID 0,1 and 5 array. But, for the moment the FreeNAS team doesn’t recommend you to use it because too many users have met with problems using the RAID 5 option of this tool.

4.8 Complex Software RAID combinations (RAID 1+0, 5+0, etc..)

FreeNAS permits you to create advanced Software RAID combinations, for example:

- RAID 1+0: Permits you to create a RAID 0 array using RAID 1 arrays
- RAID 5+0: Permits you to create a RAID 0 array using RAID 5 arrays
- RAID X + Y: Permits you to create a RAID Y array using RAID X arrays

The High-Level process flow for configuring a complex RAID X + Y array is:

1. Add the Disks (4 disks minimum for a RAID 1+0, 6 disks for a RAID 5+0)
2. Format Disks for “Software RAID”
3. Create the RAID X arrays using the previously formatted for “Software RAID”
4. Format the newly created RAID X arrays for “Software RAID”
5. Create the RAID Y array using the previously RAID X arrays formatted for “Software RAID”
6. Add Mount Point
7. Enable Services (CIFS, FTP, etc.)
5 Advanced Configuration

5.1 General system options

Using the Navigation Tree on the Left Hand side of the screen, select System/General setup

5.1.1 Changing Default Admin Username and Password

Changing the default Username and Password is performed via the System/General setup page using the Username and Password fields as shown below.

<table>
<thead>
<tr>
<th>Username</th>
<th>admin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If you want to change the username for accessing the webGUI, enter it here.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Password</th>
<th>(confirmation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If you want to change the password for accessing the webGUI, enter it here.</td>
</tr>
</tbody>
</table>

5.1.2 DNS

DNS server settings are required to permit FreeNAS to connect to NTP time servers or to ping other network devices by name.

<table>
<thead>
<tr>
<th>DNS servers</th>
<th>IP addresses</th>
</tr>
</thead>
</table>

Up to two DNS servers may be configured on the System: General setup page. A reboot is not required when changing the DNS settings.

5.1.3 Language

You can select the WebGUI language on this page:

<table>
<thead>
<tr>
<th>Language</th>
<th>English</th>
</tr>
</thead>
</table>

5.1.4 WebGUI Protocol and Port

If you require a higher level of security when accessing the WebGUI then you can modify some areas to provide this.

You can change the WebGUI protocol from the default HTTP on port 80 to the alternate and more secure HTTPS on port 443. Either port (80 or 443 are configurable).
You must reboot FreeNAS and connect to the new HTTPS WebGUI.

### 5.2 Network Settings

The following additional Network configurations are not mandatory for the operation of FreeNAS, but may be required in some network configurations.

#### 5.2.1 Ethernet Interface properties

To configure advanced interface properties, go to the *Interfaces LAN* page:

- **Static IP configuration**
  - **IP address**: 192.168.80.130/24
  - **Gateway**: 192.168.80.254

- **DHCP client configuration**
  - **Client Identifier**: 00:0c:29:03:3e:68
    - The value in this field is sent as the DHCP client identifier when requesting a DHCP lease.
  - **Hostname**: freenas.local
    - The value in this field is sent as the DHCP hostname when requesting a DHCP lease.

- **General configuration**
  - **MTU**: Standard MTU is 1500, use 9000 for jumbo frame.
  - **Device polling**: Enable device polling
    - Device polling is a technique that lets the system periodically poll network devices for new data instead of relying on interrupts. This can reduce CPU load and therefore increase throughput, at the expense of a slightly higher forwarding delay (the devices are polled 1000 times per second). Not all NICs support polling; see the m0n0wall homepage for a list of supported cards.
  - **Speed**: autoselect
  - **Duplex**: half-duplex

On this page you can configure IP addressing type: DHCP or static. **Note:** In both situations (Static or DHCP) you must set the DNS manually.
**MTU size**: Useful for enabling Jumbo frame support (if your NIC support it). You can check if your NIC card supports jumbo frame from this web site (FreeBSD manpage): [http://www.freebsd.org/cgi/man.cgi](http://www.freebsd.org/cgi/man.cgi)

Just enter your interface name (go on the Interface: Assign page for display the name of your card: fxp for example).

---

### 5.2.2 Additional Ethernet interfaces

In addition to the LAN interface, additional Ethernet Interfaces can be defined, if required. This can be either wired Ethernet interface or Wireless interfaces. See section 5.2.3 for more information relating to wireless LAN interfaces.

The additional interfaces may be used to administer FreeNAS or to access the shares, so it can be a useful redundant interface to FreeNAS for either function.

The additional Ethernet Interface can be within the existing LAN subnet or on a completely different subnet depending on your networks configuration. Where the additional interface is on a different subnet to that of the LAN interface, additional static routes may be required to facilitate connections to the other subnet, for example, the other subnet’s gateway and beyond.

Before adding an additional Ethernet Interface to FreeNAS, ensure that the additional interfaces are installed when FreeNAS is booted.

To add an additional interface, go to the Interfaces (assign) page. If your additional Ethernet interface is recognised, you will have a ![Interface icon] alongside the standard display, as shown below. If you do not have a ![Interface icon] on this display, your interface is either not correctly installed or not recognised by FreeNAS.

![Interface assignments](image)

Clicking on the ![Interface icon] to add the additional Interface called OPT1.
OPT1 is the default name of the interface, and this can be customized. Once OPT1 is configured you will notice an additional level under Interfaces (assign) called OPT1.

Click Save and reboot FreeNAS to ensure the additional interface is recognised. You can reboot FreeNAS via the Diagnostics/Reboot System page.

Once FreeNAS is again operational, you can configure the OPT1 interface and rename it to something more relevant to your network.

As per the display shown below,

Click the Enable Optional 1 interface check box.

- Enter a description for the interface.
- Enter the IP Address and Subnet for the Interface and click Save.
- Change the MTU size if you need/want to. We recommend leaving this blank unless you know what you are doing and have a requirement to change the MTU size.
- This new Interface name in the Navigation Tree and other displays like ping/traceroute, etc will be updated.

A reboot is not required.

Security Note on additional interfaces
FreeNAS does not provide any routing between Ethernet interfaces, so any potential security risks of ‘joining’ two networks via FreeNAS should be limited. But, there is always the potential for virus infected files stored on FreeNAS to be accessible from either network, and so, it is important that a current and up to date anti-virus application is able to scan all files stored on FreeNAS, from time to time. Is not a case of viruses ‘jumping’ from one network to another, its more likely that a user on one network will save a file on FreeNAS and then that is access by another user on the other network.
5.2.3 Wireless LAN interfaces

If a Wireless NIC is identified by FreeNAS, then you can configure this interface to access FreeNAS.

Note: Do not configure a wireless interface as Primary network interface for FreeNAS.

(More detail to follow here)
5.2.4 Default Gateway

If you have a Default Gateway in your network, you may need to configure the Default Gateway within FreeNAS. You may also need to configure the Default Gateway to permit FreeNAS to connect to NTP time servers.

Using the Navigation Tree on the Left Hand side of the screen, select **Interfaces/LAN**

![Interfaces: LAN](image)

Configure the address your **Default Gateway**: (192.168.80.254, in this example)

If you change your **Default Gateway**, or select **Save** at this point, you will be prompted to reboot the FreeNAS PC with the following message;

![Change have been saved](image)

To Reboot the FreeNAS PC, Expand the **Diagnostics item in the Navigation Tree, select Reboot System** and select **Yes**. The FreeNAS PC will reboot.

Once the FreeNAS PC is rebooted, again point your web browser at the FreeNAS PC. You should be presented with the System Status page again. Login if prompted.
5.2.5 Static Routes

In most LAN environments, a single LAN interface will be used (the LAN interface) and its default gateway will provide the interface to other networks. Where multiple LAN interfaces are configured in FreeNAS, then additional static routes may be needed in FreeNAS to permit network traffic to the other networks.

**Note:** This configuration is usually not required unless you have to direct traffic from one subnet via another.

In the example below the interface ‘LAN’ has the IP Address of 192.168.80.130 and its default gateway is 192.168.80.254, my Internet router.

I have another router with a local address of 192.168.80.2 that is connect to another network (10.1.1.0/24). In order for FreeNAS to direct traffic to the 10.1.1.0/24 network, a static route is configured directing any 10.1.1.0/24 traffic to the 192.168.80.2 (local router to its remote network) via the LAN NIC.

### System: Static routes: Edit

<table>
<thead>
<tr>
<th>Interface</th>
<th>LAN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Choose which interface this route applies to.</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Destination network</th>
<th>10.1.1.0</th>
<th>/24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Destination network for this static route</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gateway</th>
<th>192.168.80.2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gateway to be used to reach the destination network</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>To secondary house in La Digue - Seychelles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>You may enter a description here for your reference (not parsed)</strong></td>
<td></td>
</tr>
</tbody>
</table>

5.2.6 Hosts resolution

*Found under System/Hosts*

You can define fixed hostname / IP address resolution.

This is useful if you don’t have DNS resolution for your NFS client for example.

### System: Hosts: Hosts: Add

<table>
<thead>
<tr>
<th>Hostname</th>
<th>Grey_Red_Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The host name may only consist of the characters a-z, A-Z and 0-9, -, _, - and .</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IP address</th>
<th>172.16.66.69</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The IP address that the hostname represents.</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Dedicated to play Ultima 7 - The Black Gate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>You may enter a description here for your reference.</strong></td>
<td></td>
</tr>
</tbody>
</table>

Save
5.3 Advanced system options

*Found under System/Advanced page*

5.3.1 Shutdown and Startup Tones

If your FreeNAS PC has a speaker or audio capabilities, FreeNAS provides tones to the user when shutting down and when boot up is complete. These are provided for FreeNAS installations that are ‘headless’, that is, where no screen or keyboard is left connected to the FreeNAS PC. Tones may be disabled via the System/Advanced page using System Beep option as shown below.

5.3.2 mDNS: bonjour/ZeroConf

*About ZeroConf:*

By default, FreeNAS will announce this available service (multicast) with the Zeroconf protocol. This will permit other computers to detect that there is a computer that provide FTP, SSH, SAMBA, AFP, etc.... services. Zeroconf/Bonjour is used by Apple computer and newer Linux distributions.

5.3.3 Kernel Tuning

Tuning will permit advanced users to tune some FreeBSD kernel parameters. This option toggles some kernel parameter settings to alternate values. The values for the Tuning option being selected (checked or de-selected (unchecked) are shown in the table below.

<table>
<thead>
<tr>
<th>Tuning Unchecked</th>
<th>Tuning Checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>net.inet.tcp.delayed_ack: 1</td>
<td>net.inet.tcp.delayed_ack=0</td>
</tr>
<tr>
<td>net.inet.tcp.sendspace: 32768</td>
<td>net.inet.tcp.sendspace=65536</td>
</tr>
<tr>
<td>net.inet.tcp.recvspace: 65536</td>
<td>net.inet.tcp.recvspace=65536</td>
</tr>
<tr>
<td>net.inet.udp.recvspace: 42080</td>
<td>net.inet.udp.recvspace=65536</td>
</tr>
<tr>
<td>net.inet.udp.maxdgram: 9216</td>
<td>net.inet.udp.maxdgram=57344</td>
</tr>
<tr>
<td>net.local.stream.recvspace: 8192</td>
<td>net.local.stream.recvspace=65535</td>
</tr>
<tr>
<td>net.local.stream.sendspace: 8192</td>
<td>net.local.stream.sendspace=65535</td>
</tr>
<tr>
<td>kern.ipc.maxsockbuf: 262144</td>
<td>kern.ipc.maxsockbuf=2097152</td>
</tr>
<tr>
<td>kern.ipc.somaxconn: 128</td>
<td>kern.ipc.somaxconn=8192</td>
</tr>
<tr>
<td>kern.ipc.maxsockets: 3072</td>
<td>kern.ipc.maxsockets=16424</td>
</tr>
<tr>
<td>kern.ipc.nmbclusters: 3072</td>
<td>kern.ipc.nmbclusters=60000</td>
</tr>
<tr>
<td>kern.maxfiles: 1064</td>
<td>kern.maxfiles=65536</td>
</tr>
<tr>
<td>kern.maxfilesperproc: 957</td>
<td>kern.maxfilesperproc=32768</td>
</tr>
</tbody>
</table>

Before you do some benchmark comparisons, try to enable this option ;-)
5.3.4 Memory SWAP file

**Found under System/Advanced/Swap page**

This section will show how to create a special file on your share, and use this file for memory swap.

If your PC has less than 256MB of RAM you can create a SWAP file having a total memory size (RAM + SWAP). 256MB RAM is the minimum for using the iSCSI target and for fsck big drives.

This example show how to use the ‘secure_disk’ mount point for creating a 256MB file used for swap.

---

**System: Advanced: Swap file**

**Note:**
The options on this page are intended for use by advanced users only, and there’s NO support for them.

<table>
<thead>
<tr>
<th>Swap memory</th>
<th>Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount to use for swap</td>
<td>secure_disk</td>
</tr>
<tr>
<td>Swap file size</td>
<td>256</td>
</tr>
</tbody>
</table>

Size in MB.

[Save]
5.4 Disk Encryption

FreeNAS can encrypt your hard drive (or RAID array) using the FreeBSD geom eli module. This feature will use a hardware crypto acceleration card if supported.

Warning: Creating an encrypted disk will erase ALL data on this disk.

You should configure the WebGUI to use HTTPS protocol before using this feature: The passphrase used for encrypting your disk must be protected when you send it to the WebGUI.

The encryption layer must take place between the hard drive (or RAID array) and the filesystem.

The High-Level process flow for encrypting simple disk is:

1. Add Disks
2. Create your encrypted volume using the previously added disk: This step will automatically ‘attach’ this volume
3. Format this encrypted volume
4. Add a Mount Point using this encrypted volume

The High-Level process flow for encrypting software RAID array is:

1. Create your simple or complex RAID array (chapter 4.6) without formatting it at the end of this process.
2. Create your encrypted volume using the previously created software RAID array: This step will automatically ‘attach’ this volume
3. Format this encrypted volume
4. Add a Mount Point using this encrypted volume

Note: At each reboot of FreeNAS, the mount point using encrypted disk cannot be mount automatically: You must enter your passphrase to ‘attach’ it.

5.4.1 Configure your WebGUI for using HTTPS

It’s not a mandatory step, but a highly recommended step before you create an encrypted volume: This will prevent transferring your passphrase in clear on the network.

Note: Refer to Chapter 5.4.1 for how to change this parameter.
5.4.2 Add your disk or create your software RAID array

In this example, I will use the disk ‘ad1’.
After adding this disk on the disk management page:

5.4.3 Create the encrypted volume

Open the Disk/Encryption page and click the icon on the right hand side.

1. Select the newly added disk/created RAID array on the disk menu.
2. Choose the Encryption Algorithm
3. Choose a strong pass phrase
4. Click on “Init and encrypt disk”, and confirm

Note: Generating time for the encrypted volume is dependent on your disk size: It will fill your disk with random value.
You should obtain the following output:

```
Disk initialization and encryption:

Encrypting... Please wait!
Calculating number of iterations...
Done, using 52832 iterations.
Metadata value stored on /dev/ad1.
Done.
Attaching...
Successful
```

Then click on ‘**encryption**’ menu and ‘**save**’:

```
Disks: Encryption

<table>
<thead>
<tr>
<th>Disk</th>
<th>Data integrity</th>
<th>Encryption</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ad1</td>
<td>none</td>
<td>AES</td>
<td>Attached</td>
</tr>
</tbody>
</table>

The changes have been applied successfully.
```
5.4.4 Format Encrypted disk

When the Status is ‘attached’, then the Encrypted disk must be formatted.

Open the Disk:Format menu and choose the newly created Encrypted disk:

<table>
<thead>
<tr>
<th>Disk</th>
<th>ad1: 100MB (Encrypted disk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>File system</td>
<td>UFS (GPT and Soft Updates)</td>
</tr>
<tr>
<td>Minimum free space</td>
<td>5%</td>
</tr>
<tr>
<td>Don't Erase MBR</td>
<td>Don't erase the MBR (useful for some RAID controller cards)</td>
</tr>
</tbody>
</table>

Leave the Type as UFS (GPT and Soft Updates), click the Format Disk button and confirm.

A display similar to this should be output:

Disk initialization details:

Erasing MBR and all partitions.
Destroying old GPT information:
Creating GPT partition:
/dev/ad1 Ellis1 added
Creating filesystem with 'Soft Updates':
/dev/ad1 Ellis1: 100.0MB (304792 sectors) block size 16384, fragment size 2048 using 4 cylinder groups of 20.00MB, 1600 blocks, 3200 inodes.
with soft updates
super-block backups (for fsck -b #) at:
160, 51360, 102560, 153760
Done!
5.4.5 Create the mount point for encrypted disk

Once the Encrypted volume is created and formatted, all that is left is to create the mount point.

Open the *Disk/Mount Point* page and click the icon on the right hand side.

From the *Disk* drop down, select the Encrypted disk. The *Encrypted disk name* you previously configured is visible.

Change the *Partition* to *EFI-GPT*

Enter a useful *Share name* and click the Add button.

The *Status* should display as *configuring*, and then click the *Apply Changes* button and the *Status* should update to *UP*:

Now you can use your encrypted disk.
Try to put some files on it, and we will check the comportment after a reboot:
5.4.6 Reboot for checking your passphrase

Reboot FreeNAS, and open the Disk/Mount Point page.

You should see an error because FreeNAS can’t mount this encrypted disk without the passphrase:

![Disk/Mount Point page with error message](image1)

Now open the Disk/Encryption page

You should see this encrypted disk with the status ‘Not attached’:

![Disk/Encryption page](image2)

You must enter your passphrase by opening the Disk/Encryption/Tools page:

![Disk/Encryption/Tools page](image3)

Enter your Pass phrase, select command ‘attach’ and click on ‘Send Command!’
It should display:

![Command output]

```
Attaching...
Successful
Mounting this disk...
Successful
```

Now the state of this disk should be ‘attached’:

![Disks: Encryption]

<table>
<thead>
<tr>
<th>Disk</th>
<th>Data integrity</th>
<th>Encryption</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>BigDisk</td>
<td>none</td>
<td>AES</td>
<td>Attached</td>
</tr>
</tbody>
</table>

And the mount point status should be ‘OK’ now:

![Manage]

<table>
<thead>
<tr>
<th>Disk</th>
<th>Partition</th>
<th>File system</th>
<th>Share Name</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sd1</td>
<td>p1</td>
<td>ufs</td>
<td>secure_disk</td>
<td>Files to protect</td>
<td>OK</td>
</tr>
</tbody>
</table>
5.5 iSCSI

iSCSI simulates the presence of a local SCSI hard drive across an IP Network.
- The server side (the real disk) is called iSCSI Target.
- The client side (simulated disk) is called iSCSI disk.

5.5.1 iSCSI target

FreeNAS creates a special file with a given size that simulates a iSCSI disk.
Warning: You must have a minimum of 256MB RAM: Use the swap file if you have less than 256MB of RAM.

Open the Service/iSCSI target page and click the icon on the right hand side.

Select the mount point used for the iSCSI target file, enter the file size in MB, enter authorised network to connect to this iSCSI target and click on the Add button.

You can check the new iSCSI target entry:
5.5.2 iSCSI initiator

An iSCSI initiator simulates an SCSI controller across an IP Network to permit FreeNAS to use other drive resources as disks.

To test FreeNAS’s iSCSI support, a free iSCSI target under a Windows 2003 server such as StarWind can be used, or using another FreeNAS configured as iSCSI target.

Here is an example for using the previously created iSCSI target from another FreeNAS:

Open the Disks/Management/iSCSI initiator page and click the icon on the right hand side.

For this example, I’m using the following parameters:
- Name: Entry name (using for information only)
- Initiator name: initiator.freenas.org:yo
- Target Name: iqn.1994-04.org.netbsd.iscsi-target:target0 (The same as displayed in the iSCSI target configuration on the FreeNAS iSCSI target)
- Target IP: The IP address of the iSCSI target
After creating the iSCSI initiator entry, you can add the iSCSI disk now.

Open the *Disks/Management* page and click the on the right hand side of the Display area.

You should have a new SCSI disk (daX) as on this example:

![Disks: Disk: Add](image)

After configuring your iSCSI initiator, if you meet a problem (don’t see new SCSI disk) you can check the presence of the Target name that you are using the Diagnostics/Information/iSCSI initiator page:

![Diagnostics: Information](image)

Discovered iSCSI target for 192.168.80.131
TargetName=iqn.1994-05.org.netbsd.iscsi-target:target0
TargetAddress=192.168.80.131:3260,1
5.6 Advanced Hard Drive Parameters

When Adding a Disk, there are some options included that have the potential to increase the lifespan of Hard Disk Drives within FreeNAS.

Not all HDD support any, or all of these advanced hard drive options, and so you should confirm your HDD capabilities via the Diagnostic: Information Page and the ataidle tab. (see below).

Warning: CF cards should not have ANY of these settings enabled.

![Advanced Hard Drive Parameters](image)

5.6.1 UDMA mode

Use this option only if FreeNAS can’t automatically detect this mode correctly. Currently supported modes are:

- Auto
- UDMA-33
- UDMA-66
- UDMA-100
- UDMA-133
5.6.2 Hard Disk Standby time

Puts the hard disk into standby mode when the selected amount of time after the last access has elapsed.

Proposed values are:

```
Always on
5 minutes
10 minutes
20 minutes
30 minutes
60 minutes
```

5.6.3 Advanced Power Management (also known as APM)

This allows you to lower the power consumption of the drive, at the expense of performance.

Proposed values are:

```
Disabled
Minimum power usage with Standby
Medium power usage with Standby
Minimum power usage without Standby
Medium power usage without Standby
Maximum performance, maximum power usage
```

5.6.4 Acoustic Level (also known as AAC)

This allows you to set how loud the drive is while it's operating.

Proposed values are:

```
Disabled
Minimum performance, Minimum acoustic output
Medium acoustic output
Maximum performance, maximum acoustic output
```
5.6.5 Verifying your Disk’s S.M.A.R.T, APM, AAC capabilities

Verify your HDD capabilities for S.M.A.R.T, APM and AAC via the Diagnostic: Information page, ataidle Tab.

Examples of Advanced Hard Drive capabilities:

<table>
<thead>
<tr>
<th>List of Advanced ATA capabilities on all ATA disk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results for ad0:</td>
</tr>
<tr>
<td>Device Info:</td>
</tr>
<tr>
<td>Model: FUJITSU MPF3102AT</td>
</tr>
<tr>
<td>Serial: 31277991</td>
</tr>
<tr>
<td>Firmware Rev: 1402</td>
</tr>
<tr>
<td>ATA revision: ATA-5</td>
</tr>
<tr>
<td>Geometry: 16383 cyls, 16 heads, 63 spt</td>
</tr>
<tr>
<td>Capacity: 9GB</td>
</tr>
<tr>
<td>SMART Supported: yes</td>
</tr>
<tr>
<td>SMART Enabled: yes</td>
</tr>
<tr>
<td>APM Supported: yes</td>
</tr>
<tr>
<td>APM Enabled: no</td>
</tr>
<tr>
<td>AAC Supported: yes</td>
</tr>
<tr>
<td>AAC Enabled: no</td>
</tr>
<tr>
<td>Note: AAC = AutoAcoustic</td>
</tr>
<tr>
<td>APM = Advanced Power Management</td>
</tr>
<tr>
<td>SMART = Self-Monitoring, Analysis and Reporting Technology</td>
</tr>
</tbody>
</table>

| Results for ad2:                                |
| Device Info:                                    |
| Model: SAMSUNG SP2014N                         |
| Serial: S088J1RY906273                        |
| Firmware Rev: VC100-33                         |
| ATA revision: ATA-7                            |
| Geometry: 16383 cyls, 16 heads, 63 spt         |
| Capacity: 127GB                                |
| SMART Supported: yes                           |
| SMART Enabled: yes                             |
| APM Supported: no                              |
| APM Enabled: no                                |
| AAC Supported: yes                             |
| AAC Enabled: no                                |
| Note: AAC = AutoAcoustic                       |
| APM = Advanced Power Management                |
| SMART = Self-Monitoring, Analysis and Reporting Technology |

From this you can see that on ad0, there is no value in setting APM or AAC for this drive as it is not supported. Similarly on ad2, APM is not supported, but AAC is support, but not enabled.

5.6.6 S.M.A.R.T

SMART is enabled on a system-wide basis via the System:Advanced page by checking the Enable the S.M.A.R.T daemon option and clicking the Save button.

Warning: This option can prevent the disk Advanced Power Management from working correctly.
5.7 Upgrading FreeNAS

Upgrading FreeNAS, via the Firmware Upgrade page is only supported on FreeNAS 0.52 and above.

**Note:** You can't upgrade earlier version of FreeNAS.

Upgrading permits a user to upgrade the FreeNAS code without performing a complete installation.

Normally an installation would require an .ISO file to be burnt to CD. For upgrades, an .IMG file is used and may be stored on any location that your PC (the client) can see.

First, download the latest FreeNAS .IMG file from the FreeNAS website on Sourceforge.

Then, assuming you are logged into FreeNAS, perform the following steps.

- Backup your existing configuration
- Upgrade FreeNAS
- Verify your FreeNAS configuration

5.7.1 Backup Configuration

- Navigate to the Diagnostics: Backup/restore page

- In the Backup configuration area, click the ‘Download configuration’ button

- When prompted by your PC, select Save, and location on your PC to save the config file

Saving the config file (XP example)

Do not store the config file on your FreeNAS storage.
5.7.2 Performing the Upgrade

**Warning:** For upgrading from the 0.67x or previous release you need to follow this procedure: [http://www.freenas.org/downloads/patch/](http://www.freenas.org/downloads/patch/)

You need a minimum of 128 MB of RAM for performing Upgrade, if not; Use the Memory swap file feature to increase your RAM quantities.

Navigate to the System: Firmware page and click the *Enable firmware upload* button.

Click the *Browse* button and navigate to where you stored the previously downloaded .IMG file.

**Note:** This is not the backup xml file you just saved; this is the .IMG file from the Sourceforge or FreeNAS website. **DO NOT USE the ISO file here!!!**

Once the file is in the *firmware image file* window, click the *Upgrade* firmware button.

A message will indicate the upgrade installation is being performed and FreeNAS will reboot once this is completed.

Once the reboot is complete, log back into FreeNAS.

**Note:** If, for some reason you cannot connect to FreeNAS, connect a screen to your FreeNAS PC (if not already connected) and verify the network settings using the console menu.

It’s possible that with new release, the name of your LAN card changes (FreeBSD new NIC drivers for example).
5.7.3 Verify FreeNAS configuration

The upgrade will normally not modify any of the FreeNAS configurations, but to be sure, navigate to several screens in your FreeNAS and ensure that items such as the network and disk configuration are as you previously configured it.
5.8 User Management

Actually FreeNAS implement user and group Authentication.

The user/group permission is functional but not implemented on the WebGUI configuration interface.

[Works in progress for version 0.7]
5.8.1 Local User Management

First you must add a group by selecting the *Access/Users and Groups* page.

- Click the *Groups* TAB and click the + to add a Group.
- Enter a group name *Note*: only a-z, A-Z and 0-9 are supported. _ (underscores) and spaces are not supported.
- Enter a description then click *Add* and *Apply Changes*

Once a Group is created then users can be created.

As shown below, Enter the users login name, their Full Name, a password, select the group they belong to and Click *Add*.

**Warning**: Do not use the character “:”(colon) on the password!

*Note*: A Full Shell enabled user can access the shell account on FreeNAS via SSH. A user without Full Shell user cannot access the shell. This is a different account to the WebGUI admin account, which has full access to the WebGUI configuration.

With this box un-checked, the user has SCPONLY access. Scponly is an alternative 'shell' (of sorts) for system administrators who would like to provide access to remote users to copy file (SCP) without providing any remote execution privileges.
## 5.8.2 MS Active Directory

FreeNAS can get the user database (login and password) from a Microsoft Active Directory (Windows 2000/2003).

Note: in FreeNAS, you must use the pre-win2000 domain name. For example if your domain name is ‘freenas.org’, you must set the domain name ‘FREENAS’

### Access: Active Directory

<table>
<thead>
<tr>
<th>Active Directory</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AD server name</strong></td>
<td>mainpdc</td>
</tr>
<tr>
<td><strong>AD server IP</strong></td>
<td>192.168.80.10</td>
</tr>
<tr>
<td><strong>Domain name</strong></td>
<td>FREENAS</td>
</tr>
<tr>
<td><strong>Administrator name</strong></td>
<td>Administrator</td>
</tr>
<tr>
<td><strong>Administration password</strong></td>
<td>(Confirmation)</td>
</tr>
</tbody>
</table>

After configuring, CIFS/FTP/SSH/Unison authentication will rely **ONLY** on user's accounts present in the AD.

### 5.8.3 LDAP

The LDAP page is enabled on the 0.684b but doesn’t work.
6 How to contribute to FreeNAS

6.1 Translators

6.1.1 Web GUI

If you want to translate the FreeNAS Web GUI, here is to proceed:

1. Check on the FreeNAS documentation mailing list that no other same language translator as you are already working on it:
   https://sourceforge.net/mailarchive/forum.php?forum_id=48149

2. Download the English reference .pot file (en_EN.ISO8859-1.pot) from the Web SVN FreeNAS site:

3. Download a PO file editor. For example you can use this tool:
   http://sourceforge.net/projects/poedit/

4. Start you PO file editor, and use the .pot as reference file, and create your own language file

5. Send your own language .po file on the FreeNAS-documentation mailing-list (This will permit to archive your name with your file).

6.1.2 UserManual

You can download the MS word file or OpenOffice version here:
http://www.freenas.org/downloads/docs/user-docs/FreeNAS-SUG.doc
http://www.freenas.org/downloads/docs/user-docs/FreeNAS-SUG.odt

Add your modifications and send your file to this list of FreeNAS team member:
olivier@freenas.org
bobj@freenas.org

6.1.3 Website

The web sit supporting multiple editor account, you can propose your translation.
Contact the webmaster for proposing your help:
youri.trioreau@no-log.org
6.2 BSD user and/or PHP coder

We are not BSD guru’s, but only simple users. Then the configuration file of FreeNAS can be easily improved.

We are looking for PHP expert too for reviewing/improving the FreeNAS code (99% of PHP, 1% of Unix shell).

Here is a simple way for ‘playing with FreeNAS’:
1. Enable SSHD with ‘Permit root access’ checked
2. Open an WinSCP (or other SCP tools) session on your FreeNAS.

You can now directly edit the code files of FreeNAS:
- /var/etc directory contain the configuration files generated (simple text config files)
- /usr/local/www contain the WebGUI files (PHP files)
- /etc/inc contain the systems scripts (PHP files too)

Check existing file for learning how FreeNAS works (it’s very simple!)

2. Send your modifications on the FreeNAS developer mailing-list: https://sourceforge.net/mailarchive/forum.php?forum_id=47361
   (This will archive your name with your patch)

Don’t forget to update the licence page if you are re-using other Open source code!

If you want to build a FreeNAS from scratch, follow the FreeNAS Developers’ Handbook:
http://www.freenas.org/downloads/docs/devel-docs/

There is a rapid FreeBSD installation guide with QEMU under Windows here:
http://docs.google.com/Doc?id=ah8hztpqrdfp_31fr866v

6.3 User support

Simply check the FreeNAS support forum:
https://sourceforge.net/forum/?group_id=151951

And answers at the maximum users questions…