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Backing Up The FreeNAS Configuration File Nightly Using A Cron Job

This is entirely optional.

It is recommended that you have email notifications setup on the FreeNAS server before embarking on this subsection.

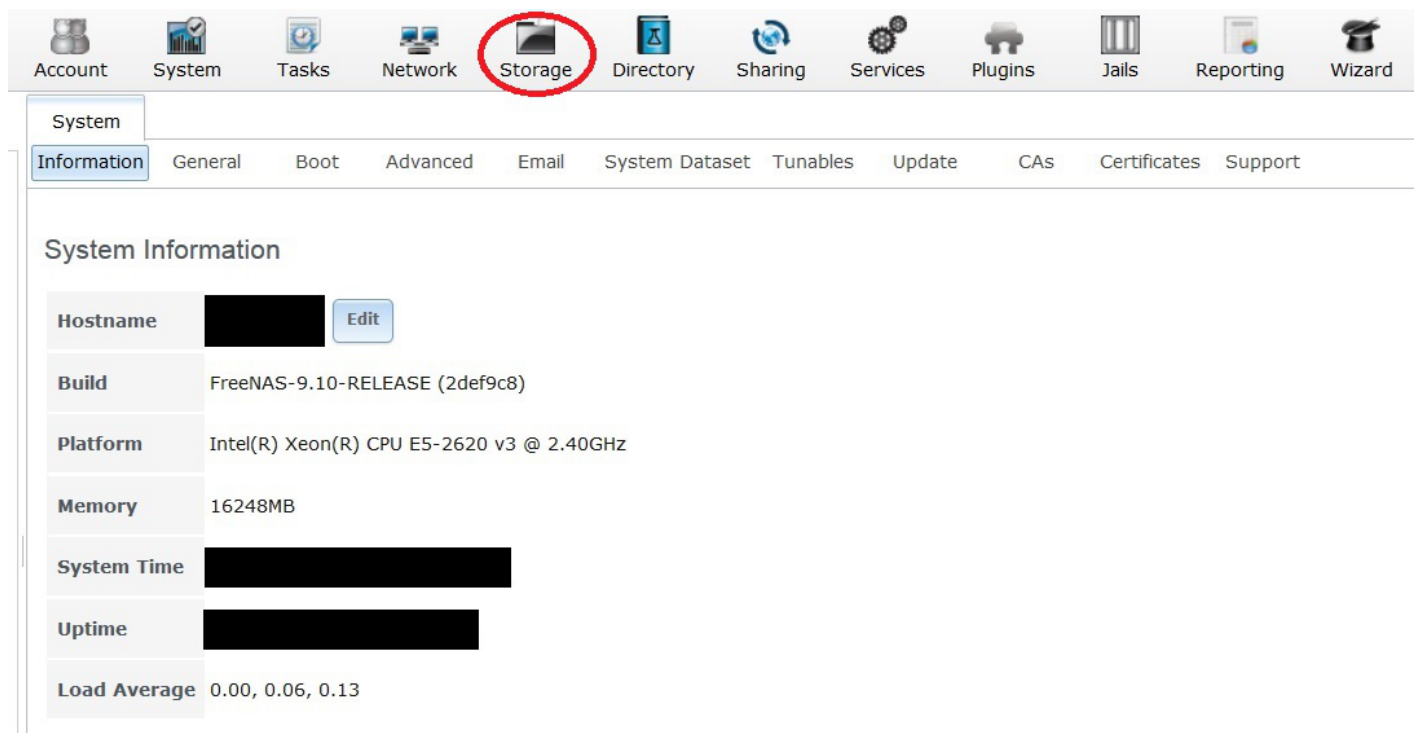
This is a guide for creating a Cron job to back-up the FreeNAS configuration file each night.

This file can be used for recovery purposes should your FreeNAS server encounter a problem of some sort (bloody ferrets!), so this is well worth doing.

Creating the Dataset

The first thing to do is to create a dataset within which we can store the nightly backup of the FreeNAS configuration file. This will keep things neat and tidy.

Go to the “Storage” page.



Select “Tank1” or whatever you called the volume (1) by clicking on it (it should turn blue when selected).

A series of buttons should appear on the bottom of the screen.

From these buttons click on one that creates a dataset (2).

Storage

Volumes

Periodic Snapshot Tasks

Replication Tasks

Scrubs

Snapshots

VMware-Snapshot

Volume Manager

Import Disk

Import Volume

View Disks

Name	Used	Available
▲ Tank1 1	1.9 GiB (0%)	29.0 TiB
▲ Tank1	1.4 GiB (0%)	20.0 TiB
Media	33.4 MiB (0%)	20.0 TiB
TestShare	33.4 MiB (0%)	20.0 TiB
▲ jails	1013.3 MiB (0%)	20.0 TiB
jails/.warden-template-pluginjail	605.6 MiB (0%)	20.0 TiB
jails/plexmediaserver_1	407.4 MiB (0%)	20.0 TiB

2

Create Dataset

A new smaller window will pop up for creating the dataset.

- In the “Dataset Name:” text box (1) give the share a name (because this is a backup dataset, Fester used **NightlyBackup**).
- Leave the “Compression level:” drop down selection box (2) set to lz4.
- Set the “Share type:” to whatever suits the type of clients on your network (Fester has mainly Windows machines so I set this to **Windows**).
- Leave the “Case Sensitivity:” drop down selection box and “Enable atime:” at their default settings as shown (4).
- “ZFS Deduplication:” should be set to **off** in the drop down selection box (5) unless you understand this and you have plenty of memory.
- Now click the “Add Dataset” button (6).

Create Dataset

Create ZFS dataset in Tank1

Dataset Name:	1	NightlyBackup
Compression level:	2	Inherit (lz4)
Share type:	3	Windows
Case Sensitivity:		Sensitive
Enable atime:	4	<ul style="list-style-type: none"><input checked="" type="radio"/> Inherit (on)<input type="radio"/> On<input type="radio"/> Off
ZFS Deduplication:		Enabling dedup may have drastic performance implications, as well as impact your ability to access your data. Consider using compression instead.
	5	Inherit (off)

6

Add Dataset

Cancel

Advanced Mode

The dataset will now be created and you should see something like this.

Storage

VolumesPeriodic Snapshot TasksReplication TasksScrubsSnapshotsVMware-Snapshot

Volume ManagerImport DiskImport VolumeView Disks

Name	Used	Available
▲ Tank1	1.9 GiB (0%)	29.0 TiB
▲ Tank1	1.4 GiB (0%)	20.0 TiB
Media	33.4 MiB (0%)	20.0 TiB
NightlyBackup	204.8 KiB (0%)	20.0 TiB
TestShare	33.4 MiB (0%)	20.0 TiB
▲ jails	1013.3 MiB (0%)	20.0 TiB
jails/.warden-template-pluginjail	605.6 MiB (0%)	20.0 TiB
jails/plexmediaserver_1	407.5 MiB (0%)	20.0 TiB

Remain on this screen and select the newly created dataset (1) if it is not selected already (in Fester's case this was NightlyBackup).

Now click on the change permissions button (2).

Storage

Volumes

Periodic Snapshot Tasks

Replication Tasks

Scrubs

Snapshots

VMware-Snapshot

Volume Manager

Import Disk

Import Volume

View Disks

Name	Used	Available
▲ Tank1	1.9 GiB (0%)	29.0 TiB
▲ Tank1	1.4 GiB (0%)	20.0 TiB
Media	33.4 MiB (0%)	20.0 TiB
NightlyBackup	204.8 KiB (0%)	20.0 TiB
TestShare	33.4 MiB (0%)	20.0 TiB
▲ jails	1013.3 MiB (0%)	20.0 TiB
jails/.warden-template-pluginjail	605.6 MiB (0%)	20.0 TiB
jails/plexmediaserver_1	407.5 MiB (0%)	20.0 TiB

2

Change Permissions

A new window will pop up for changing the permissions of the new dataset.

I did not need to change any of the settings from their default value (1).

Now click the “Change” button (2).

Do not set the user and group to any of those you use for shares. This would be unwise. Only the **root** user and **wheel** group should be allowed to access this particular share.

Change permission

Change permission on /mnt/Tank1/NightlyBackup to:

Apply Owner (user):	<input checked="" type="checkbox"/>																
Owner (user):	root																
Apply Owner (group):	<input checked="" type="checkbox"/>																
Owner (group):	wheel																
Apply Mode:	<input checked="" type="checkbox"/>																
Mode:	<div>1</div> <table><thead><tr><th></th><th>Owner</th><th>Group</th><th>Other</th></tr></thead><tbody><tr><td>Read</td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td></tr><tr><td>Write</td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td></tr><tr><td>Execute</td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td><td><input checked="" type="checkbox"/></td></tr></tbody></table> <div><ul style="list-style-type: none"><input type="radio"/> Unix<input type="radio"/> Mac<input checked="" type="radio"/> Windows</div>		Owner	Group	Other	Read	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Write	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Execute	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Owner	Group	Other														
Read	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>														
Write	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
Execute	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>														
Permission Type:																	
Set permission recursively:	<input type="checkbox"/>																

2

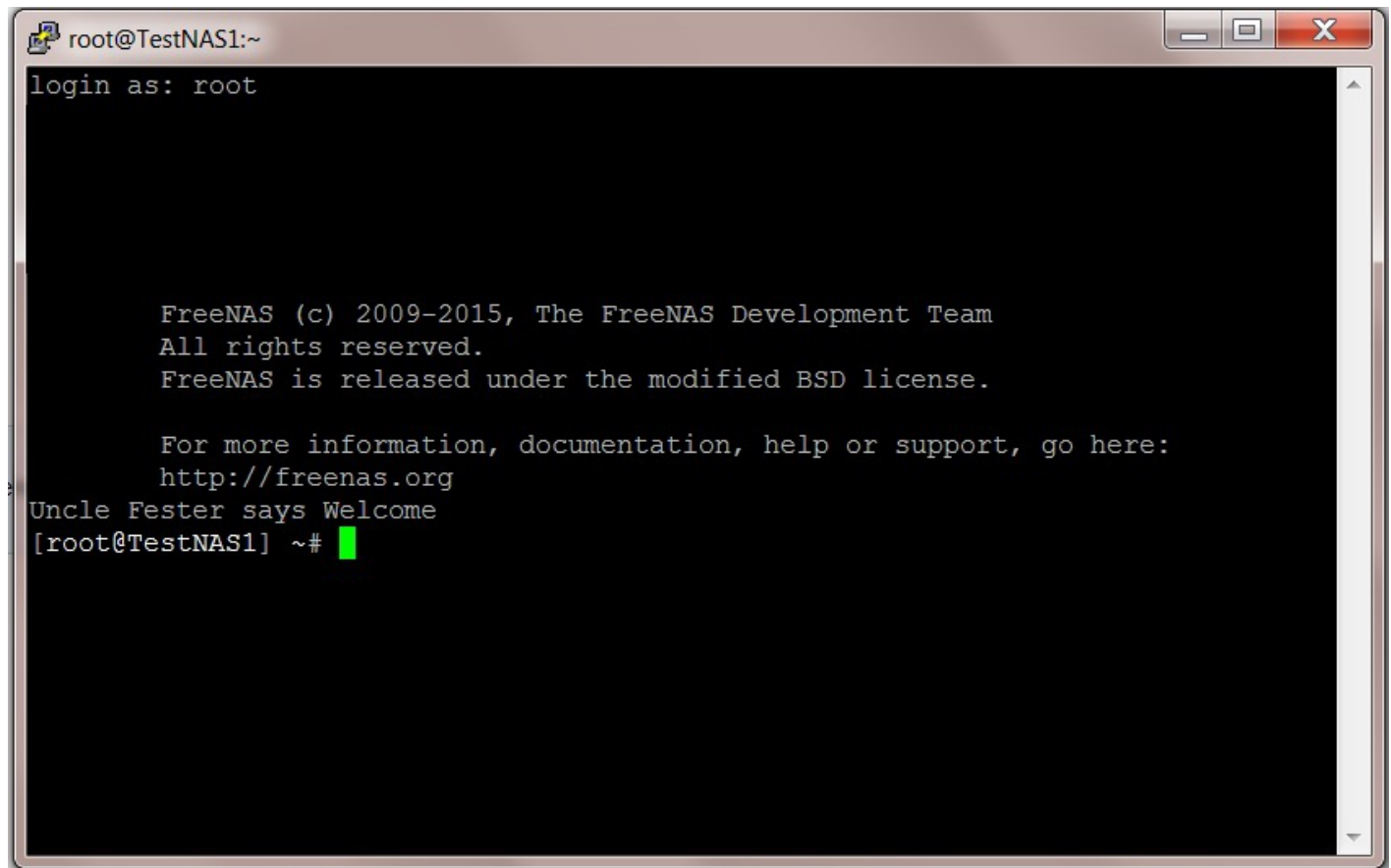
Change

Cancel

Creating the Script

We now need to create a file in the volume directory (in Fester's case this is Tank1).

Open up an SSH session in PuTTY and log in as the root user. You should see a screen something like this.

A terminal window titled 'root@TestNAS1:~' with standard window controls. The text inside shows a login process where the user is 'root'. It displays the FreeNAS copyright notice (© 2009-2015, The FreeNAS Development Team), states that all rights are reserved and it's released under the modified BSD license. It provides a URL for more information: http://freenas.org. A custom message 'Uncle Fester says Welcome' is shown. The prompt is '[root@TestNAS1] ~#' followed by a green cursor.

```
root@TestNAS1:~
login as: root

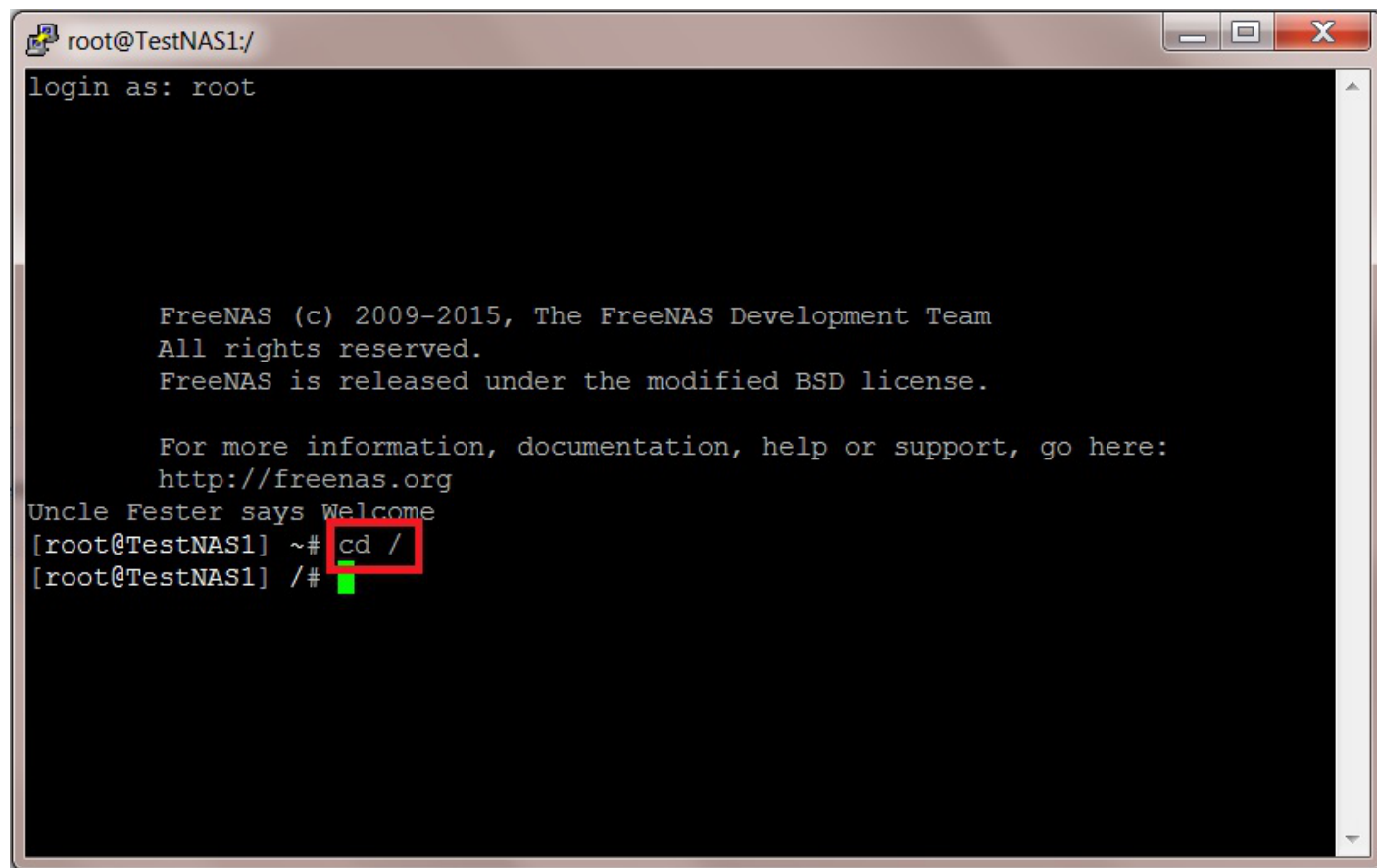
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For more information, documentation, help or support, go here:
http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~#
```

We now need to navigate to the volume directory by typing in the following command into the command prompt. Don't forget to hit the "Return/Enter" key to execute the command.

```
cd /
```

You should now see a screen something like this.



```
root@TestNAS1:/
login as: root

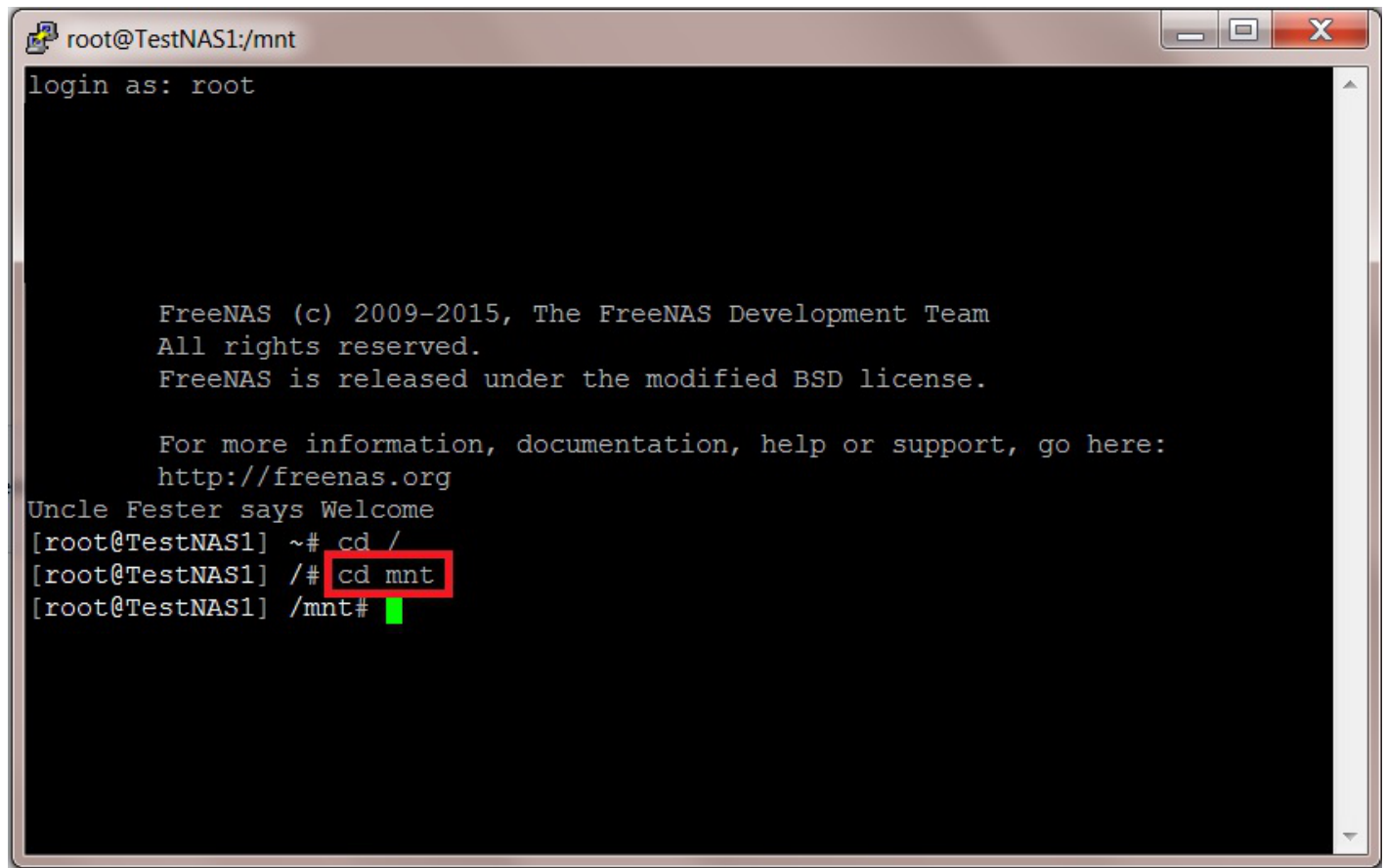
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For more information, documentation, help or support, go here:
http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /#
```

Now type into the command prompt the following command.

```
cd mnt
```

You should see a screen something like this.

A terminal window titled 'root@TestNAS1:/mnt' with standard window controls. The terminal shows a login prompt 'login as: root' followed by a welcome message from 'Uncle Fester'. The user enters 'cd /' and then 'cd mnt', with the latter command highlighted by a red box. The prompt changes from '[root@TestNAS1] ~#' to '[root@TestNAS1] /#' and finally to '[root@TestNAS1] /mnt#' with a green cursor.

```
root@TestNAS1:/mnt
login as: root

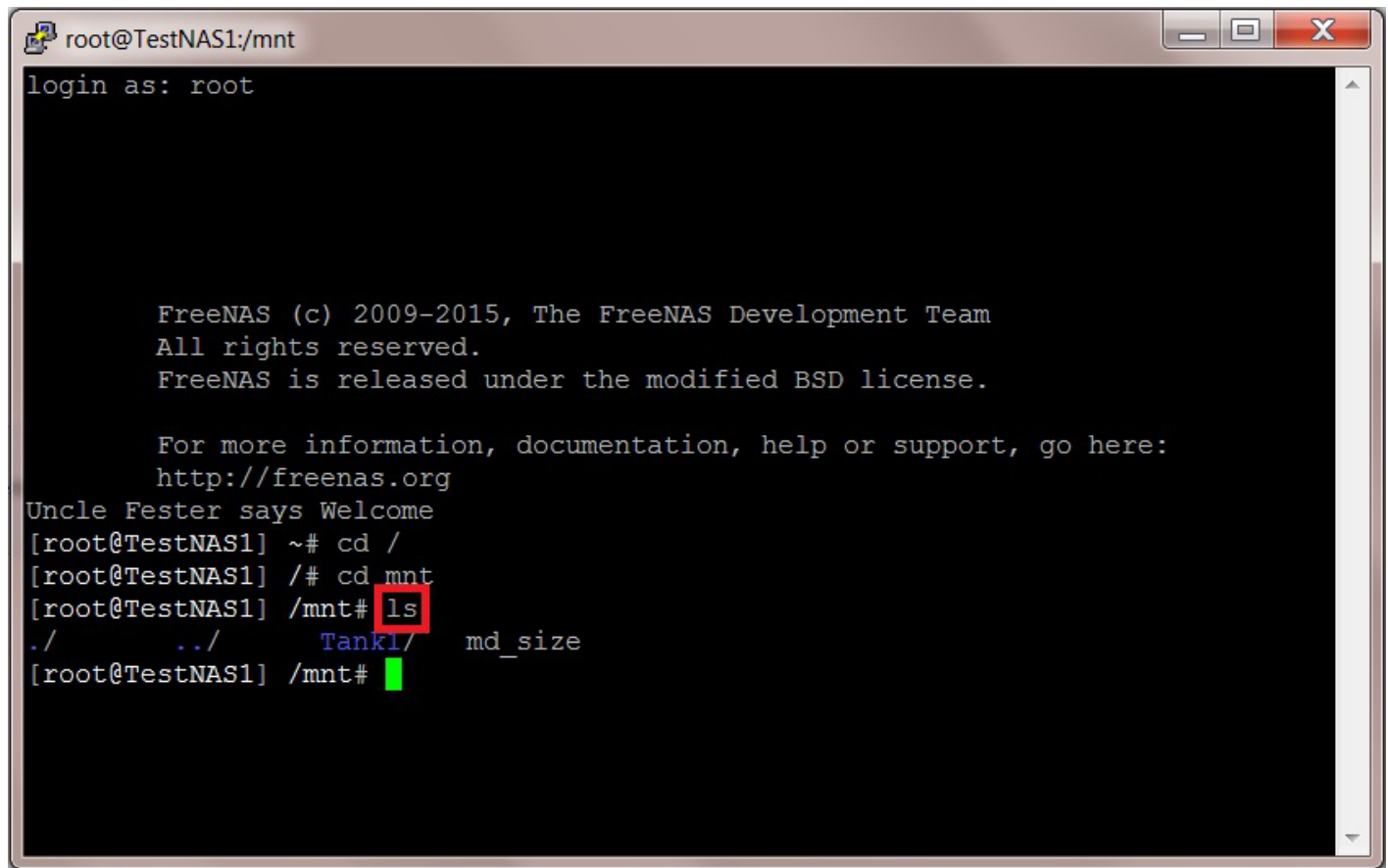
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For more information, documentation, help or support, go here:
http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt#
```

Now type in the following command at the command prompt to see your volume's name.

`ls`

You should see a screen that looks something like this.



```
root@TestNAS1:/mnt
login as: root

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For more information, documentation, help or support, go here:
http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd /mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md_size
[root@TestNAS1] /mnt#
```

The name of the volume will be revealed at this point (in Fester's case it is the blue text "Tank1").

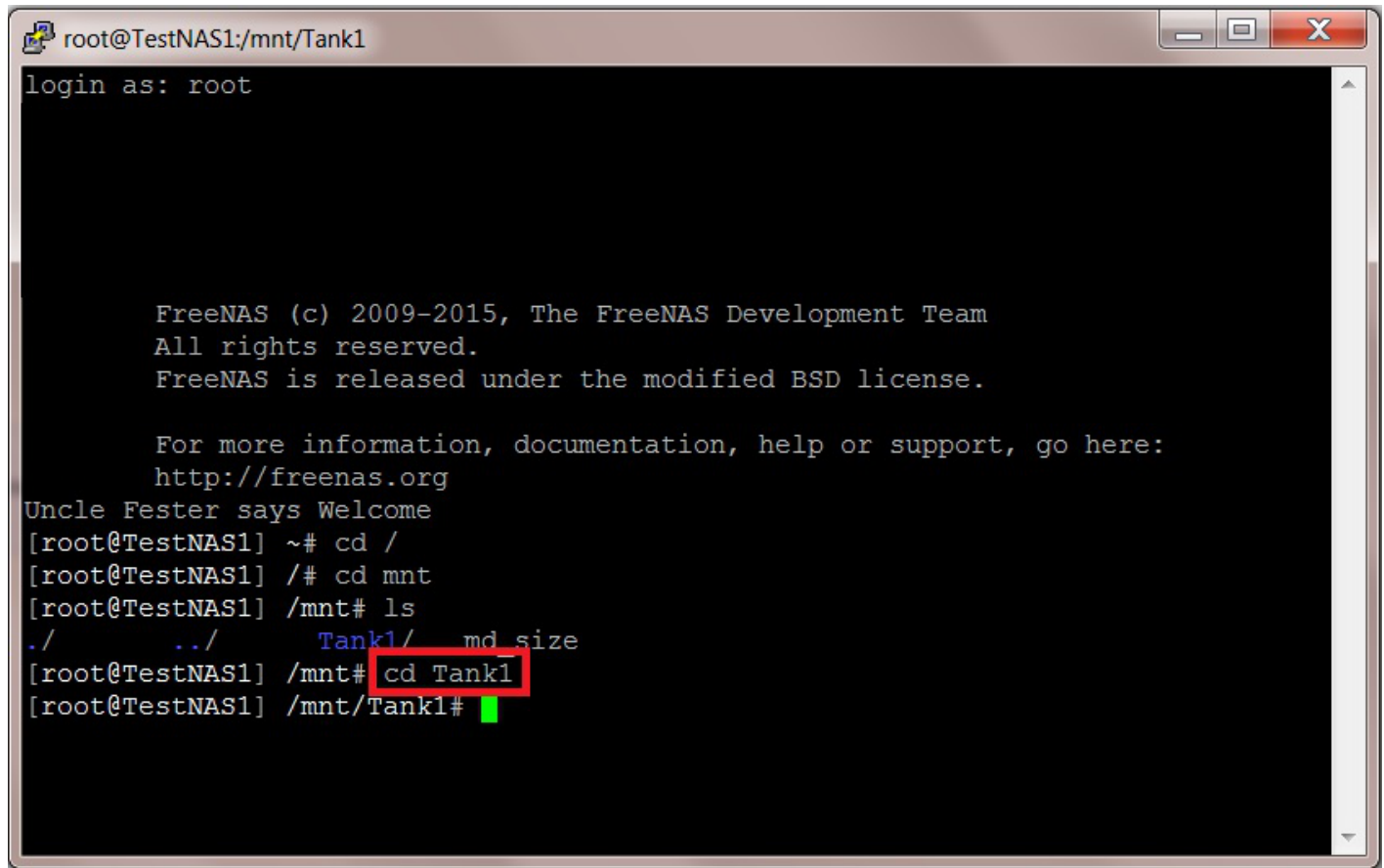
Now type into the command prompt the following command with your volume name. The volume name is case sensitive so make sure you observe this when typing in the command.

```
cd YourVolumeNameHere
```

In Fester's case the command would look like this:

```
cd Tank1
```

You should see a screen like this.

A terminal window titled 'root@TestNAS1:/mnt/Tank1' with standard window controls. The terminal shows a login sequence for 'root' on 'TestNAS1'. It displays the FreeNAS copyright notice (2009-2015) and the modified BSD license. After a 'Welcome' message from 'Uncle Fester', the user navigates from the root directory to '/mnt' and then to '/mnt/Tank1'. The command 'cd Tank1' is highlighted with a red rectangle. The terminal output shows the directory listing for '/mnt' with columns for permissions, owner, group, size, and file name, listing 'Tank1' as a directory.

```
root@TestNAS1:/mnt/Tank1
login as: root

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For more information, documentation, help or support, go here:
http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md          size
[root@TestNAS1] /mnt# cd Tank1
[root@TestNAS1] /mnt/Tank1#
```

We now need create an empty file in this directory. You can call this file anything you like but remember its name as you will need it later.

At the command prompt type the following command (1).

```
touch YourFileNameHere.sh
```

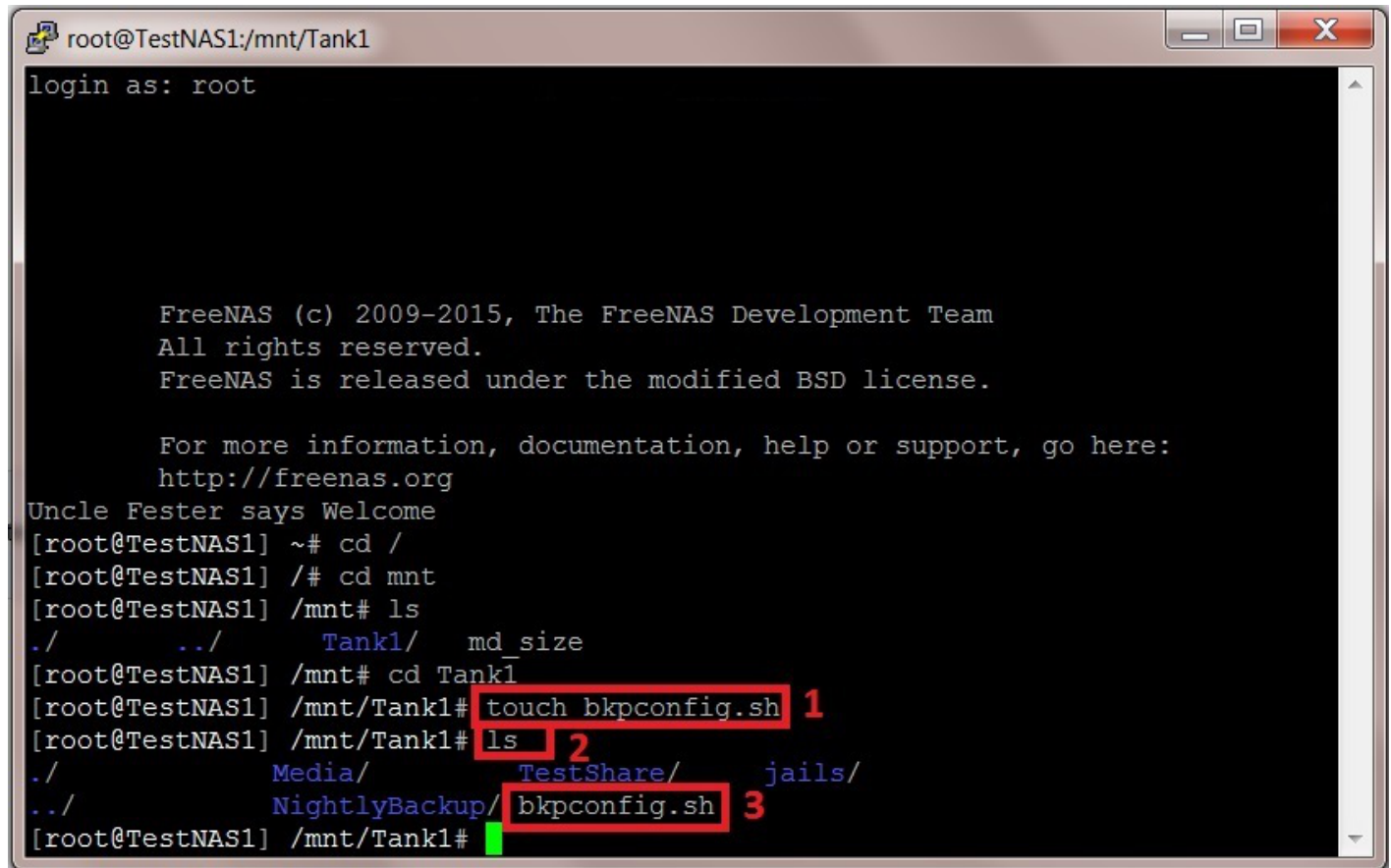
In Fester's case the command looked like this.

```
touch bkpconfig.sh
```

Now type in the following command to confirm the file was created (2).

```
ls
```

If all has gone well you should see the file listed in the SSH window (3).

A terminal window titled 'root@TestNAS1:/mnt/Tank1' with standard window controls. The terminal shows a login sequence as 'root', followed by FreeNAS copyright and license information. The user navigates through the directory structure: from the root of the system to /mnt, then into the Tank1 directory. Three specific commands are highlighted with red boxes and numbered: 1. 'touch bkpconfig.sh', 2. 'ls', and 3. 'bkpconfig.sh'. The terminal also shows a directory listing of /mnt/Tank1 containing 'md' and 'size'.

We now need to edit the file. At the command prompt type in the following command.

```
edit YourFileNameHere.sh
```

In Fester's case this command would look like this.

```
edit bkpconfig.sh
```

If all goes well you should see a screen like this.

```

root@TestNAS1:/mnt/Tank1
^[(escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char ^z next word
^t top of text ^e end of line ^r restore word ^f forward char
^c command ^d delete char ^j undelete char ESC-Enter: exit
====line 1 col 0 lines from top 1 =====
file "bkpconfig.sh", 1 lines

```

We now need to put in the text line that will run each evening when the Cron Job is activated.

Type into the edit window the following line of text (this is all one line).

```
cp /data/freenas-v1.db /mnt/YourVolumeNameHere/YourDatasetNameHere/`date
+%Y%m%d`.db
```

So in Fester's case this command would look like this.

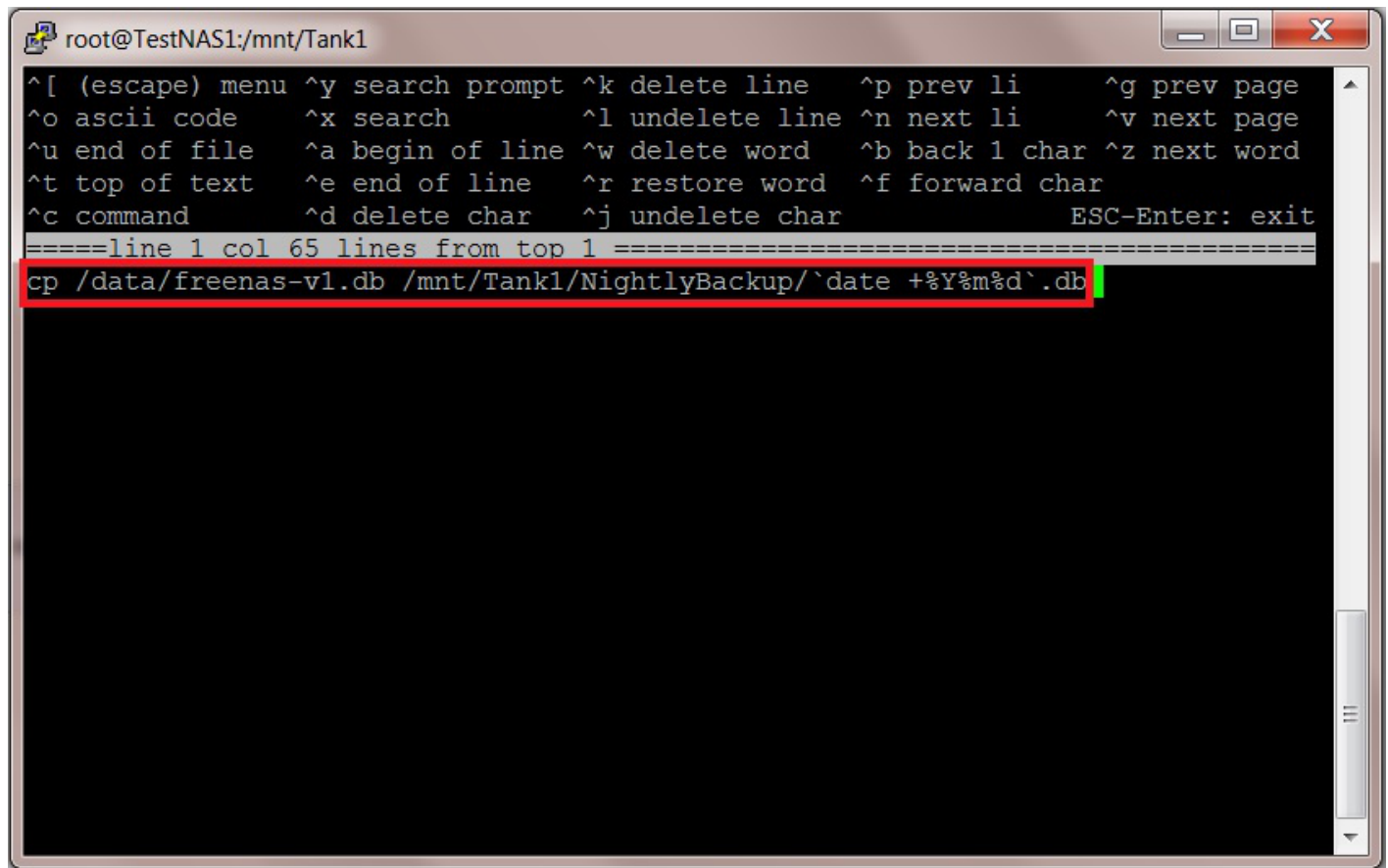
```
cp /data/freenas-v1.db /mnt/Tank1/NightlyBackup/`date +%Y%m%d`.db
```

If you want the FreeNAS version tagged on to the backup file names then use this command instead. This is all one one line; do not press the Enter key to insert a line break:

```
cp /data/freenas-v1.db /mnt/YourVolumeNameHere/YourDatasetNameHere
/.scripts/ConfigBackups/`date %Y%m%d`_`cat /etc/version | cut -d'-' -f2`_`cat
/etc/version | cut -d'-' -f4`.db
```

(Please note the “`” character is not an apostrophe. This character on my keyboard is found at the top left hand side under the “Esc” key. Your keyboard may be different.)

When you are done the edit screen should look something like this.

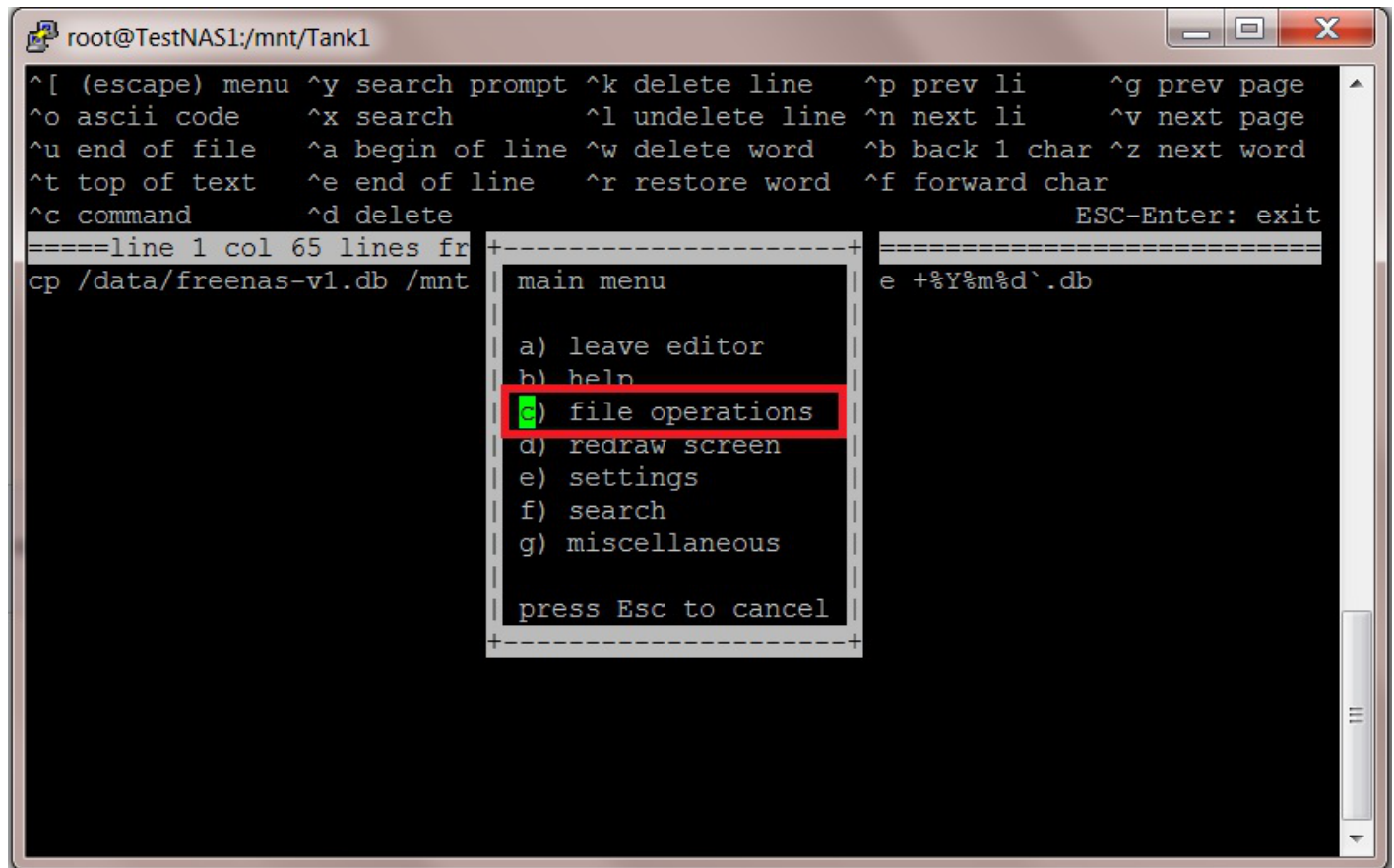


```
root@TestNAS1:/mnt/Tank1
^[(escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char ^z next word
^t top of text ^e end of line ^r restore word ^f forward char
^c command ^d delete char ^j undelete char ESC-Enter: exit
====line 1 col 65 lines from top 1====
cp /data/freenas-v1.db /mnt/Tank1/NightlyBackup/`date +%Y%m%d`.db
```

Now hit the “Esc” key.

You should be presented with a series of options at this point.

Press the “c” key or navigate to the c option using the “↑↓” keys and press the “Return/Enter” key.



```
root@TestNAS1:/mnt/Tank1

^[ (escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char ^z next word
^t top of text ^e end of line ^r restore word ^f forward char
^c command ^d delete ESC-Enter: exit

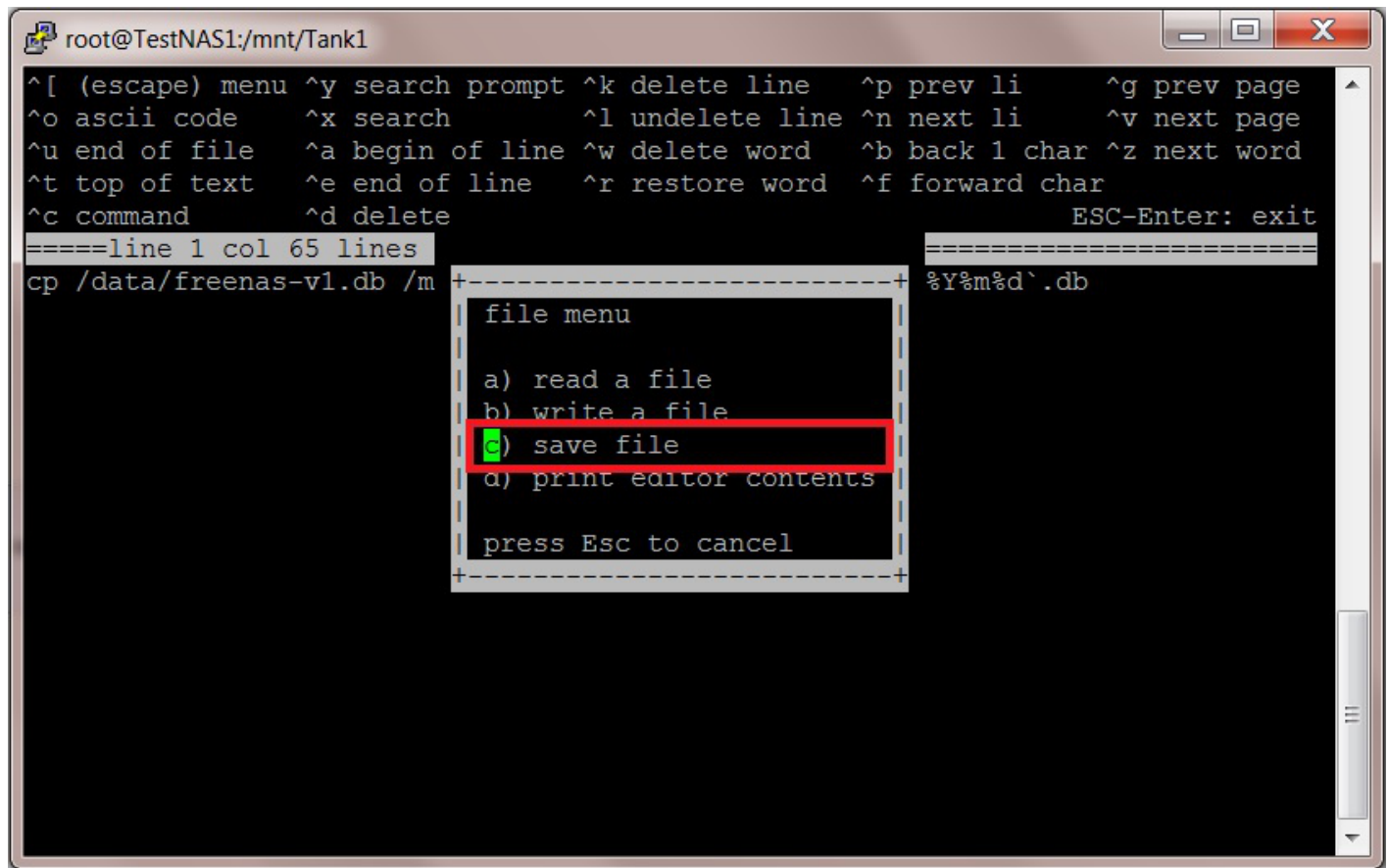
====line 1 col 65 lines fr
cp /data/freenas-v1.db /mnt

main menu
a) leave editor
b) help
c) file operations
d) redraw screen
e) settings
f) search
g) miscellaneous

press Esc to cancel

e +%Y%m%d`.db
```

Now press the “c” key again or navigate to the c option using the “↑↓” keys and press the “Return/Enter” key.



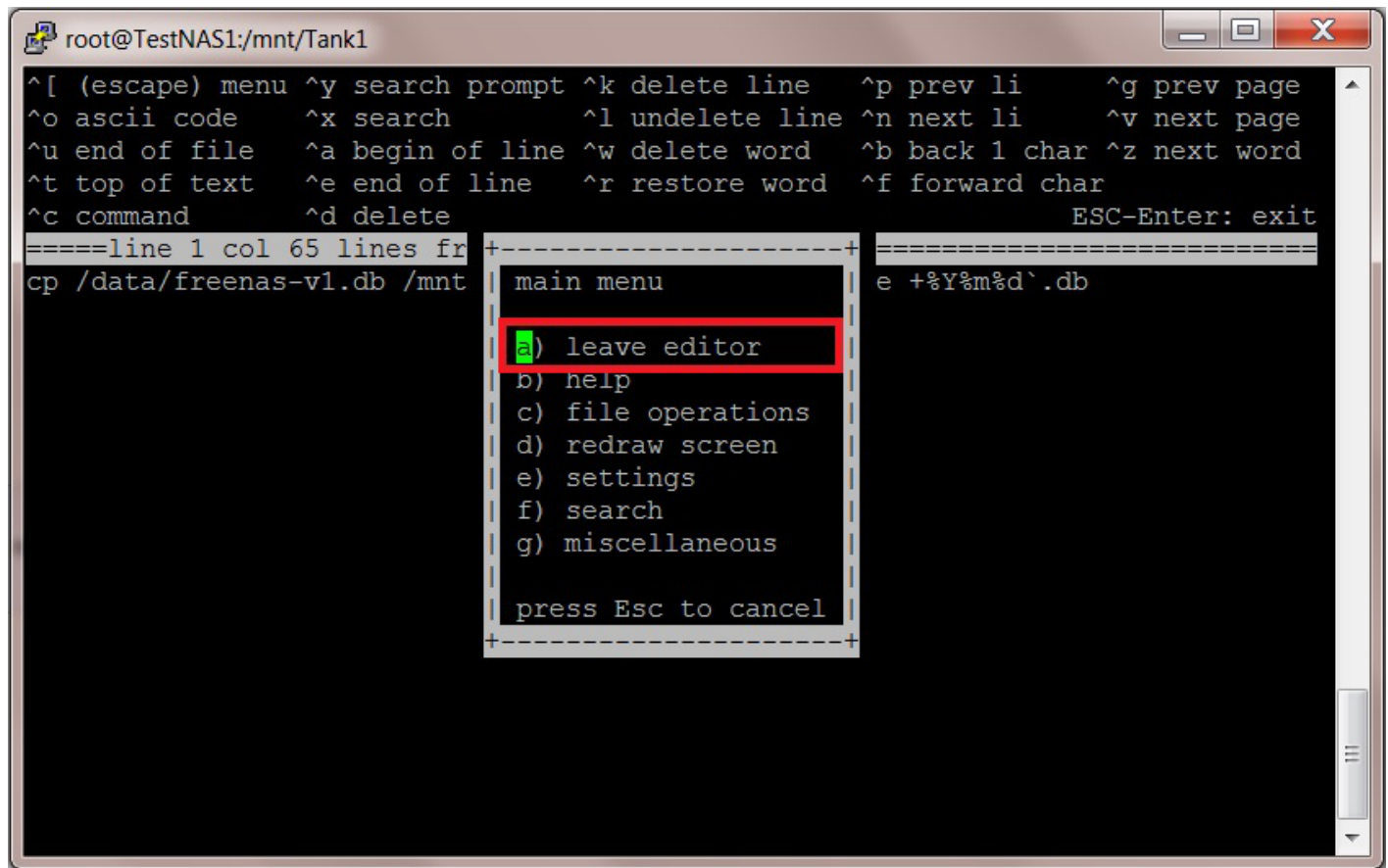
The screenshot shows a terminal window titled 'root@TestNAS1:/mnt/Tank1'. The terminal displays a file editor with a list of keyboard shortcuts at the top. A file menu is overlaid on the editor, listing options: 'a) read a file', 'b) write a file', 'c) save file' (highlighted with a red box), and 'd) print editor contents'. The prompt 'cp /data/freenas-v1.db /m' is visible at the bottom left of the editor area. The file menu also includes the text 'press Esc to cancel'.

```
root@TestNAS1:/mnt/Tank1
^[ (escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char ^z next word
^t top of text ^e end of line ^r restore word ^f forward char
^c command ^d delete ESC-Enter: exit
====line 1 col 65 lines
cp /data/freenas-v1.db /m
file menu
a) read a file
b) write a file
c) save file
d) print editor contents
press Esc to cancel
%Y%m%d`.db
```

The text line in the editor will now be saved to the file.

Press the “Esc” key again.

Now press the “a” key or navigate to the a option and press the “Return/Enter” key.



```
root@TestNAS1:/mnt/Tank1
^[(escape) menu ^y search prompt ^k delete line ^p prev li ^g prev page
^o ascii code ^x search ^l undelete line ^n next li ^v next page
^u end of file ^a begin of line ^w delete word ^b back 1 char ^z next word
^t top of text ^e end of line ^r restore word ^f forward char
^c command ^d delete ESC-Enter: exit
====line 1 col 65 lines fr
cp /data/freenas-v1.db /mnt

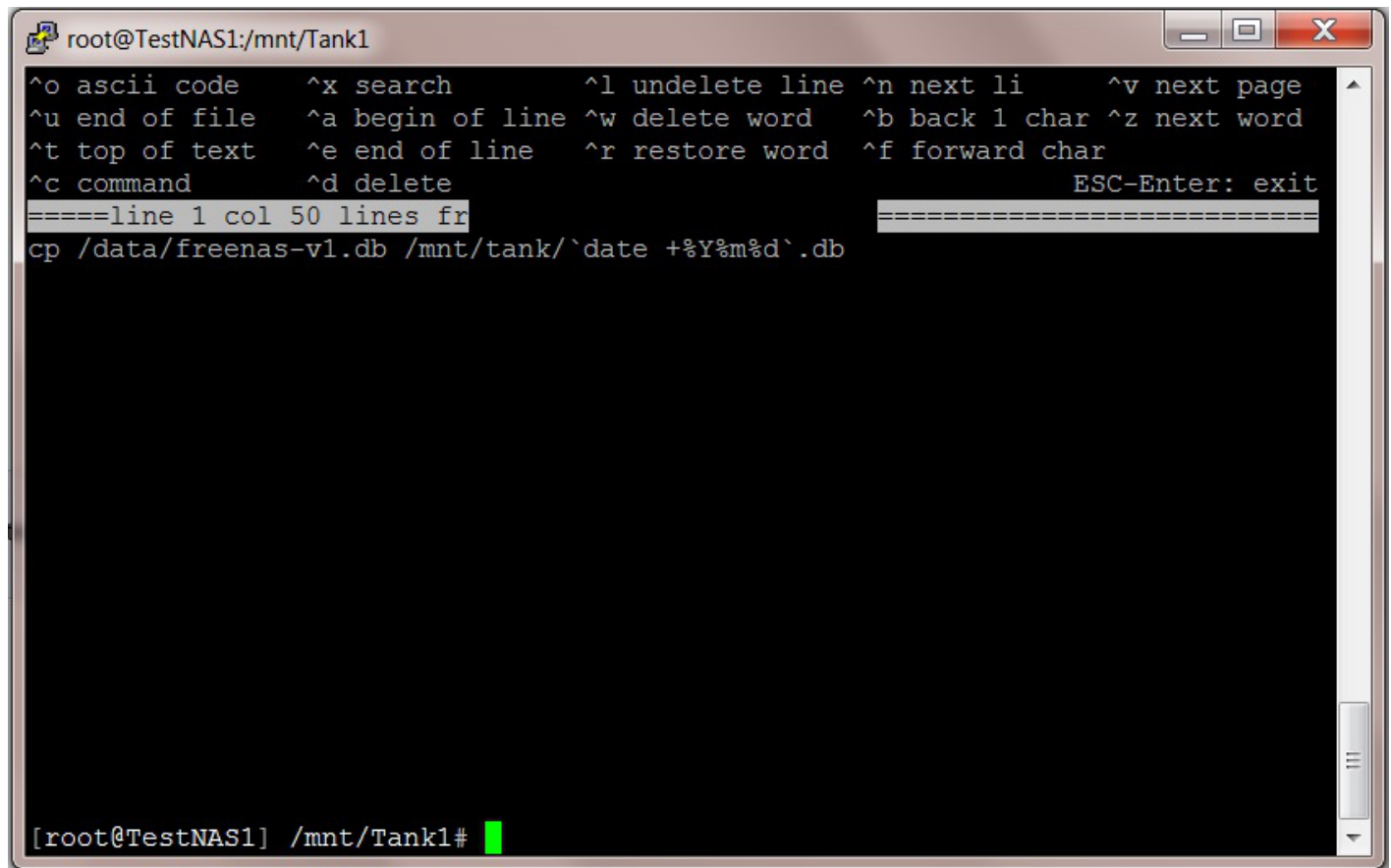
main menu
a) leave editor
b) help
c) file operations
d) redraw screen
e) settings
f) search
g) miscellaneous

press Esc to cancel

e +%Y%m%d`.db
```

This will take you out of the editor and return the command prompt.

You should see a screen something like this.



```
root@TestNAS1:/mnt/Tank1
^o ascii code      ^x search          ^l undelete line  ^n next li        ^v next page
^u end of file     ^a begin of line   ^w delete word    ^b back 1 char   ^z next word
^t top of text     ^e end of line    ^r restore word   ^f forward char
^c command         ^d delete                                     ESC-Enter: exit
====line 1 col 50 lines fr
cp /data/freenas-v1.db /mnt/tank/`date +%Y%m%d`.db

[root@TestNAS1] /mnt/Tank1#
```

Now type the following command to leave the SSH console.

```
exit
```

Creating the Cron Job

Now go to the FreeNAS GUI and log in if needed.

Go to the “Tasks” page.

Click on the “Cron Jobs” button (1) if it is not selected already.

Now click on the “Add Cron Job” button (2).

A new window will pop up that should allow you to configure the Cron job.

In the “User:” drop down selection box (1) chose root as the user.

In the “Command:” text box (2) type in the following command.

```
sh /mnt/YourVolumeNameHere/bkpconfig.sh
```

So in Fester’s case this would look like this.

```
sh /mnt/Tank1/bkpconfig.sh
```

In the “Short description:” text box (3) give the Cron job a meaningful name.

Fester wants this Cron job to run every day, of every month at midnight (if you run this Cron job at midnight while repeating a special incantation that only certain SysAdmin's know it will give your FreeNAS system the ability emulate a Sinclair ZX Spectrum when there is a full moon!).

To run the Cron job every day at midnight set the "Each selected minute" setting of the "Minute:" section to 00 (4).

Set the "Each selected hour" of the "Hour:" section to 00 (5).

The screenshot shows the Cron job configuration interface. The 'User:' field is set to 'root'. The 'Command:' field is set to 'sh /mnt/Tank1/bkpconfig.sh'. The 'Short description:' field is set to 'Nightly backup of config file.'. The 'Minute:' section is set to 'Each selected minute' with '00' selected. The 'Hour:' section is set to 'Each selected hour' with '00' selected.

User:	root																																																						
Command:	sh /mnt/Tank1/bkpconfig.sh																																																						
Short description:	Nightly backup of config file.																																																						
Minute:	<div>Every N minute Each selected minute</div> <table><tr><td>00</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td></tr><tr><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td></tr><tr><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td></tr><tr><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td></tr><tr><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td></tr><tr><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td><td>51</td><td>52</td><td>53</td></tr></table>	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
00	01	02	03	04	05	06	07	08																																															
09	10	11	12	13	14	15	16	17																																															
18	19	20	21	22	23	24	25	26																																															
27	28	29	30	31	32	33	34	35																																															
36	37	38	39	40	41	42	43	44																																															
45	46	47	48	49	50	51	52	53																																															

Now scroll down.

In the "Every N day of month" setting of the "Day of month:" section set this to 1 (6).

Put a tick next to every month in the "Month:" section (7).

The screenshot shows a configuration window with two main sections: 'Day of month' and 'Month'. The 'Day of month' section has two tabs: 'Every N day of month' (selected) and 'Each selected day of month'. Below the tabs is a horizontal slider with a value of 6 and a red box containing the number 1. The 'Month' section has a red box containing the number 7 and a list of months from January to December, each with a checked checkbox.

Day of month:

Every N day of month | Each selected day of month

6 1

Month:

7

- ☒ January
- ☒ February
- ☒ March
- ☒ April
- ☒ May
- ☒ June
- ☒ July
- ☒ August
- ☒ September
- ☒ October
- ☒ November
- ☒ December

Now scroll down.

Put a tick next to every day in the "Day of week:" section (8).

Fester leaves the "Redirect Stdout:" and "Redirect Stderr:" at their default values as I don't know what they do. The "Enabled:" tick box needs to be ticked (9).

Now click the "OK" button (10).

Month:

- ☒ May
- ☒ June
- ☒ July
- ☒ August
- ☒ September
- ☒ October
- ☒ November
- ☒ December

Day of week:

- ☒ Monday
- ☒ Tuesday
- ☒ Wednesday
- ☒ Thursday
- ☒ Friday
- ☒ Saturday
- ☒ Sunday

Redirect Stdout: ☒ ⓘ

Redirect Stderr: ☐ ⓘ

Enabled: ☒

OK Cancel

If all goes well you should see an entry for the newly created Cron job. It should look something like this.

Tasks							
Cron Jobs							
Init/Shutdown Scripts Rsync Tasks S.M.A.R.T. Tests							
Add Cron Job							
User	Command	Short description	Minute	Hour	Day of month	Month	Day of week
root	sh /mnt/Tank1/bkpconfig.sh	Nightly backup of config file.	00	00	Everyday	Every month	Everyday

Testing the Cron Job

We now need to test that the Cron job actually works.

Select the newly created Cron job by clicking on it (it will turn blue when selected) (1).

Now click the “Run Now” button (2).

Tasks

Cron Jobs Init/Shutdown Scripts Rsync Tasks S.M.A.R.T. Tests

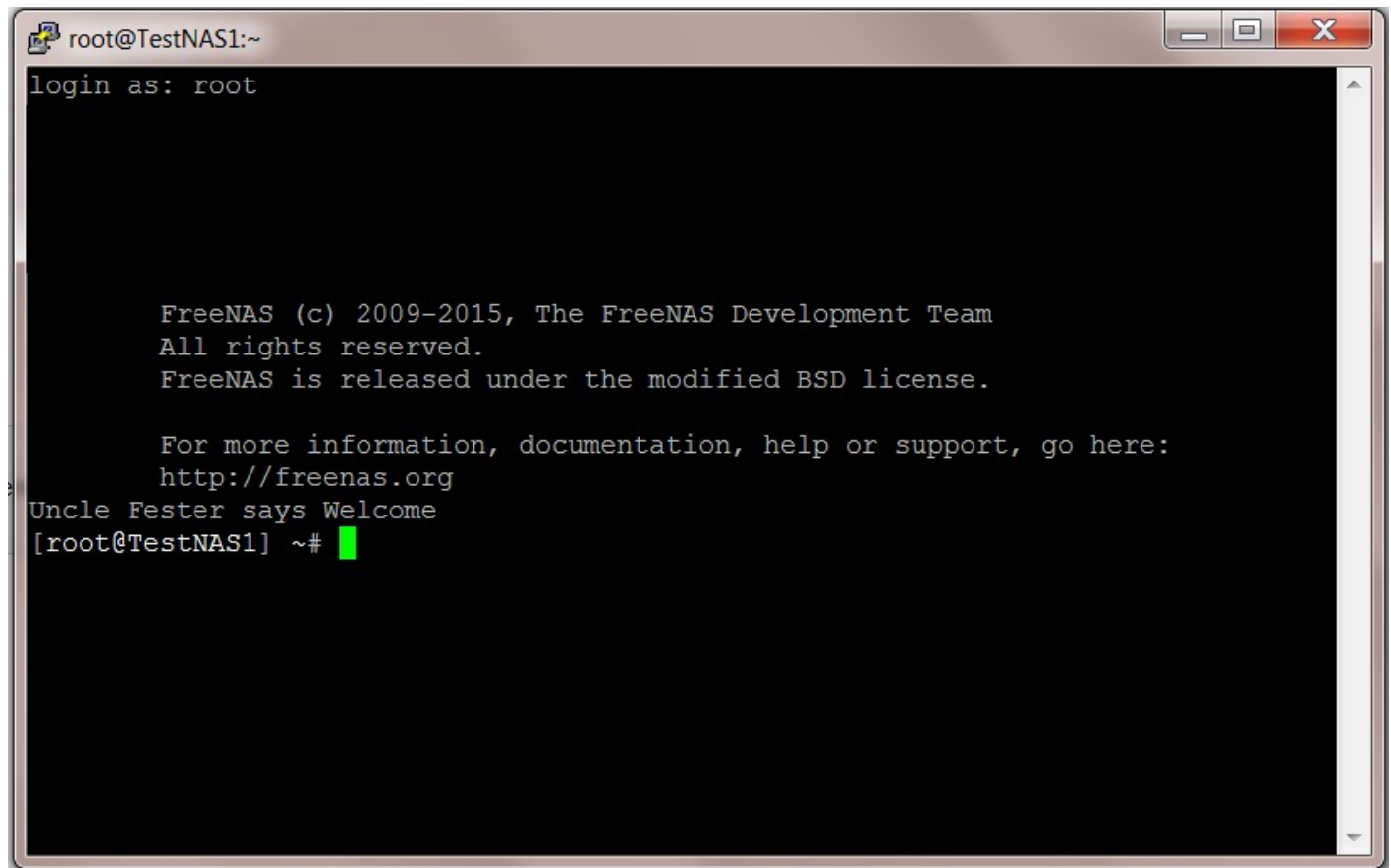
Add Cron Job

User	Command	Short description	Minute	Hour	Day of month	Month	Day of week
root	sh /mnt/Tank1 /bkpconfig.sh	Nightly backup of config file.	00	00	Everyday	Every month	Everyday

Edit Delete Run Now

If this worked then a file should have been created in the dataset you made for this (in Fester’s case this was the “NightlyBackup” data set). We now need to go and check the file was created.

Open up an SSH session in PuTTY and log in as the root user. You should see a screen something like this.

A terminal window titled 'root@TestNAS1:~' with standard window controls. The text inside the terminal is as follows:

```
login as: root

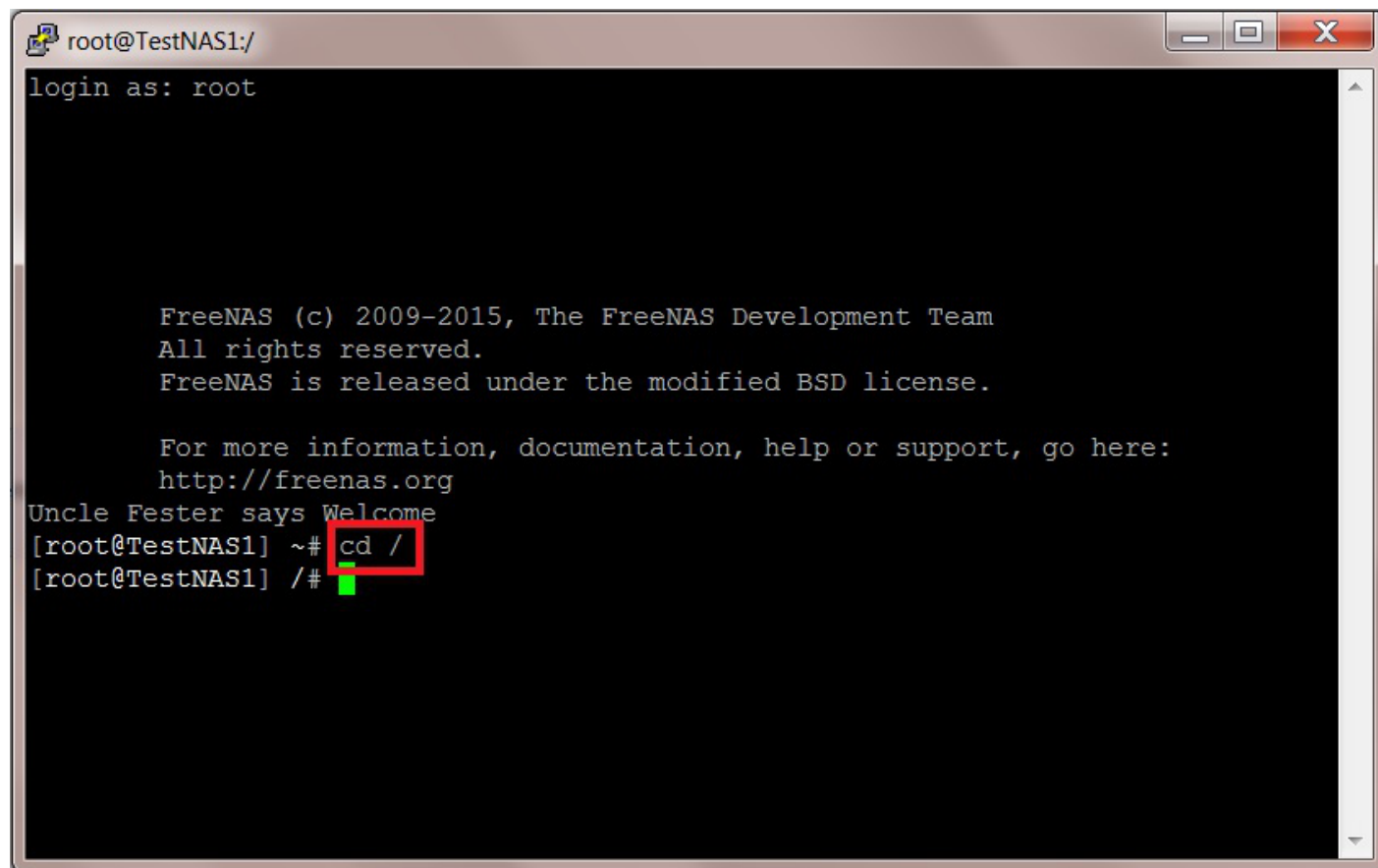
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http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~#
```

We now need to navigate to the dataset you created to hold the nightly backups by typing in the following command into the command prompt. Don't forget to hit the "Return/Enter" key to execute the command.

```
cd /
```

You should now see a screen something like this.

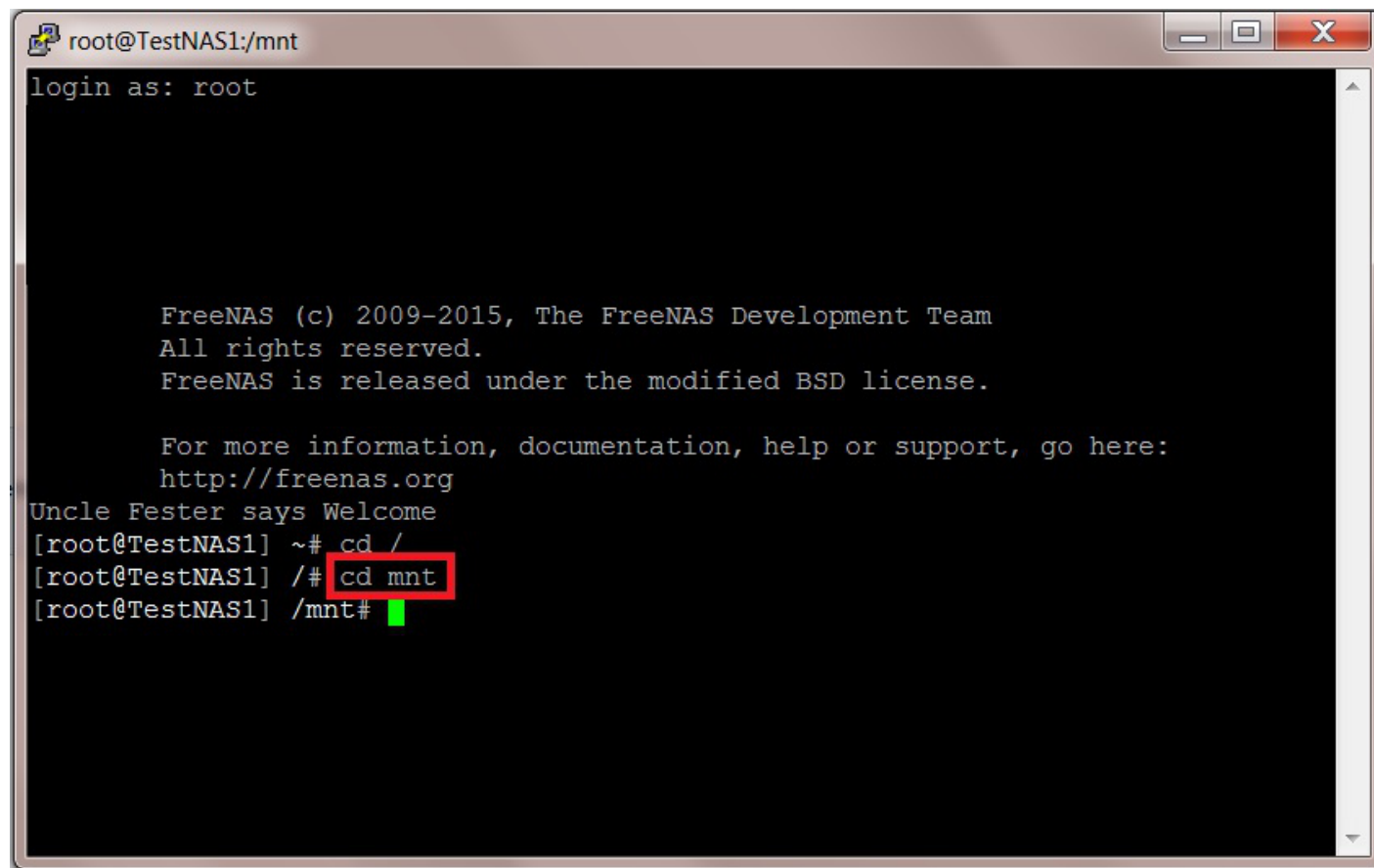
A terminal window titled 'root@TestNAS1:/' with standard window controls. The terminal shows a login prompt 'login as: root' followed by the FreeNAS copyright notice and a welcome message from 'Uncle Fester'. The user enters 'cd /' at the prompt, which is highlighted with a red box. The prompt then changes to '/#'.

```
root@TestNAS1:/  
login as: root  
  
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FreeNAS is released under the modified BSD license.  
  
For more information, documentation, help or support, go here:  
http://freenas.org  
Uncle Fester says Welcome  
[root@TestNAS1] ~# cd /  
[root@TestNAS1] /#
```

Now type into the command prompt the following command.

```
cd mnt
```

You should see a screen something like this.

A terminal window titled 'root@TestNAS1:/mnt' with standard window controls. The terminal shows a login sequence where the user is logged in as 'root'. It displays the FreeNAS copyright notice (© 2009-2015, The FreeNAS Development Team) and the modified BSD license. A welcome message from 'Uncle Fester' is shown. The user then enters 'cd /' and 'cd mnt' (the latter is highlighted with a red box). The prompt changes from '[root@TestNAS1] ~#' to '[root@TestNAS1] /#' and finally to '/mnt#' with a green cursor.

```
root@TestNAS1:/mnt
login as: root

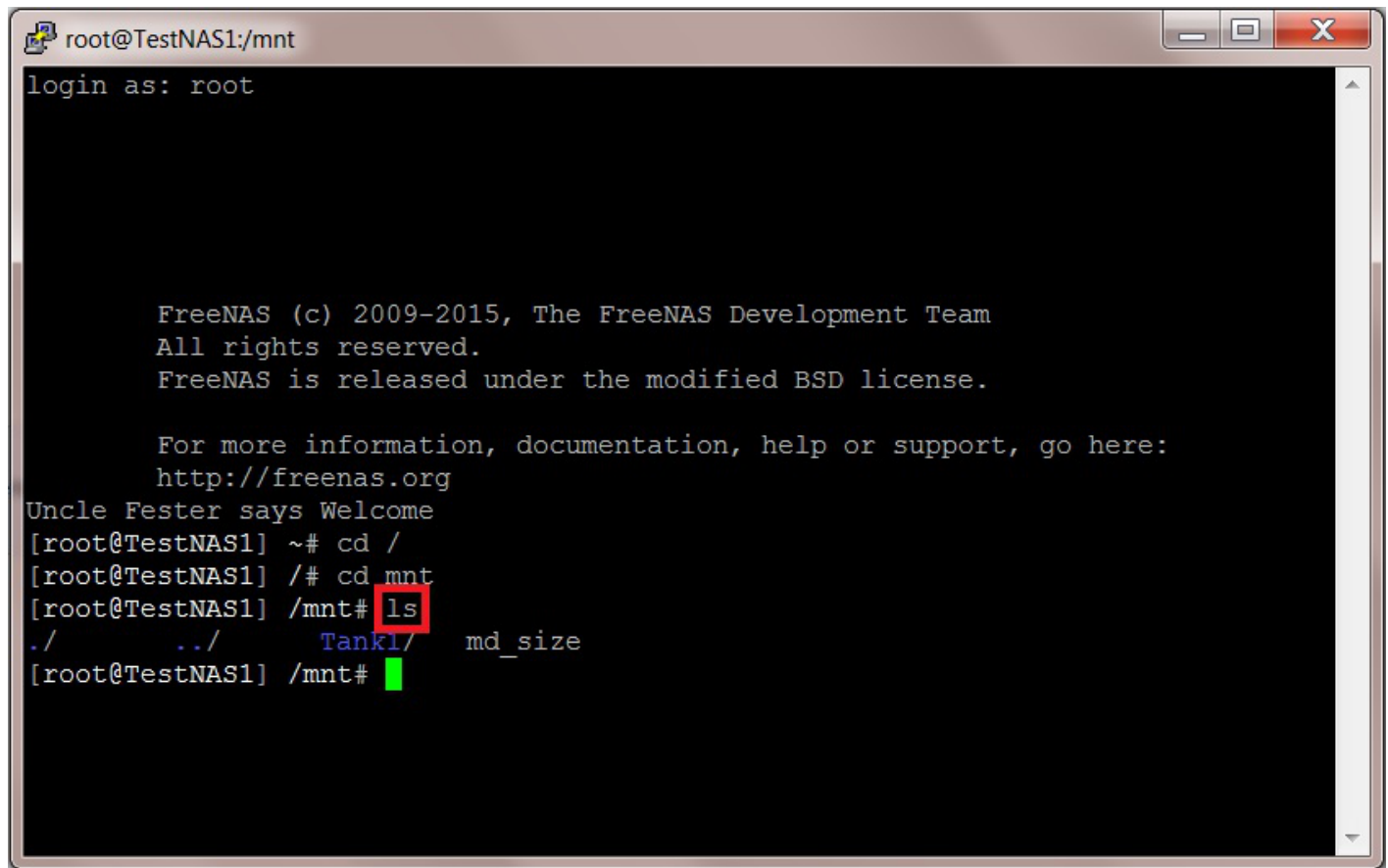
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http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt#
```

Now type in the following command at the command prompt to see your volume's name.

`ls`

You should see a screen that looks something like this.

A terminal window titled 'root@TestNAS1:/mnt' with standard window controls. The terminal shows a login sequence where the user is prompted to login as 'root'. After logging in, a welcome message from 'Uncle Fester' is displayed, followed by FreeNAS copyright and license information. The user then navigates to the root directory and then to the '/mnt' directory. Finally, the 'ls' command is executed, showing the contents of the '/mnt' directory, which includes a directory named 'Tank1' (highlighted in blue) and a file named 'md_size'.

```
root@TestNAS1:/mnt
login as: root

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Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd /mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md_size
[root@TestNAS1] /mnt#
```

The name of the volume will be revealed at this point (in Fester's case it is the blue text "Tank1").

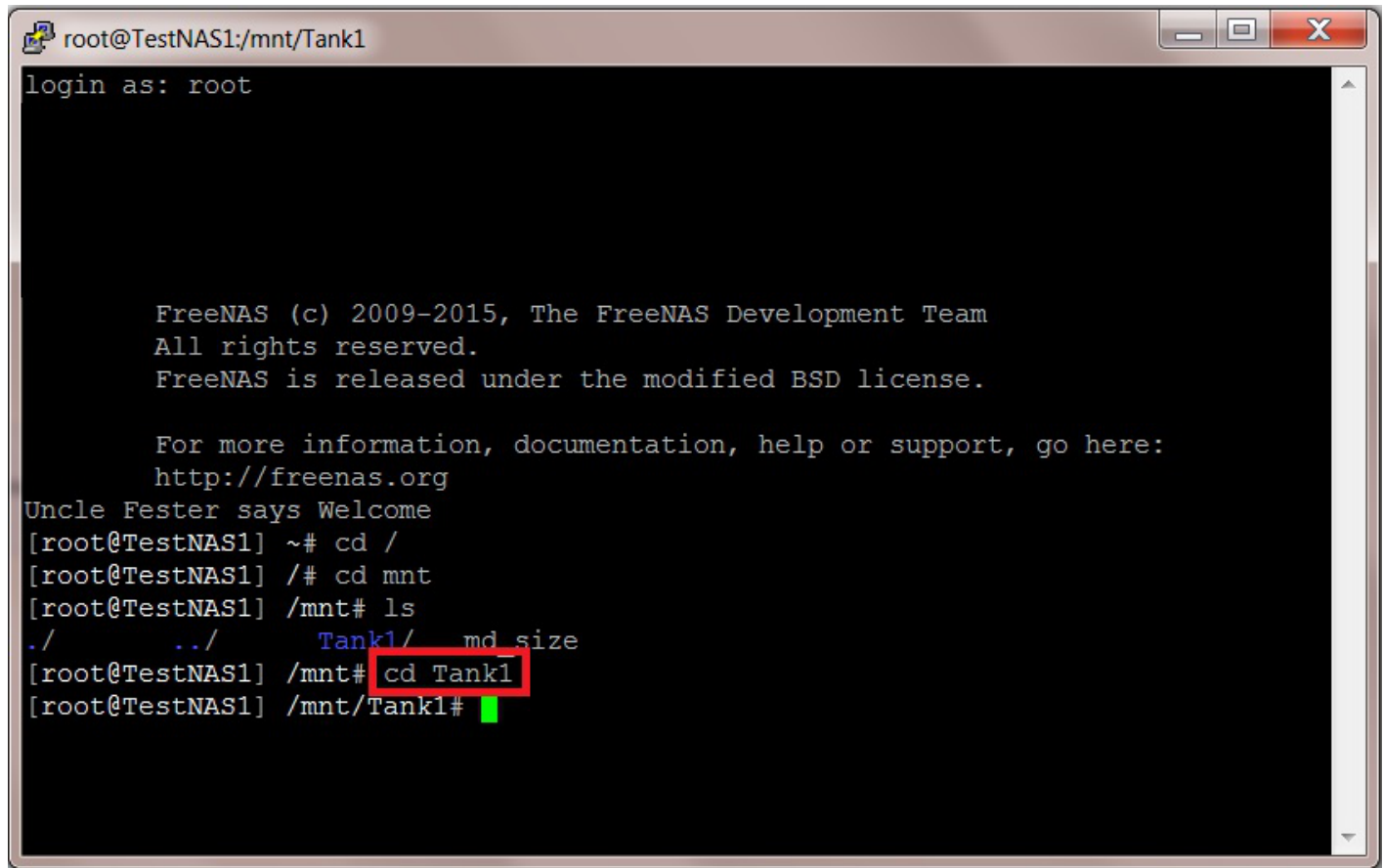
Now type into the command prompt the following command with your volume name. The volume name is case sensitive so make sure you observe this when typing in the command.

```
cd YourVolumeNameHere
```

In Fester's case the command would look like this.

```
cd Tank1
```

You should see a screen like this.

A terminal window titled 'root@TestNAS1:/mnt/Tank1' with standard window controls. The terminal shows a login sequence for 'root', followed by FreeNAS version information and a welcome message from 'Uncle Fester'. The user then navigates through the directory structure: from the root directory to '/mnt', and finally to '/mnt/Tank1'. The command 'cd Tank1' is highlighted with a red rectangle. The terminal output shows the directory listing for '/mnt/Tank1' with columns for permissions, owner, group, size, and name.

```
root@TestNAS1:/mnt/Tank1
login as: root

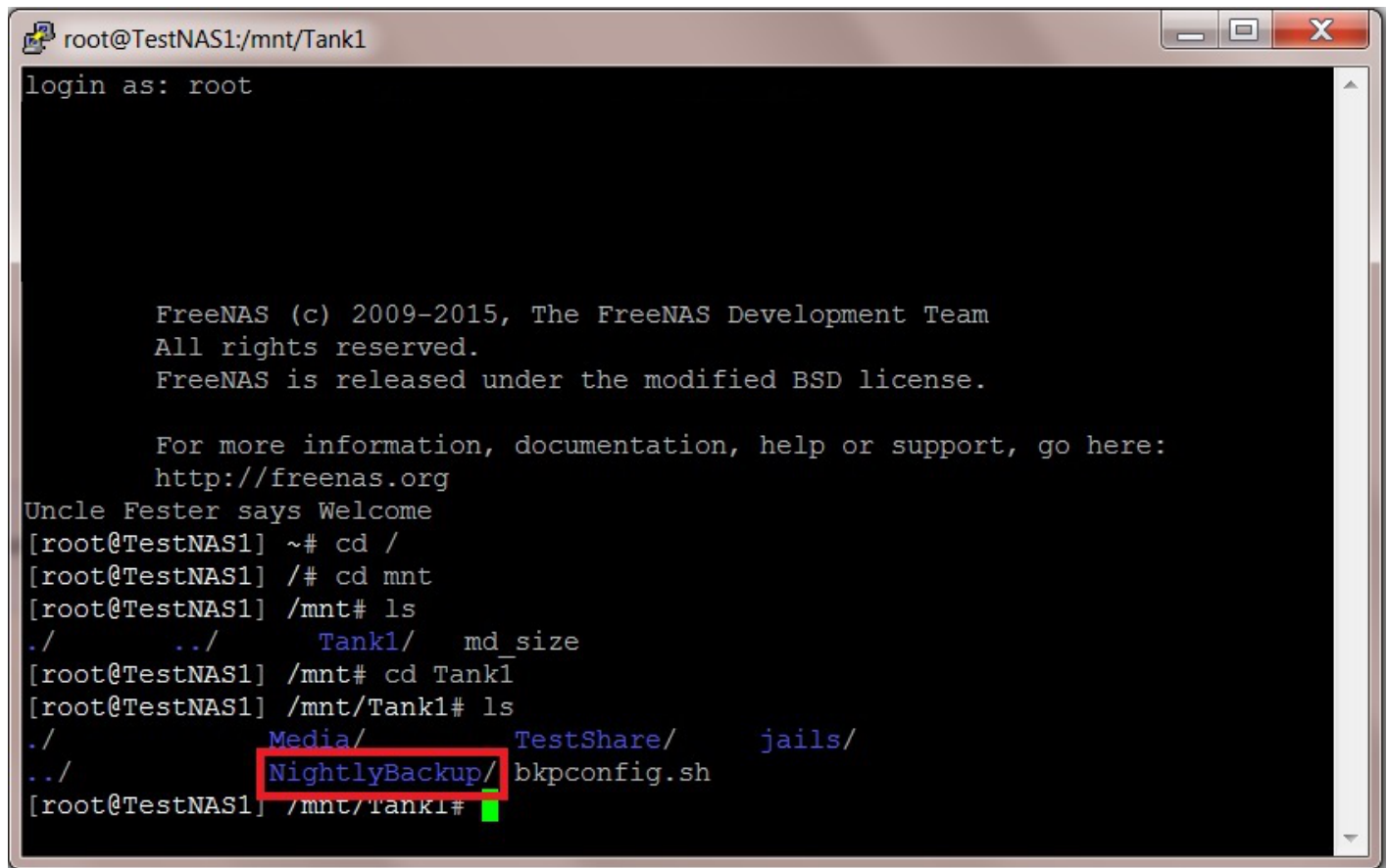
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Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md          size
[root@TestNAS1] /mnt# cd Tank1
[root@TestNAS1] /mnt/Tank1#
```

Now type in the following command at the command prompt to see your dataset's name.

```
ls
```

You should see a screen that looks something like this.

A terminal window titled 'root@TestNAS1:/mnt/Tank1' with standard window controls. The terminal shows a login sequence as 'root', followed by FreeNAS copyright and license information. It then shows a series of directory navigation commands: 'cd /', 'cd mnt', 'ls' (showing Tank1), 'cd Tank1', and 'ls' (showing Media, TestShare, jails, and NightlyBackup). The 'NightlyBackup/' entry is highlighted with a red box. The prompt is currently at '/mnt/Tank1#'.

```
root@TestNAS1:/mnt/Tank1
login as: root

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Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt# ls
./      ../      Tank1/  md_size
[root@TestNAS1] /mnt# cd Tank1
[root@TestNAS1] /mnt/Tank1# ls
./      Media/  TestShare/  jails/
../      NightlyBackup/  bkpconfig.sh
[root@TestNAS1] /mnt/Tank1#
```

The name of the dataset will be revealed at this point (in Fester's case it is the blue text "NightlyBackup").

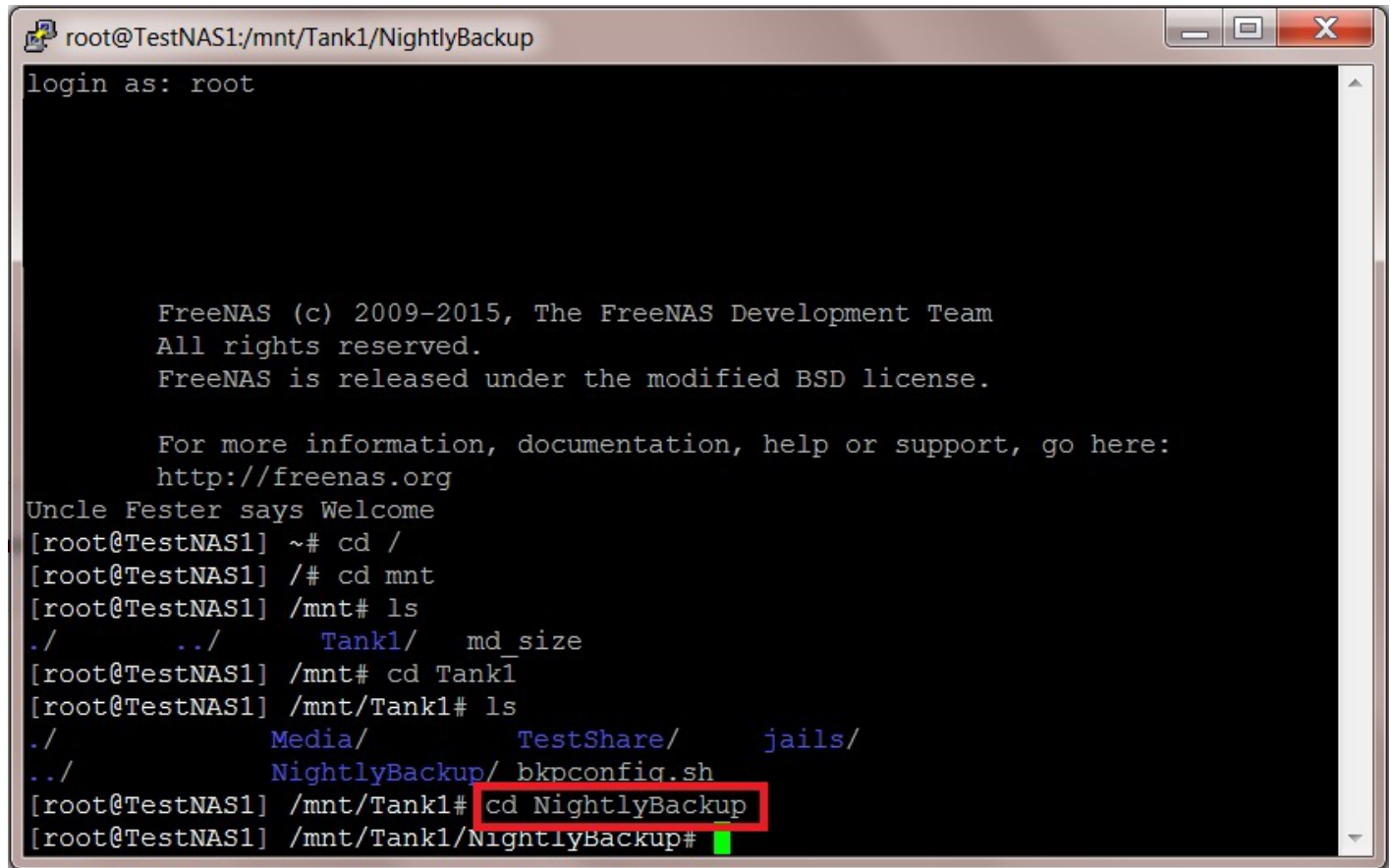
Now type into the command prompt the following command with your dataset name. The dataset name is case sensitive so make sure you observe this when typing in the command.

```
cd YourDatasetNameHere
```

In Fester's case the command would look like this.

```
cd NightlyBackup
```

You should see a screen like this.

A terminal window titled 'root@TestNAS1:/mnt/Tank1/NightlyBackup'. The window shows the login process as 'root'. It displays the FreeNAS copyright notice (c) 2009-2015, The FreeNAS Development Team, and the modified BSD license. It also provides a URL for more information: http://freenas.org. The user 'Uncle Fester' says 'Welcome'. The user then navigates through the directory structure: from the root prompt, they type 'cd /', then '# cd mnt', then '/mnt# ls', which shows '../' and 'Tank1/' with file sizes. Then they type '/mnt# cd Tank1', followed by '/mnt/Tank1# ls', which shows '../' and 'Media/' with file sizes, and 'TestShare/' and 'jails/' with file sizes. Finally, they type '/mnt/Tank1# cd NightlyBackup', which is highlighted with a red box, and the prompt changes to '/mnt/Tank1/NightlyBackup#'.

```
root@TestNAS1:/mnt/Tank1/NightlyBackup
login as: root

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http://freenas.org
Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md_size
[root@TestNAS1] /mnt# cd Tank1
[root@TestNAS1] /mnt/Tank1# ls
./          Media/       TestShare/  jails/
../         NightlyBackup/ bkpconfig.sh
[root@TestNAS1] /mnt/Tank1# cd NightlyBackup
[root@TestNAS1] /mnt/Tank1/NightlyBackup#
```

Now type in the following command at the command prompt.

`ls`

You should see a screen showing a file with the date for its name starting with the year, then the month and then the day. If you get something that resembles the following then it has worked.


```
root@TestNAS1:/mnt/Tank1/NightlyBackup

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For more information, documentation, help or support, go here:
http://freenas.org

Uncle Fester says Welcome
[root@TestNAS1] ~# cd /
[root@TestNAS1] /# cd mnt
[root@TestNAS1] /mnt# ls
./          ../          Tank1/      md_size
[root@TestNAS1] /mnt# cd Tank1
[root@TestNAS1] /mnt/Tank1# ls
./          Media/       TestShare/  jails/
../         NightlyBackup/ bkpconfig.sh
[root@TestNAS1] /mnt/Tank1# cd NightlyBackup
[root@TestNAS1] /mnt/Tank1/NightlyBackup# ls
./          ../          .windows    20160517.db*
[root@TestNAS1] /mnt/Tank1/NightlyBackup#
```

So the “20160517.db” file in the screen shot was created on the 17/05/2016.

That’s the nightly backup of the FreeNAS configuration file done.

From:
<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

Permanent link:
https://www.familybrown.org/dokuwiki/doku.php?id=fester112:additional_configbackup

Last update: **2017/06/24 16:24**



General Build Guide

1. Be careful of electric shock. Disconnect the power before working on a computer. NEVER dismantle a PSU, there are lethal voltages and currents inside and you can still get a shock off them even when they are disconnected from mains power. Computer parts are replaceable, you are not.
2. Be careful of the sharp edges of the computer case/chassis. This tends not to be so much of a problem these days as contemporary computer cases tend to be made better now.
3. Disconnect the power before connecting or disconnecting cables or components. If power is still going to the motherboard while you are carrying out these activities you might damage the electronics.
4. Always use an antistatic wrist band when handling the components.
5. Don't build your server on a surface that is or could become heavily electrostatically charged (e.g. carpets, etc).
6. Certain types of clothing are more prone to electrostatic build-up than others (in the past Fester built all his computers in a gorgeous diaphanous negligee, but was building up too much charge. I now wear nothing more than a cheeky smile and the thong).
7. Don't grab the contacts when handling components. Even the cleanest hands have a thin film of grease on them which you will transfer to the copper contacts.
8. Good cable management will slightly improve air flow around your components. Take some time on this and do a little planning (I tend to get the power cables in first and then the data cables).
9. Have a good supply of cable ties, these will help you with cable management.

(If anyone can think of anything else that should go in this section let me know and if it's reasonable and I have time, I will add it.)

From:

<https://www.familybrown.org/dokuwiki/> - **danb35's Wiki**

Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:build_general

Last update: **2016/06/07 23:26**



Why No Specific Build Guide Fester!

I had no idea at the time of building the server that I would end up writing a FreeNAS guide. So naturally I did not take any pictures (this is known as a Fester f@%k-up).

If there is someone out there who is building a server and would like to provide detailed, copyright free pictures (stage by stage, no missing bits out because it's a beginners guide) then let me have them, I would love to include them in this guide.

You can also become a contributor. Why not replace this section with your own?

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:build_specific

Last update: **2016/06/07 23:27**



Write an Image File to a USB Stick

Many of the procedures in this guide require writing an image file (usually the file name ends in .img or .iso) to a USB stick, so that you can boot from that stick. Here's how you can do that.

Windows

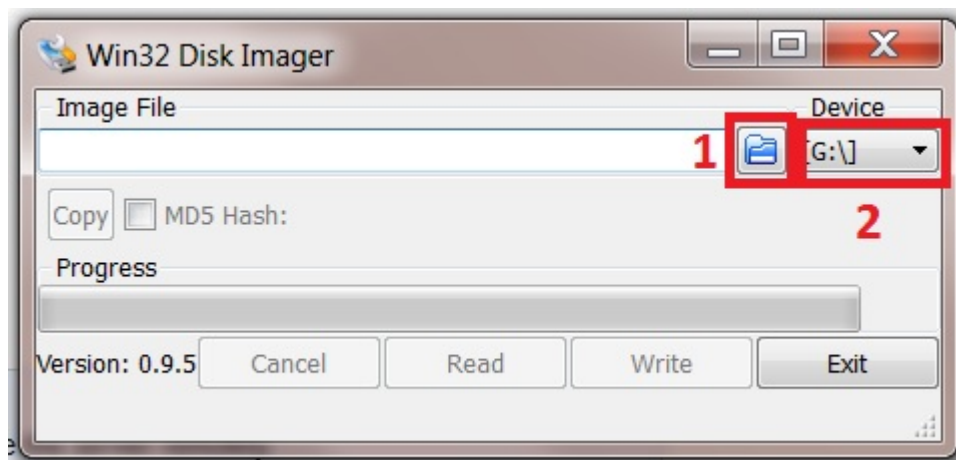
Download the program "[Win32DiskImager](#)" to your Windows machine.

Now run the "Win32DiskImager" installer under an administrator's account or right click on it and run as an administrator (have your administrator's password ready).

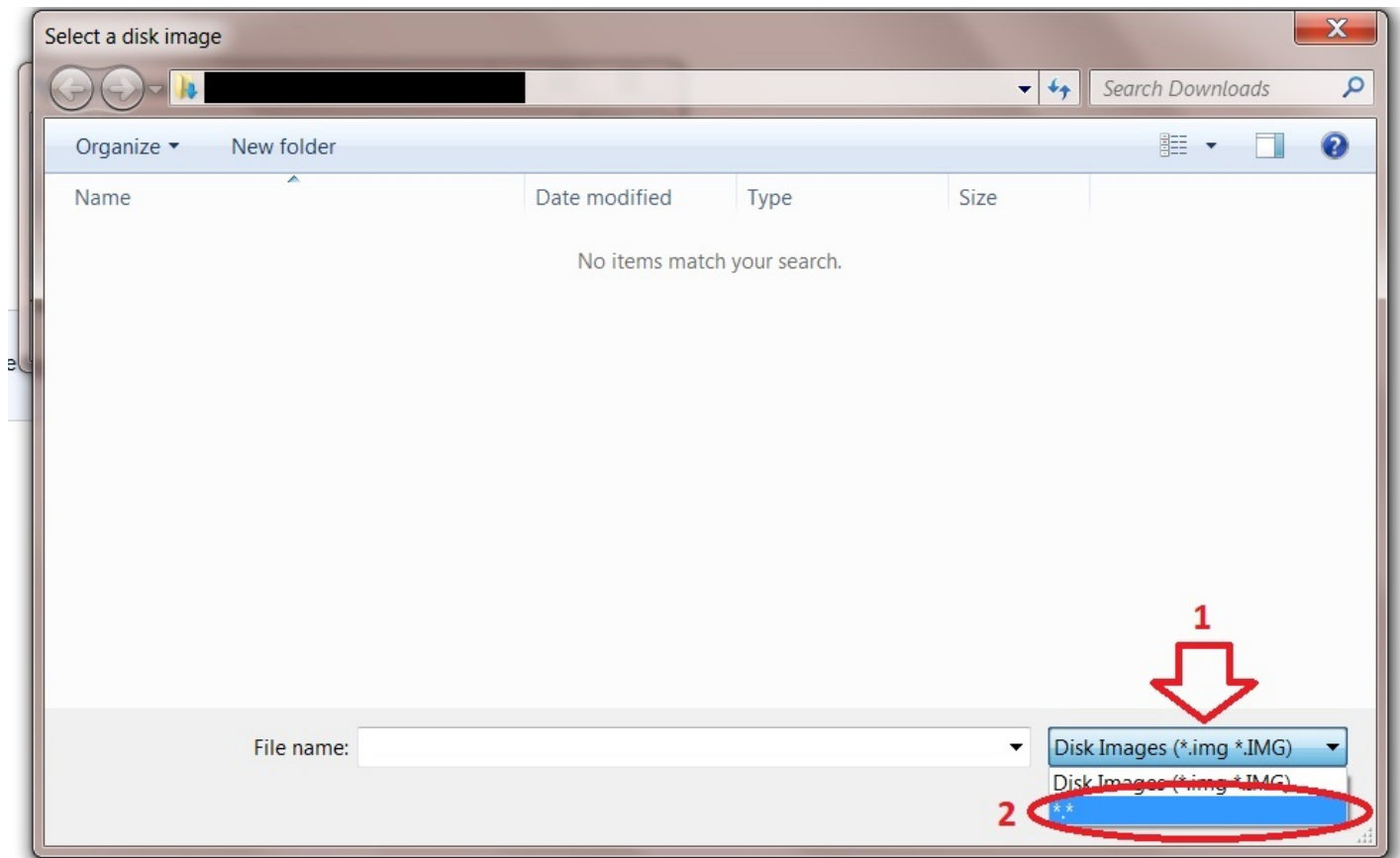
When the program is installed run it under an Administrator's account or right click and run as Administrator.

Now insert the USB stick you intend to use and wait for the computer to recognise it.

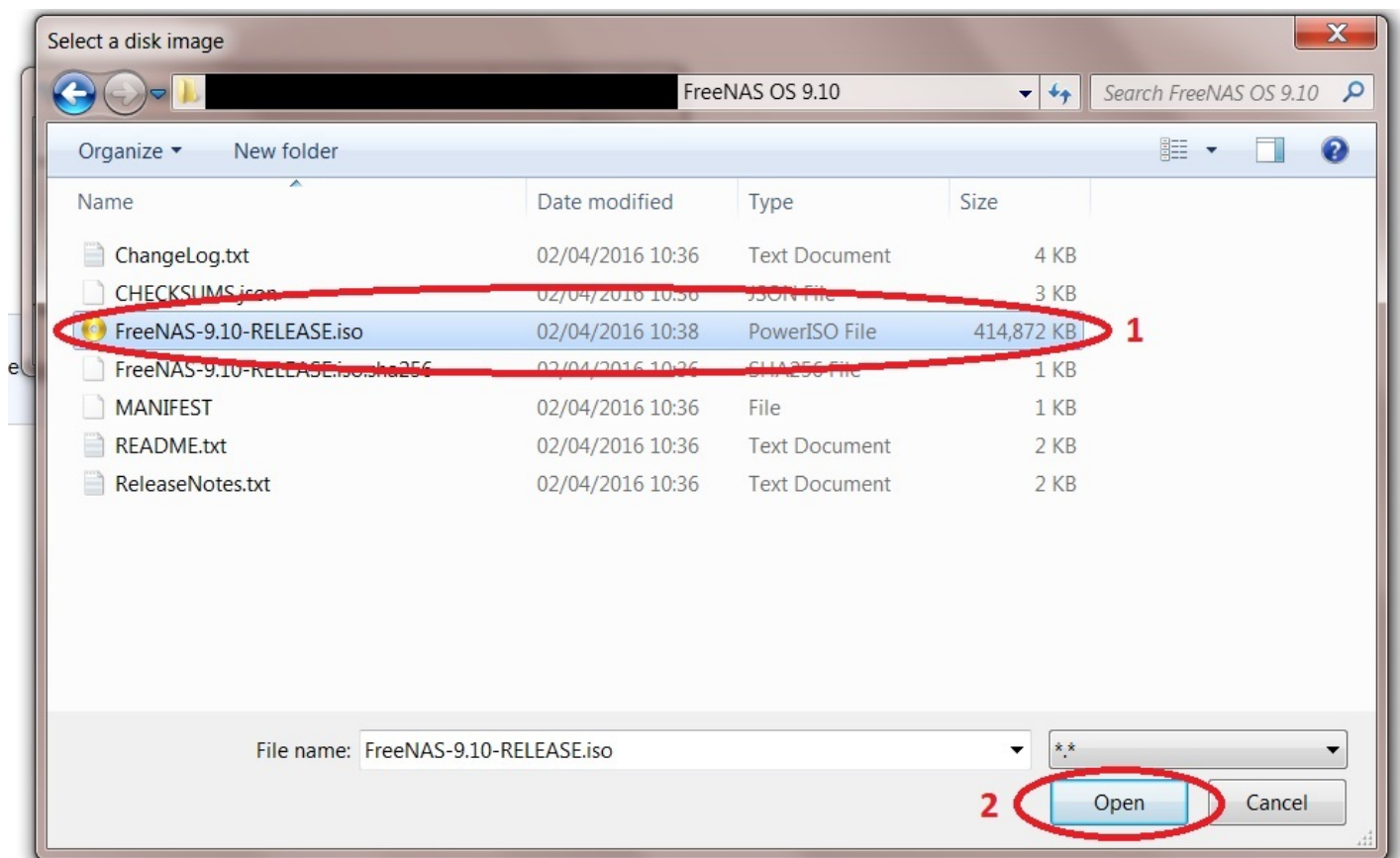
Click the small folder icon (1) and navigate to the location of the image file and select it. Now select the USB device by clicking the drop down selector under "Device" (2) if it isn't already selected.



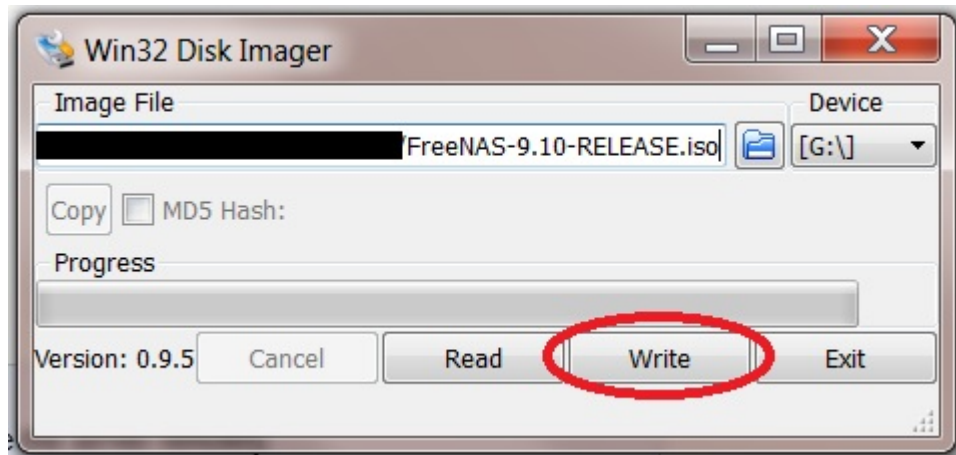
If you cannot see the image file and you know you are in the correct location then click on the drop down selector that determines the file type to be displayed (1) (this will likely be initially set to display only IMG files, if your image is in the form of an ISO file it won't be shown) and chose the wild card "*.*" (2) this will display all files present.



The image file should now appear. Now select it (1) and click “Open” (2).



With the image file now loaded click on the “Write” button to begin making the bootable USB installer.



At this point a small window will pop up giving a “confirm write” warning message, click the “Yes” button to proceed.

The image file will now be written to your USB stick.

When the process completes successfully a small window will pop up with “Write Successful” displayed. Click the “OK” button.

Close the application and eject the USB stick.

Mac OS X

I can't help you here as I don't know how and I don't own a Mac.

However, the [FreeNAS documentation](#) has a full description of how to do this.

If anyone would like to provide the relevant information with copyright free screen shots I would be happy to include them in this guide or you could replace this or any section with your own?

Linux, FreeBSD, or other Unix-like OS

I can't help you here as I don't know how.

However, the [FreeNAS documentation](#) has a full description of how to do this (but no screen shots).

If anyone would like to provide the relevant information with copyright free screen shots I would be happy to include them in this guide or you could replace this or any section with your own?

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<https://www.familybrown.org/dokuwiki/> - **danb35's Wiki**

Permanent link:

<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:burnusb>

Last update: **2016/06/08 22:54**



Creating a FreeNAS Pool

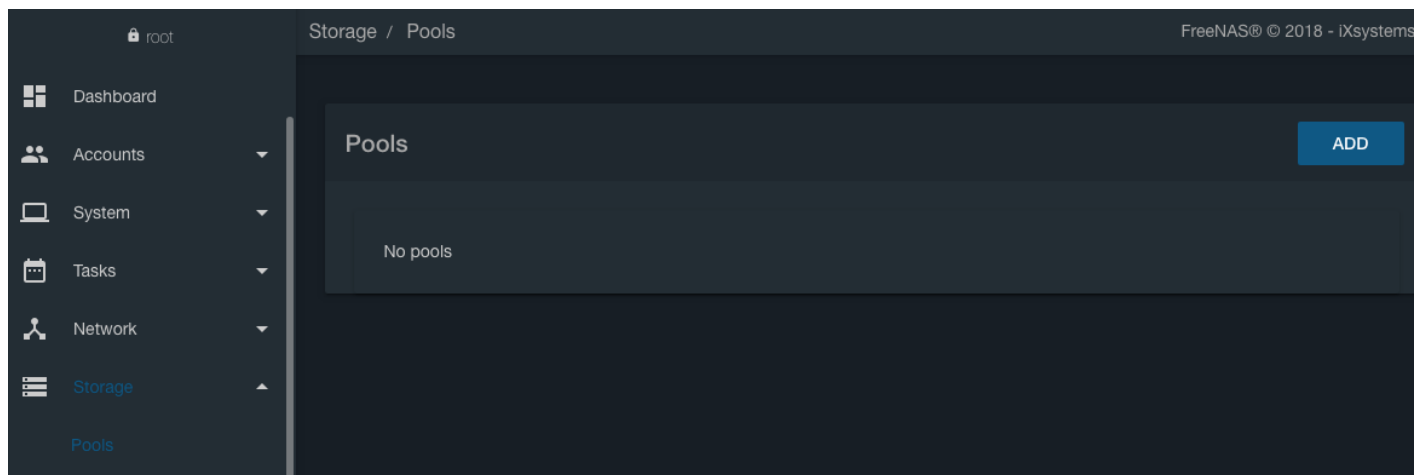
There are many different ways to organise the storage of your FreeNAS server. I can't tell you what is best for you because it depends on various factors, how many vdevs and pools you want, how many data storage drives you have available, etc. Review [cyberjock's guide to ZFS for newbies](#) if you aren't thoroughly familiar with it.

Whatever way you decide to arrange things make sure you build in some sort of redundancy. This goes for the vdevs as well.

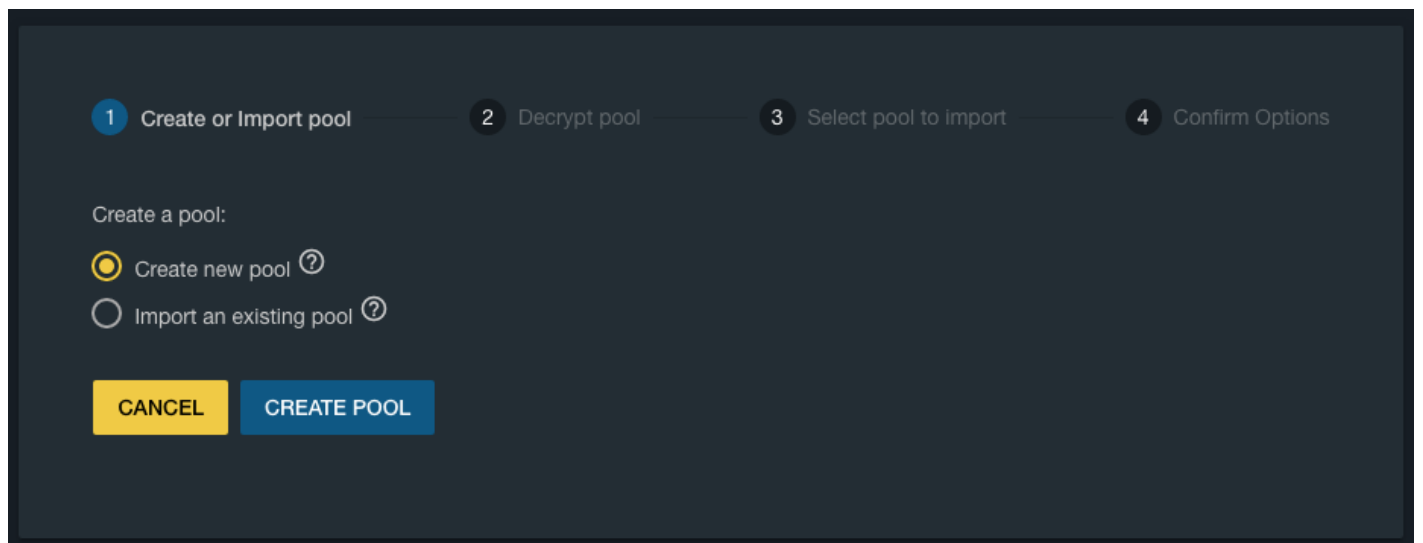
Remember, if one vdev fails in a pool it takes the whole pool with it.

This is how I arranged mine.

Click "Storage" in the left column, then "Pools".



Now click on the "Add" button.



At the this screen, the default selection is "Create a new pool"; leave this selected and click "Create

Pool”.

Pool Manager

Name ^{*}
tank

☐ Encryption

SUGGEST LAYOUT

Available Disks			Data VDevs		
<input type="checkbox"/>	Disk	Capacity	<input type="checkbox"/>	Disk	Capacity
<input type="checkbox"/>	da1	32 GiB	No data to display		
<input type="checkbox"/>	da2	100 GiB	0 selected / 0 total		
<input type="checkbox"/>	da3	100 GiB	Stripe Estimated raw capacity: 0 B		

Give your volume a name in the “Name” text box. If you cannot think of anything then “tank” seems to be popular amongst FreeNAS users (I don’t know why?).

If you want the pool to use encryption then tick the “Encryption” box. But only do this if your processor supports AES-NI encryption and you have enabled it in the BIOS, otherwise don’t use it. Remember to save a recovery key. **Again, unless you have a specific legal or regulatory requirement for full-disk encryption, this is discouraged.**

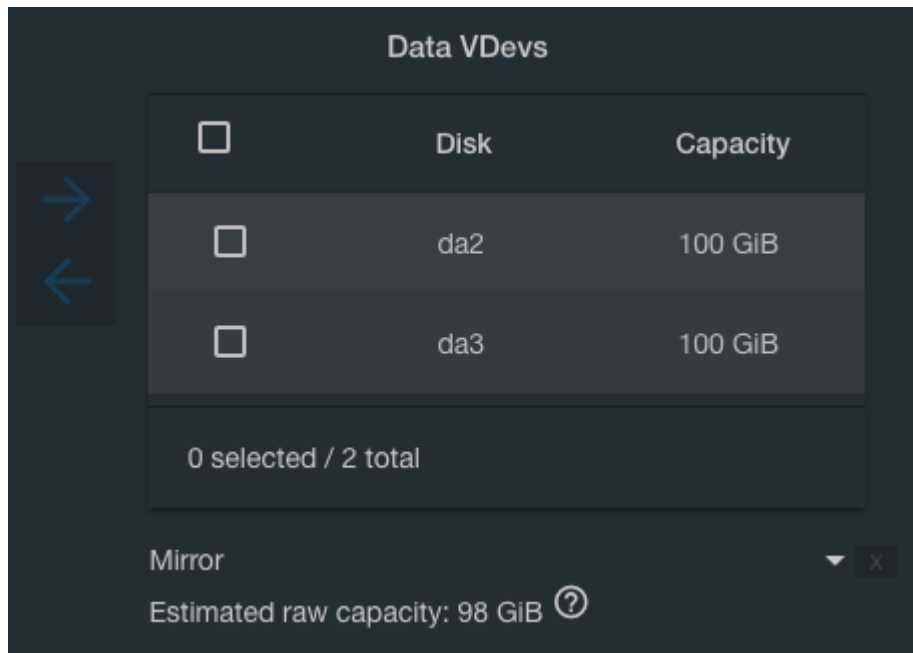
If you like, you can click “Suggest Layout”, and FreeNAS will select a layout that's generally sensible. Otherwise, you can manually select the disks you want in your pool as shown here:

Available Disks

<input type="checkbox"/>	Disk	Capacity
<input type="checkbox"/>	da1	32 GiB
<input checked="" type="checkbox"/>	da2	100 GiB
<input checked="" type="checkbox"/>	da3	100 GiB

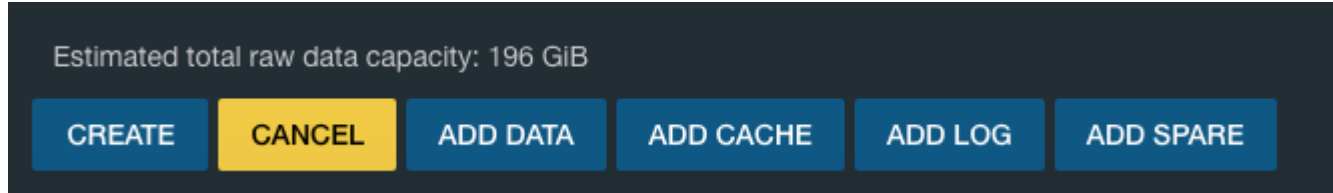
Stripe
Estimated raw capacity: 0 B

Then click the right arrow button to move them to the “Data VDevs” list:

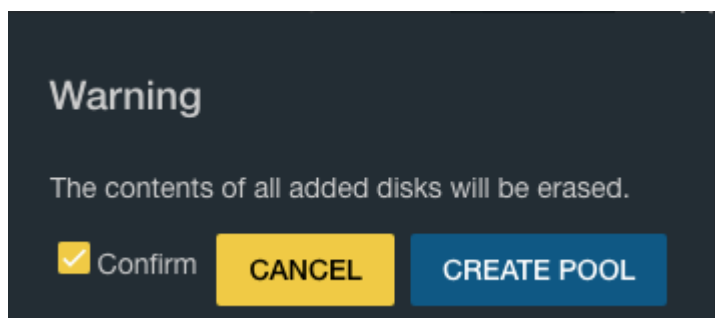


At the bottom of that list, you can select any form of vdev (strip, mirror, RAIDZn) that's appropriate to the number of disks selected.

Then click the “Create” button to create the pool.



You'll see a pop-up window warning you that all data on the disks you're adding to the pool will be erased. Check the “Confirm” box, then click the “Create Pool” button.



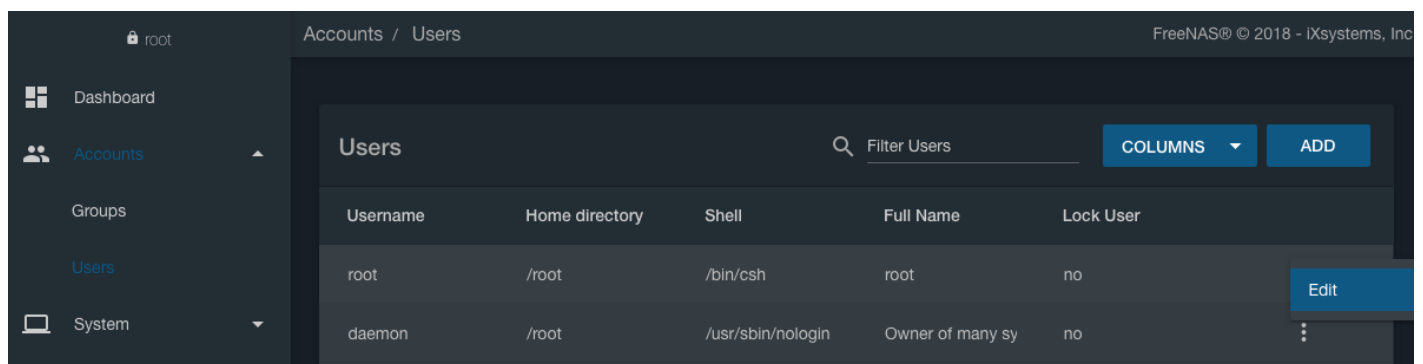
When the operation completes you'll be returned to the Pools page.

Email Notifications

The FreeNAS OS and the IPMI monitor can give you warnings and other types of useful information delivered straight to your email account. This is an incredibly useful feature (not to mention important to the security of your data—it's how the system will warn you of problems) and does not take long to setup.

Setting Up Email Notifications From The FreeNAS Web GUI

You'll first need to set an email address for the root user. Click “Accounts” in the left column, then “Users”. Click the three vertical dots to the right of the root user, then click “Edit” on the pop-up menu.



In the “Email” text box type in the email account you want to use to receive the messages from your server (Fester uses a Gmail account for this e.g. Festerservermail@gmail.com).

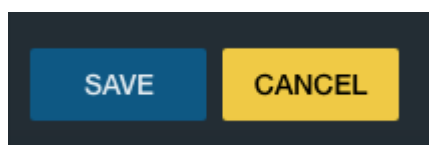
Name & Contact

Full Name *
root

Username
root

Email
me@example.com

Now scroll down this window and click on the “Save” button.



Now click “System” in the left column, then “Email”.

System / Email

From E-mail

root@freenas.local

Outgoing Mail Server

smtp.gmail.com

Mail Server Port

465

Security




SSL

☒ SMTP Authentication ?


Username *

testuser

Password *

Confirm Password *



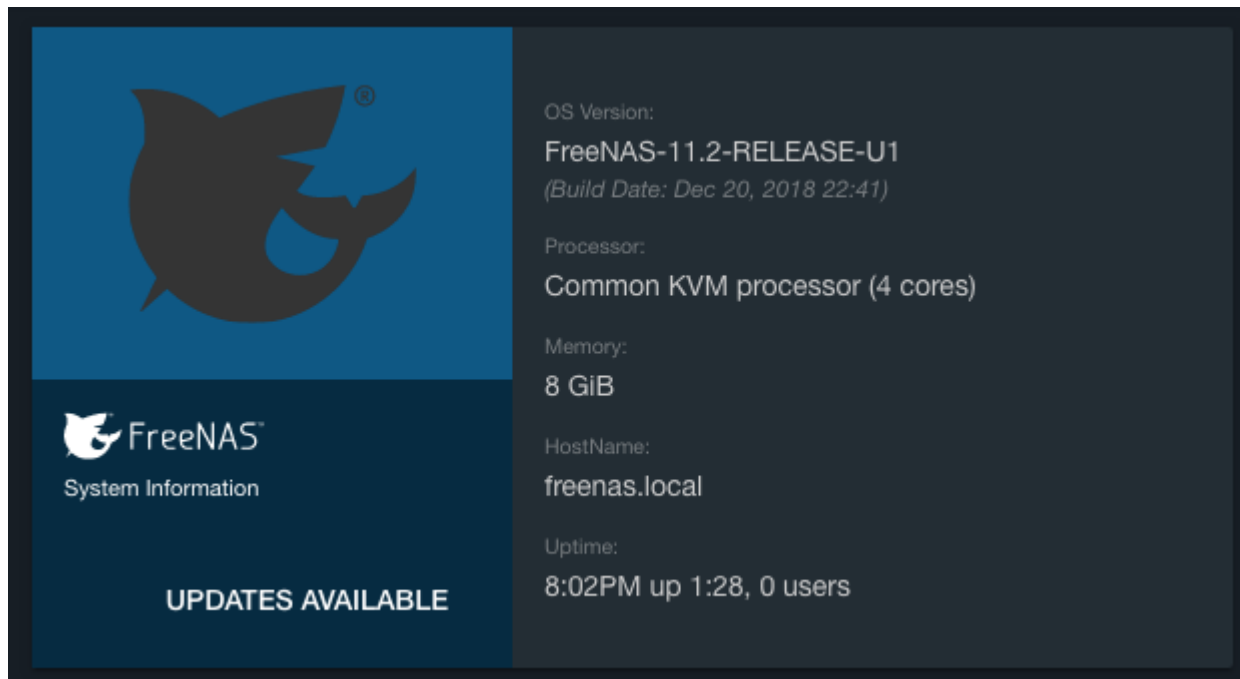
SAVE

SEND MAIL

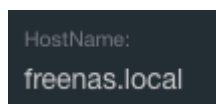
To setup email notifications we must use an email address for one of the user accounts on the FreeNAS server (not your actual external email address e.g. Festerservermail@gmail.com). This is an internal email address (i.e. for the server only) and it follows a specific syntax. Here is how it works.

user@hostname.local

The hostname of your server can be found in the “Dashboard” page and looks something like this.



Here is an example hostname.



So in Fester's case the internal email address would take this form.

root@freenas.local

So armed with this information we can now go ahead and start configuring the "Email" page.

In the "From email:" text box type the internal email address you want (Fester's is root@freenas.local).

In the "Outgoing mail server:" text box type in the mail server of the email service you use. If you don't know it you can usually get it from looking on the mail service provider's website (Fester uses Gmail so this would be set to **smtp.gmail.com**).

The Gmail service uses port 25 for plain text email, port 465 for SSL encrypted email and port 587 for TLS encrypted email.

In the "Port to connect to:" text box type in the port you need, again if you don't know it you can usually get it from the mail service provider's website (Fester uses SSL encryption therefore the port number is 465).

In the "TLS/SSL:" drop down selection box chose if you want encryption or not, and which type (your mail service provider must support your choices).

Put a tick in the "Use SMTP Authentication:" tick box if this is required. If this box is ticked, fill in the fields below.

In the "Username:" text box type in the user name only (not the complete email address) of the external

email address you want to use for notifications (in Fester's case this is **Festerservermail**).

Next type in the password for your external email account (not the internal server user account) in the "Password:" text box and then retype your password again to confirm it in the "Password confirmation:" text box.

Now click the "Save" button.

Do not click on the "Send Test Mail" button yet as there is a little more work to be done.

The next part applies specifically to Gmail. If you are using a different mail service provider I can't help you.

Log into your external email account (in Fester's case this was Fesrterservermail@gmail.com) and navigate to the "My Account" page.

Go to "Connected Apps & Sites" and turn on "Allow less secure apps".

If you do not do this then Gmail will prevent the server from accessing your external email account and you may receive an email entitled "Sign-in attempt Prevented" or something to that effect in your Gmail inbox.

(Fester does not have screen shots for this. If anyone would like to provide some copyright free ones I would be happy to include them in the guide or you could replace this or any section with your own?)

Now go back to the "System" → "Email" page in FreeNAS and click on the "Send Test Mail:" button (9). If all goes well you should receive an email from your server momentarily.

If you are using 2 step verification with your Gmail account then you will not receive the email. You must go into your Gmail account and do a little more configuration.

Configuration Of A Gmail Account With 2 Step Verification

In order to do this, you need to create an application password. Go to <https://myaccount.google.com/apppasswords> and then create a new app password (Select App: Mail, Select Device: Other (Custom Name), Name: FreeNAS) and click on Generate. A popup window will open with your generated app password. Be sure to copy this password to a good location, you can only view it once. Use this password in the password settings for the email authentication.

This will create a revoke-able app password that only allows access to your gmail account.

Setting Up Email Notifications From The IPMI Web GUI

I don't know how to do this or if it is even possible to get IPMI to email notifications direct to a Gmail account.

If anyone knows how to do this would you pass on the information and I will try to include it in the guide so everyone can benefit from your knowledge or you could replace this or any section with your own?

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General Hardware Recommendations

In general: You're building a server, so use server-grade hardware. The "gamer" motherboard you bought may work (may even work well), but isn't going to be ideal. It probably won't support important features like ECC, it will most likely have a crappy Realtek NIC, and it will probably have other built-in hardware that you don't need and can't use, like a sound card.

In addition to the notes here, it's strongly recommended to read the [FreeNAS Community Hardware Recommendations Guide](#). It's kept updated by some of the more active and knowledgeable FreeNAS users.

If you have questions about a particular build, ask on the [Will It FreeNAS?](#) forum.

Memory

1. Use only Error Correcting Memory (ECC memory). I know it is more expensive, but you are introducing a possible source of corruption into the file system (ZFS) in FreeNAS if you don't use ECC memory.
2. The minimum amount of RAM for a FreeNAS system is 8GB. But Fester recommends a minimum of 16GB. Even more is better. More RAM is the best payoff to improve performance of your system, since ZFS will use it for caching.
3. If you have time take a look at Cyberjock's article entitled "ECC vs non-ECC RAM and ZFS". It is detailed, but excellent ([ECC vs Non-ECC and ZFS](#)).
4. If you have time take a look at Jgreco's article entitled "How To Fail ... a guide to things not-to-do". It mentions ECC memory amongst other things ([How Not To Do Things](#)).
5. If you have time have a read through this. It talks about hardware choices and ECC memory ([FreeNAS All Disks Suddenly Degraded](#)).

CPU

1. Use a multicore 64 bit Intel processor.
2. If you follow the advice on ECC memory then the processor must support ECC memory (not all do). All Xeon CPUs do, as do many Pentiums, Celerons, and Core i3 CPUs. No Core i5 or Core i7 CPUs support ECC.
3. Home users with modest demands generally do not require expensive dual or multiprocessor setups.
4. If using encryption select a processor that supports AES-NI. Otherwise, don't use encryption; it results in too much of a performance hit. **In fact, unless you have a specific legal requirement for full-disk encryption, don't use it. The risk of data loss is too great.**
5. Most modern (i.e., Sandy Bridge or newer) Intel CPUs will have adequate performance for any sort of file sharing over a gigabit network.

Motherboard

1. Server motherboards are expensive but the best way to go. Supermicro motherboards are generally recommended.
2. If you follow the advice on ECC memory then the motherboard must support it (not all do).
3. It's a good idea to use the manufacturer's Qualified Vendors List (QVL) where possible. This is a list of hardware that has been tested by the motherboard manufacturer for compatibility.
4. Make sure you match the memory and the processor to the motherboard. Memory comes in different speeds, capacities, etc. Processors are designed for specific sockets, have different speeds, etc (don't get caught out). The motherboard must support your choices.
5. Get a motherboard that features the Intelligent Platform Management Interface (IPMI) if you can (it's freaking brilliant!).
6. Motherboards with Intel NICs are recommended. Avoid Realtek NICs (they are about as useful as an ashtray on a motorbike).

Storage HDDs for your data

1. Use NAS recommended HDDs.
2. **TLER** is a useful feature to have on NAS HDDs.
3. Use enough HDDs in your system so you can employ some sort of redundancy within the zpool/s and the vdev/s. If you aim for a minimum of 4 this will allow RAIDZ2 (ooooo yummy).

Boot Device for the FreeNAS OS

1. The FreeNAS OS must reside on a separate drive. It cannot be installed on the HDD/s you will use for data storage.
2. A minimum of 16GB capacity for the FreeNAS boot device is recommended. Any larger than 32 GB is wasteful.
3. A SATA DOM or Solid State Device (SSD) is recommended. If your budget does not stretch this far you can use a high quality USB device. If you are using a USB stick, consider using two, and mirroring them.

Host Bus Adapters (HBAs) and RAID Controllers

1. Use HBA cards and not RAID cards.
2. If a RAID card must be used flash it to IT Mode or JBOD. Many RAID cards do not support a true JBOD mode, in which each disk is directly presented to the operating system, which is why HBAs are preferred over RAID cards (see above).
3. LSI HBAs are recommended.
4. The HBA or RAID (IT Mode) firmware version must match with the driver version in FreeNAS. FreeNAS will give a warning if this is not the case. This is important as a mismatch can lead to possible data corruption.

5. Using a backplane can seriously reduce the amount of cabling in your server.
6. Do not use SATA port multipliers.

Power Supply Units (PSUs) and Uninterruptible Power Supplies (UPSs)

1. Don't buy low quality PSUs.
2. When selecting a PSU for a quiet server build chose one that will operate at around 50% - 60% of its rated maximum wattage. So if your server draws 300W, select a PSU with a maximum rating of around 600W.
3. If you have time have a look at [this](#) article by Jgreco. It is excellent and should help.
4. If your budget allows, invest in an Uninterruptible Power Supply (UPS). If your budget doesn't allow, adjust your budget until it does. I know it's not the most seductive bit of kit (incidentally, the most seductive bit of kit I ever bought was a leather thong, but that's another story) and it's expensive (the UPS, not the thong!), but it is good practice to use one. Although the ZFS file system, along with the ZIL is designed to stop data corruption when experiencing a power outage, apparently it can still happen (I don't know how or why??).
5. Some server PSUs will not work with a UPS that uses a simulated sine wave output. Some PSUs don't seem to mind. The reasons are beyond the scope of this guide. I have seen the output of some simulated sine wave UPSs on an oscilloscope and some of them are shockingly bad and do not even come close to a sine wave. If you don't want to take a chance, then get a UPS that provides a proper sine wave at its output. Unfortunately, this will cost you more.
6. Whatever UPS you choose make sure it is supported on the Network UPS Tools (NUT) [hardware compatibility list](#). This will allow the server via an attached USB, serial, or network cable to monitor the UPS.

Miscellaneous

1. Arrange your storage so that all VDEVs within a pool have redundancy. THIS IS VERY IMPORTANT!
2. Do not use a 1 disk vdev, it has no redundancy. THIS IS VERY IMPORTANT!
3. Do not use RAIDZ1, as it has only 1 disk redundancy (Z2 has 2 disk redundancy and Z3 has 3 disk redundancy). THIS IS VERY IMPORTANT!
4. Remember when any vdev fails in a pool it takes the entire pool with it!
5. Read Cyberjock's [guide to ZFS for newbies](#). Then read it again. It would probably be worth reading it a third time.
6. Another good beginner's resource for ZFS is [this guide by Ericl we](#).
7. Home users will generally not benefit from a SLOG or L2ARC. More RAM is a better buy.

Esoteric Tips & Advice

1. No matter how well you train them, don't use ferrets to build your server (that's 3 years of my life I'm not getting back).
2. Same goes for pigeons (but they can be trained to make great cocktails).

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Specific Hardware Recommendations

Selecting hardware can be a difficult business even for the initiated. It usually takes a lot of time and research, and even then it can still go very wrong (much like DIY surgery).

For those who don't have the time, here is a specific list of hardware for a quiet FreeNAS server I made in early January 2016.

The intention was to build an expandable, 8 bay, quiet FreeNAS system that would be situated in the living room.

(The "quiet" part was very important as I did not want to upset the psychopath I share a house with, although she prefers to be introduced to people as my girlfriend.)

If you don't need a quiet system you can dispense with the costly Noctua fans and use the ones that come as standard in the case.

Also, rack mounting your equipment makes things very neat and tidy, but I couldn't find a rack mount case that accommodated the Noctua fans.

The SSD capacity (in this case 256GB) is excessively large. If you can get smaller you will save some money. As long as it is 16GB or more you should be fine.

The big expense with this system was the storage hard drives. If you don't need 8 of these then the total cost of the server can be significantly reduced.

Incidentally, I do not recommend the SilverStone SST-SDP10B bay adaptor. In the words of my old Professor, "Bag of shite!" He was a plain speaking man.

Parts List

Item	Description	Qty
Processor	Intel Xeon E5-2620v3	1
CPU Heatsink/Fan	Noctua NH-U12DX i4 High Performance Intel Xeon CPU Cooler & 120mm Fan	1
Motherboard	Supermicro X10SRH-CLN4 Single socket R3 (LGA 2011) 8 SAS3 12Gb and 10 SATA 3 6GB	1
Memory	Samsung 8GB DDR4 2133MHz ECC Registered Server Memory - M393A1G40DB0	2
Graphics Card	Not needed	
OS HDD	256GB Samsung 850 PRO	1
Data HDDs	WD Red 4 TB	8
HBA Card	Not needed	
Optical Drive	Not needed	
Operating System	Not needed	
PSU	Seasonic AU-650x	1

Item	Description	Qty
Case	Fractal Design Define XL R2 Titanium Gray	1
Rails	Not Needed	
Case Fans (Front)	Noctura NF-A14	2
Case Fans (Back)	Noctura NF-A14	1
Gigabit Network Switch	Not needed	
UPS	Eaton 5SC 1000i	1
SAS Cable	LSI 0.6m Cable SFF8643 to X4 SATA CBL-SFF8643-SATASB-06M (SFF8643 to X4 SATA)	2
Server Rack	Not needed	
KVM Switch	Not needed	
SATA Cable		1
Bay Adaptor		1
Molex-to-SATA Adaptor		1

The whole thing came to just over £2600 with the UPS (when the bill came in I slightly soiled myself).



If you decide to go with this very expensive build then it should look something like this when completed.





However, if you let ferrets build your server you will get this.



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Processor Validation

Processor validation is carried out by running a program on the server which works the processor at 100% of its capacity, 100% of the time. That means all threads in all cores working at 100% (or very near to 100%) all the time.

These types of programs are generically referred to as “CPU Stress Testers” and there are various free ones available on the internet.

There is no generally agreed duration for this test. I ran it for an hour.

Make sure you carefully observe the temperature of your processor during this test, especially if you have built a quiet system as temperatures in these servers tend to run a little higher due to the much slower fan speeds.

Fester uses the free version of a program called “[Breakin](#)” by Advanced Clustering run from a bootable USB stick. If you want to use it then download it from their website.

It comes as an ISO file (but can also be obtained as a PXE image if you want to do this stuff across a network).

The first thing we need to do is make the bootable USB stick.

Creating a Bootable USB Stick

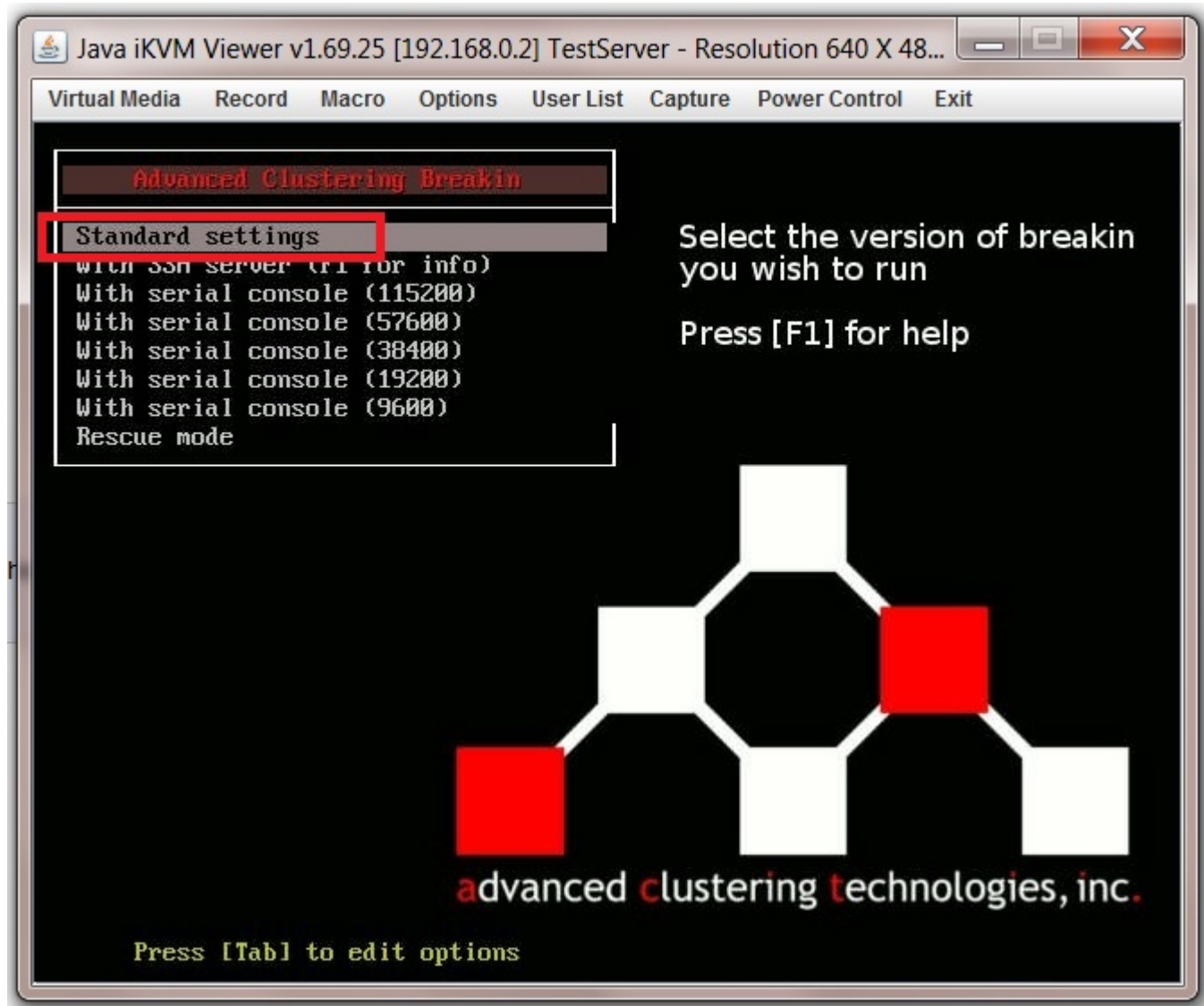
Follow the instructions in [Writing a USB Stick](#) to write the Breakin image file to a USB Stick. You can alternatively burn it to a CD-ROM, or [mount the file via IPMI](#).

Using Breakin

Start by powering down the server if it isn't powered down already.

Insert the bootable Breakin USB stick and switch on the server.

If all goes well you will eventually be presented with a screen like this. Chose the “standard settings” option by using the “↑” and “↓” keys and then press the “Return/Enter” key.



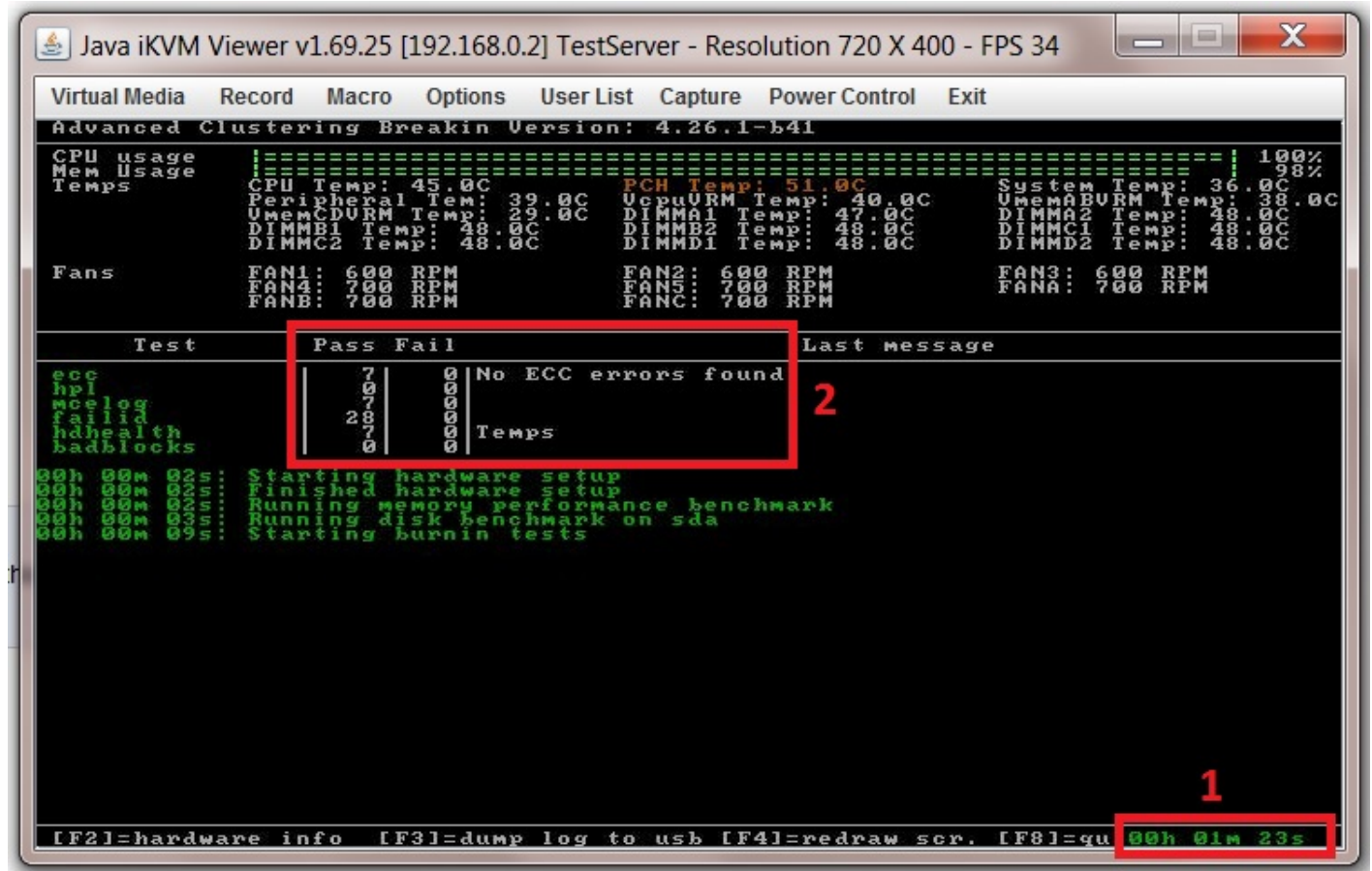
The program will start to load up.

When it is finished you should see something like this with the test duration at the bottom of the screen (1).

Any failures will be listed in the "Fail" column, with the number of times the test passed in the "Pass" column just to the left of this (2).

Keep an eye on the temperatures especially if this is a quiet server build.

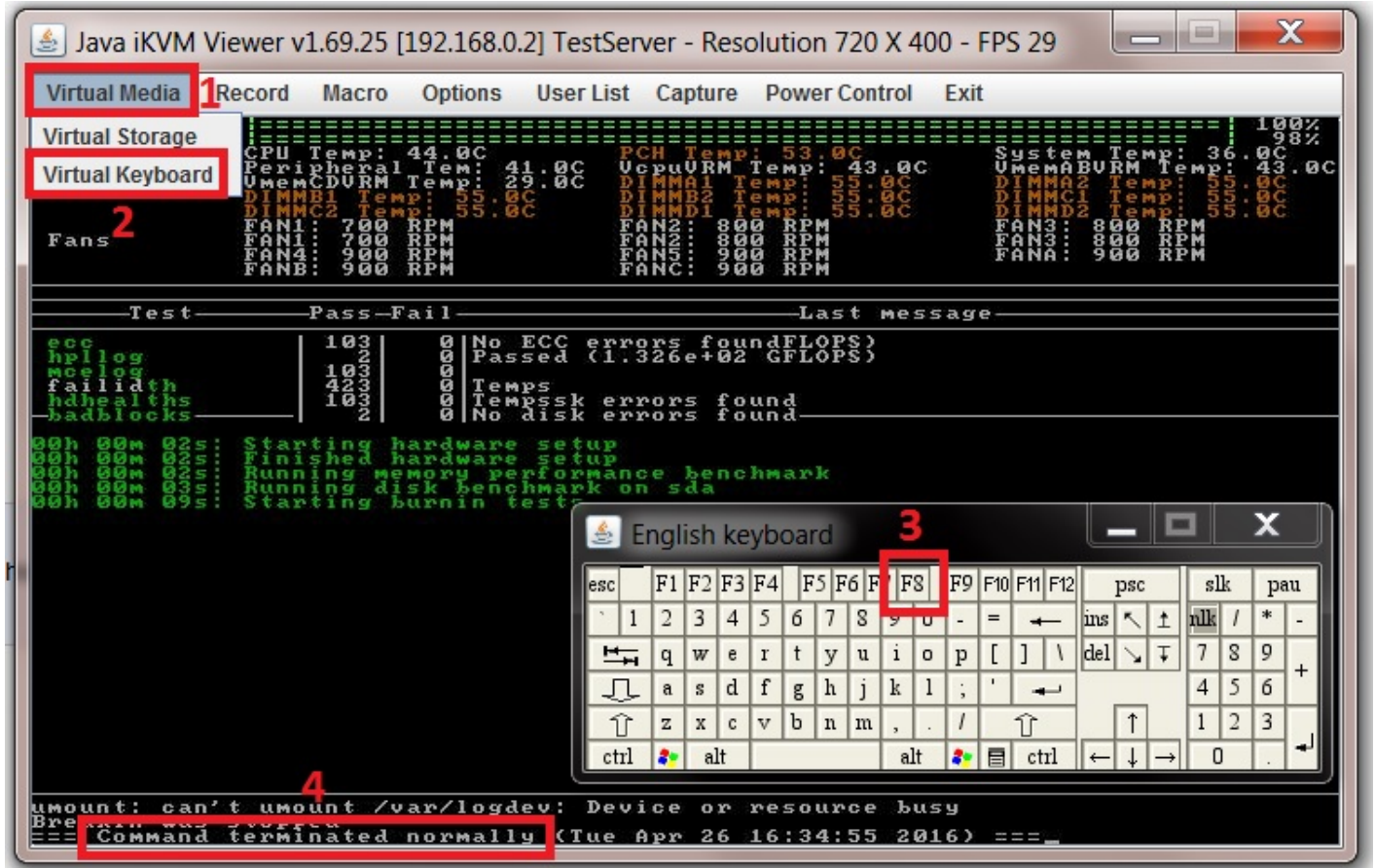
There should be zero failures.



If at any point you need to stop the test open the virtual keyboard by selecting "Virtual Media" (1) from the drop down menus along the top of the iKVM Viewer. Now select "Virtual Keyboard" (2) and click with your mouse on F8 of the virtual keyboard (3).

Pressing F8 on your actual (i.e. physical) keyboard will not work.

If this works you should see something like this with "Command terminated normally" (4) at the bottom of the screen.



When you think the CPU has been thoroughly tested power off the server and remove the USB stick.

That's the CPU validation done.

Why No Prime95 Fester!

Prime95 is a CPU stress tester that seems to be popular with the FreeNAS community.

Unfortunately Fester could not make this bootable. I don't know how.

If someone would like to give me the information and some copyright free screen shots I would be happy to include them in this guide or you could replace this or any section with your own?

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HDD/SSD Validation

HDD validation (in this case) basically involves 5 stages.

1. A SMART short test. This is a test that looks at certain aspects of the electrical and mechanical performance of the HDD. It is not a thorough test of the HDD. The tests take somewhere in the region of 2-5 minutes to complete.
2. A SMART conveyance test. This is a test performed on HDDs to check if they have survived transit without any damage. (I don't know how they differ from the short or long test if someone wants to give me the information Fester will try to add it.)
3. A SMART long test. Think of this as an extended version of the short test. It is a much more thorough test of the HDD and will include a surface scan of the drive. This test will take many hours to complete depending on the capacity of the HDD.
4. A Badblocks test. This is a test where every physical location on the HDD has a write/read test performed on it. The test consists of a block of data that gets written to every physical location on the HDD in sequence. Every physical location on the HDD is then read back also in sequence and each time at each location the value is checked to see if it is correct. This is one pass. The whole process is repeated with a different block of data, this is the second pass. The badblocks test uses 4 patterns by default. This test will take a very long time, usually between 24 hours to a few days depending on the capacity of the drive.
5. The SMART long test is repeated.

SMART Tests: A Short Introduction

SMART stands for Self-Monitoring Analysis and Reporting Technology.

A SMART test is a test a HDD or SSD can perform by itself on itself. These tests, often referred to as "self tests" are carried out by the HDD's/SSD's onboard firmware, not a separate piece of software running on the server as we have already seen.

The results of these tests are stored in the drives onboard non-volatile memory so they can be retrieved and utilised by simply interrogating the drive in the correct way.

However, to be able to use the SMART capabilities built into the drives we need a program or an OS that is capable of communicating with the built in SMART functions of the drive.

With such a program or OS present we can simply issue commands to invoke the firmware to initiate a SMART test and/or interrogate a SMART drive to obtain the results of that test (very convenient).

Only one SMART test can be performed per drive. So you cannot run the short test and the long test on the same drive simultaneously. Also the current SMART test must complete before another can be run on the same drive. If a SMART test is running on a drive and you start another then the current test is stopped and abandoned in favour of the newly requested test.

Fortunately, you can run SMART tests in parallel on different drives. So you could have any number of

drives all performing the short test at the same time, or the long test or a mix if you wish (i.e. some performing the short test and some performing the long test).

HDD/SSD Validation Via the FreeNAS OS Route

There is more than one way to carry out the HDD/SDD validation tests on the server.

A program specially written for this purpose could be used in a bootable form and run on the server.

However, the easiest way to conduct the HDD/SDD validation tests is to install the FreeNAS OS on the server. It has everything we need. This is not a proper installation of the OS, but just a test installation so we can conduct the SMART and badblocks tests needed.

There are a number of ways the FreeNAS OS can be installed, for example from a CD/DVD, or across a network using PXE. Fester favours a USB stick.

[Create the installer USB stick](#), [install FreeNAS](#), and [enable the SSH service](#), as described on the linked pages. When you first log in to the web GUI, you'll likely see the Initial Wizard; you can just exit out of this at this time.

Conducting The HDD/SDD Validation Tests (Finally!) In FreeNAS Via An SSH Console

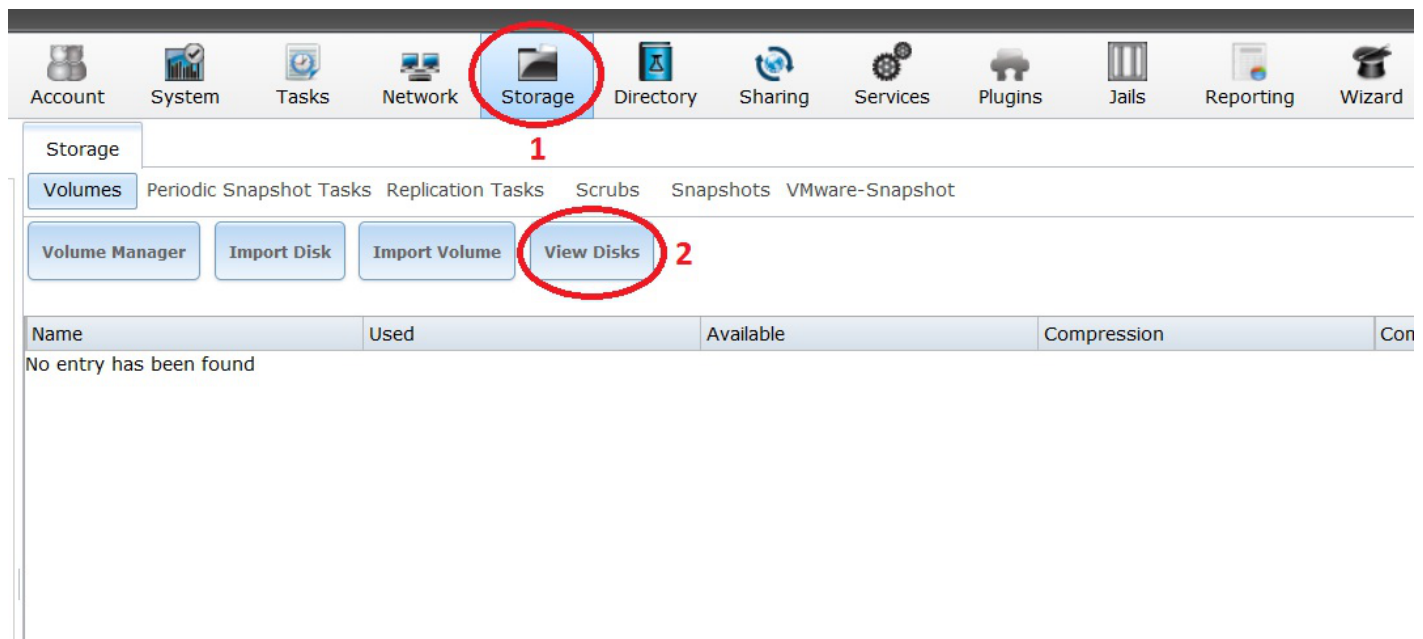
FreeNAS comes with certain software tools and capabilities built into it that will make the task of HDD/SDD validation much easier. This is why we needed to install it before conducting the tests.

The SSH console provides no tools for validation purposes, but does provide the means by which we can flexibly interact with the built in tools in FreeNAS to accomplish the validation tests. This is why we needed to set this up before carrying out the tests.

SMART Short Tests Via The SSH Console

Open up the FreeNAS web GUI in your browser and log in.

Go to the "Storage" page (1) and click the "View Disks" button (2).



This should bring up a list of the storage HDDs (i.e. for data, not the OS) that are currently in your system.

Make a list of the names of each drive (shown in a red box in the screen shot) these will be needed soon.

(On Fester's system this would be **da0 - da7**, giving a total of 8 HDDs.)

Incidentally, the name FreeNAS gives the OS HDD is **ada0**. If you have two OS drives (i.e. a mirrored configuration) this would be **ada0** and **ada1** respectively.

The screenshot shows the 'View Disks' page in the FreeNAS web interface. It displays a table with the following columns: Name, Serial, Disk Size, Description, Transfer Mode, HDD Standby, and Advanced Power Management. The table lists 8 drives, with the 'Name' column highlighted by a red box. The drives are named da0 through da7, each with a 4.0 TB disk size. The Serial column is redacted with a black box. The Transfer Mode is 'Auto' for all drives, and the HDD Standby is 'Always On'. The Advanced Power Management is 'Disabled' for all drives.

Name	Serial	Disk Size	Description	Transfer Mode	HDD Standby	Advanced Power Management
da0	WD-	4.0 TB		Auto	Always On	Disabled
da1	WD-	4.0 TB		Auto	Always On	Disabled
da2	WD-	4.0 TB		Auto	Always On	Disabled
da3	WD-	4.0 TB		Auto	Always On	Disabled
da4	WD-	4.0 TB		Auto	Always On	Disabled
da5	WD-	4.0 TB		Auto	Always On	Disabled
da6	WD-	4.0 TB		Auto	Always On	Disabled
da7	WD-	4.0 TB		Auto	Always On	Disabled

Start an SSH session and log in.

Where possible when entering commands it is easier and more accurate to use copy and paste. You can copy the text out of this document in the usual way (i.e. highlight the text, right click with the mouse and from the pop up menu select "Copy") and then paste it into the PuTTY SSH console by simply right clicking with the mouse anywhere in the console window (the copied text will appear at the command prompt).

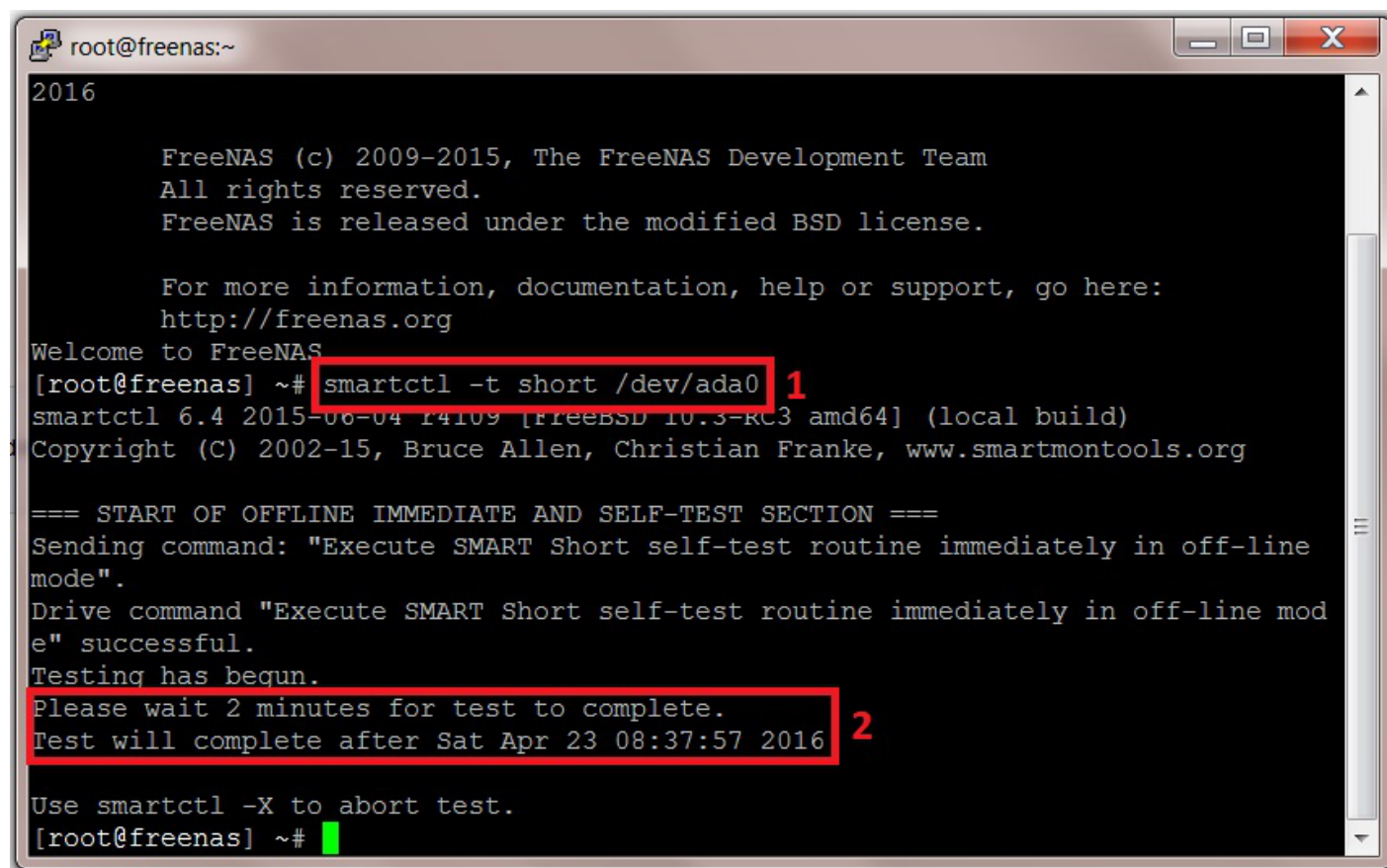
If you do it manually then commands entered at the prompt must be exactly as shown including all the spaces or they tend not to work.

Let us start by running the SMART short test on the OS drive labelled ada0 (in Fester's case this is the SSD drive).

At the command prompt type:

```
smartctl -t short /dev/ada0
```

You should get the following screen, the entered command is shown in the first red box (1) and the duration and completion time are shown in the second (2).



```
root@freenas:~
2016

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All rights reserved.
FreeNAS is released under the modified BSD license.

For more information, documentation, help or support, go here:
http://freenas.org
Welcome to FreeNAS
[root@freenas] ~# smartctl -t short /dev/ada0 1
smartctl 6.4 2015-06-04 r4109 [FreeBSD 10.3-RC3 amd64] (local build)
Copyright (C) 2002-15, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===
Sending command: "Execute SMART Short self-test routine immediately in off-line
mode".
Drive command "Execute SMART Short self-test routine immediately in off-line mod
e" successful.
Testing has begun.
Please wait 2 minutes for test to complete.
Test will complete after Sat Apr 23 08:37:57 2016 2

Use smartctl -X to abort test.
[root@freenas] ~#
```

(Do not worry about the fact that you cannot see any results or the test running. This is completely correct. The results are obtained later by entering another command at the command prompt after all the tests are completed.)

We now need to repeat this process for each drive in the system. We do not need to wait for this drive to complete its test before starting another on a different drive.

So at the command prompt enter the command to start the SMART short test for the next drive in your system (in Fester's case this is da0, the first storage drive).

```
smartctl -t short /dev/da0
```

Then do the same operation for the next drive, and the next, until all the drives are running the short

SMART test. In Fester's case this would be:

```
smartctl -t short /dev/da1  
smartctl -t short /dev/da2  
smartctl -t short /dev/da3  
smartctl -t short /dev/da4  
smartctl -t short /dev/da5  
smartctl -t short /dev/da6  
smartctl -t short /dev/da7
```

Make a note of the time when the last drive will complete the test and then go and get a cup of tea (or in Fester's case training Ferrets to make cheese cake).

When you are certain the last short test, on the last HDD has completed (you will know because you noted the completion time on the last test) then it is time to start the conveyance tests.

SMART Conveyance Tests Via The SSH Console

If you have exited the SSH session then start another and login.

Run the SMART conveyance test on the OS drive labelled ada0 (in Fester's case this is the SSD drive).

At the command prompt type in:

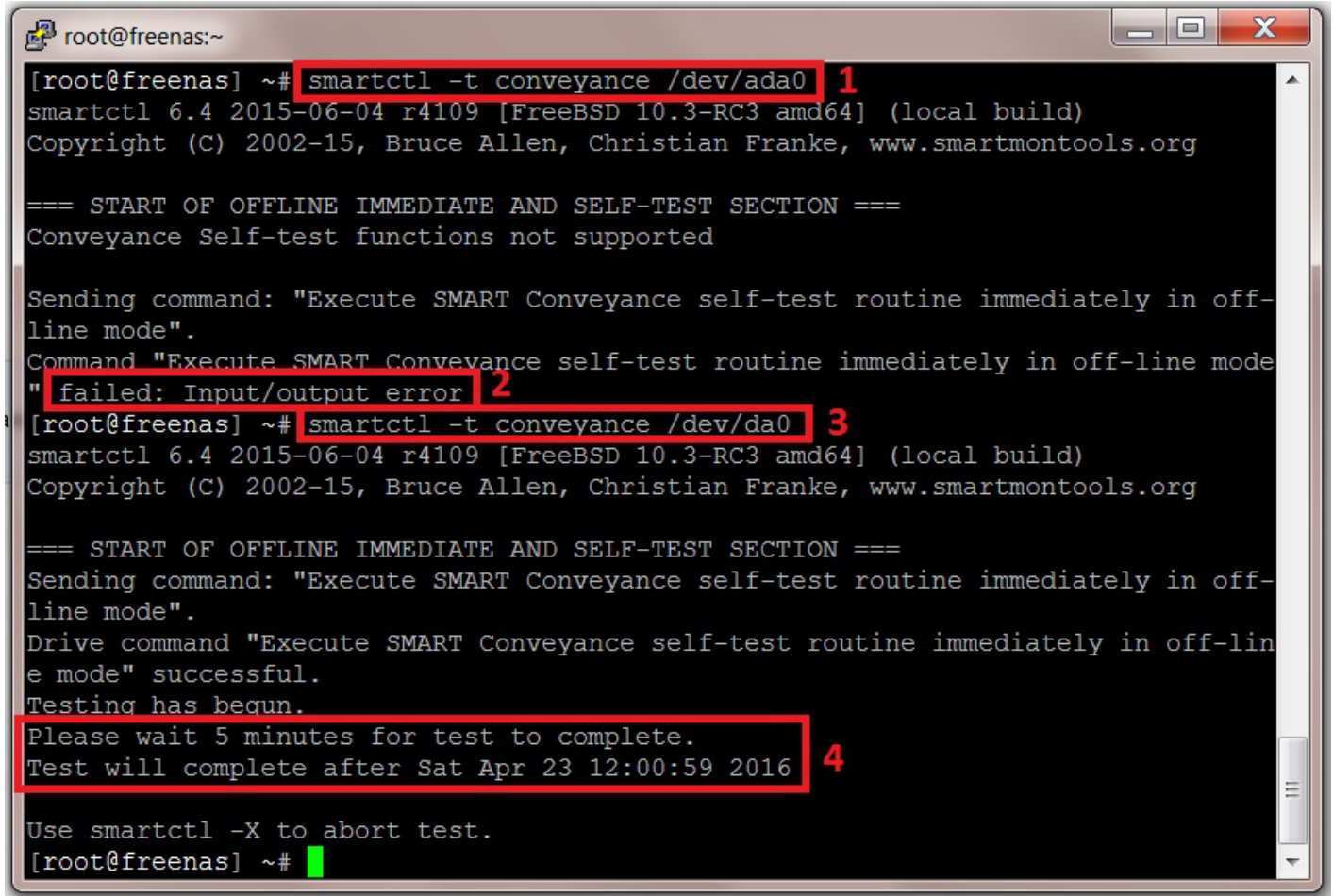
```
smartctl -t conveyance /dev/ada0
```

You should get the following screen, the entered command is shown in the first red box (1). However, the conveyance test failed on this drive due to an input/output error shown in the second red box (2) (some drives don't support conveyance tests, if yours does this just move on to the SMART long test).

So I ran the test on the next drive in the system with the following command:

```
smartctl -t conveyance /dev/da0
```

This is shown in the third red box (3) and now we see how it normally looks when the command is successful. The duration and completion time are shown in the fourth red box (4).



```
root@freenas:~  
[root@freenas] ~# smartctl -t conveyance /dev/ada0 1  
smartctl 6.4 2015-06-04 r4109 [FreeBSD 10.3-RC3 amd64] (local build)  
Copyright (C) 2002-15, Bruce Allen, Christian Franke, www.smartmontools.org  
  
=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===  
Conveyance Self-test functions not supported  
  
Sending command: "Execute SMART Conveyance self-test routine immediately in off-  
line mode".  
Command "Execute SMART Conveyance self-test routine immediately in off-line mode"  
" failed: Input/output error 2  
[root@freenas] ~# smartctl -t conveyance /dev/da0 3  
smartctl 6.4 2015-06-04 r4109 [FreeBSD 10.3-RC3 amd64] (local build)  
Copyright (C) 2002-15, Bruce Allen, Christian Franke, www.smartmontools.org  
  
=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===  
Sending command: "Execute SMART Conveyance self-test routine immediately in off-  
line mode".  
Drive command "Execute SMART Conveyance self-test routine immediately in off-lin  
e mode" successful.  
Testing has begun.  
Please wait 5 minutes for test to complete.  
Test will complete after Sat Apr 23 12:00:59 2016 4  
  
Use smartctl -X to abort test.  
[root@freenas] ~#
```

We now need to repeat this process for each drive in the system. We do not need to wait for this drive to complete its test before starting another on a different drive.

So at the command prompt enter the command to start the SMART conveyance test for the next drive in your system (in Fester's case this is da1, the second storage drive).

```
smartctl -t conveyance /dev/da1
```

Then do the same operation for the next drive, and the next, until all the drives are running the SMART conveyance test. In Fester's case this would be:

```
smartctl -t conveyance /dev/da2
```

```
smartctl -t conveyance /dev/da3
```

```
smartctl -t conveyance /dev/da4
```

```
smartctl -t conveyance /dev/da5
```

```
smartctl -t conveyance /dev/da6
```

```
smartctl -t conveyance /dev/da7
```

Make a note of the time when the last drive will complete the test and then go and get a cup of tea (or in

Fester's case cleaning cheese cake off the walls, bloody ferrets!).

When you are certain the last conveyance test, on the last HDD has completed (you will know because you noted the completion time on the last test) then it is time to start the long tests.

SMART Long Tests Via The SSH Console

If you have exited the SSH session then start another and login.

Run the SMART long test on the OS drive labelled ada0.

(Fester did not run this test on ada0 because the drive is an SSD drive. A surface scan on an SSD drive is pointless. The reasons why are beyond the scope of this guide and relate to the way in which SSDs handle a bad memory location using the built in hardware manager and over-provisioned memory).

At the command prompt type in:

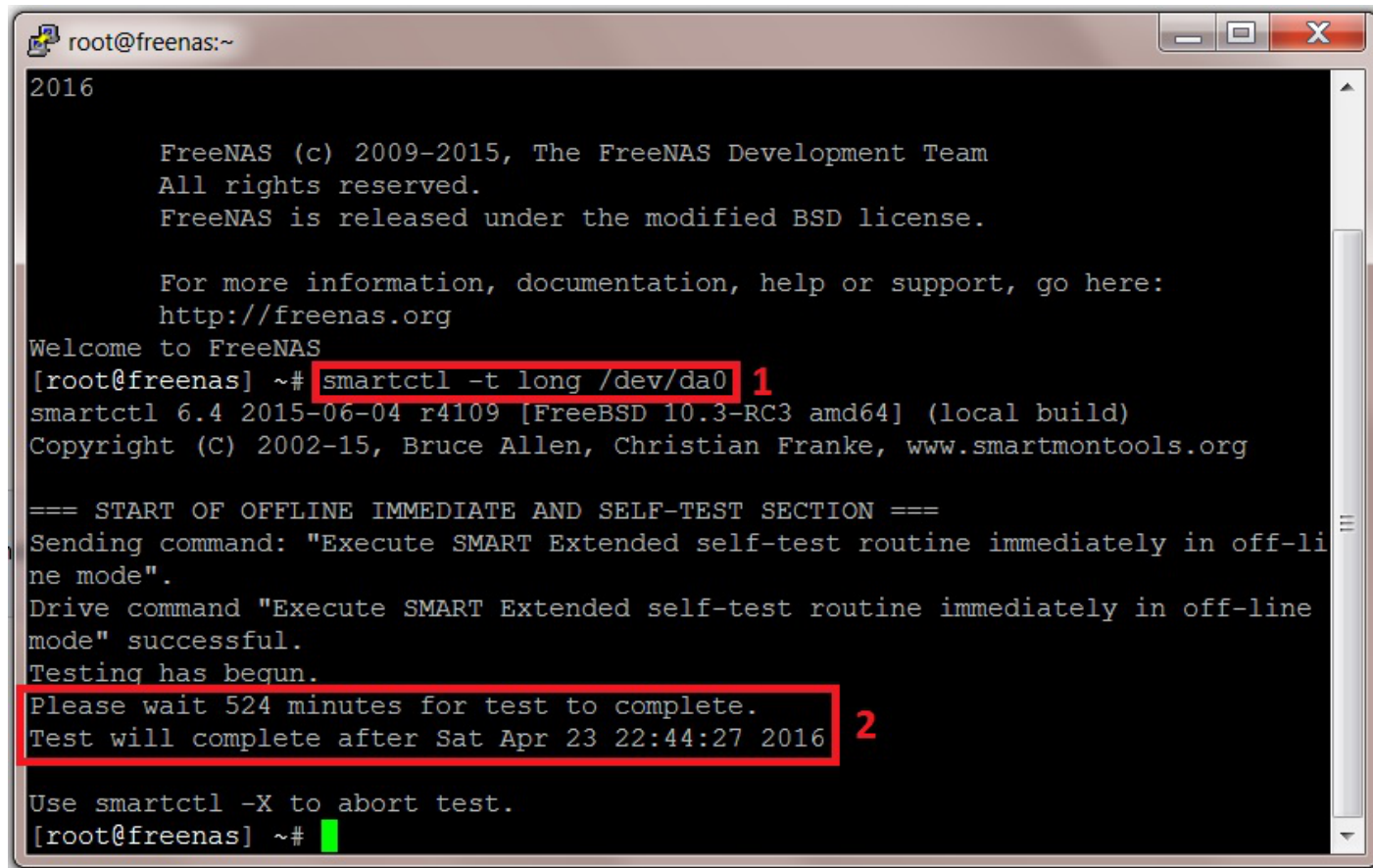
```
smartctl -t long /dev/ada0
```

I can't show you a screen shot of this on ada0 for reasons I have already explained. So let us go on to the next drive in the system and run the SMART long test on that.

At the command prompt type in:

```
smartctl -t long /dev/da0
```

You should get the following screen, the entered command is shown in the first red box (1) and the duration and completion time are shown in the second (2).



```
root@freenas:~
2016

FreeNAS (c) 2009-2015, The FreeNAS Development Team
All rights reserved.
FreeNAS is released under the modified BSD license.

For more information, documentation, help or support, go here:
http://freenas.org
Welcome to FreeNAS
[root@freenas] ~# smartctl -t long /dev/da0 1
smartctl 6.4 2015-06-04 r4109 [FreeBSD 10.3-RC3 amd64] (local build)
Copyright (C) 2002-15, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===
Sending command: "Execute SMART Extended self-test routine immediately in off-line mode".
Drive command "Execute SMART Extended self-test routine immediately in off-line mode" successful.
Testing has begun.
Please wait 524 minutes for test to complete.
Test will complete after Sat Apr 23 22:44:27 2016 2

Use smartctl -X to abort test.
[root@freenas] ~#
```

We now need to repeat this process for each drive in the system. We do not need to wait for this drive to complete its test before starting another on a different drive.

So at the command prompt enter the command to start the SMART long test for the next drive in your system (in Fester's case this is da1, the second storage drive).

```
smartctl -t long /dev/da1
```

Then do the same operation for the next drive, and the next, until all the drives are running the SMART long test. In Fester's case this would be:

```
smartctl -t long /dev/da2
```

```
smartctl -t long /dev/da3
```

```
smartctl -t long /dev/da4
```

```
smartctl -t long /dev/da5
```

```
smartctl -t long /dev/da6
```

```
smartctl -t long /dev/da7
```

Make a note of the time when the last drive will complete the test and then go and get several cups of tea (this one takes a while, most likely several hours).

When you are certain the last long test, on the last HDD has completed (you will know because you noted the completion time on the last test) then it is time to start the badblocks tests.

Badblocks Tests Via The SSH Console

The Badblocks test differs from the SMART tests in important ways.

Unlike the SMART test it is not a self-test. It is done using a piece of software built into the FreeNAS OS (it's actually part of FreeBSD which FreeNAS is built on).

This means if we end the SSH session we also terminate the Badblocks test. Due to the long period of time these tests take to complete it becomes seriously inconvenient to keep an SSH session open that long.

Another problem that occurs is when we start the Badblocks program we can no longer input commands into the SSH command prompt until Badblocks completes its test. Therefore, we cannot run Badblocks tests in parallel on different drives (unlike the SMART tests that can run concurrently).

This means we would need to run one Badblocks test at a time on each drive consecutively (i.e. run Badblocks on one drive and wait for that to complete. Then run it on the next drive and wait for that to complete, until all the drives had been tested).

Considering that this test can take anything from 24 hours to 2 - 4 days depending on the capacity of the drive, then the Badblocks test on an 8 drive system would take an inordinate amount of time (assuming 1 drive takes 3 days, an 8 drive system would take $3 \times 8 = 24$ days!).

So when conducting these tests we will use **tmux** which is a session multiplexer built into FreeNAS. A session multiplexer is a console that is capable of running more than one session at the same time. This means we can now run multiple instances of Badblocks in parallel on different drives (this reduces the 24 days to just 3 days).

Also when we close the SSH console, tmux on the FreeNAS system is kept open. It only closes properly when we formerly exit the tmux session. This means we do not need to keep the SSH console open for 3 days on the client computer (very convenient).

However, there are some caveats to be aware of when using tmux.

FreeNAS Storage Volumes And A Known Problem With badblocks

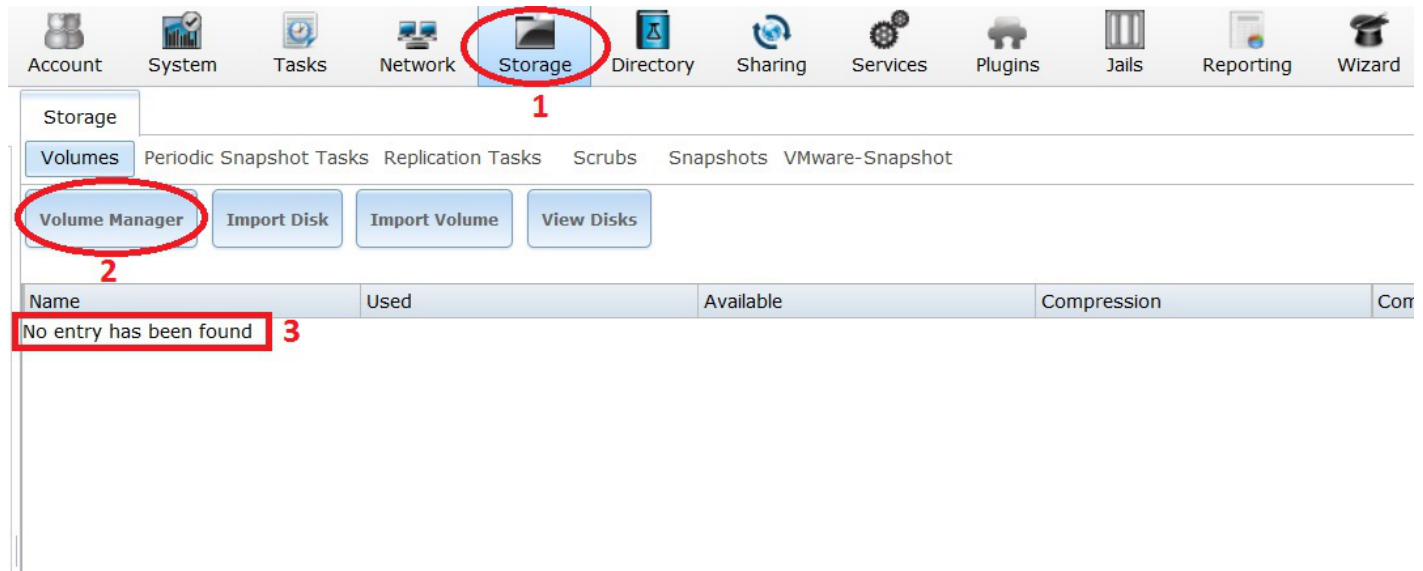
If you have a volume (this is a Zpool) created on the server using the "Volume Manager" in the FreeNAS web GUI, then it is essential to detach the volume before commencing any Badblocks tests.

This is because the FreeNAS OS does a series of small short writes to the volume (Fester does not know the how or why of this, if someone wants to provide some information I will try to include it in the guide so everyone can benefit).

This activity will mess up the Badblocks tests!

This is how to check if your system has a volume.

- Go to the “Storage” page (1).
- Click on the “Volume Manager” button (2).
- If you see text that states “No entry has been found” (3) then your system has no volume and you are good to go with the Badblocks tests.



However, if your system has a volume then you must detach it before continuing.

Detaching The Storage Volume Before A Badblocks Test (DESTRUCTIVE Method)

This is the DESTRUCTIVE method of how to detach a volume.

This means that any and all data on the storage disks will be destroyed forever.

(Which according to the latest scientific research is apparently a long time!)

- Go to the “Storage” page (1).
- Click on the “Volume Manager” button (2).
- If you see entries similar to the screen shot (Fester’s volume is called “TestVolume”) (3) then your system has a volume which you must detach before you are good to go with the Badblocks tests.

Storage

Volumes Periodic Snapshot Tasks Replication Tasks Scrubs Snapshots VMware-Snapshot

Volume Manager Import Disk Import Volume View Disks

Name	Used	Available	Compression	Com
TestVolume	1.2 MiB (0%)	29.0 TiB	-	-
TestVolume	665.4 KiB (0%)	20.0 TiB	lz4	1.00

- To detach the volume select it by clicking on it (it will turn blue when this is done) (1).
- Now click the “Detach Volume” button (2).
- Then tick the “Mark the disks as new (destroy data):” tick box (3)
- (THIS WILL DESTROY ANY AND ALL DATA YOU MAY HAVE ON THE STORAGE DRIVES, DON’T DO THIS IF YOU HAVE DATA YOU WISH TO KEEP).
- Now click the “Yes” button (4).

Storage

Volumes Periodic Snapshot Tasks Replication Tasks Scrubs Snapshots VMware-Snapshot

Volume Manager Import Disk Import Volume View Disks

Name	Used	Available	Compression	Com
TestVolume	1.2 MiB (0%)	29.0 TiB	-	-
TestVolume	665.4 KiB (0%)	20.0 TiB	lz4	1.00x

Detach Volume

You have 1.2 MiB of used space within this volume

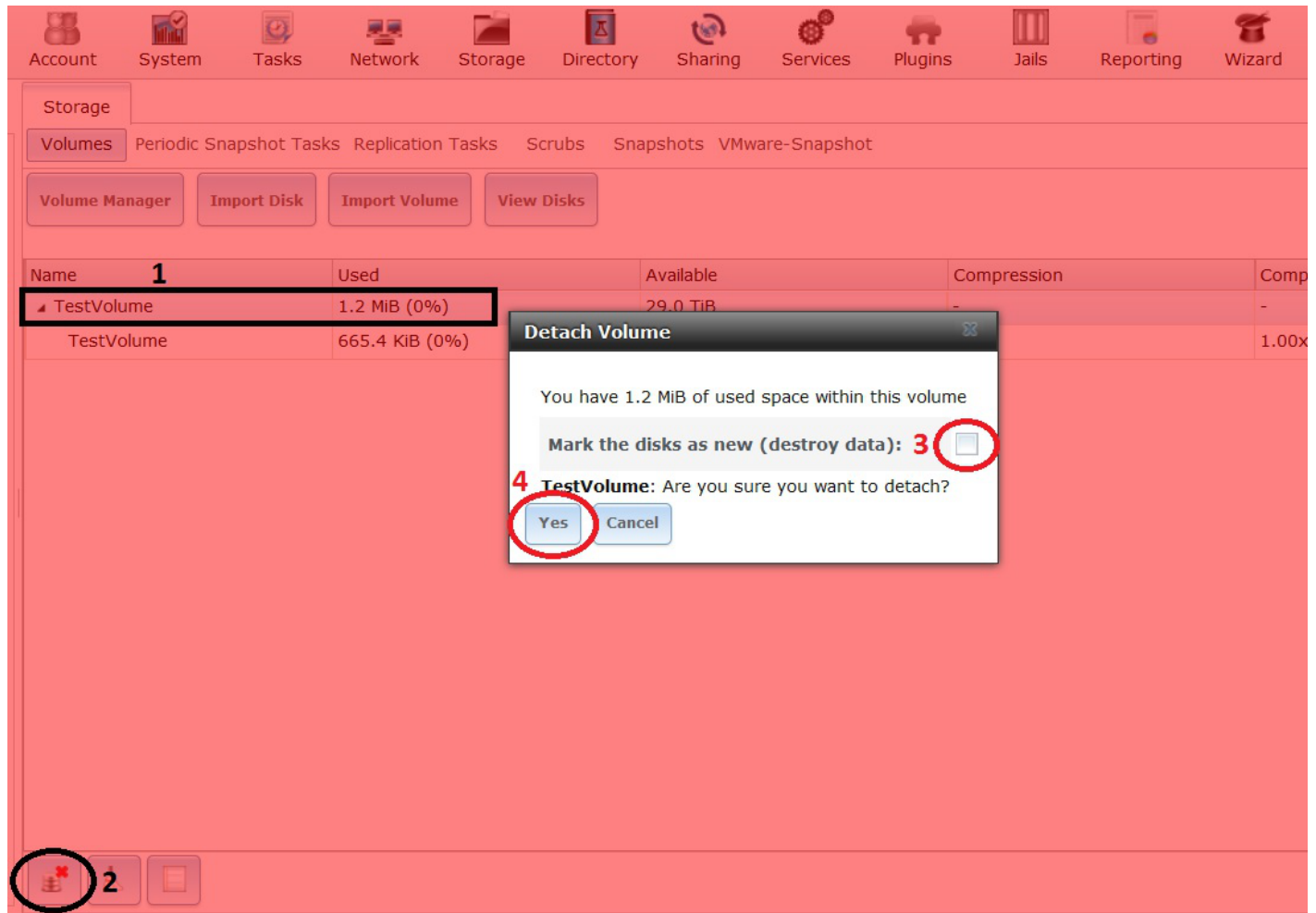
Mark the disks as new (destroy data): ☒ 3

TestVolume: Are you sure you want to detach?

Yes Cancel

Detaching The Storage Volume Before A Badblocks Test (Non-Destructive Method)

- To detach the volume select it by clicking on it (it will turn blue when this is done) (1).
- Now click the “Detach Volume” button (2).
- DO NOT TICK the “Mark the disks as new (destroy data):” tick box (3)
- Now click the “OK” button (4).

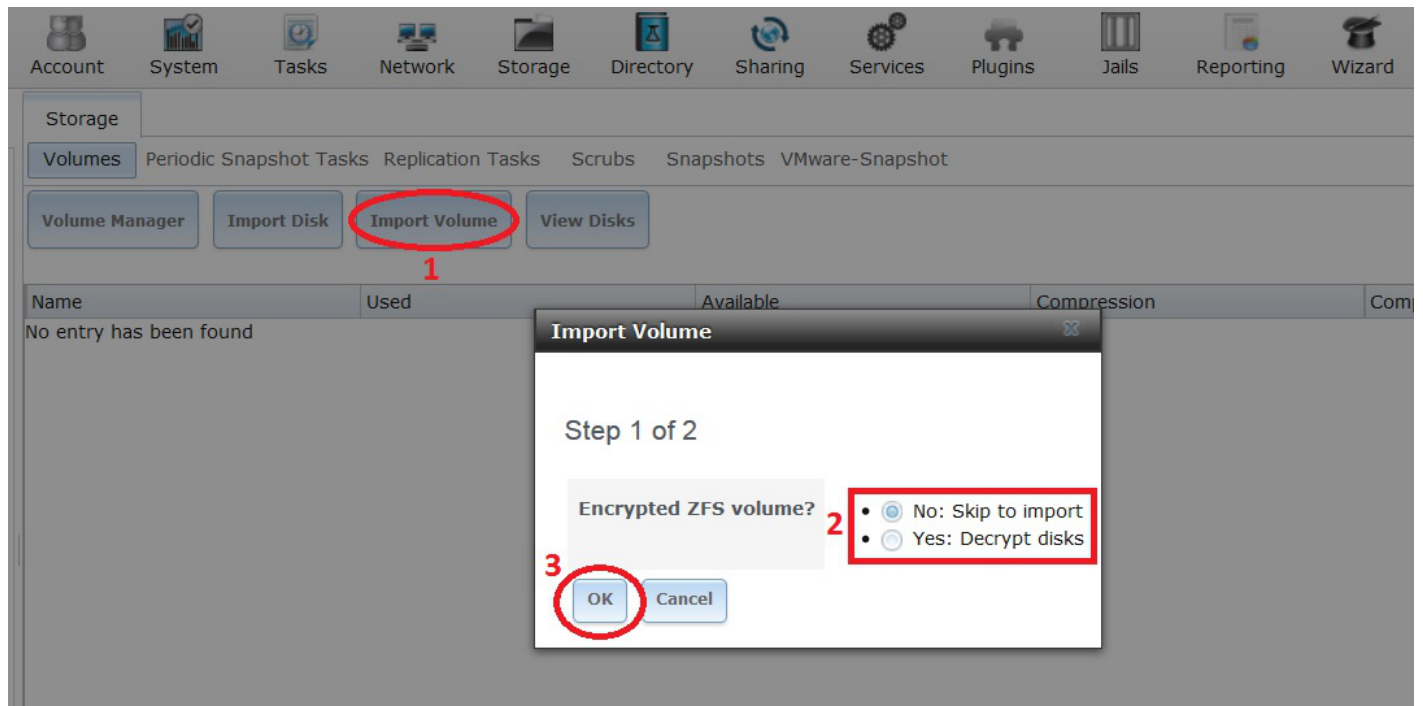


When you have carried out the **non-destructive** version of the Badblocks test (more on this in a moment) you will then need to reattach the volume.

Importing An Unencrypted Volume After A Non-Destructive Badblocks Test

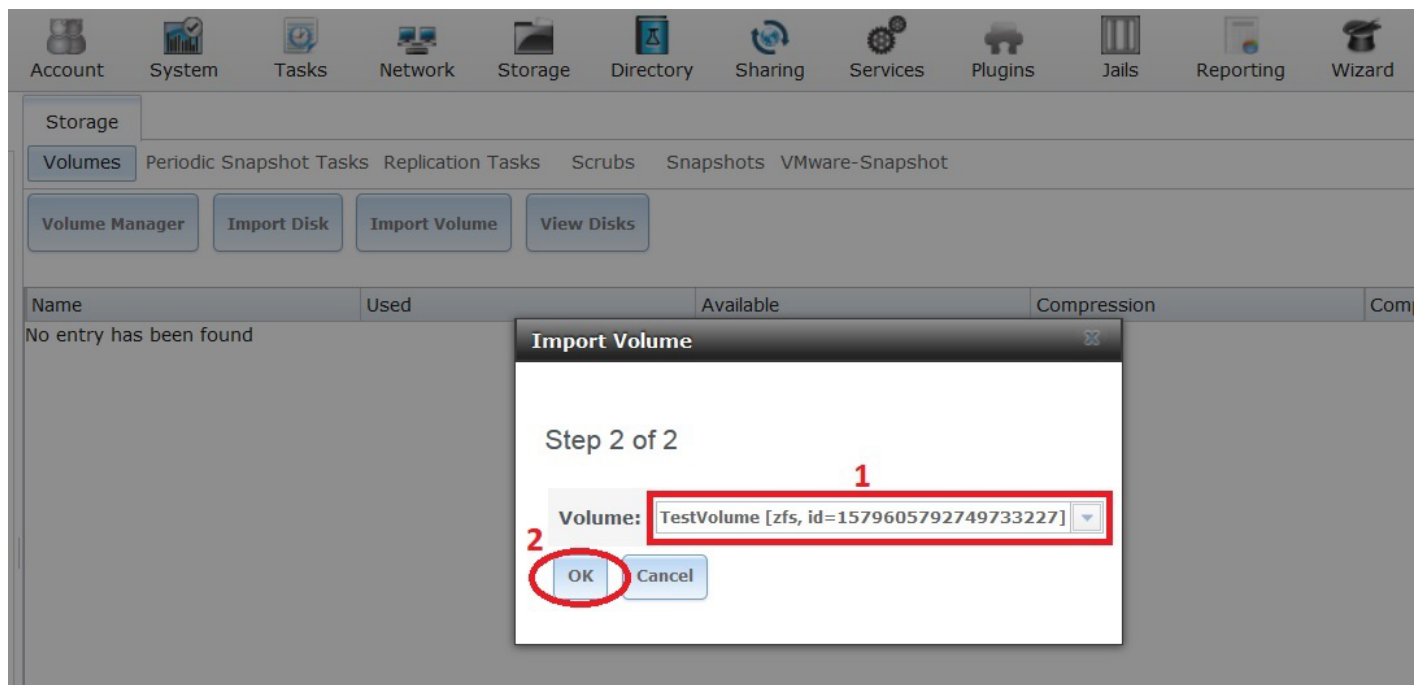
This is how to reattach a non-encrypted volume in the FreeNAS web GUI.

- Assuming you have selected the “Storage” page click on the “Import Volume” button (1).
- If the volume is not encrypted then click the “No: Skip to import” radio button (2).
- Now click the “OK” button (3).



This will take you to a second screen and step 2 of a 2 part process.

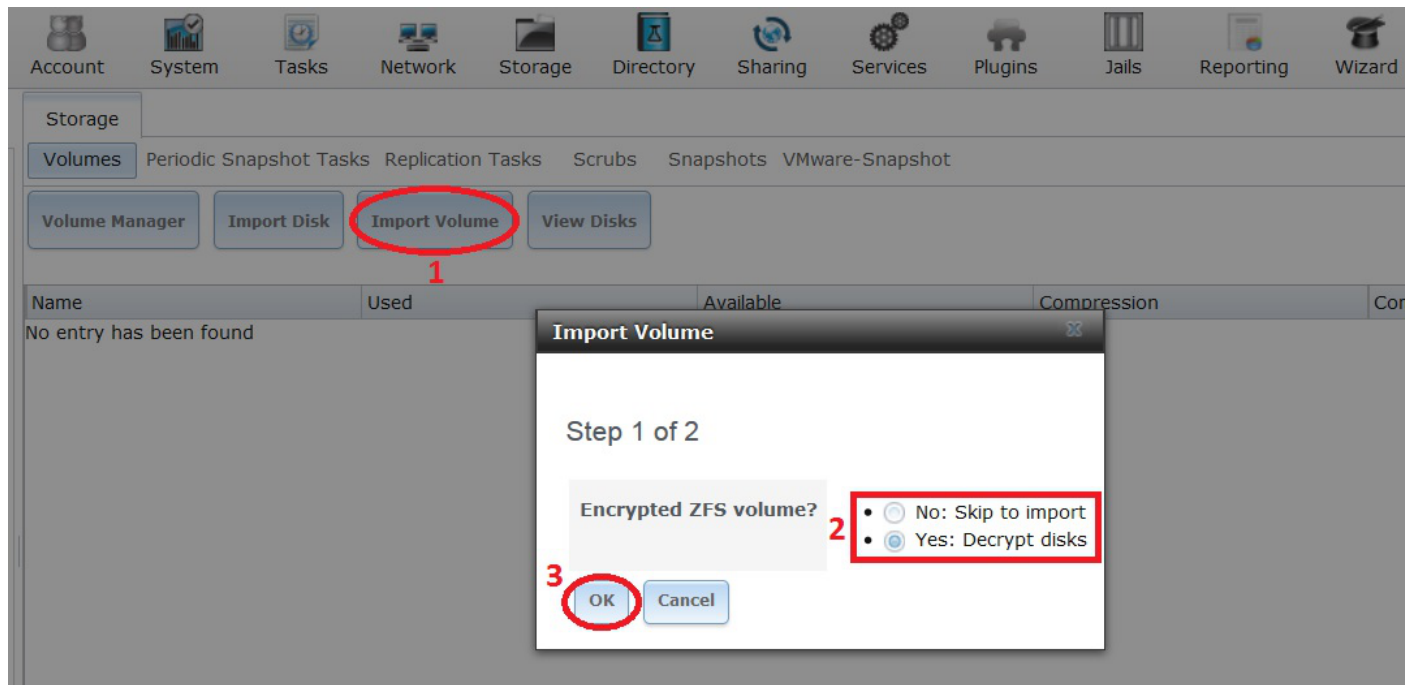
- In the “Volume:” drop down selection box (1) you should see your previously detached volume.
- With the correct volume selected click the “OK” button (2) and the volume should be imported momentarily.



Importing An Encrypted Volume After A Non-Destructive Badblocks Test

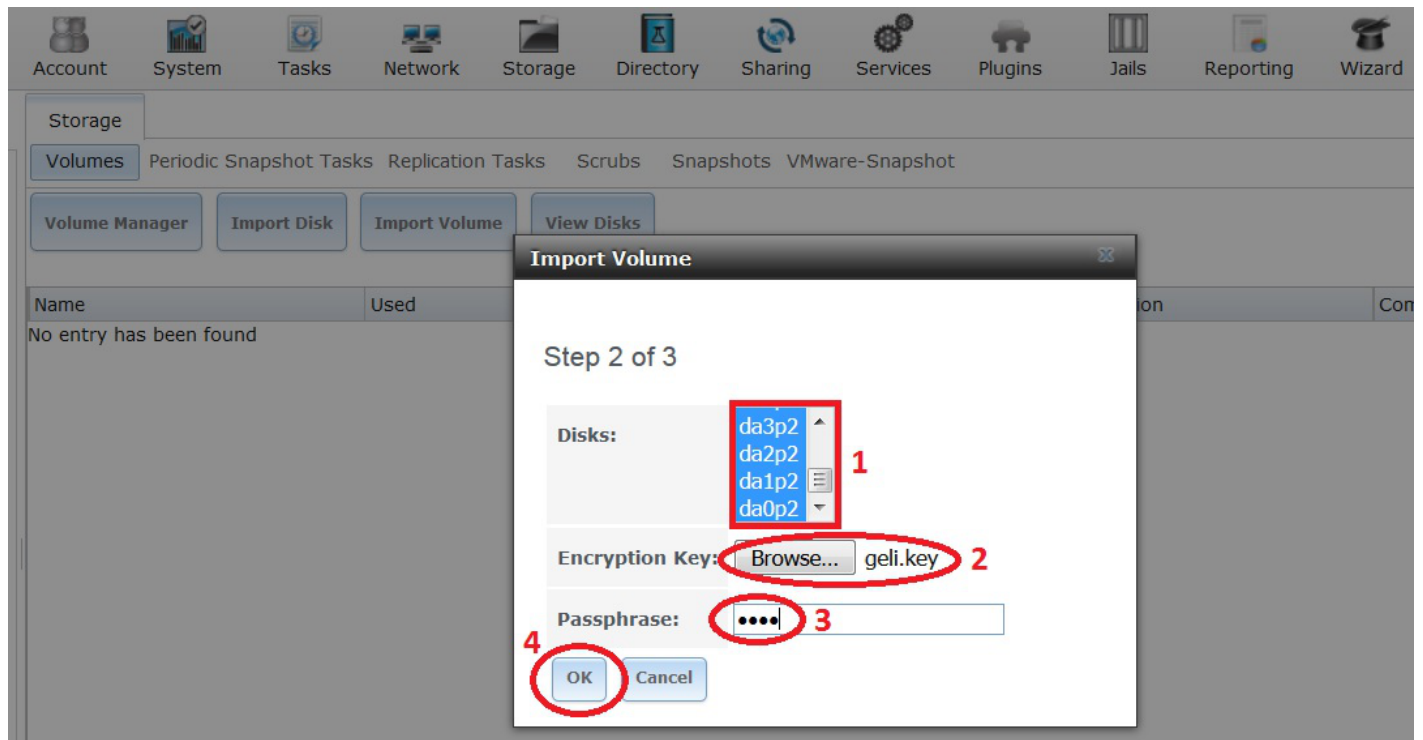
This is how to reattach an encrypted volume in the FreeNAS web GUI.

- Assuming you have selected the “Storage” page click on the “Import Volume” button (1).
- If the volume is encrypted then click the “Yes : Decrypt disks” radio button (2).
- Now click the “OK” button (3).



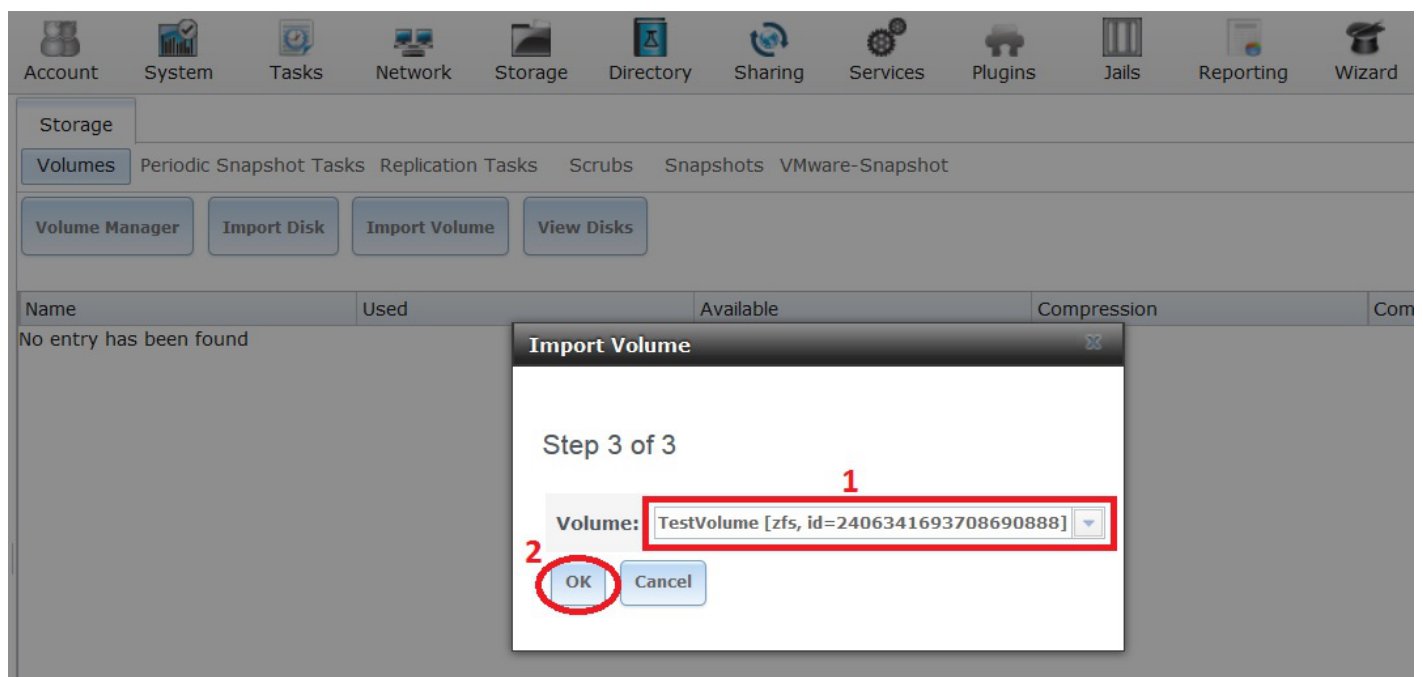
This will take you to a second screen and step 2 of a 3 part process.

- Select the disks that form the volume from the “Disks:” window (1) (in Fester’s case this was all of them).
- Now click the “Browse” button (2) and a window will pop up that allows you to load in your previously saved geli key (when creating encrypted volumes always make sure you save a recovery key).
- Navigate to the location of your key and load it into the FreeNAS GUI. If all goes well you should see it next to the “Browse” button (Fester’s shows up as geli.key) (2).
- Now type in the passphrase (which is a password you created when you made the encrypted volume), in the text box next to “Passphrase:” (3) (Fester very imaginatively used **test** here).
- Now click the “OK” button (4).



The third and final screen will now appear.

- In the “Volume:” drop down selection box (1) you should see your previously detached volume.
- With the correct volume selected click the “OK” button (2) and the volume should be imported momentarily.



Destructive Badblocks Test Using tmux

Start an SSH session and log in.

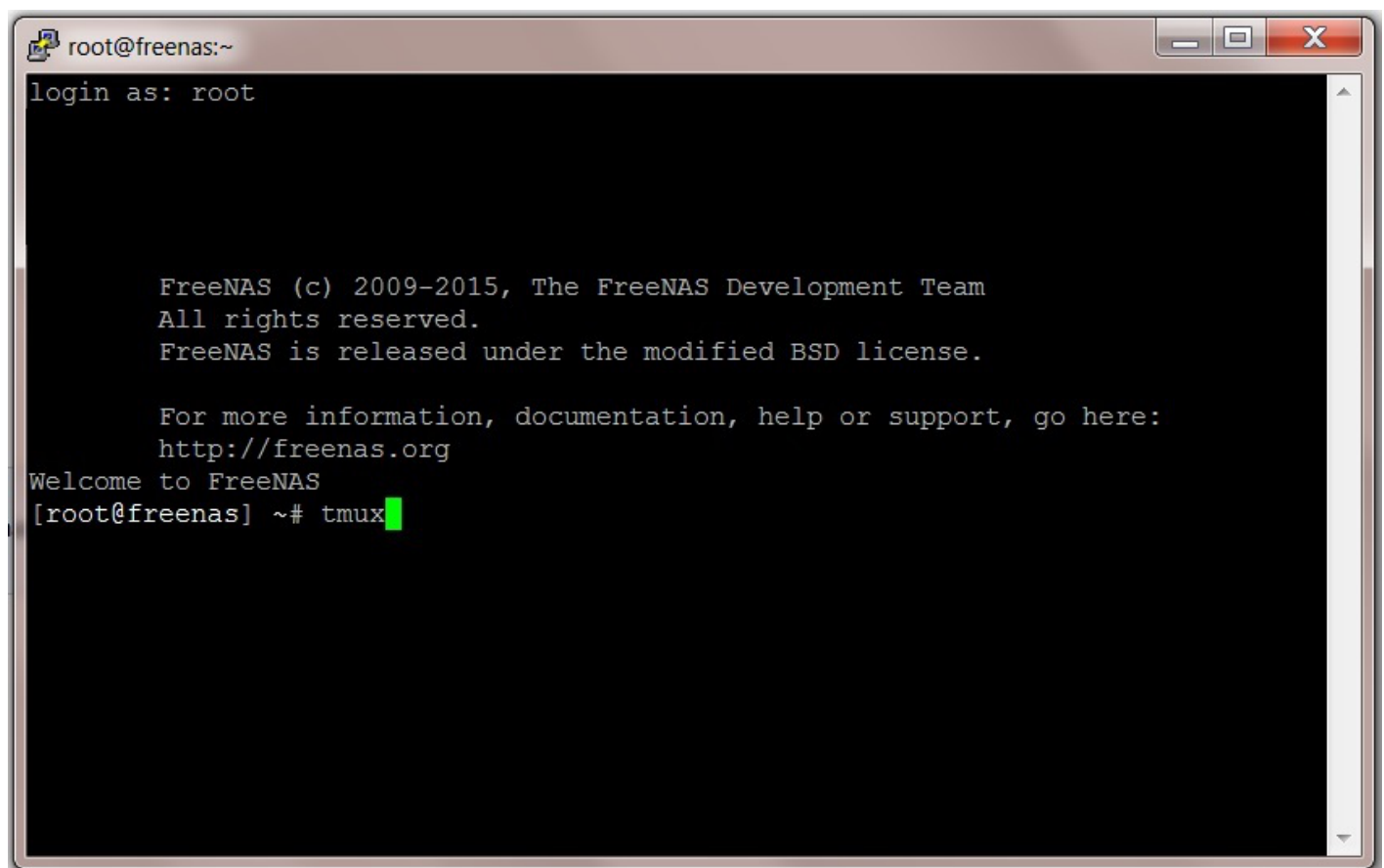
Before starting tmux we need to enable the kernel geometry debug flags, so type in this command at the command prompt.

```
sysctl kern.geom.debugflags=0x10
```

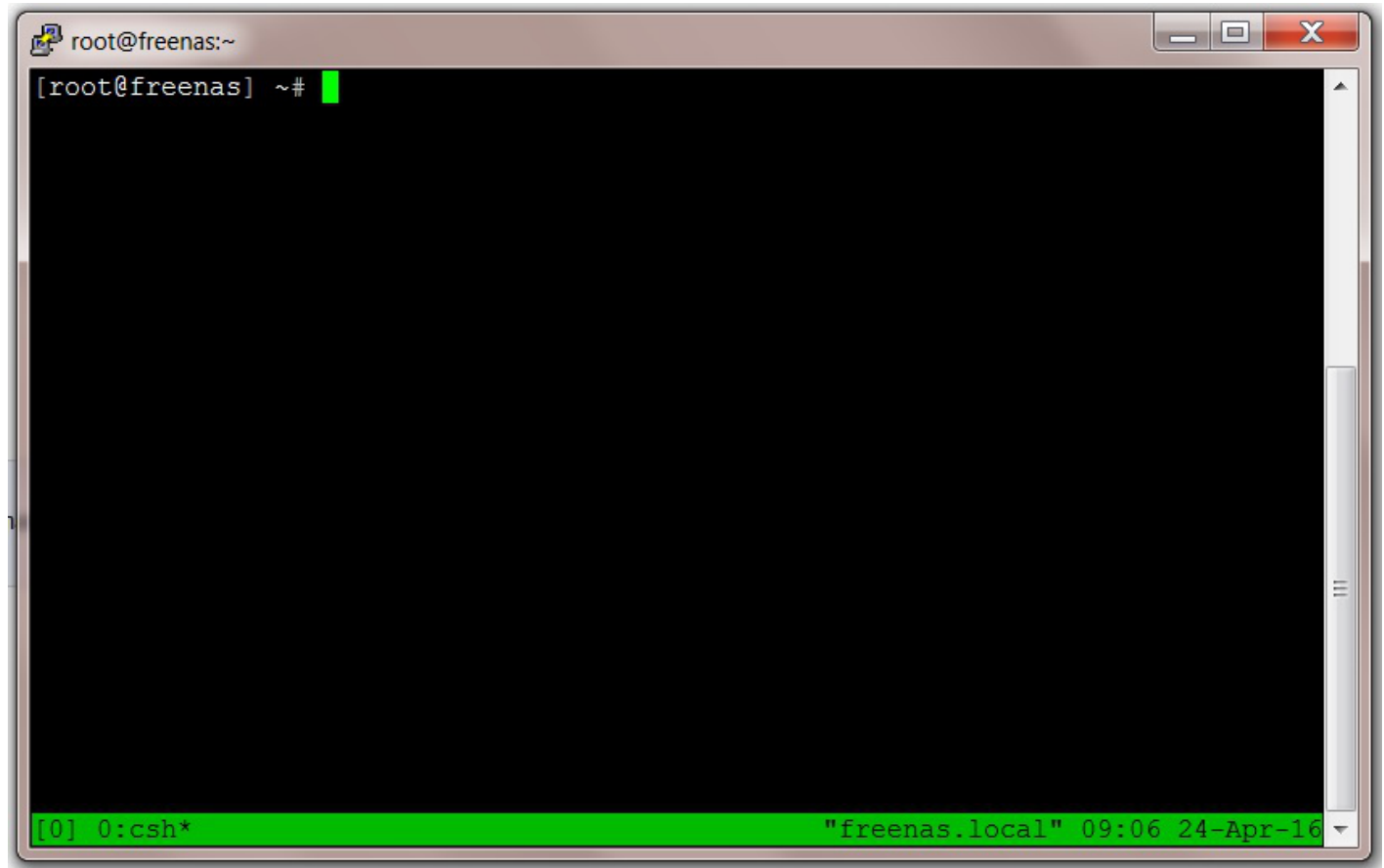
(When all the Badblocks tests are done the kernel geometry debug flags must be returned to their normal state. Thankfully no additional command is necessary, just reboot the server as this setting is not persistent and cannot survive the reboot.)

Now type the following command at the command prompt.

```
tmux
```



You should see a screen something like this. Notice the green band at the bottom of the screen, this is a tmux session.



I will not be running the Badblocks test on ada0 (the SSD drive) there is no point as already explained and this is a destructive test (the FreeNAS OS is on this drive!).

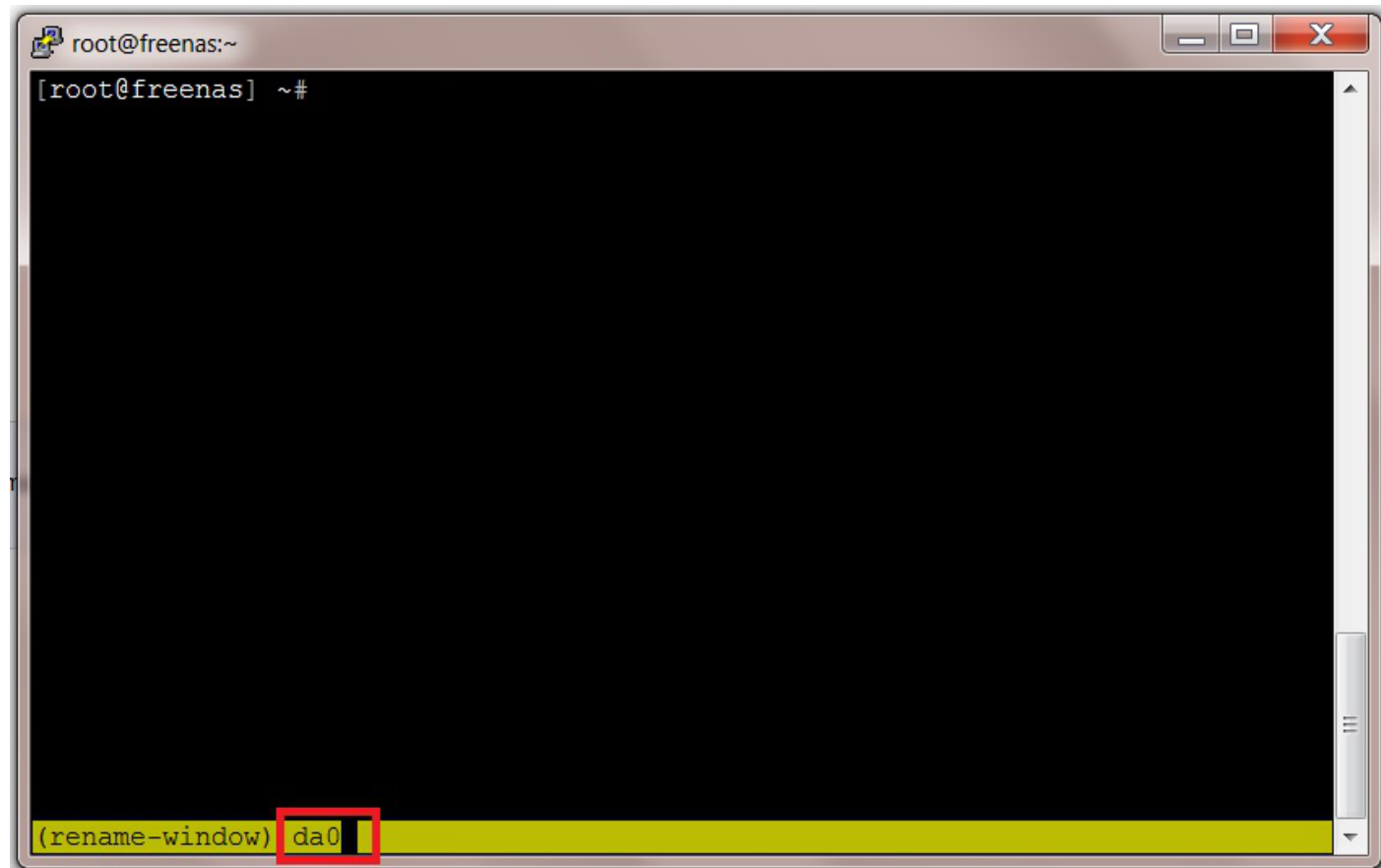
This leaves the 8 data storage drives to check.

This means I will need 8 sessions opened in tmux (open the number of sessions that suits your requirements).

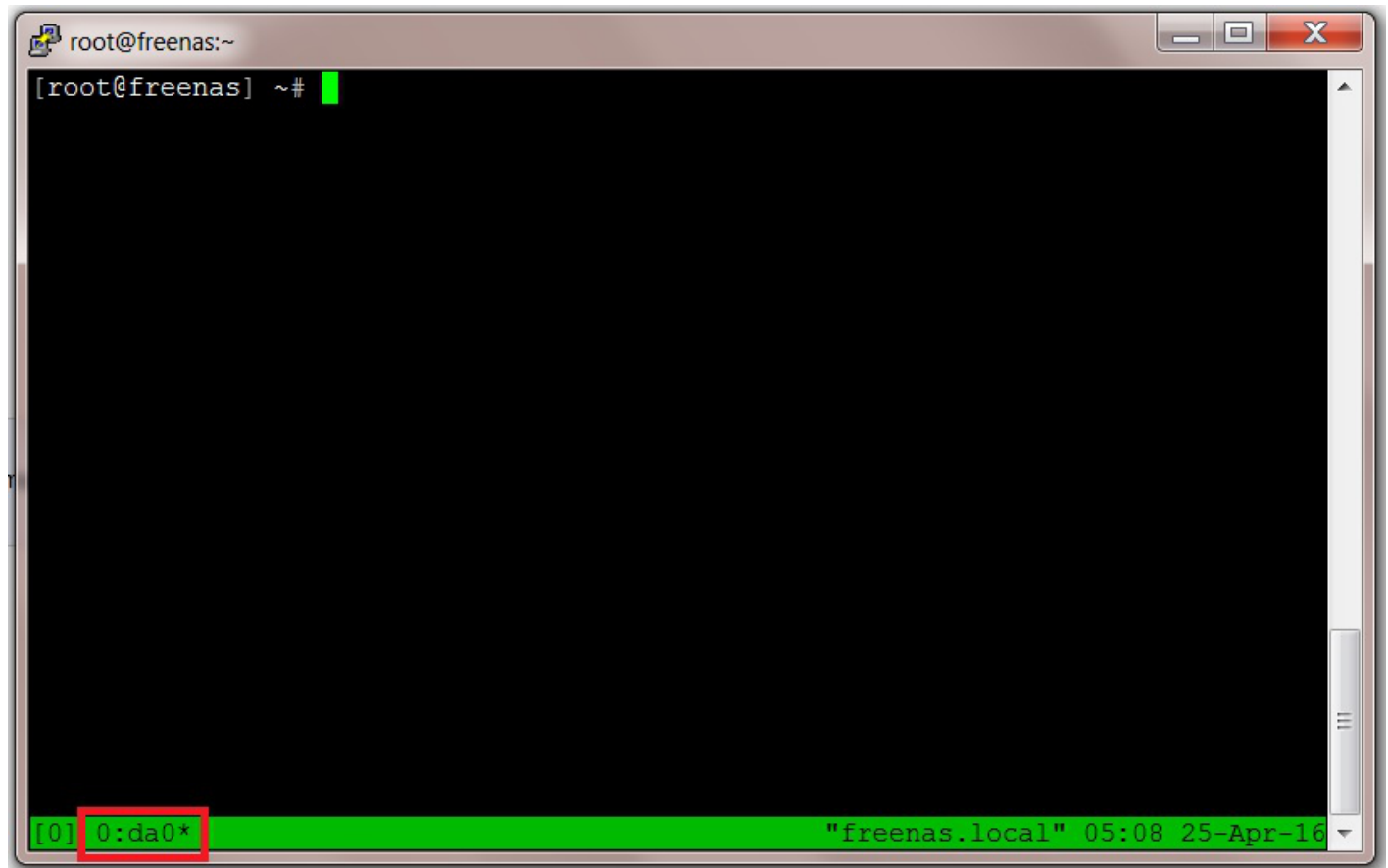
Let us start by renaming the current session in tmux to something more meaningful than "csh".

In the tmux window press the "Ctrl" and "b" keys together, release them and then press the "," key.

The bar at the bottom of the window should turn yellow and you can now delete the "csh" text and rename it (Fester called his "da0" after the drive that will be tested).



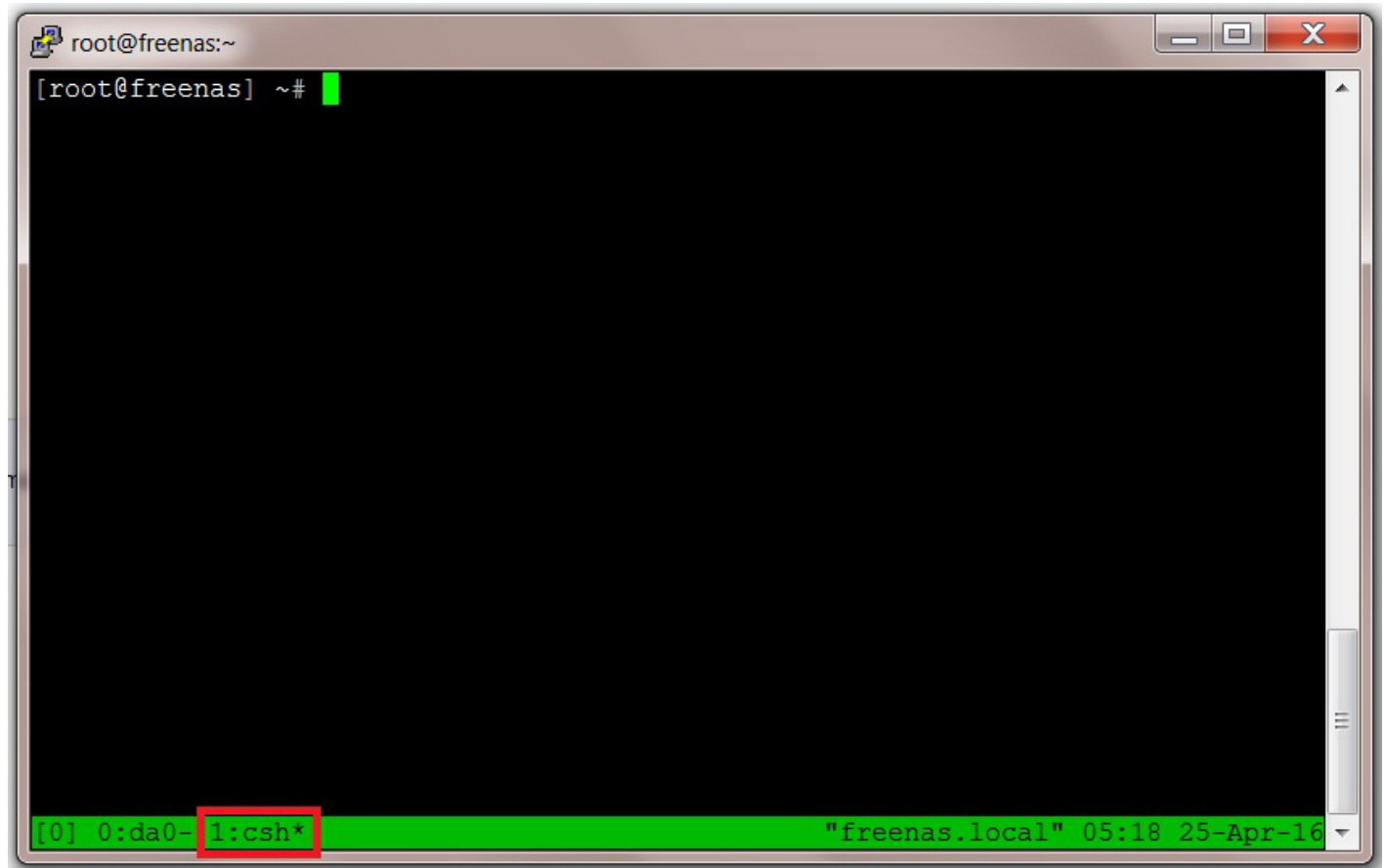
When you have typed in the new name press the “Return/Enter” key, the bar should now resort back to its original green colour and the session should be renamed.



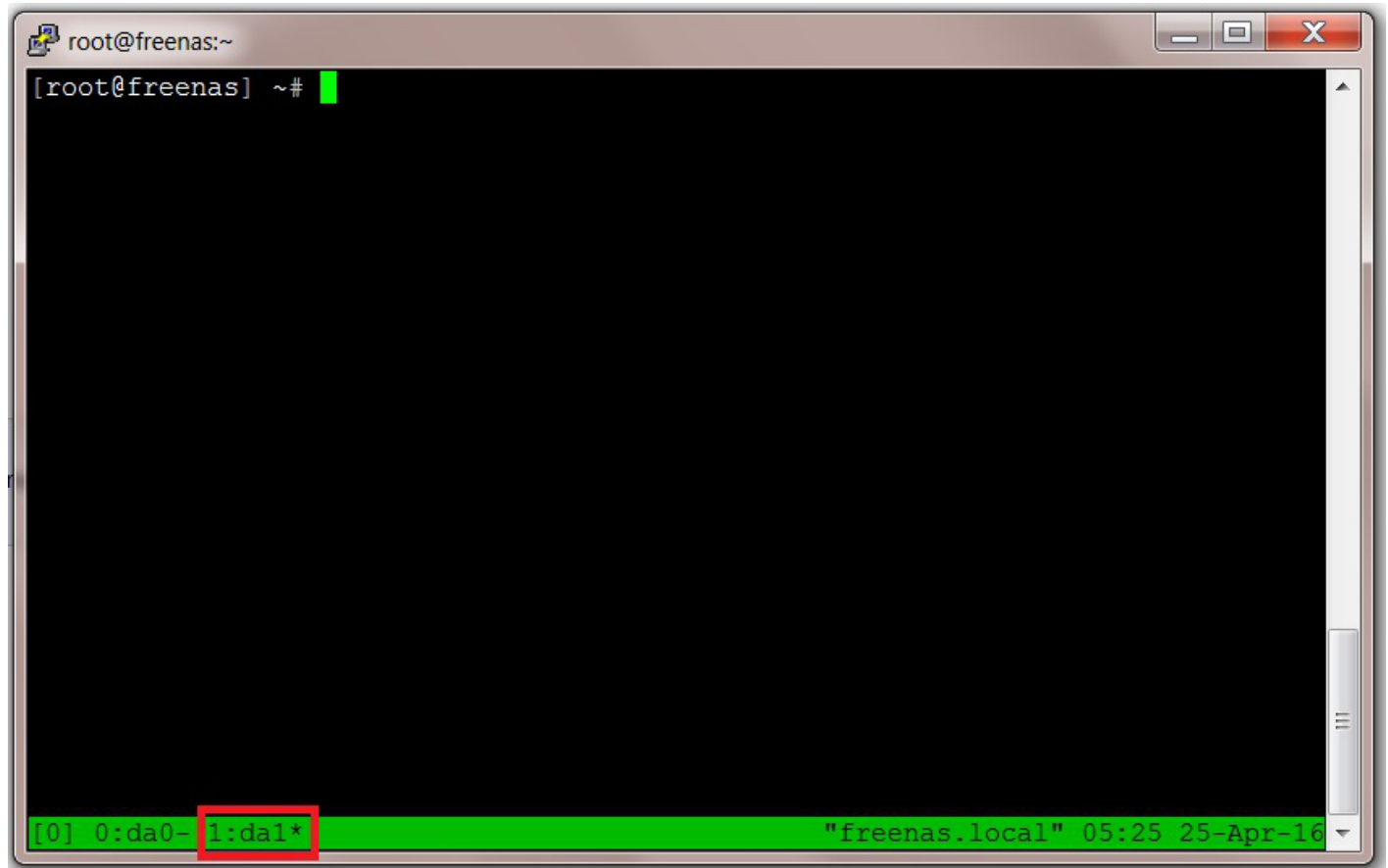
At this point we need to create an additional session and rename it for the next drive to be tested.

To create a new session press the "Ctrl" and "b" keys together, release them and then press the "c" key.

You should get something like this where "1:csh*" is the newly created session. Incidentally the asterisk just denotes the currently selected session.



Let us rename this session by pressing the "Ctrl" and "b" keys together, releasing them and then pressing the "," key. Type in the new name and press the "Return/Enter" key (just as we did before, I called this one "da1" after the next drive to be tested).

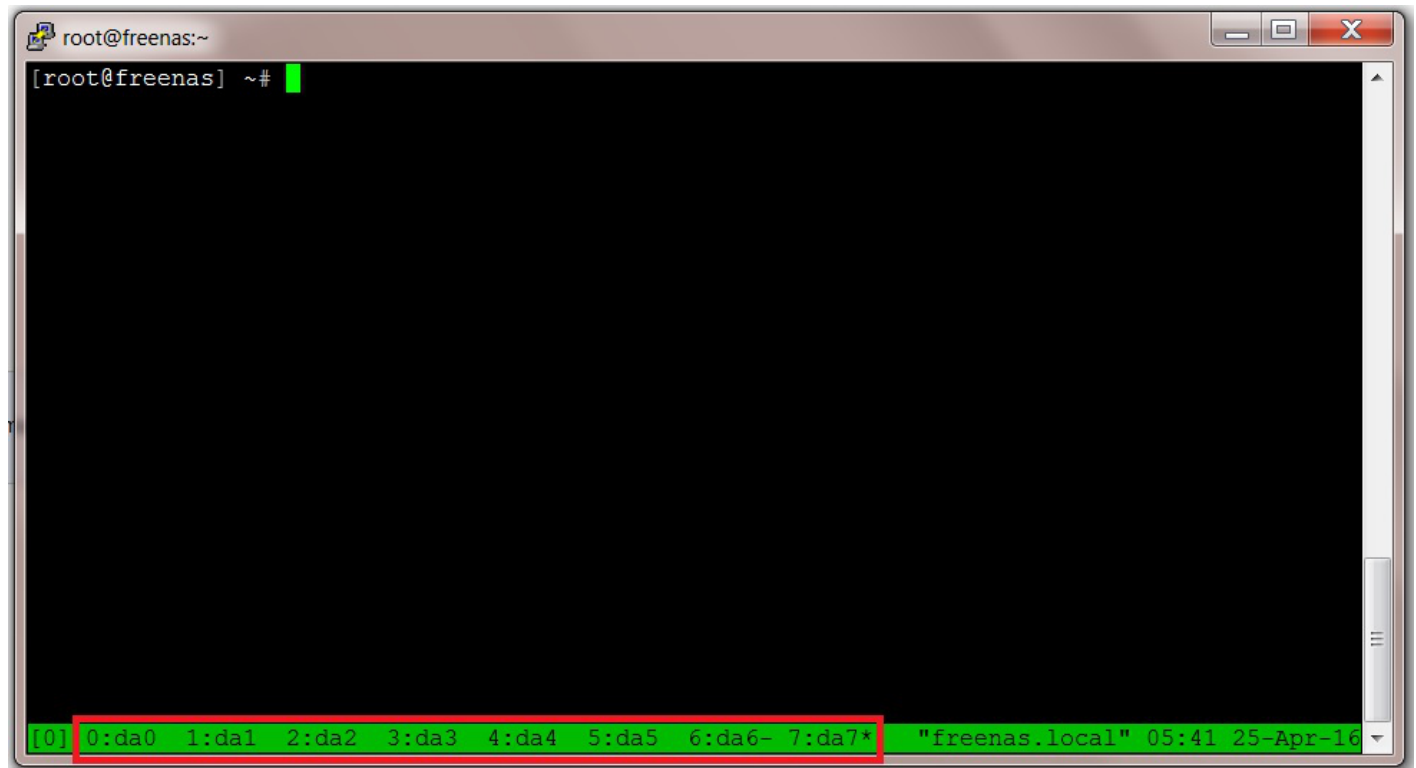


Navigation between the different sessions is achieved by pressing the “Ctrl” and “b” keys together, releasing them and then pressing the “n” key. This will take you to the next session along.

Alternatively you can also press the “Ctrl” and “b” keys together, release them and then press the “p” key. This will take you to the previous session.

By using the next and previous navigational keystroke combinations you can navigate through the different sessions, the asterisk signifying which session you are currently viewing.

Using the key combinations already explained let us create the remaining sessions needed and rename each one.



Now we can run the Badblocks tests from within tmux.

Navigate to the first session (i.e. "0:da0") and type in the following command at the prompt.

```
badblocks -ws /dev/da0
```

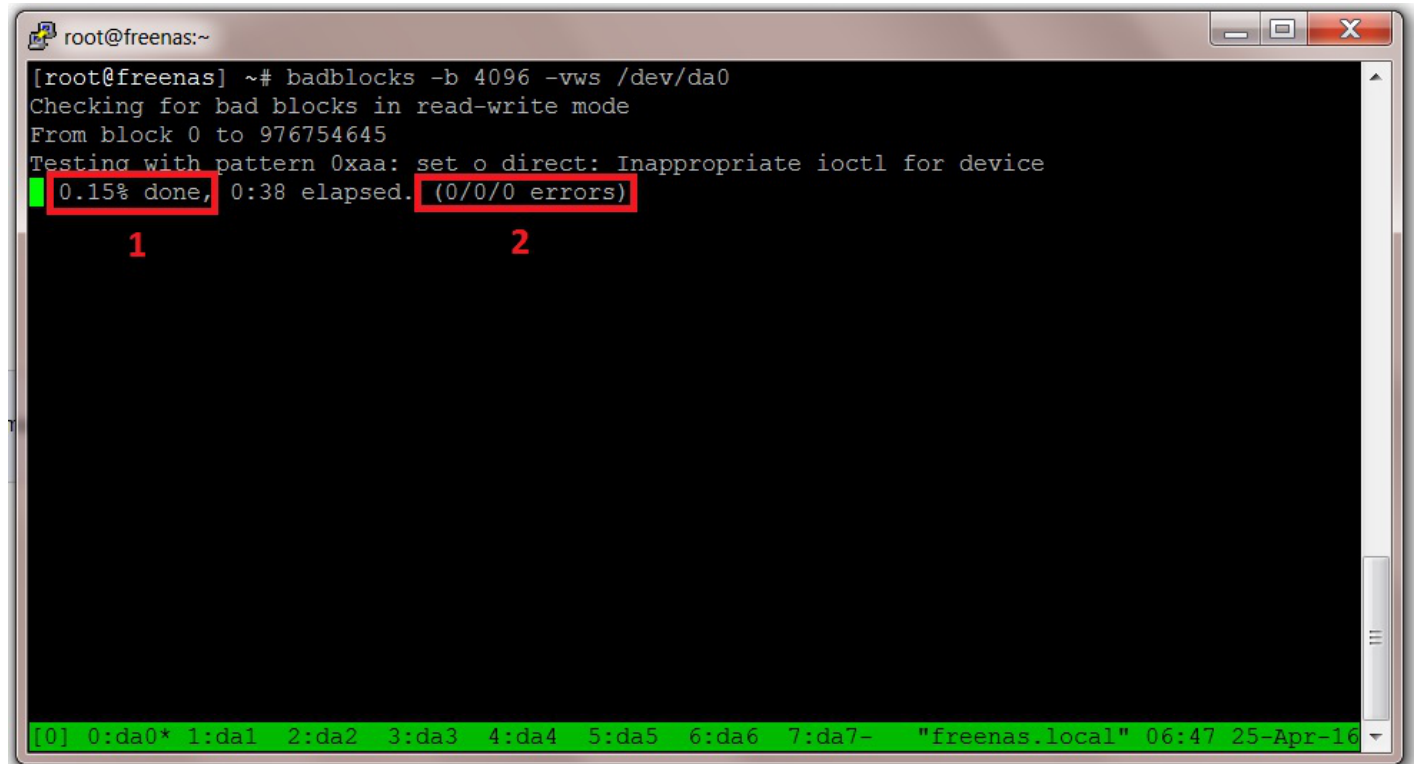
Fester uses a slightly different command to improve the efficiency of the tests with the WD40EFRX drives. These drives have a sector size of 4096 bytes (even though they report 512 bytes, naughty Western Digital). I also like a more verbose output from these tests so the command includes the `-v` switch. I include it here for informational purposes only. In addition to improving efficiency, the `"-b 4096"` below is required with larger disks (i.e., larger than about 4 TB).

```
badblocks -b 4096 -vws /dev/da0
```

If the command executes properly you should see something like this.

You will see from the screen the completion progress expressed as a percentage (1) and any errors that have occurred expressed like this "(0/0/0 errors)" (2).

There should be zero errors throughout the test. If you get even one error then you should return the disk for testing.

A terminal window titled 'root@freenas:~' showing the execution of the 'badblocks' command. The command is 'badblocks -b 4096 -vws /dev/da0'. The output shows 'Checking for bad blocks in read-write mode', 'From block 0 to 976754645', and 'Testing with pattern 0xaa: set o direct: Inappropriate ioctl for device'. The progress bar shows '0.15% done, 0:38 elapsed. (0/0/0 errors)'. The terminal has a green status bar at the bottom with the text '[0] 0:da0* 1:da1 2:da2 3:da3 4:da4 5:da5 6:da6 7:da7- "freenas.local" 06:47 25-Apr-16'.

```
root@freenas:~  
[root@freenas] ~# badblocks -b 4096 -vws /dev/da0  
Checking for bad blocks in read-write mode  
From block 0 to 976754645  
Testing with pattern 0xaa: set o direct: Inappropriate ioctl for device  
0.15% done, 0:38 elapsed. (0/0/0 errors)
```

Now navigate to the next session (in Fester's case that is "1:da1") and type this at the command prompt.

```
badblocks -ws /dev/da1
```

(Or Fester's variation if it suits you better, but remember to change the drive name from "da0" to "da1".)

Repeat this process of changing session and running the Badblocks command for every drive in your system that you want to test. In Fester's case this means running these commands while changing sessions each time.

```
badblocks -ws /dev/da2
```

```
badblocks -ws /dev/da3
```

```
badblocks -ws /dev/da4
```

```
badblocks -ws /dev/da5
```

```
badblocks -ws /dev/da6
```

```
badblocks -ws /dev/da7
```

Non-Destructive Badblocks Test Using tmux

To do a non-destructive badblocks test, follow the instructions above, but replace -w with -n. Example commands might look like:

```
badblocks -ns /dev/da0
```

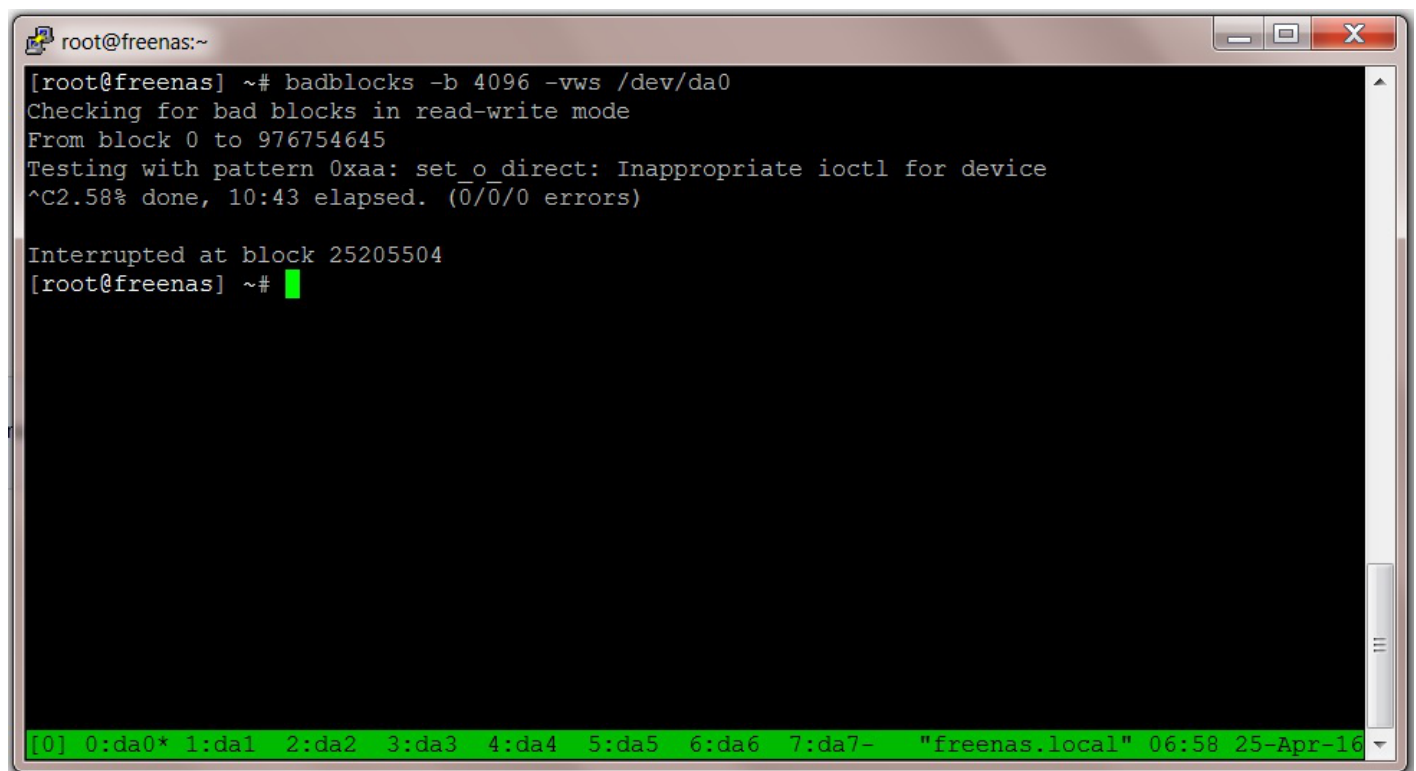
or

```
badblocks -b 4096 -nsv /dev/da1
```

This test is intended to be non-destructive—once it has completed, the data on your disk should be unharmed. Even so, I'd discourage running this on a disk with important data unless you have a good, readily-accessible backup.

Stopping A Badblocks Test In tmux

If for any reason you need to stop a Badblocks test then navigate to the applicable session at press the “Ctrl” and “c” keys together, then release them. This should stop the test.

A screenshot of a terminal window titled 'root@freenas:~'. The terminal shows the execution of the command 'badblocks -b 4096 -vws /dev/da0'. The output indicates it is checking for bad blocks in read-write mode from block 0 to 976754645, testing with pattern 0xaa. It reports 'set_o_direct: Inappropriate ioctl for device' and shows progress at 2.58% done. The test is then interrupted at block 25205504. The prompt returns to '[root@freenas] ~#'. At the bottom of the terminal, a green status bar displays session information: '[0] 0:da0* 1:da1 2:da2 3:da3 4:da4 5:da5 6:da6 7:da7- "freenas.local" 06:58 25-Apr-16'.

```
root@freenas:~  
[root@freenas] ~# badblocks -b 4096 -vws /dev/da0  
Checking for bad blocks in read-write mode  
From block 0 to 976754645  
Testing with pattern 0xaa: set_o_direct: Inappropriate ioctl for device  
^C2.58% done, 10:43 elapsed. (0/0/0 errors)  
  
Interrupted at block 25205504  
[root@freenas] ~#  
[0] 0:da0* 1:da1 2:da2 3:da3 4:da4 5:da5 6:da6 7:da7- "freenas.local" 06:58 25-Apr-16
```

Detaching a tmux Session

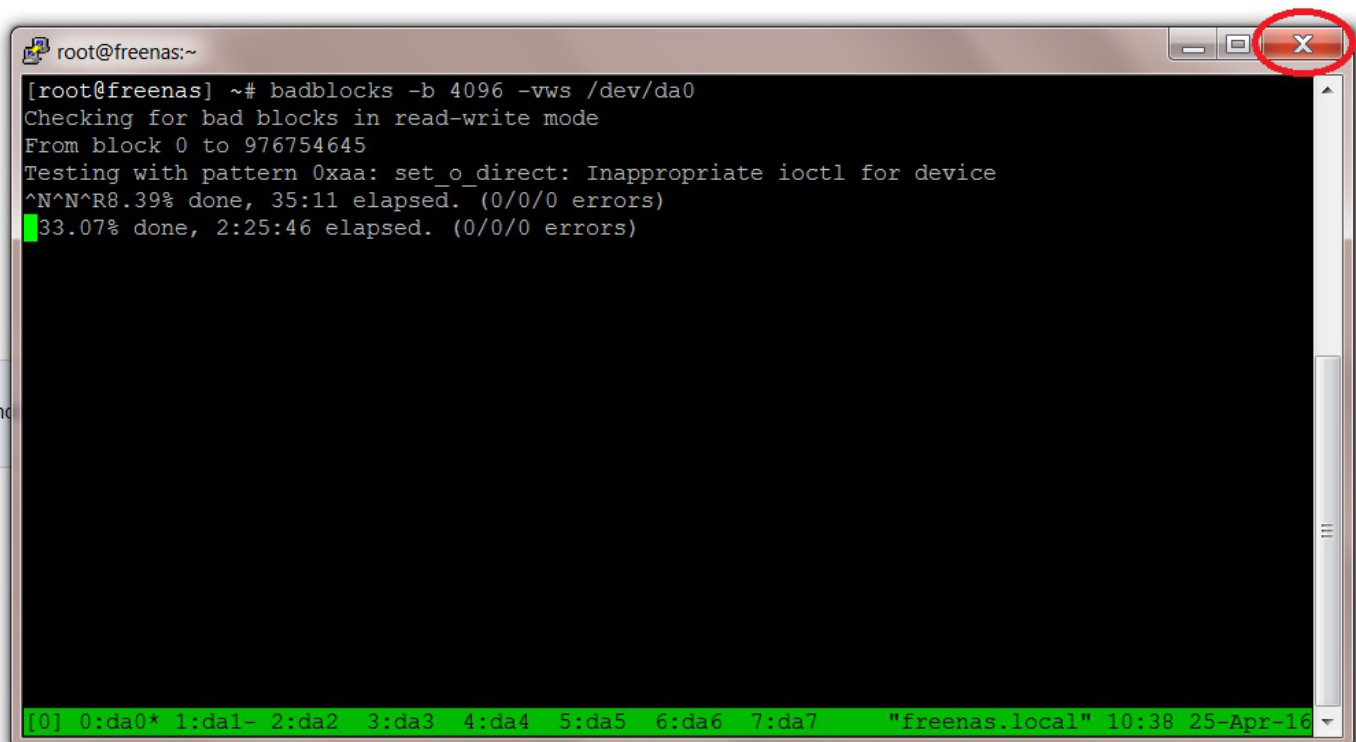
Once you've started all your tests running, you can “detach” your tmux session to let the tests run while you do something else with your SSH session (or just close the SSH connection entirely). To do this, press the “Ctrl” and “b” keys together, then press the “d” key. This will return you to your SSH session, without the tmux session (you'll notice that the green bar isn't present on the bottom of the screen).

Resuming A Session In tmux

Badblocks tests can take a long time (when the tests completed Fester was far from where he had started due to Continental Drift and Plate Tectonics).

You do not need to keep the terminal open or the client computer switched on in order to keep the tmux session running.

If you need to pack up for the night then just close the window that the sessions are running in (just don't shut down the server). Then get your ferrets to shut down your client computer and your pigeons to knock up a suitable night cap (I find a Multiple Orgasm very agreeable before bed).



```
root@freenas:~  
[root@freenas] ~# badblocks -b 4096 -vws /dev/da0  
Checking for bad blocks in read-write mode  
From block 0 to 976754645  
Testing with pattern 0xaa: set_o_direct: Inappropriate ioctl for device  
^N^N^R8.39% done, 35:11 elapsed. (0/0/0 errors)  
33.07% done, 2:25:46 elapsed. (0/0/0 errors)  
[0] 0:da0* 1:da1- 2:da2 3:da3 4:da4 5:da5 6:da6 7:da7 "freenas.local" 10:38 25-Apr-16
```

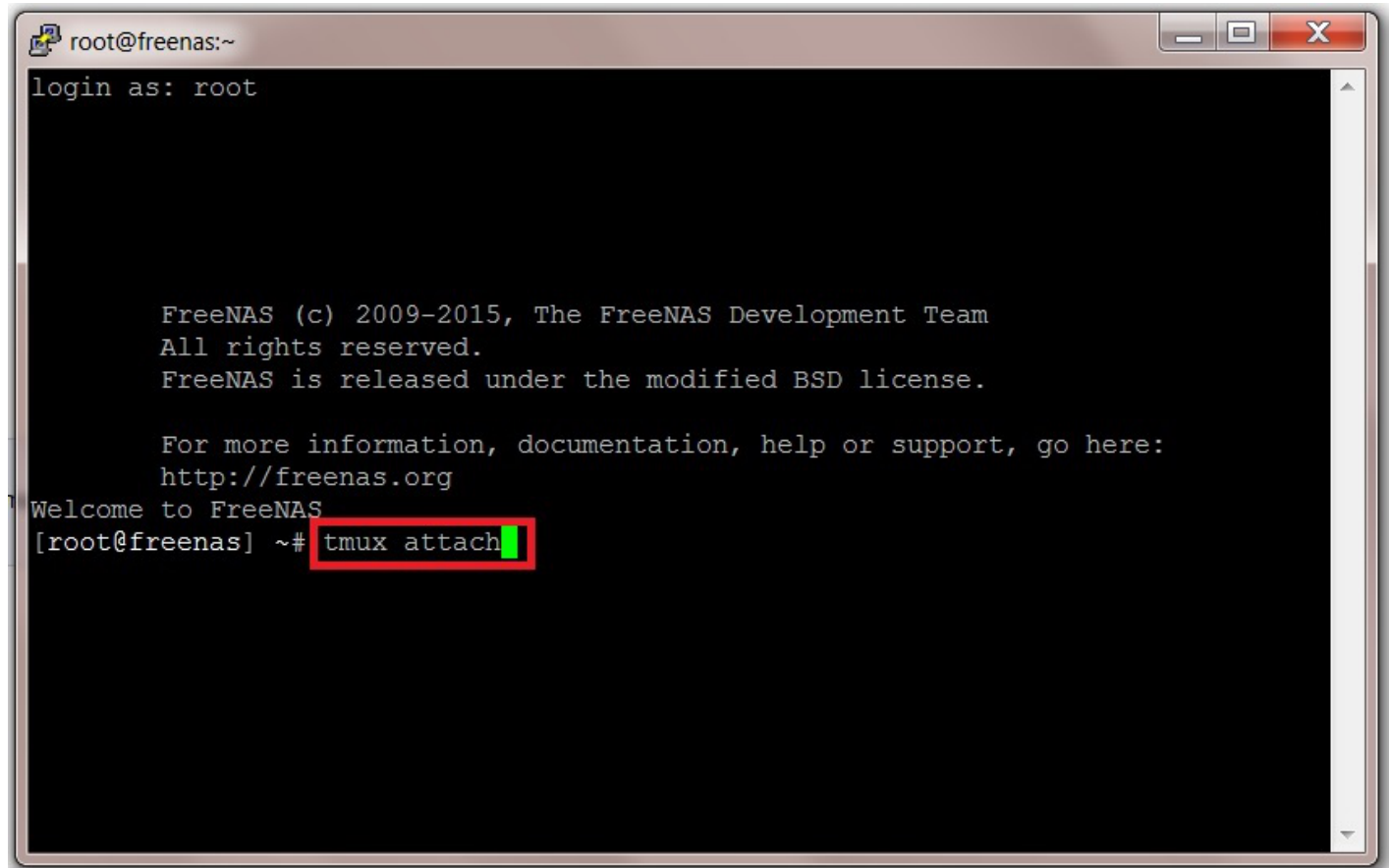
When you need to re-establish the connection with the tmux session/s simply start an SSH session and log in.

Type the following command in the command prompt.

```
tmux attach
```

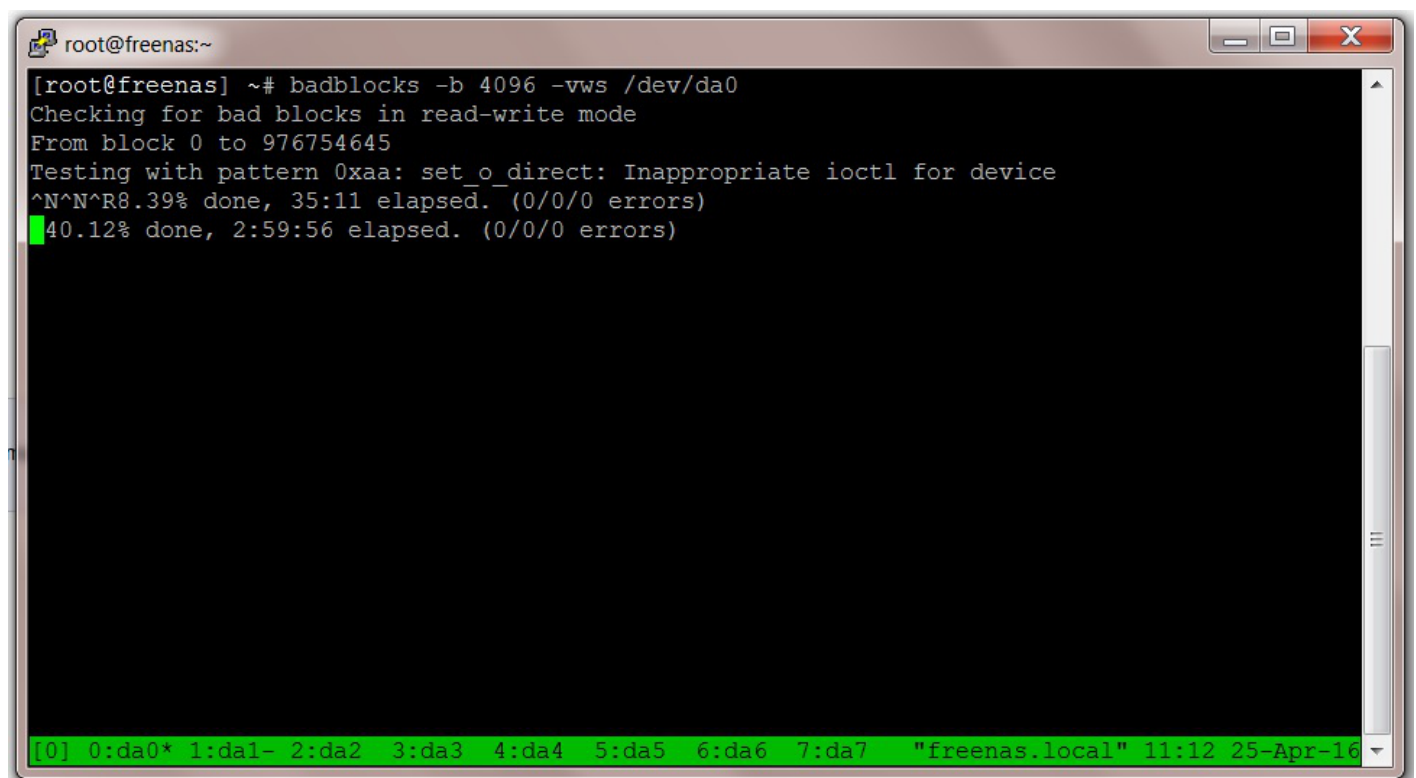
or simply

```
tmux a
```

A terminal window titled 'root@freenas:~' with standard window controls. The prompt is 'login as: root'. The output shows FreeNAS copyright information (2009-2015), a welcome message, and the URL 'http://freenas.org'. The user has entered the command 'tmux attach' at the prompt, which is highlighted with a red box and a green cursor.

```
root@freenas:~  
login as: root  
  
FreeNAS (c) 2009-2015, The FreeNAS Development Team  
All rights reserved.  
FreeNAS is released under the modified BSD license.  
  
For more information, documentation, help or support, go here:  
http://freenas.org  
Welcome to FreeNAS  
[root@freenas] ~# tmux attach
```

This should return you to the tmux session(s).

A terminal window titled 'root@freenas:~' showing the execution of the 'badblocks' command. The output indicates the test is in progress, with a progress bar at the bottom showing 40.12% completion. The command being run is 'badblocks -b 4096 -vws /dev/da0'.

```
root@freenas:~  
[root@freenas] ~# badblocks -b 4096 -vws /dev/da0  
Checking for bad blocks in read-write mode  
From block 0 to 976754645  
Testing with pattern 0xaa: set_o_direct: Inappropriate ioctl for device  
^N^N^R8.39% done, 35:11 elapsed. (0/0/0 errors)  
40.12% done, 2:59:56 elapsed. (0/0/0 errors)  
  
[0] 0:da0* 1:da1~ 2:da2 3:da3 4:da4 5:da5 6:da6 7:da7 "freenas.local" 11:12 25-Apr-16
```

When the tests are complete navigate to an open session, note the results if you need to and then type

the following into the command prompt.

```
exit
```

This will close that particular session in tmux.

Do this for each session in turn until you have exited all the sessions in tmux.

You will find that on exiting the last open session in tmux you will be returned to the standard SSH console (in Fester's case PuTTY).

Now reboot the server to reset the kernel geometry debug flags to their standard setting.

That's the Badblocks tests complete.

In order to complete all the HDD validation tests we must now repeat the SMART long tests. As this has already been documented I won't repeat it here. Just go back to the relevant section and repeat again.

Once the SMART long tests have completed then it is time to collect the results.

Getting Your Test Results

Getting your test results is always a tense moment.

(I remember such an instance in the doctor's examination room after an unforgettable trip to Bognor Regis, often referred to as "The Riviera of the South West". Unfortunately the doctor confirmed Fester had come back with more than just fond memories, but with the liberal application of a strong antibiotic cream Fester was as good as new in a couple of weeks.)

Here is how to get your results.

(Do not start this section until all HDD tests have been completed.)

Open an SSH console and log in.

We are going to issue a command to each HDD/SDD in succession that will interrogate and retrieve the results of the tests stored in each drives memory using SMART commands.

At the command prompt type in the following command using the name of the first drive you want to interrogate (in Fester's case this is ada0).

```
smartctl -a /dev/ada0
```



```

root@freenas:~
login as: root
Authenticating with public key "Test SSH"
Passphrase for key "Test SSH":
Last login: Mon Apr 25 11:00:28 2016 from 192.168.0.53
FreeBSD 10.3-RC3 (FreeNAS.amd64) #0 86b9b91(freebsd10): Mon Mar 21 17:43:20 PDT
2016

FreeNAS (c) 2009-2015, The FreeNAS Development Team
All rights reserved.
FreeNAS is released under the modified BSD license.

For more information, documentation, help or support, go here:
http://freenas.org
Welcome to FreeNAS
[root@freenas] ~# smartctl -a /dev/ada0

```

This should produce the following screen with the test results. The window displaying the information has been maximised (1) so it is easier to read.

```

root@freenas:~
9 Power_On_Hours          0x0032 099 099 000 Old_age Always -
701
12 Power_Cycle_Count      0x0032 099 099 000 Old_age Always -
191
177 Wear_Leveling_Count    0x0013 100 100 000 Pre-fail Always -
0
179 Used_Rsvd_Blk_Cnt_Tot 0x0013 100 100 010 Pre-fail Always -
0
181 Program_Fail_Cnt_Total 0x0032 100 100 010 Old_age Always -
0
182 Erase_Fail_Count_Total 0x0032 100 100 010 Old_age Always -
0
183 Runtime_Bad_Block       0x0013 100 100 010 Pre-fail Always -
0
187 Uncorrectable_Error_Cnt 0x0032 100 100 000 Old_age Always -
0
190 Airflow_Temperature_Cel 0x0032 075 069 000 Old_age Always -
25
195 ECC_Error_Rate         0x001a 200 200 000 Old_age Always -
0
199 CRC_Error_Count        0x003e 100 100 000 Old_age Always -
0
235 POR_Recovery_Count     0x0012 099 099 000 Old_age Always -
70
241 Total_LBAs_Written     0x0032 099 099 000 Old_age Always -
29851289

SMART Error Log Version: 1
No Errors Logged

SMART Self-test log structure revision number 1
# Num Test_Description Status Remaining LifeTime(hours) LBA
of first_error
# 1 Short offline Completed without error 00% 645 -
# 2 Short offline Completed without error 00% 499 -
# 3 Short offline Completed without error 00% 497 -
# 4 Short offline Completed without error 00% 496 -

SMART Selective self-test log data structure revision number 1
#SPAN MIN_LBA MAX_LBA CURRENT_TEST_STATUS
1 0 0 Not_testing
2 0 0 Not_testing
3 0 0 Not_testing
4 0 0 Not_testing
5 0 0 Not_testing

Selective self-test flags (0x0):
After scanning selected spans, do NOT read-scan remainder of disk.
If Selective self-test is pending on power-up, resume after 0 minute delay.

[root@freenas] ~#

```

At this point Fester copies the information and pastes it into a text editor for ease of use.

If you want to do this then select the text in the SSH console by clicking with the left mouse button where you want to begin, hold it down and then highlight the text you want to include.

When you have done this press the “Ctrl” button and the “v” button together. This keystroke will copy the highlighted text into the clip board.

Open the text editor you wish to use (Fester uses Notepad in Windows) and paste it into the text into the editor.

You now need to repeat this process for the next drive in your system.

At the command prompt type in the following command using the name of the next drive you want to interrogate (in Fester’s case this is da0).

```
smartctl -a /dev/da0
```

This will produce the next set of results in the SSH console. Copy and paste as before (if you want to).

Now repeat the process for the next drive and the next until all the drives have been interrogated and their data copied and pasted.

(In this way you will build up a list of each drives test results in a single text file that can be saved for examination later.)

In Festers case this would mean issuing the following commands in the SSH console.

```
smartctl -a /dev/da1
```

```
smartctl -a /dev/da2
```

```
smartctl -a /dev/da3
```

```
smartctl -a /dev/da4
```

```
smartctl -a /dev/da5
```

```
smartctl -a /dev/da6
```

```
smartctl -a /dev/da7
```

These commands produce copious amounts of information about the drives. If you want something a little less gregarious then use this command instead (don’t forget to change the drive name each time, and note the capital -A rather than the lowercase -a).

```
smartctl -A /dev/ada0
```

This should produce a screen that looks something like this (much more compact).

```

root@freenas:~# smartctl -A /dev/ada0
smartctl 6.4 2015-06-04 r4109 [FreeBSD 10.3-RC3 amd64] (local build)
Copyright (C) 2002-15, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF READ SMART DATA SECTION ===
SMART Attributes Data Structure revision number: 1
Vendor Specific SMART Attributes with Thresholds:
ID# ATTRIBUTE_NAME          FLAG     VALUE WORST THRESH TYPE      UPDATED  WHEN_FAILED RAW_VALUE
  5 Reallocated_Sector_Ct     0x0033   100    100   010   Pre-fail  Always       -         0
  9 Power_On_Hours            0x0032   099    099   000   Old_age   Always       -        702
 12 Power_Cycle_Count         0x0032   099    099   000   Old_age   Always       -        191
177 Wear_Leveling_Count       0x0013   100    100   000   Pre-fail  Always       -         0
179 Used_Rsvd_Blk_Cnt_Tot    0x0013   100    100   010   Pre-fail  Always       -         0
181 Program_Fail_Cnt_Total    0x0032   100    100   010   Old_age   Always       -         0
182 Erase_Fail_Count_Total    0x0032   100    100   010   Old_age   Always       -         0
183 Runtime_Bad_Block         0x0013   100    100   010   Pre-fail  Always       -         0
187 Uncorrectable_Error_Cnt   0x0032   100    100   000   Old_age   Always       -         0
190 Airflow_Temperature_Cel   0x0032   075    069   000   Old_age   Always       -        25
195 ECC_Error_Rate            0x001a   200    200   000   Old_age   Always       -         0
199 CRC_Error_Count          0x003e   100    100   000   Old_age   Always       -         0
235 POR_Recovery_Count        0x0012   099    099   000   Old_age   Always       -         70
241 Total_LBAs_Written        0x0032   099    099   000   Old_age   Always       -       29851289

[root@freenas] ~#

```

So you have now gathered your results, but they make about as much sense as a bacon butty at a bar mitzvah.

What now?

Making Sense of SMART Data

When looking at SMART data from a SMART storage device certain entries in the table are not important in terms of data integrity and health. They just give general information (e.g. Model, serial number, etc) and other types of information that could be useful in certain circumstances.

Other entries are very important and should immediately ring alarms bells if certain values are present.

In terms of HDD/SDD hardware validation these are the entries in the SMART data you need to scrutinise.

ID#	ATTRIBUTE_NAME	FLAG	VALUE	WORST	THRESH	TYPE	UPDATED	WHEN_FAILED	RAW_VALUE
1	Raw_Read_Error_Rate	0x002f	200	200	051	Prefail	Always	-	0
5	Reallocated_Sector_Ct	0x0033	200	200	140	Prefail	Always	-	0
7	Seek_Error_Rate	0x002e	200	200	000	Old_age	Always	-	0
10	Spin_Retry_Count	0x0032	100	100	000	Old_age	Always	-	0
11	Calibration_Retry_Count	0x0032	100	100	000	Old_age	Always	-	0

196	Reallocated_Event_Count	0x0032	200	200	000	Old_age	Always	-	0
197	Current_Pending_Sector	0x0032	200	200	000	Old_age	Always	-	0
198	Offline_Uncorrectable	0x0030	100	253	000	Old_age	Always	-	0
199	UDMA_CRC_Error_Count	0x0032	200	200	000	Old_age	Always	-	0

If you get any value other than zero in the “RAW VALUE” for these entries you should be suspicious of this drive and may need to return the device for testing depending on the manufacturer’s warranty.

Another area you should look at is the “SMART Self-test log structure”. Here is an example. It will tell you if the drive passed its tests. Any result other than “Completed without error” is cause for concern.

SMART Self-test log structure revision number 1

Num	Test_Description	Status	Remaining LifeTime(hours)	LifeTime(hours)	LBA_of_first_error
# 1	Extended offline	Completed without error	00%	503	-
# 2	Conveyance offline	Completed without error	00%	494	-
# 3	Short offline	Completed without error	00%	75	-

(If Fester is misinformed about interpreting SMART data or has omitted something important please let me know and I will try to put it in the guide or you could replace this or any section with your own?)

That’s the HDD/SDD validation completed. Now it is time to reinstall FreeNAS and create a basic server.

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Hardware Validation

Statistically speaking electronic equipment tends to fail towards the beginning of its life cycle or towards the end.

So when buying hardware to build a server, how do we know if we have a component or device that will fail early or towards the end of its life cycle?

We don't know. So we stress the hell out of it before entrusting it with any data to see if it will fail (Fester takes a similar approach with underwear). If it doesn't it is probably (statistically speaking) going to give good service. This is basically hardware validation.

The areas that usually get stress tested are the processor, memory and the HDDs in the server, although technically you can stress test anything in a computer if you have the relevant tool (Fester can be found stress testing his head with a hammer when he forgets his medication).

Stress testing usually takes the form of running a piece of software on the server that intensely and repeatedly tests (and therefore stresses) a particular component or device in the server (i.e. memory, processor, etc). The generic term for software of this type is "burn-in" software.

You can place a monitor and keyboard on the server or use IPMI to administer and observe the tests.

Fester puts the server in its final location at this point (in my case the living room) and monitors through IPMI. This is because when monitoring temperatures during the validation tests, I want to see how hot the server will get with the given ambient temperatures in the final location. This will give me a truer picture of how hot the server could get (mine is next to a radiator, not the smartest choice, but there were no other options without upsetting the psychopath).

This section discusses using discrete software tools to check out the CPU, memory, and hard drives on your system. Most of these tools, or equivalents, are also available in a single package on the [Ultimate Boot CD](#). The structure of that download means that it can't be directly burned to a USB stick, but it can be burned to a CD or mounted via [IPMI](#).

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Memory Validation

Memory validation is performed by running a piece of software on the server that basically writes data to a memory location, reads it back and then checks it is correct.

Once this has been done for the particular memory location under test, the program will then move on to the next location until all locations have been tested.

The program can perform a variety of different tests usually specified by the user. It may also start the whole process all over again from the start after completing all the tests specified until the program completes or is stopped by the user.

Fester uses “MemTest86+” for memory testing from a USB stick, but there are many other free memory testers available.

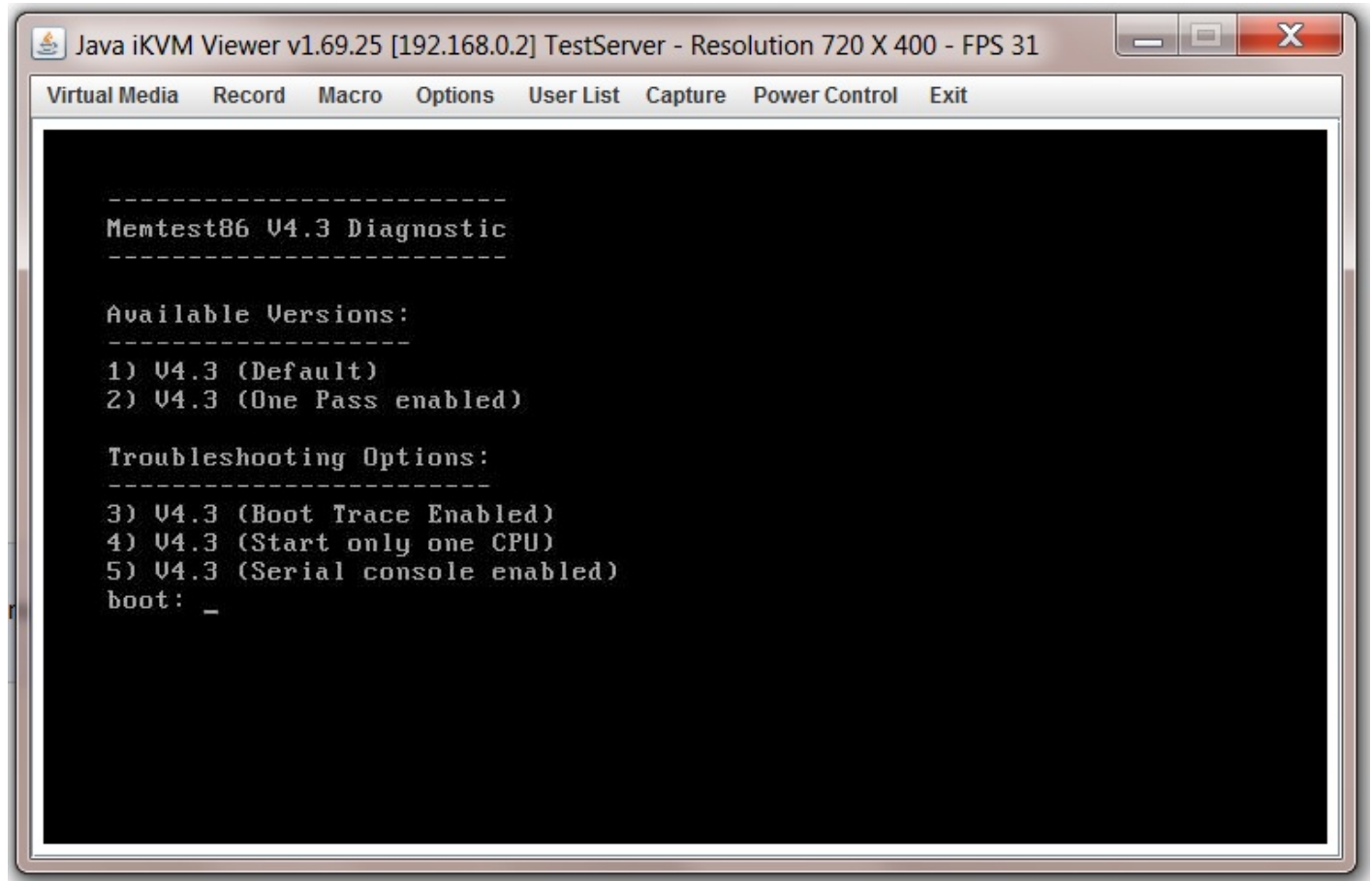
Creating a Bootable MemTest86+ USB Stick

Download the “[MemTest86+ USB Drive](#)” ISO image for Windows. Unzip the file and [write it to a USB stick](#) or [mount via IPMI](#).

Using MemTest86+

Shut down the server if it isn't already and then insert the USB stick.

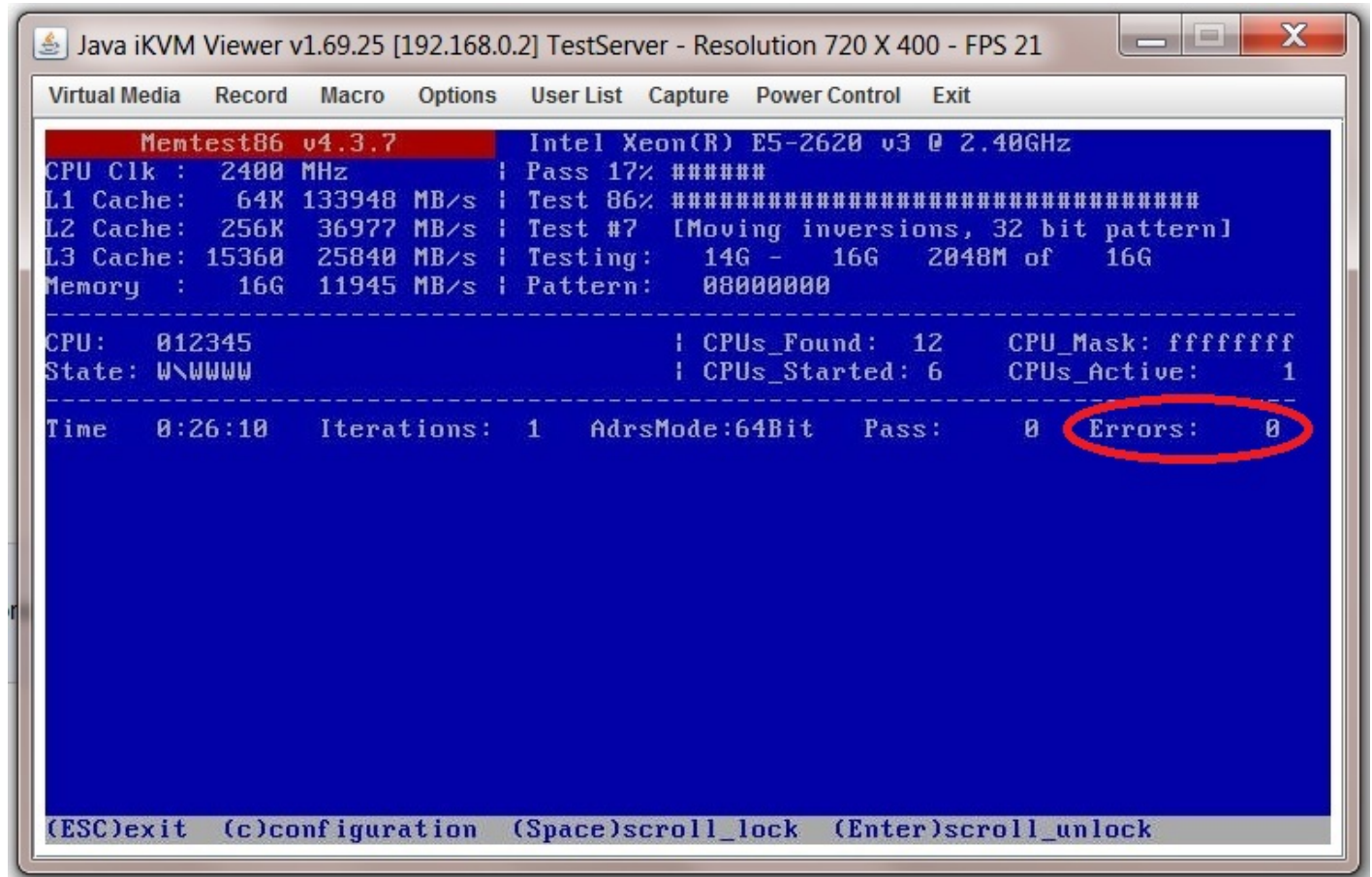
Power up and the server should boot into the MemTest86+ start up screen as shown.



If you are happy running the default tests, then when the start up screen appears do nothing, don't hit any keys just wait and after a short period of time MemTest86+ will just launch into the default tests with no user intervention.

Fester uses the default tests (I don't know if this is a good or bad idea, perhaps someone has some advice on this so I can improve the guide).

When MemTest86+ is conducting the tests you should see a screen that looks something like this.



```
Java iKVM Viewer v1.69.25 [192.168.0.2] TestServer - Resolution 720 X 400 - FPS 21
Virtual Media  Record  Macro  Options  User List  Capture  Power Control  Exit

Memtest86 v4.3.7      Intel Xeon(R) E5-2620 v3 @ 2.40GHz
CPU Clk : 2400 MHz      | Pass 17% #####
L1 Cache: 64K 133948 MB/s | Test 86% #####
L2 Cache: 256K 36977 MB/s | Test #7 [Moving inversions, 32 bit pattern]
L3 Cache: 15360 25840 MB/s | Testing: 14G - 16G 2048M of 16G
Memory : 16G 11945 MB/s | Pattern: 08000000

-----
CPU: 012345      | CPUs_Found: 12    CPU_Mask: ffffffff
State: W\WWW     | CPUs_Started: 6   CPUs_Active: 1
-----
Time 0:26:10    Iterations: 1    AdrsMode:64Bit    Pass: 0    Errors: 0

(ESC)exit (c)configuration (Space)scroll_lock (Enter)scroll_unlock
```

I ran the test for 24 hours. But some people run this test for days or even weeks!

The test should return zero errors (circled in red in the previous screen shot). If you get even one error then this might be a faulty module/s and should be returned for testing. It cannot be used for the FreeNAS server as it will likely cause corruption in the ZFS file system.

When you are finished press the “Esc” button (this will reboot the server) or switch it off with the power button. Don’t forget to remove the USB stick.

That’s the memory tested.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:hvalid_ram

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Configuring FreeNAS 11.2 (The essentials)

There are a number of ways you can configure FreeNAS (e.g. through the GUI or through an SSH console, etc), this is just one way. Ordinarily the configuration should be done through the web GUI.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:install_configuring

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Creating A Bootable FreeNAS Installer

Download the latest ISO for FreeNAS from the [FreeNAS.org web site](https://www.familybrown.org/dokuwiki/doku.php?id=fester112:intro). Then follow the [appropriate instructions for your operating system](#) to write it to a USB stick, or [mount the ISO using IPMI](#).

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<https://www.familybrown.org/dokuwiki/> - **danb35's Wiki**

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:install_create

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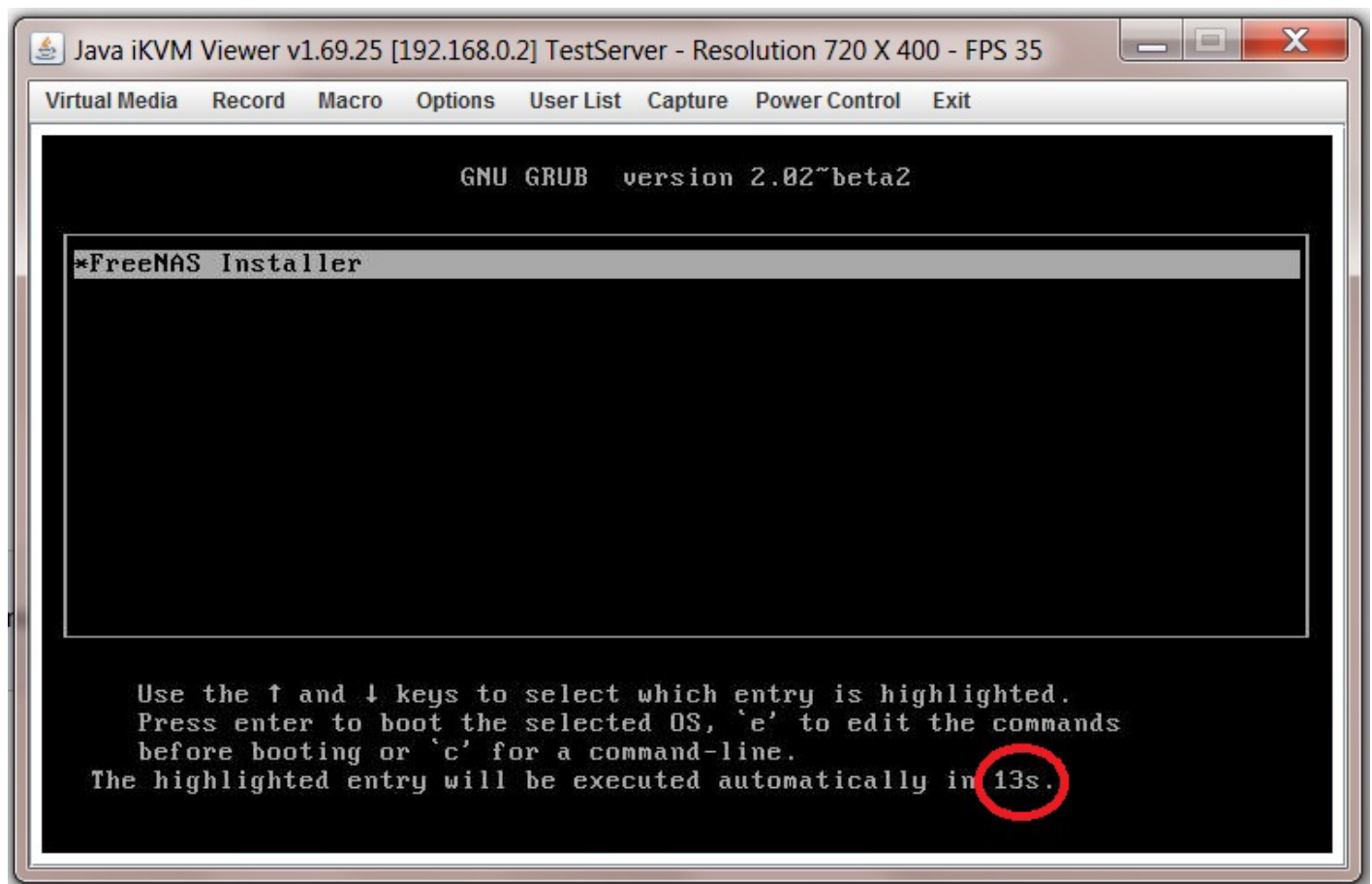
Installing FreeNAS 11.2

Start by powering down the server if it isn't powered down already.

Insert the bootable FreeNAS 11.2 installation USB stick and switch on the server.

If all goes well you will eventually be presented with the GNU GRUB screen.

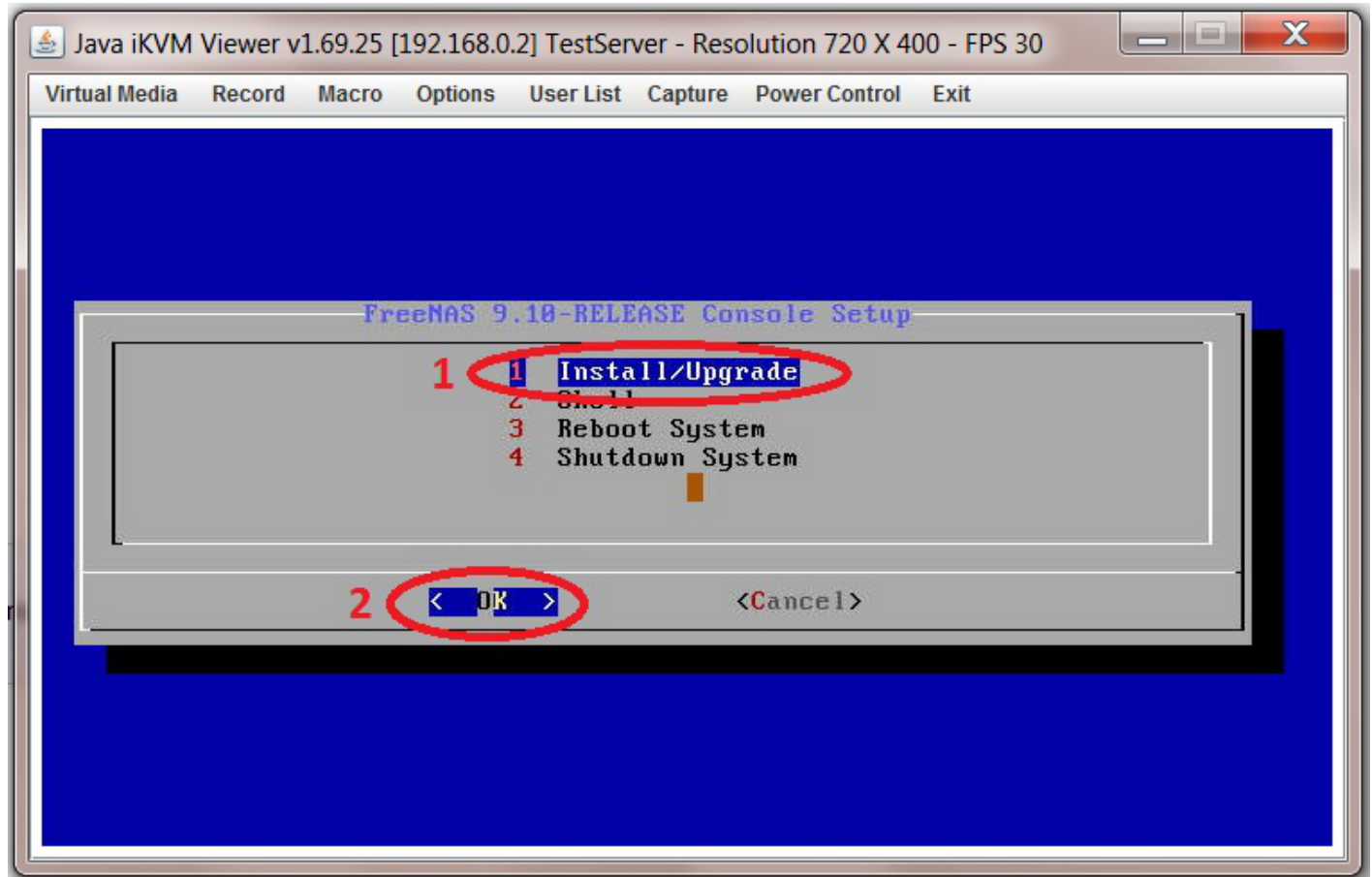
Hit the "Return/Enter" key or wait for the counter to reach zero (shown in a red circle in the screen shot) and the process will start automatically.



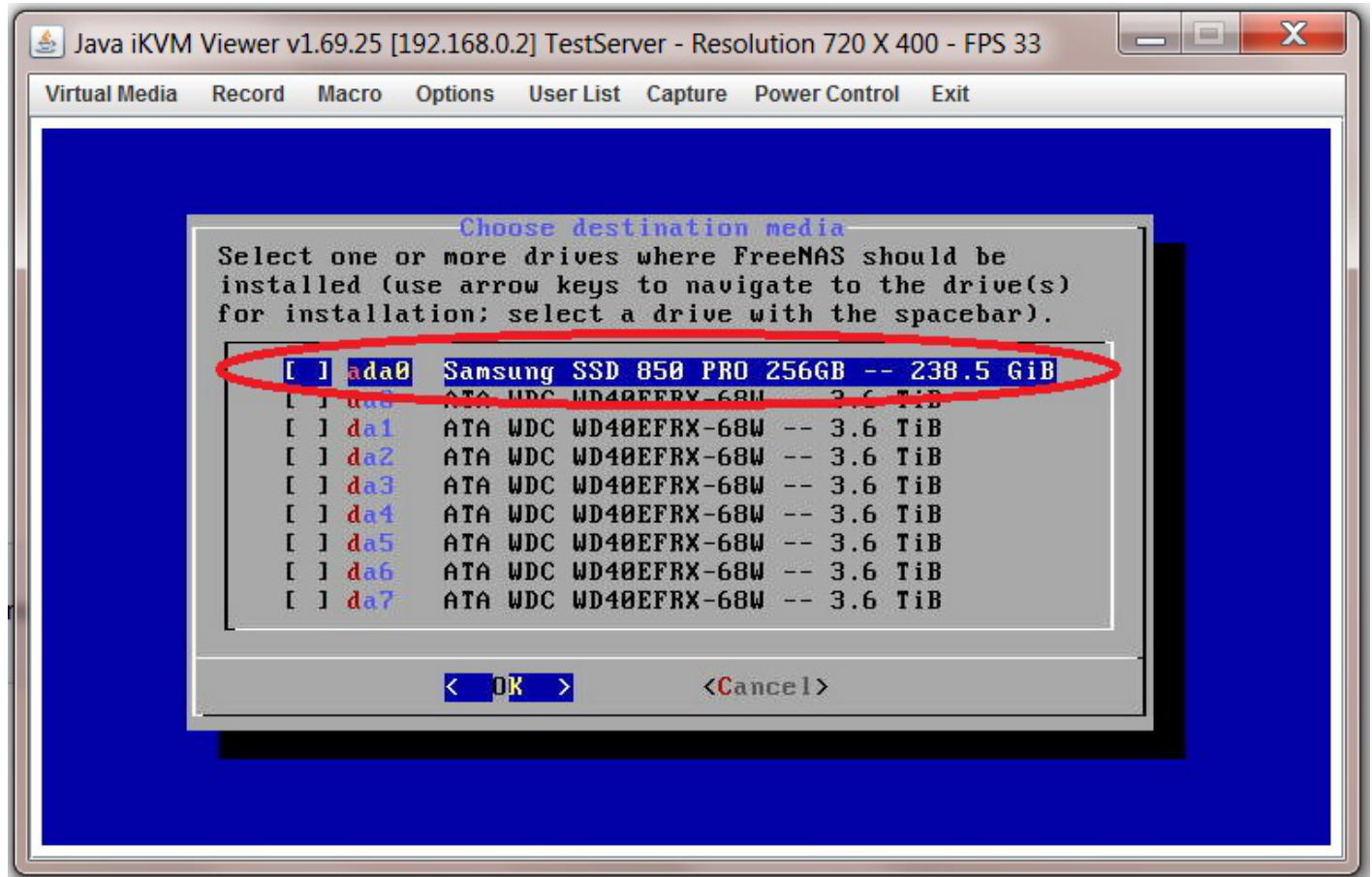
The FreeNAS console setup screen will appear.

Navigate around it using the "←→↑↓" keys and to activate your choice hit the "Return/Enter" key.

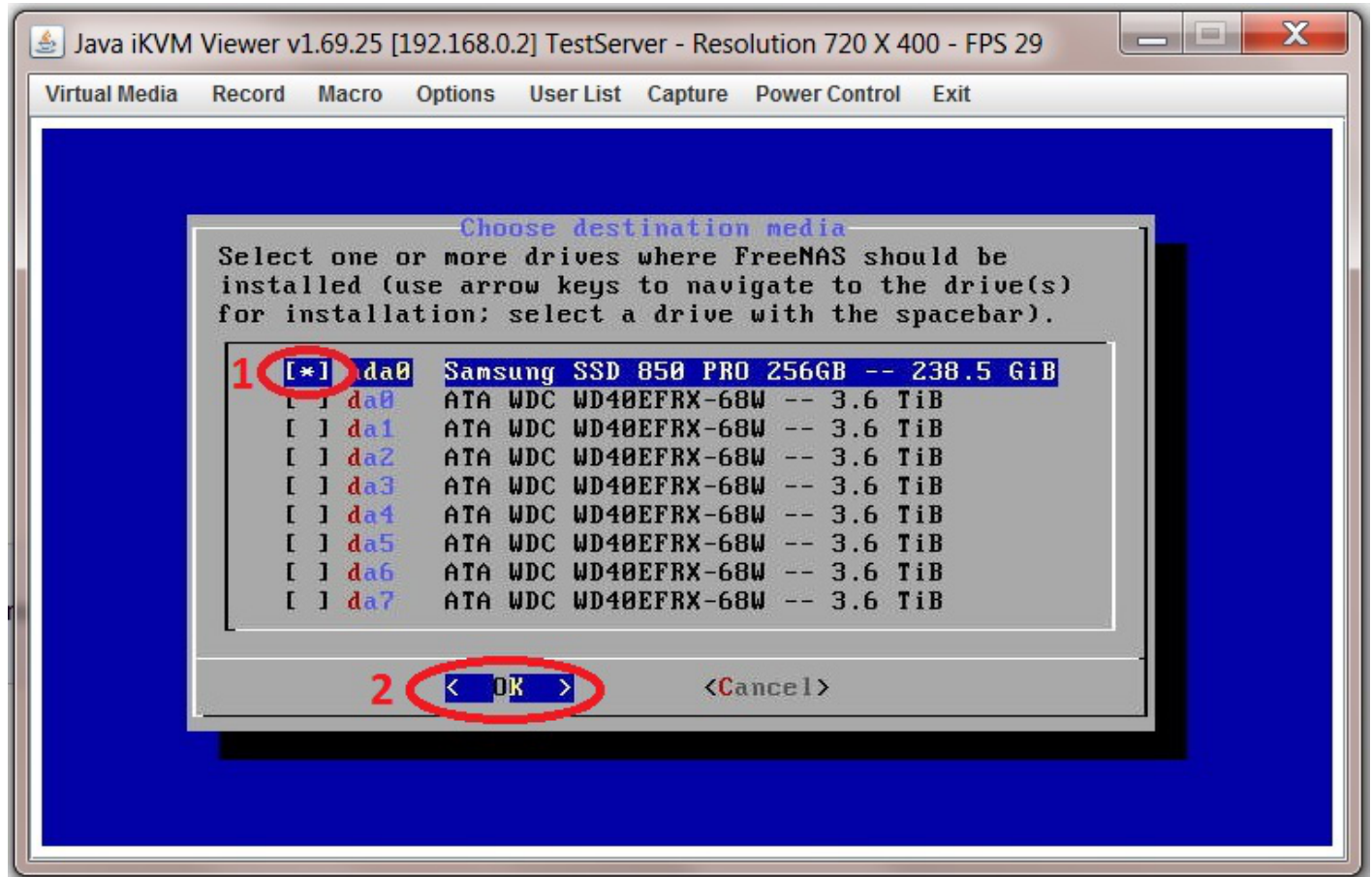
Chose option 1 "Install/Upgrade" (1), select "OK" (2) and press the "Return/Enter" key.



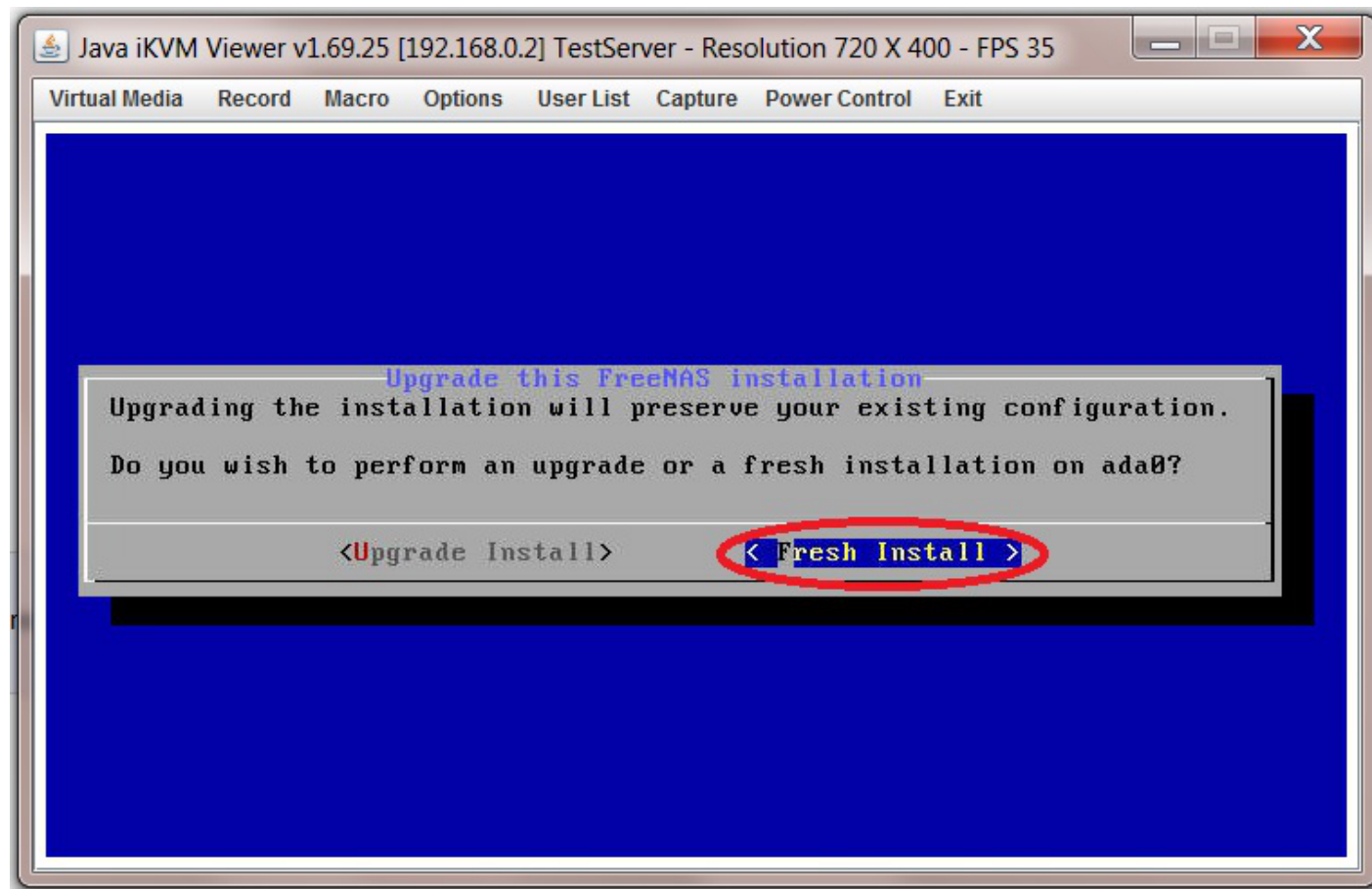
Now select the storage device you want the FreeNAS OS installed on (in Fester's case it's the SSD drive). Do not choose any of the HDDs you intend to use for your data, the FreeNAS OS cannot reside on any of the data storage disks (in Fester's server that is any of the WD40EFRX HDDs).



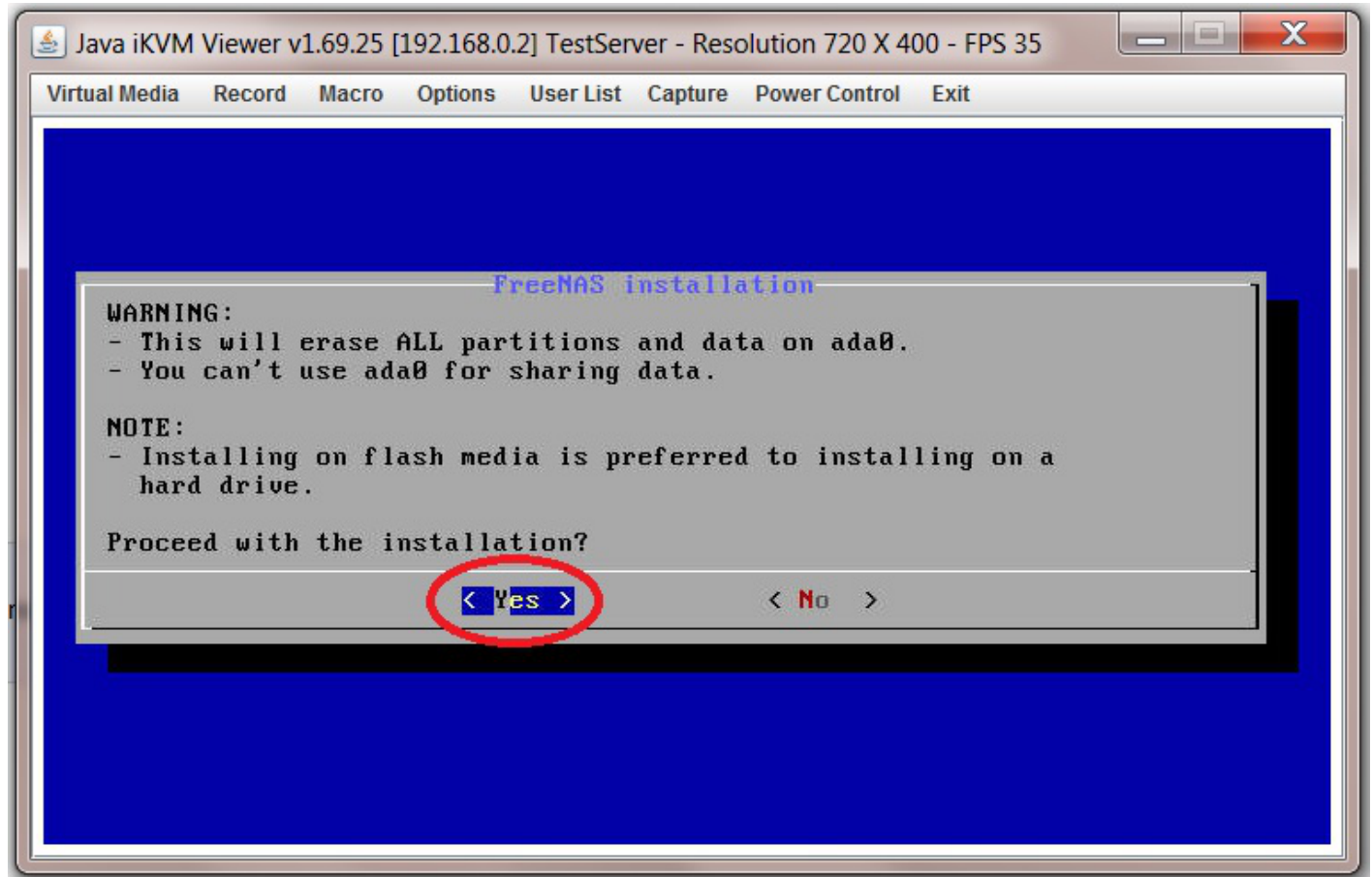
With the drive of your choice selected press the "Space Bar" key and an asterisk should appear next to the selected drive (1) now select "OK" (2) and press the "Return/Enter" key. If you want to install to two mirrored USB sticks, select them both and the installer will create the mirror.



If you see the following screen (it will only appear if FreeNAS has previously been installed on your boot device), select "Fresh Install" on the next screen and hit the "Return/Enter" key.



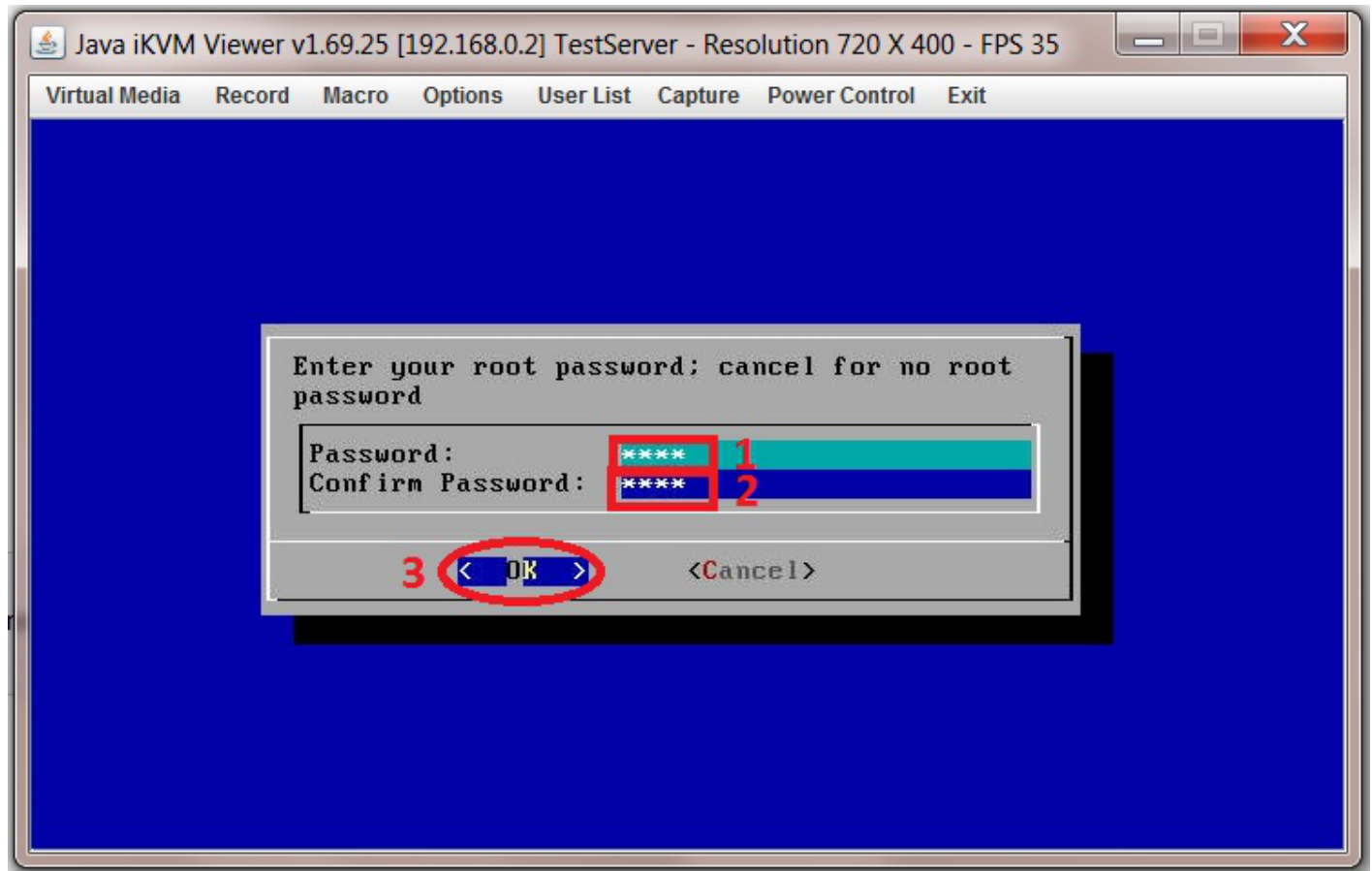
A warning screen will now appear, just select "Yes" and press the "Return/Enter" key.



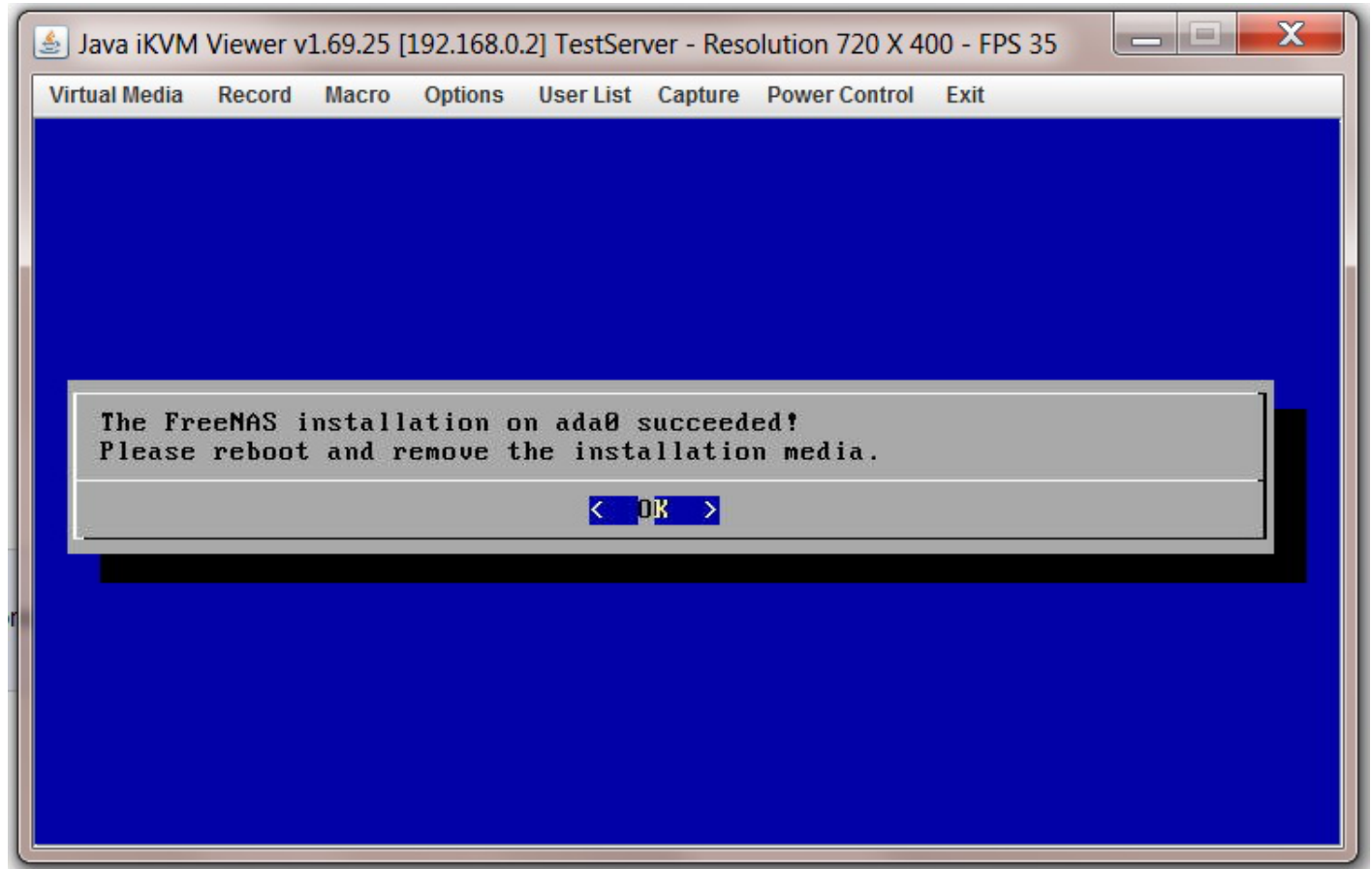
The next screen will ask you to create a login password for accessing FreeNAS. This is the final installation so a strong password (1) is recommended (you can change it later in the FreeNAS web GUI), just make sure you remember it.

Now press the "Tab" key, this should take you to the "Confirm Password" section and re-enter your password (2).

Press the "Tab" key again and this should take you to the "OK" section (3), press the "Return/Enter" key and the installation should begin.



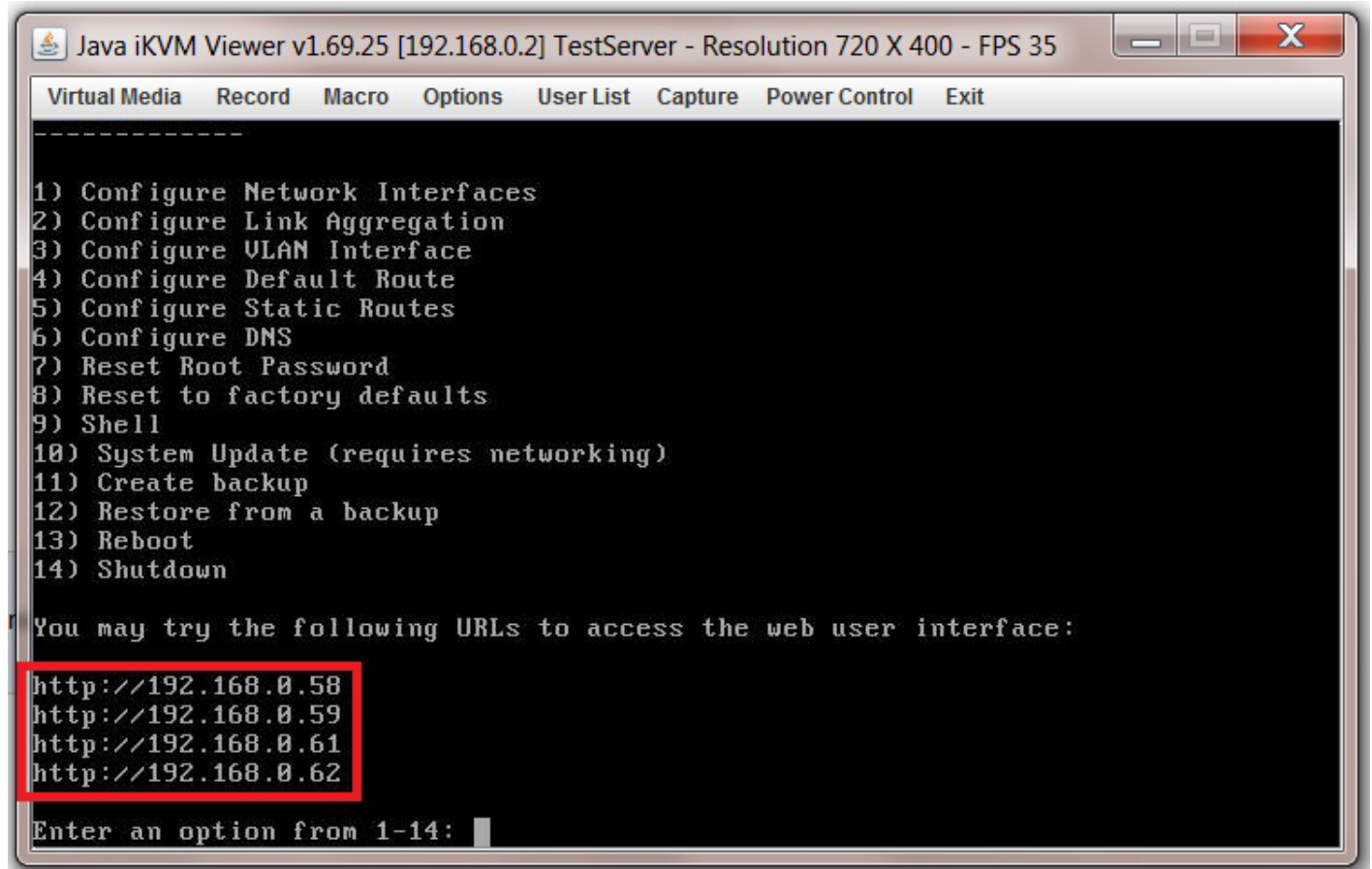
When the installation is complete you should see a screen like this. Power off the server and remove the USB stick.



Now power up the server and the first screen you encounter will be the GNU GRUB screen, don't press any keys just wait a few seconds and it will automatically continue booting up FreeNAS.

When FreeNAS has finished booting you should see a screen like this with the IP address of the FreeNAS web GUI on display (shown in red in the screen shot).

(There are 4 IP addresses on Fester's screen because there are 4 NICs on the motherboard, and he has them all plugged in. This isn't ordinarily a good configuration—only plug in one NIC.)



Make a note of the IP address/s for the FreeNAS web GUI, it will be needed soon.

That's FreeNAS 11.2 installed now we need to configure it.

(By using IPMI or looking it up in your router's attached devices table, you will always be able to find the FreeNAS web GUI even if it changes.)

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:install_installing

Last update: 2019/06/20 02:10



Uncle Fester's Basic FreeNAS 11.2 Configuration Guide

Introduction

This guide has been written with complete beginners to FreeNAS in mind (although some general computer knowledge is assumed).

Therefore, depending on your level of knowledge and experience, you probably won't need to read all the sections.

Please note: This guide was written for FreeNAS 11.2. If you're using a later version, the GUI images may not be accurate.

There is some Fester humour throughout the guide (or what passes for humour in Fester's very strange world). It is there to try and keep the user of this guide going until they reach the end. This is a very boring document. The humour will not be to everyone's taste. If you find it offensive just ignore it and move on; Fester means no harm.

Download

Download a PDF copy of this guide by clicking the link below:

Aim and Scope of This Guide

This guide is for people who want or need to set up FreeNAS as quickly as possible with a minimum of fuss.

The aim is to provide all the information you need in one place to set up a basic FreeNAS server.

- It is not intended to teach or educate.
- It is no substitute for learning and understanding the FreeNAS OS.
- It is no substitute for the excellent [official guide](#) that accompanies the FreeNAS OS.
- It is my attempt to give something back to the FreeNAS community.

It is my hope that others will contribute, augment, update and completely replace parts of this guide so it can be a useful resource to all FreeNAS beginners. To more easily enable this, the guide is highly sectionalised and released under a Creative Commons Attribution license.

Disclaimer

This guide has been written by a FreeNAS complete beginner for complete beginners.

Proceed at your own risk. I will not be held responsible for anything that happens to your system, you, your hair, the real wood veneered floor, your prostate gland or the world in general. I take no responsibility for anything (just ask anyone who knows me).

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 10. [SMART Test Schedules](#)
 11. [Creating a Periodic Snapshot Task](#)
 12. [Enabling Console Messages in the Footer of the Web GUI](#)
 13. [Setting up an SSH Console](#)
 14. [Creating Certificate Authorities and Certificates for FreeNAS](#)
6. [Shares](#)

1. [Fester's Very Basic One User/One Dataset Experimental Starter Share](#)
7. [Jails](#)
 1. [Global Configuration of Jails](#)
 2. [Plex Media Server](#)
 3. [Transmission](#)
8. Additional FreeNAS Configurations to Consider
 1. [Backup the FreeNAS Configuration File Nightly](#)
9. Misc. Topics
 1. [Writing an Image File to a USB Stick](#)
 2. [Mounting an ISO Image File via IPMI](#)

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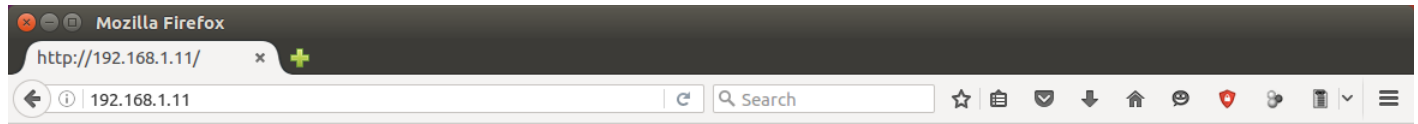
<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:intro>

Last update: **2019/06/20 01:37**



Mounting an ISO Image File via IPMI

If your motherboard supports IPMI, you can mount image files (like the FreeNAS installer, Memtest86+, or other test utilities) through the virtual console. Your system will see the file as a local CD-ROM or flash drive. To start, open a web browser, and browse to the IP address of the IPMI interface on your server.



SUPERMICRO

Please Login

Username

Password

Log in with the username of ADMIN and the password you chose. In the IPMI window, under the **Remote Control** menu, click on **Console Redirection**.

Host Identification
Server: 192.168.001.011
User: ADMIN (Administrator)

Normal Refresh Logout English

System Server Health Configuration Remote Control Virtual Media Maintenance Miscellaneous

System Information FRU Reading

Summary

Firmware Revision : 03.39
Firmware Build Time : 2015-02-03

IP address : 192.168.001.011
BMC MAC address : 00:25:90:ce:7f:2b
System LAN1 MAC address : 00:25:90:ca:f3:40
System LAN2 MAC address : 00:25:90:ca:f3:41
System LAN3 MAC address : 00:25:90:ca:f3:42
System LAN4 MAC address : 00:25:90:ca:f3:43

Remote Console Preview

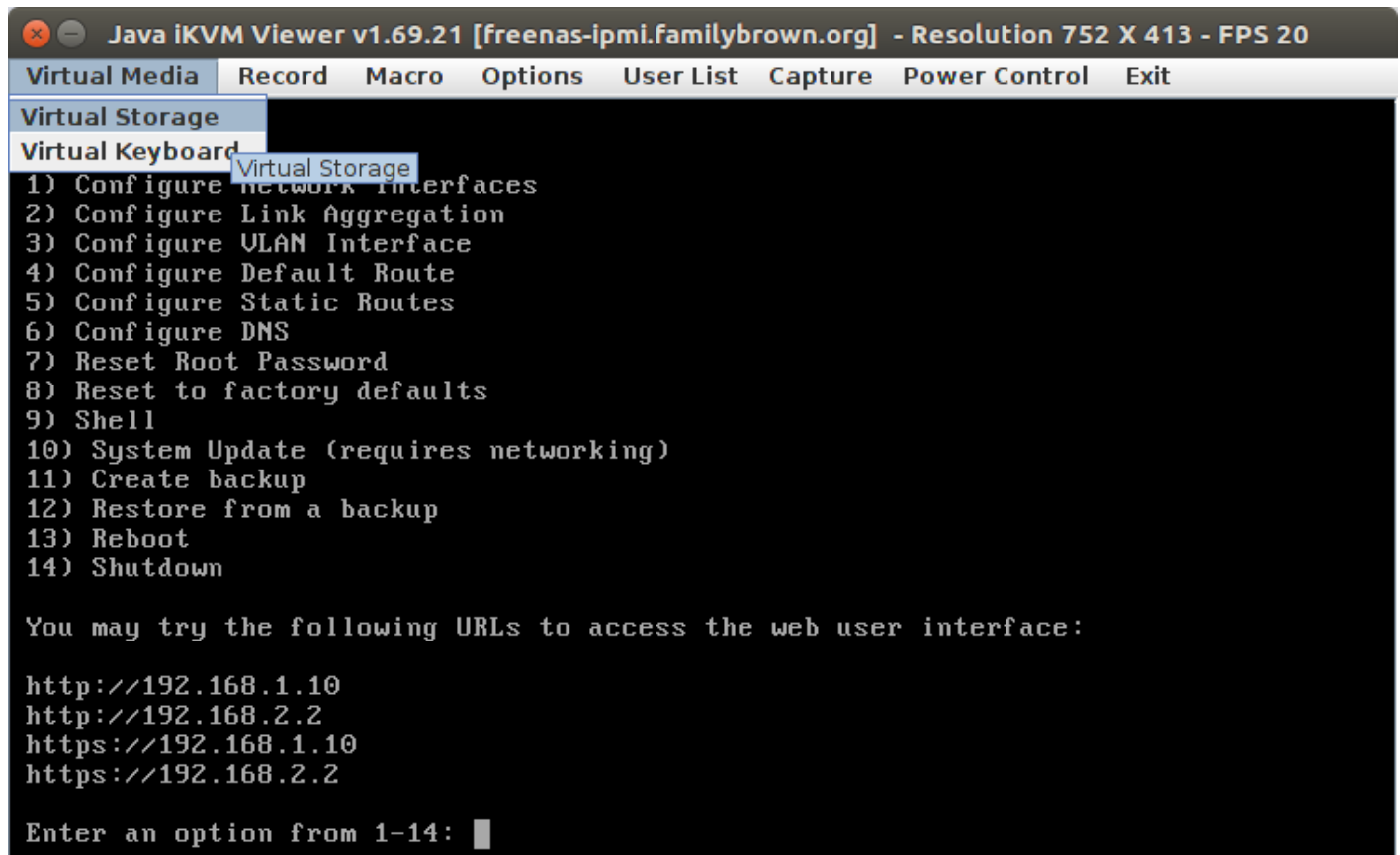
Refresh Preview Image

```
ses0: da14,pass14: Element Descriptor: 'Slot 15'
ses0: da14,pass14: SAS Device Slot Element: 1 Phys at Slot 14
ses0: phy 0: SATA device
ses0: phy 0: parent 5003040000c57baf addr 5003040000c57b3c
ses0: da15,pass15: Element Descriptor: 'Slot 16'
ses0: da15,pass15: SAS Device Slot Element: 1 Phys at Slot 15
ses0: phy 0: SATA device
ses0: phy 0: parent 5003040000c57baf addr 5003040000c57b3c
ses0: da16,pass16: Element Descriptor: 'Slot 17'
ses0: da16,pass16: SAS Device Slot Element: 1 Phys at Slot 16
ses0: phy 0: SATA device
ses0: phy 0: parent 5003040000c57baf addr 5003040000c57b3c
ses0: da17,pass17: Element Descriptor: 'Slot 18'
ses0: da17,pass17: SAS Device Slot Element: 1 Phys at Slot 17
ses0: phy 0: SATA device
ses0: phy 0: parent 5003040000c57baf addr 5003040000c57b3c
Jun 12 03:01:37 virtualbox su-wta(54149): s5c71b30054149: SYSERR(root): hash map
"Aliases": missing map file /etc/mail/aliases.db: No such file or directory
Jun 12 03:01:37 virtualbox su-wta(54151): s5c71b30054149: SYSERR(root): hash map
"Aliases": missing map file /etc/mail/aliases.db: No such file or directory
Jun 12 03:01:38 virtualbox su-wta(54177): s5c71b30054177: SYSERR(root): hash map
"Aliases": missing map file /etc/mail/aliases.db: No such file or directory
Jun 12 03:01:38 virtualbox su-wta(54178): s5c71b30054177: SYSERR(root): hash map
"Aliases": missing map file /etc/mail/aliases.db: No such file or directory
```

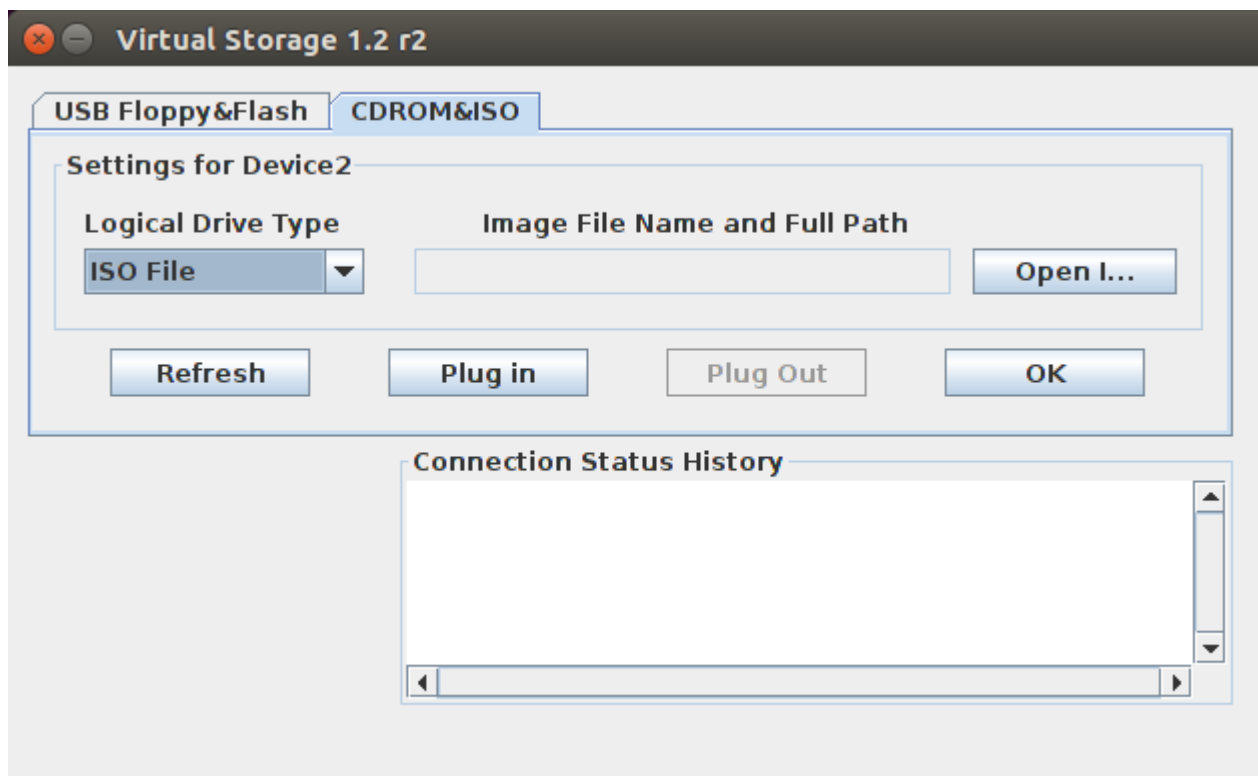
javascript:page_mapping('remote','man_ikvm')

Copyright © 2010 Super Micro Computer, Inc.

Click on the **Launch Console** button. You'll probably need to click some confirmation messages for Java; these vary from system to system. Once you've confirmed them, the console window will open. Under the **Virtual Media** menu, click on **Virtual Storage**.



In the Virtual Storage window, click on the **CD-ROM & ISO** tab. Then, under **Logical Drive Type**, select **ISO File**. Click the **Open I...** button, then browse to the .iso file you want to mount. Click the **Plug In** button, then click **OK**. Your .iso file will be attached to your server and appear as a local CD-ROM.



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Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:ipmi_iso

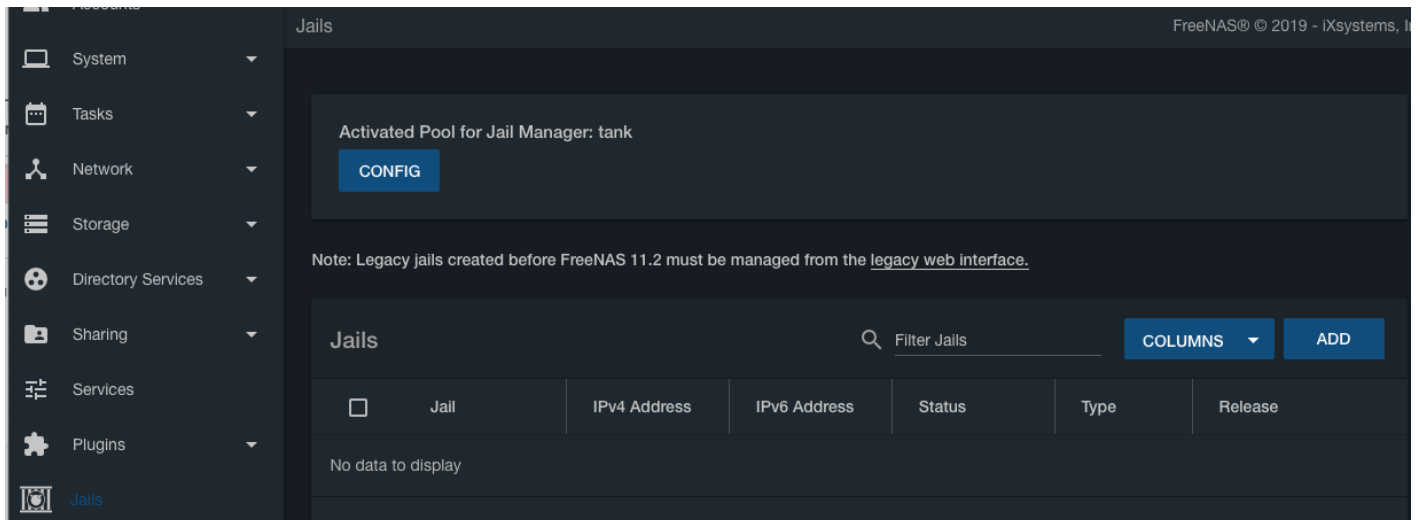
Last update: **2016/06/12 17:33**



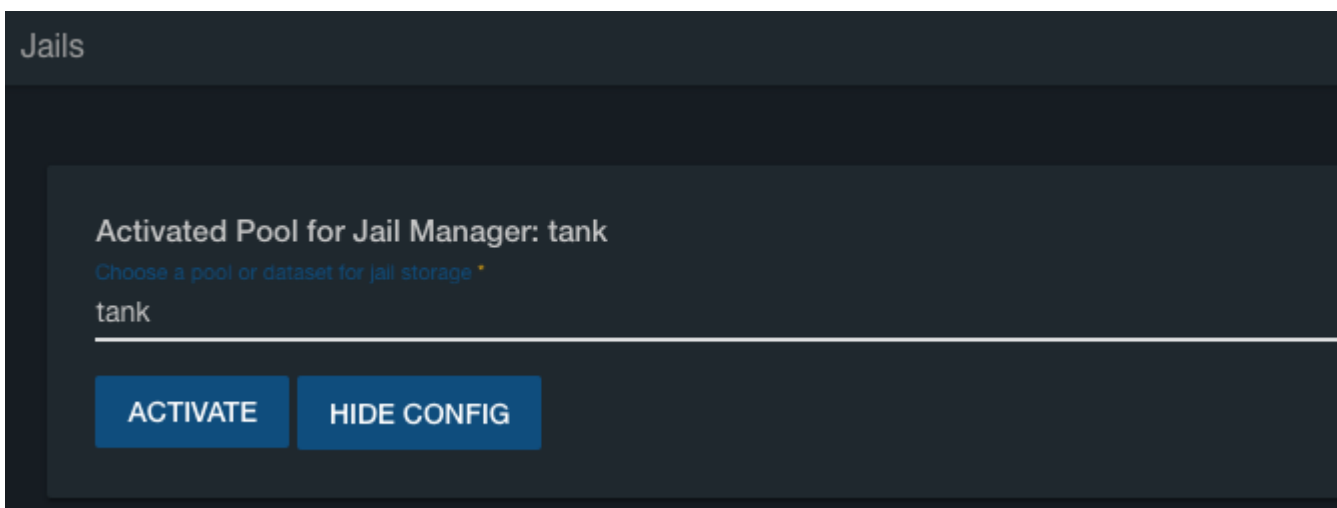
Global Configuration of Jails

Before setting up any plugins on the server we must first configure the global settings for all Jails.

Click “Jails” in the left column.



There is no need to change anything here, just click the “Config” button.



Ensure your pool is selected (if you've created more than one pool, select the pool on which you want your jails to live), and click the “Activate” button.

That’s global configuration of the Jails done.

Now we can install some plugins, or create some new jails by hand.

Incidentally you are not confined by the plugins on offer in FreeNAS. It is possible to configure programs that work in FreeBSD so they will work in FreeNAS Jails. This often requires a lot of manual configuration and probably some things Fester is completely unaware of at present. You will also need a good knowledge of FreeBSD commands and UNIX permissions in order to work this way. It offers a great deal

of flexibility but is not easy.

Plugins however, are designed so that you can do everything you need from within the FreeNAS GUI.

Fester uses the supplied plugins in FreeNAS as I don't know enough at present to install and compile programs by hand for jails.

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Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:jails_global

Last update: **2019/05/27 13:04**



Jails

I decided to create a separate section for jails. I did this so others can easily add their plugin guides after this one. In this way a repository of different plugins can be accumulated over time.

The user of this guide can then choose the one they need for the plugin of their choice.

Jails basically allow the FreeNAS OS to be customised in particular ways to provide extra functionality and offer additional services that did not come with the standard FreeNAS OS.

Jails also provide another very important function in addition to this. If any program running in a jail hangs, crashes or falls over (like Fester when he has had one sherbet too many) the jail acts as a bulwark so the FreeNAS OS and other jails do not also crash.

Jails also supply a totally independent network stack which can be very useful and ensures a certain amount of resilience when things go wrong.

Before we get to the specifics of configuring a particular plugin we first must set the conditions within which all the jails will operate.

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Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:jails_intro

Last update: **2016/06/08 01:10**

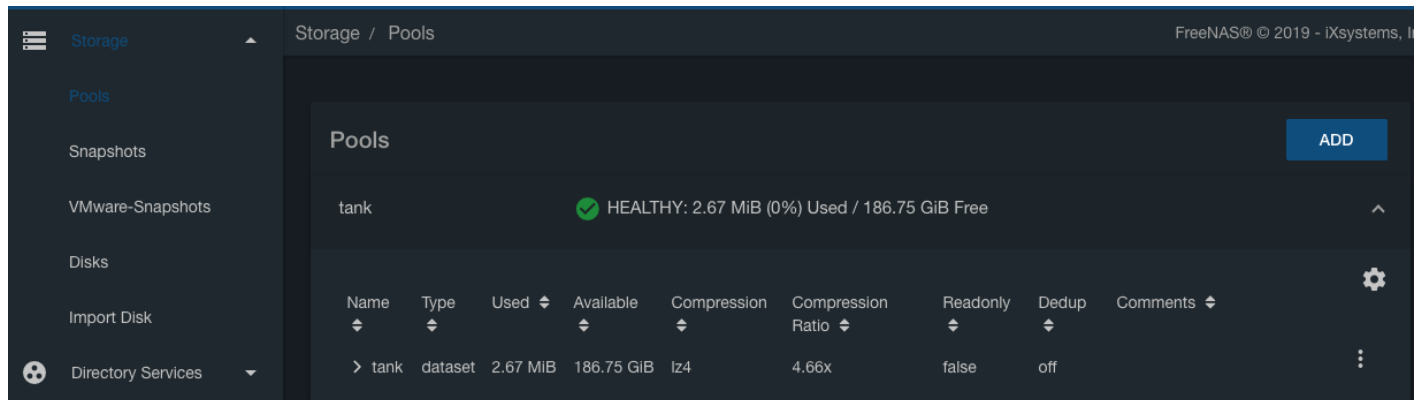


Plex Media Server

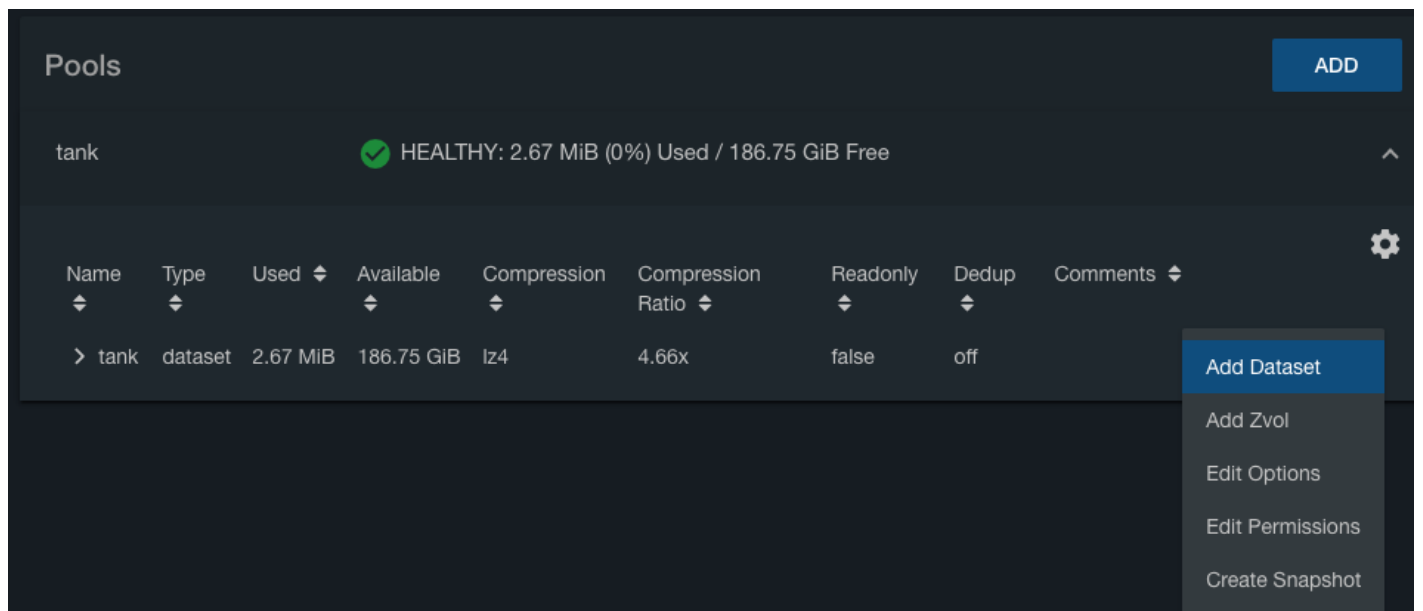
This is a guide for installing the Plex Media Server plugin.

Create the Media Dataset

Click “Storage” in the left column, then “Pools”.



Click the three vertical dots to the right of your pool, and select “Add Dataset” from the pop-up menu.



You'll see the “Add Dataset” window.

Storage / Pools / Add Dataset

Name *

Media

Comments

Sync

Inherit (standard)

Compression level

Inherit (lz4)

Share Type ?

☒ Unix

☐ Windows

☐ Mac

Enable Atime

Inherit (on)

ZFS Deduplication

Inherit (off)

Case Sensitivity

Sensitive

SAVE CANCEL ADVANCED MODE

- In the “Name” text box type a name for the new media dataset (Fester very imaginatively used **Media**).
- Leave the “Compression level” drop down selection box (2) at its default value (**Inherit (lz4)**).
- In “Share Type” I selected **Windows** simply because most of the clients on Fester’s network are Windows machines.
- Now click on the “Save” button.

Your dataset will be created. Click the > next to your pool name to show the datasets.

Pools

ADD

tank

HEALTHY: 2.79 MiB (0%) Used / 186.75 GiB Free

^

Name	Type	Used	Available	Compression	Compression Ratio	Readonly	Dedup	Comments
▼ tank	dataset	2.79 MiB	186.75 GiB	lz4	4.44x	false	off	
Media	dataset	127.88 KiB	186.75 GiB	Inherits (lz4)	1.00x	false	off	
TestShare	dataset	127.88 KiB	186.75 GiB	Inherits (lz4)	1.00x	false	off	

If all goes well the new dataset will be listed in the “Storage” page.

Click the three vertical dots to the right of the new dataset, and click “Edit Permissions” from the pop-up menu.

▼ tank

dataset

2.79 MiB

186.75 GiB

lz4

4.44x

false

off

Media

dataset

127.88 KiB

186.75 GiB

Inherits (lz4)

1.00x

false

off

TestShare

dataset

127.88 KiB

186.75 GiB

Inherits (lz4)

1.00x

false

off

Add Dataset

Add Zvol

Edit Options

Edit Permissions

Delete Dataset

Create Snapshot

You'll see the “Edit Permissions” window.

Storage / Pools / Edit Permissions

Path
/mnt/tank/Media

ACL Type ?

☐ Unix

☒ Windows

☐ Mac

☒ Apply User ?

User
TestUser ?

☒ Apply Group ?

Group
TestGroup ?

☐ Apply permissions recursively ?

SAVE **CANCEL**

- In the “User” drop down selection box select whatever user you created when we created the experimental share (in Fester’s case this was TestUser).
- In the “Group” drop down selection box select whatever group you created when we created the experimental share (in Fester’s case this was TestGroup).
- Now click the “Save” button.

Add Media Share

Now click “Sharing” in the left column, then “Windows (SMB) Shares”.





The screenshot shows the FreeNAS web interface for managing SMB shares. On the left is a sidebar with a menu: Storage, Directory Services, Sharing (selected), Apple (AFP) Shares, Unix (NFS) Shares, WebDAV Shares, Windows (SMB) Shares, and Block (iSCSI). The main header shows 'Sharing / SMB' and 'FreeNAS® © 2019 - iXsystems'. The main content area is titled 'Samba' and contains a table with columns 'Name' and 'Path'. One entry is visible: 'Test Share' with path '/mnt/tank/TestShare'. There is a search bar 'Filter Samba', a 'COLUMNS' dropdown, and an 'ADD' button. At the bottom of the table, it says '1 - 1 of 1'.

Click the “Add” button.

The screenshot shows the 'Add' configuration page for an SMB share. The breadcrumb is 'Sharing / SMB / Add'. The main form has a 'Path' field with a folder icon and the text '/mnt/tank/Media'. Below this is a tree view showing the directory structure: /mnt, tank, Media (selected), and TestShare. The 'Name' field is labeled 'Fester's Plex Share'. There are three checkboxes: 'Use as home share', 'Time Machine', and 'Allow Guest Access', each with a help icon. Below these is a section for 'Periodic Snapshot Task'. At the bottom are three buttons: 'SAVE', 'CANCEL', and 'ADVANCED MODE'.

A new smaller window will pop up. In the “Path” section click the folder icon to the left, then browse to find your new Media dataset.

- The “Path” text box should now display the chosen dataset.
- Do not tick the “Use as home share:” tick box at the moment.
- Give the share a name in the “Name” text box.
- Do not tick the “Allow Guest Access:” tick box.
- Now click the “Save” button.

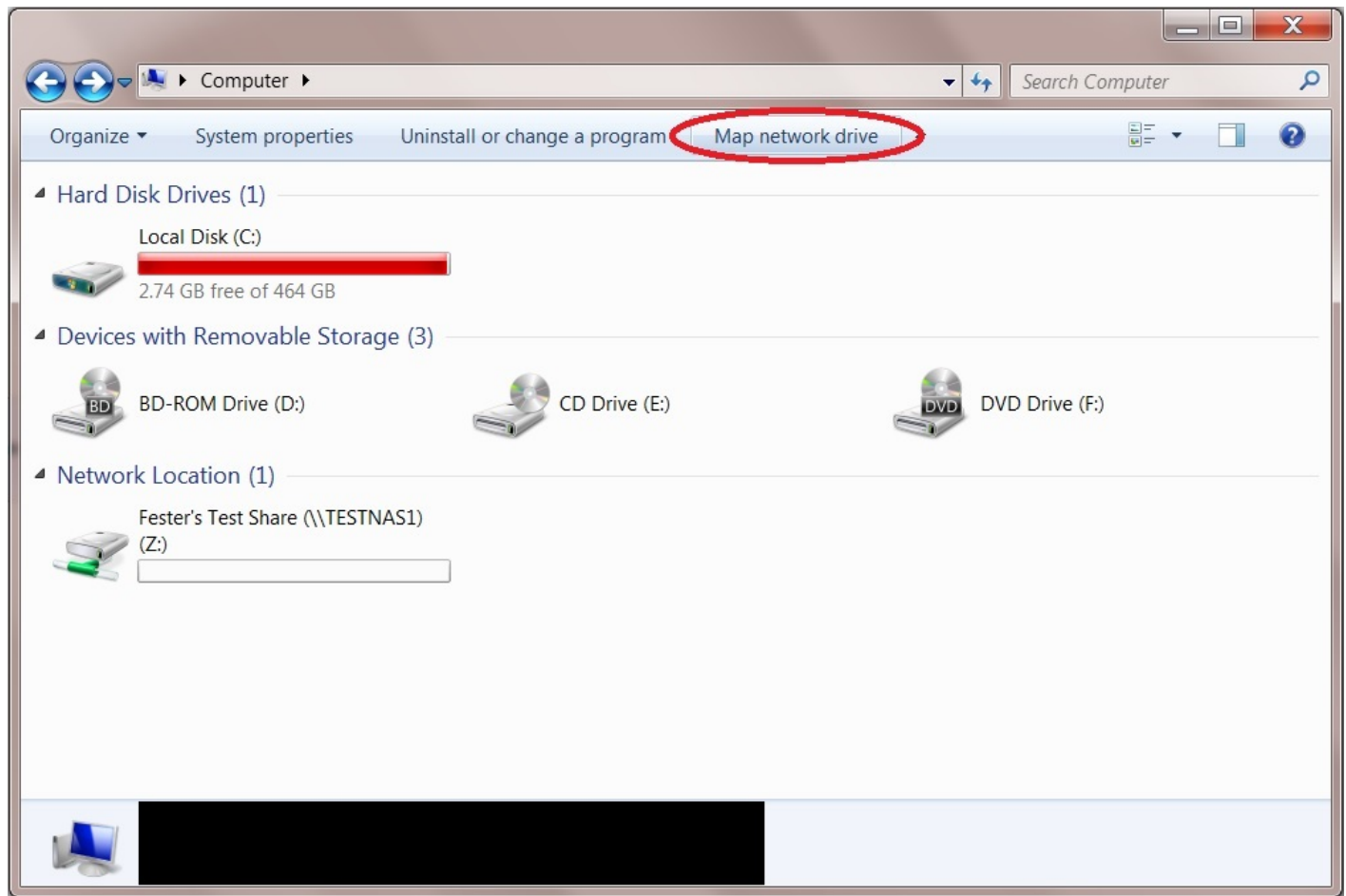
Samba		
 Filter Samba		<div>COLUMNS </div> <div>ADD</div>
Name	Path	
Fester's Plex Share	/mnt/tank/Media	
Test Share	/mnt/tank/TestShare	
1 - 2 of 2		

If all goes well you will see the newly created SMB share entry.

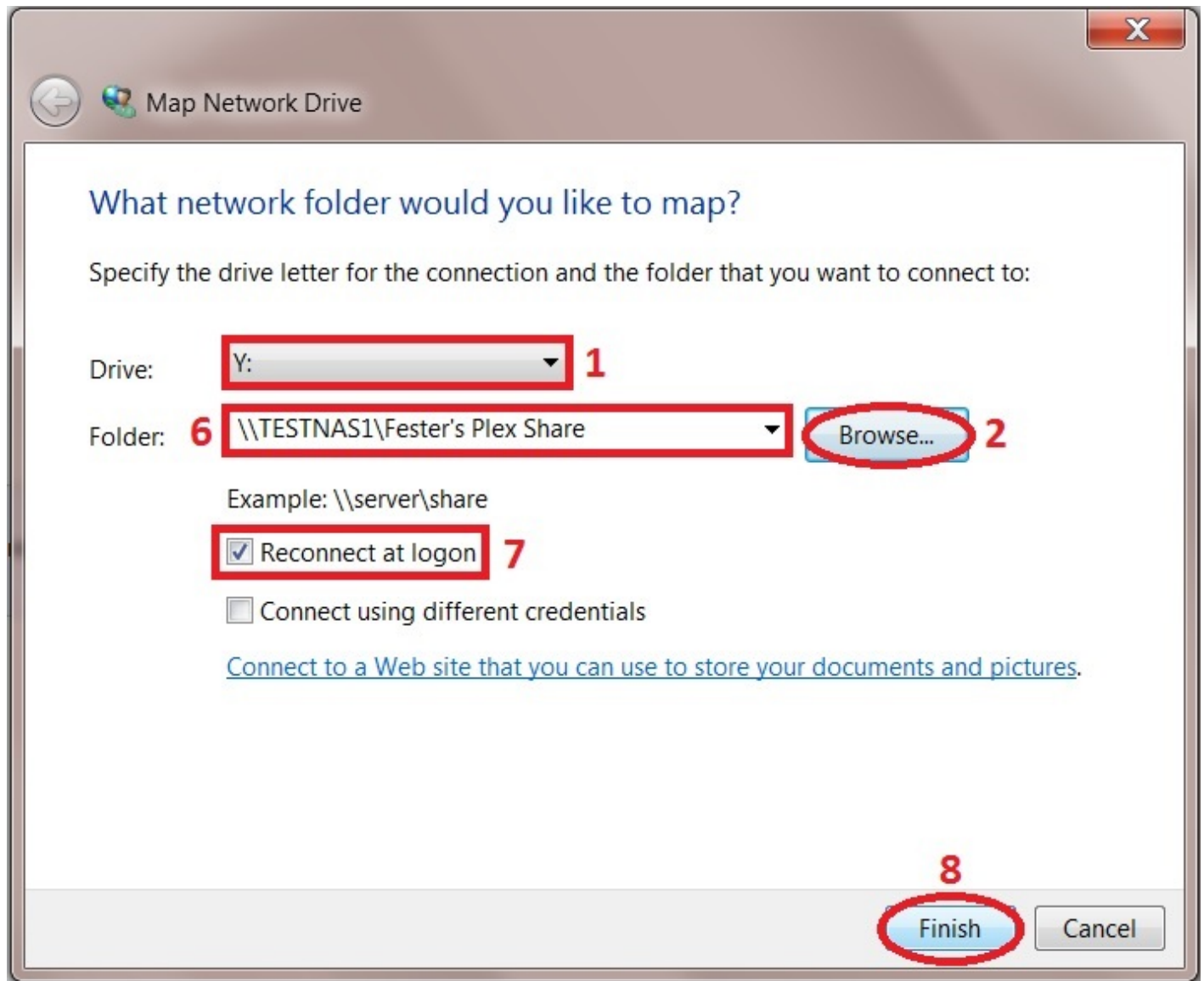
Give the server some time to get the share up and running, then it is time to map the new network folder to a drive letter.

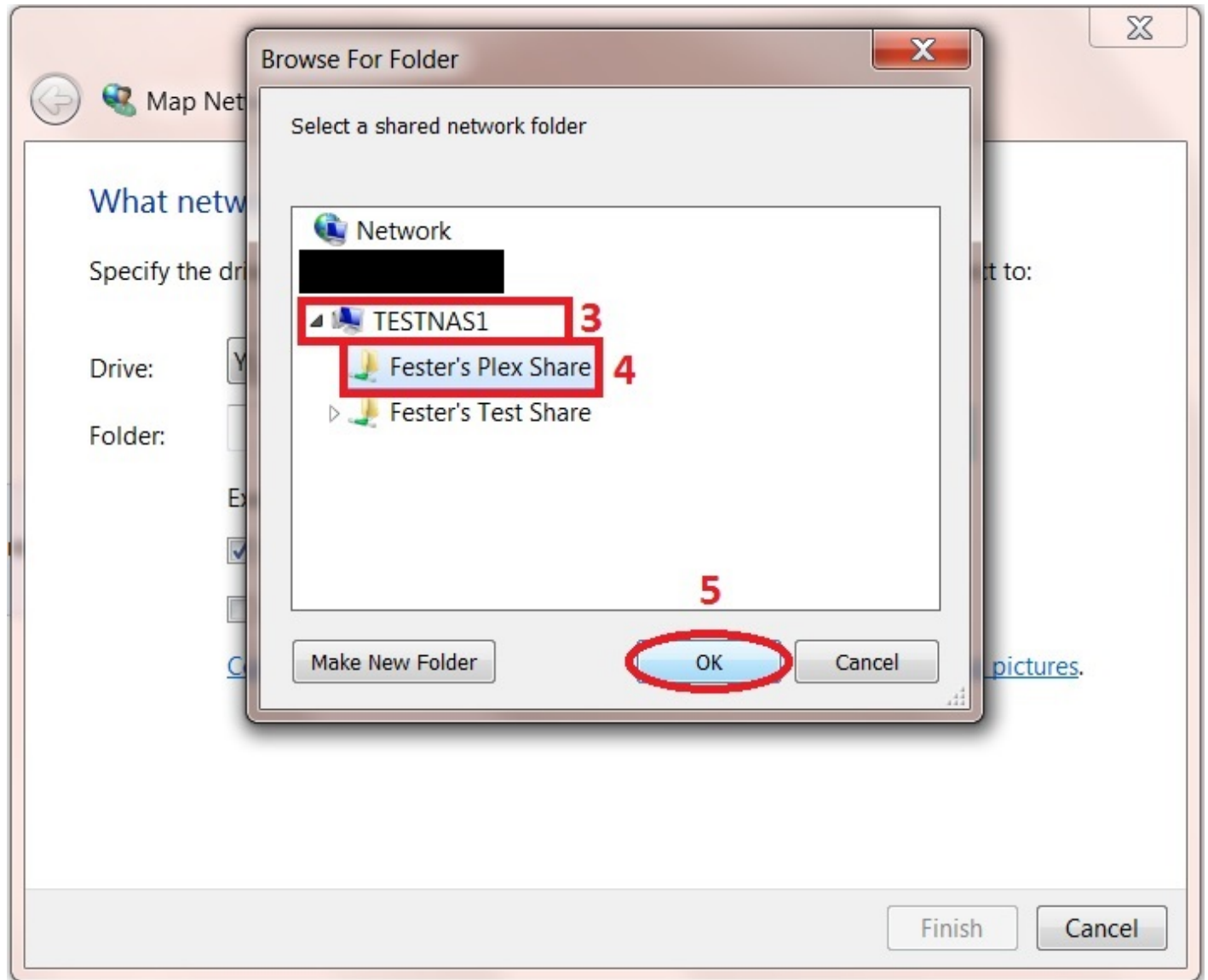
Map Network Drive

On the Windows client click on the “Start” button and go into “Computer” (this was on a Windows 7 machine). This should bring up a window that shows all the hard drives and any other devices connected to the Windows computer. Click on the “Map Network Drive” button.



- From the “Drive:” drop down selection box (1) chose the drive letter you wish to assign to the shared folder (Fester accepted the default Y letter).
- Now click the “Browse...” button (2). This will cause a window to pop up.
- Navigate to the location of the shared folder by clicking on the server (in this case TestNAS1) (3) and then clicking on the shared folder itself (in this case Fester’s Plex Share) (4).
- Now click the “OK” button (5).
- The shared folder’s path name should appear in the “Folder:” text box (6).
- Tick the “Reconnect at logon! Tick box (7).
- Now click the “Finish” button (8).

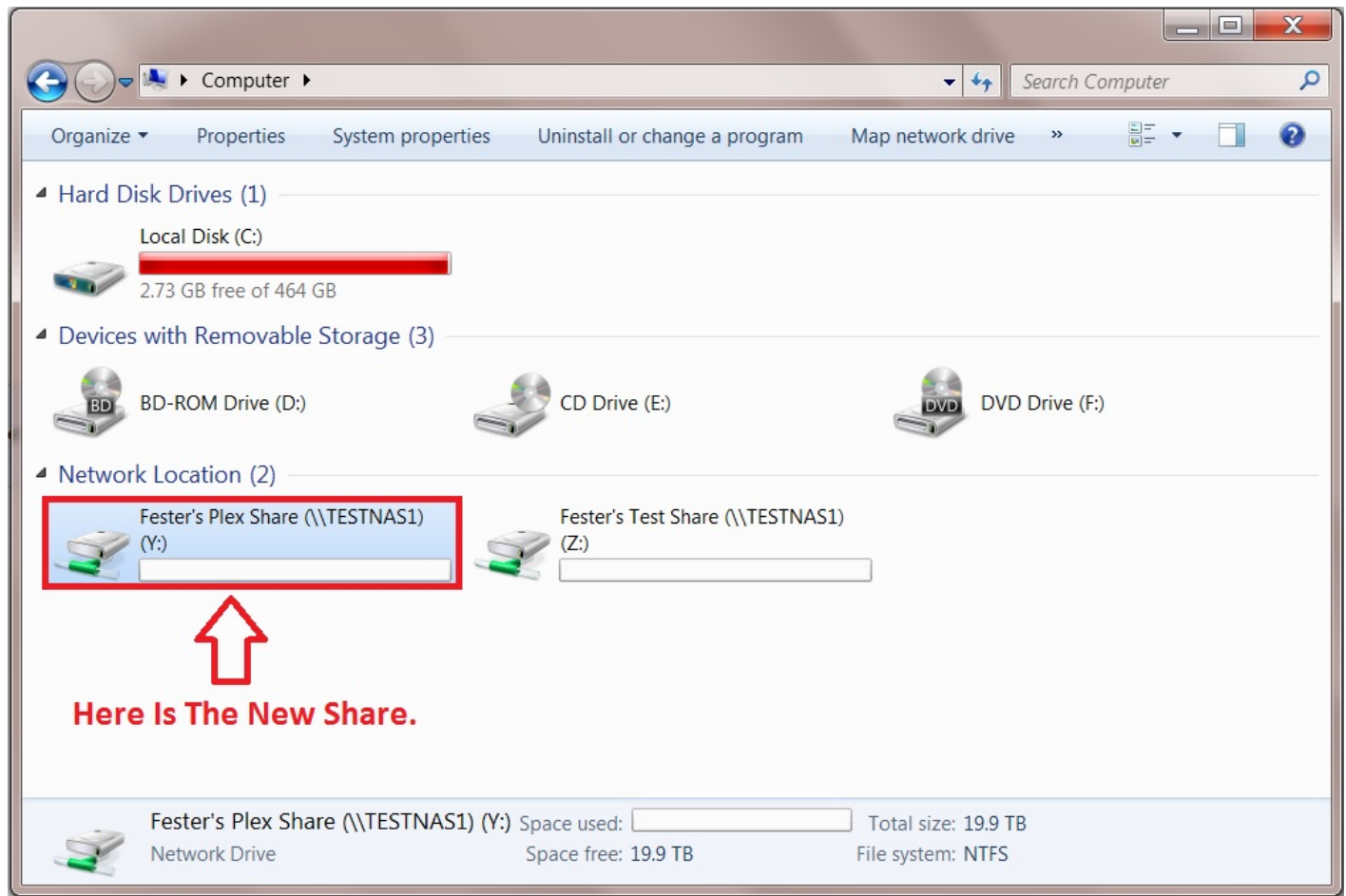




If all has gone well you should find yourself in the shared folder. Here you can create other folders and save files. Test this to make sure there are no permissions problems. You should create a folder here for each type of media you want to use with the Plex Media Server (Movies, TV shows, Music, etc.).

Now copy a couple of media files (i.e. music, films, etc) into this folder. We will need these later to check the Plex media server.

The shared folder will now appear as another drive on your system and should look something like this.



Install the Plex Plugin

Now click “Plugins” in the left column, than “Available”, and wait for the list to appear. If the Plugins page does not populate then check the DNS servers are configured properly in FreeNAS.

Available Plugins				
Filter Available Plugins				
Name	Description	Version	Official	
nextcloud	Access, share and protect your files, calendar	N/A	true	
Plex Media Server	The Plex media server system	1.15.5.994	True	
Plex Media Server (F	The Plex media server system	1.15.5.994	True	

Scroll down and find the plugin you want (in Fester’s case this was the PlexMediaServer). Then, within that text area, scroll sideways if necessary until you see the three vertical dots on the far right. Click on those dots, and click “Install” from the pop-up menu.

Available Plugins					Filter Available Plugins	COLUMNS
	Description	Version	Official			
	Access, share and protect your files, calendar, photos, music, and more.	N/A	True			
Plex Media Server	The Plex media server system	1.15.5.994	True			Install
Plex Media Server (F)	The Plex media server system	1.15.5.994	True			

You'll then see a window prompting you for network settings for the plugin.

Plugins / Add FreeNAS® © 2019 - iXsystems, Inc.

Plugin Name
plexmediaserver

☐ DHCP ?

IPv4 interface *
em0

IPv4 Address *
192.168.1.75

IPv4 Netmask *
24

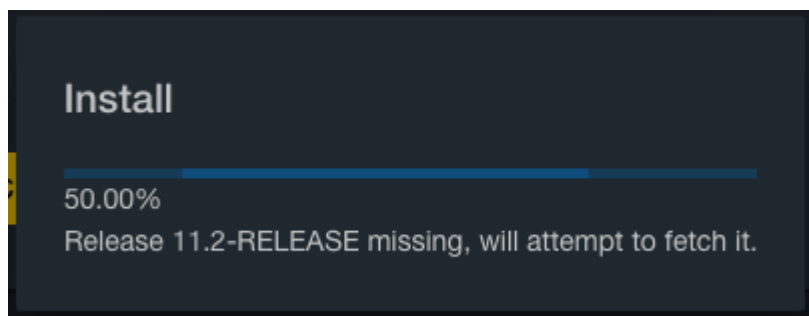
IPv6 Interface

IPv6 Address

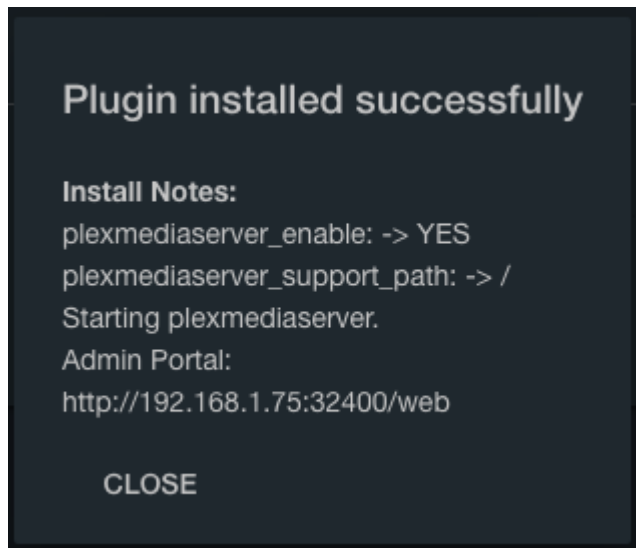
IPv6 Prefix

SAVE **CANCEL** **ADVANCED PLUGIN INSTALLATION**

DHCP is ticked by default, but is discouraged—services running on your network should generally have static IP addresses. Untick the DHCP box, select a network interface from the dropdown, enter an IP address that's available on your network, and select an IPv4 Netmask (in most cases, you'll use 24). Then click "Save." An installation window will pop up for a few moments.



If all goes well, you'll see this once installation is finished:



Click the “Close” button. You'll be taken to the Installed Plugins page, showing this plugin as installed.

Installed Plugins							Filter Installed Plugins	COLUMNS
<input type="checkbox"/>	Jail	Status	IPv4 Address	IPv6 Address	Version	Release		
<input type="checkbox"/>	plex	up	192.168.1.75/24		N/A	11.2-RELEASE		

1 - 1 of 1

Configure a Mount Point

The plugin is installed, but it can't see the Media dataset we created. To address this, we'll need to add a mount point to the plugin. Begin by clicking on “Jails” in the left column.

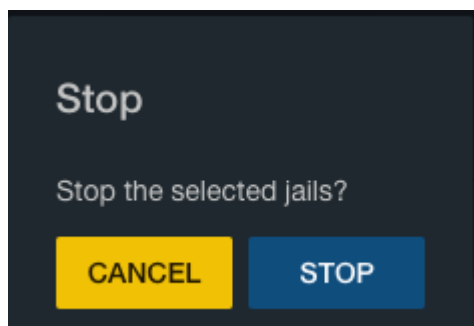
Jails							Filter Jails	COLUMNS	ADD
<input type="checkbox"/>	Jail	IPv4 Address	IPv6 Address	Status	Type	Release			
<input type="checkbox"/>	plex	192.168.1.75/24	none	up	pluginv2	11.2-RELEASE			

1 - 1 of 1

You'll see your jails listed (in this example there's only one). Scroll sideways in the list if necessary to see the three vertical dots to the far right.

Jails							Filter Jails	COLUMNS	ADD
	IPv4 Address	IPv6 Address	Status	Type	Release				
	192.168.1.75/24	none	up	pluginv2	11.2-RELEASE-				
1 - 1 of 1								Edit	
								Mount points	
								Restart	
								Stop	

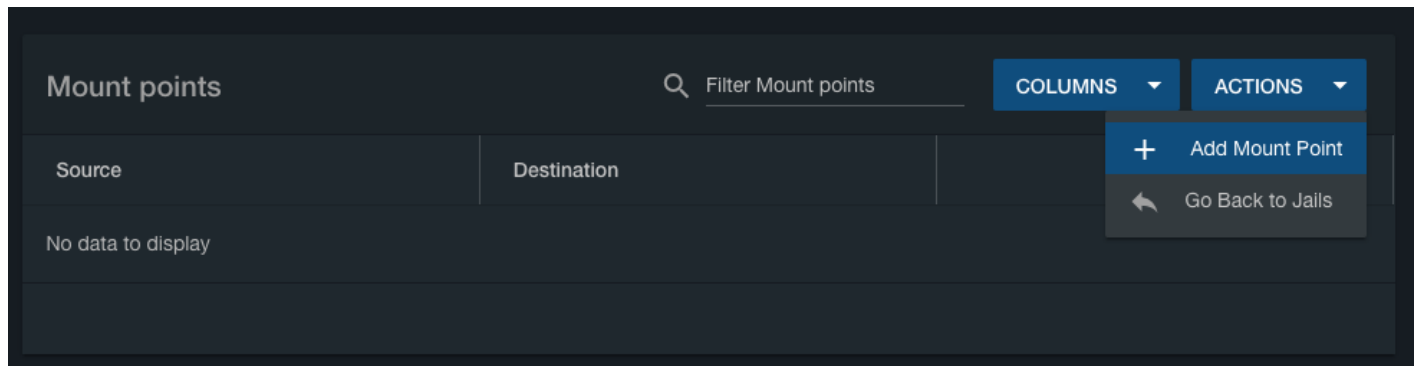
Click on the dots, and then select “Stop” from the pop-up menu.



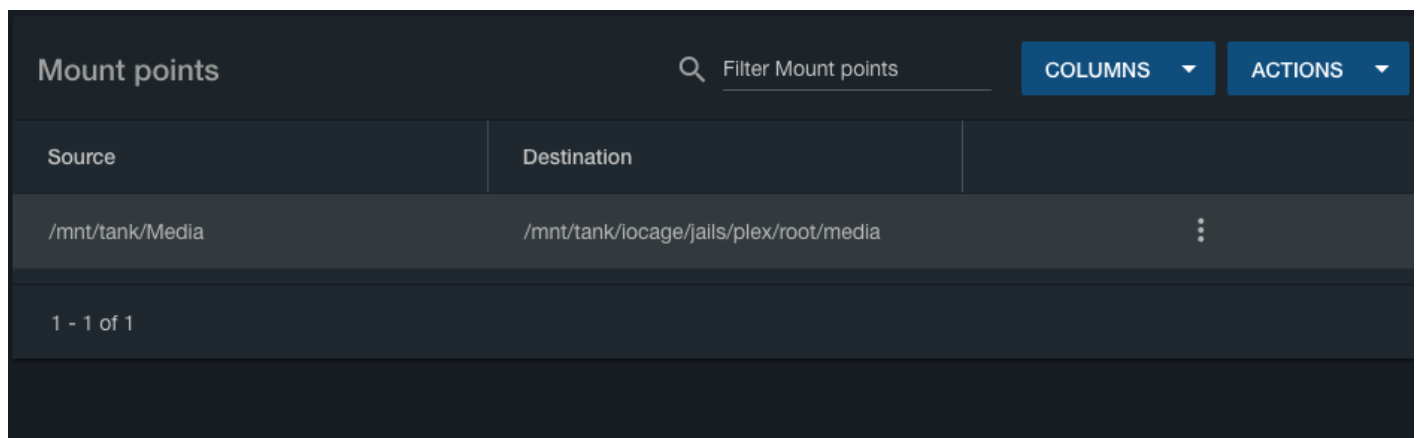
You'll see a warning screen; click “Stop” again here.

Jails							Filter Jails	COLUMNS	ADD
	IPv4 Address	IPv6 Address	Status	Type	Release				
	192.168.1.75/24	none	up	pluginv2	11.2-RELEASE-				
1 - 1 of 1								Edit	
								Mount points	
								Restart	
								Stop	
								Update	
								Shell	
								Delete	

Click on the dots again, and then select “Mount points” from the pop-up menu. You'll see the Mount Points page. Click “Actions”, then “Add Mount Point”.



You'll see the "Add Mount Point" screen. As before, you can manually type in paths for source and destination, or click the folder icons to browse to your desired path. Note that the "Destination" paths will always begin with `/mnt/pool/iocage/jails/jailname/root/`. If you want the dataset to appear as `/media` inside the jail, the destination would read `/mnt/tank/iocage/jails/plex/root/media`. Then click "Save".



You're returned to the mount points screen, with your new mount point listed.

Restart the Plugin

Now that the mount point has been added, you'll need to start the plugin again. Click "Plugins" in the left column, then "Installed".

FreeNAS® © 2019 - iXsystems, Inc.

Activated Pool for Jail Manager: tank

[CONFIG](#)

Note: Legacy plugins created before FreeNAS 11.2 must be managed from the [legacy web interface](#).

Installed Plugins

Filter Installed Plugins

[COLUMNS](#)

	Jail	Status	IPv4 Address	IPv6 Address	Version	Release
<input type="checkbox"/>	plex	down	192.168.1.75/24		N/A	11.2-RELEASE

Scroll sideways if necessary to see the three vertical dots on the far right.

Installed Plugins

Filter Installed Plugins

[COLUMNS](#)

	Status	IPv4 Address	IPv6 Address	Version	Release	
	down	192.168.1.75/24		N/A	11.2-RELEASE-	

1 - 1 of 1

- Start
- Update
- Delete

Click on the three dots, then click “Start” from the pop-up menu. To launch the Plex web interface, click on the three dots again, then click “Management”.

Installed Plugins

Filter Installed Plugins

[COLUMNS](#)

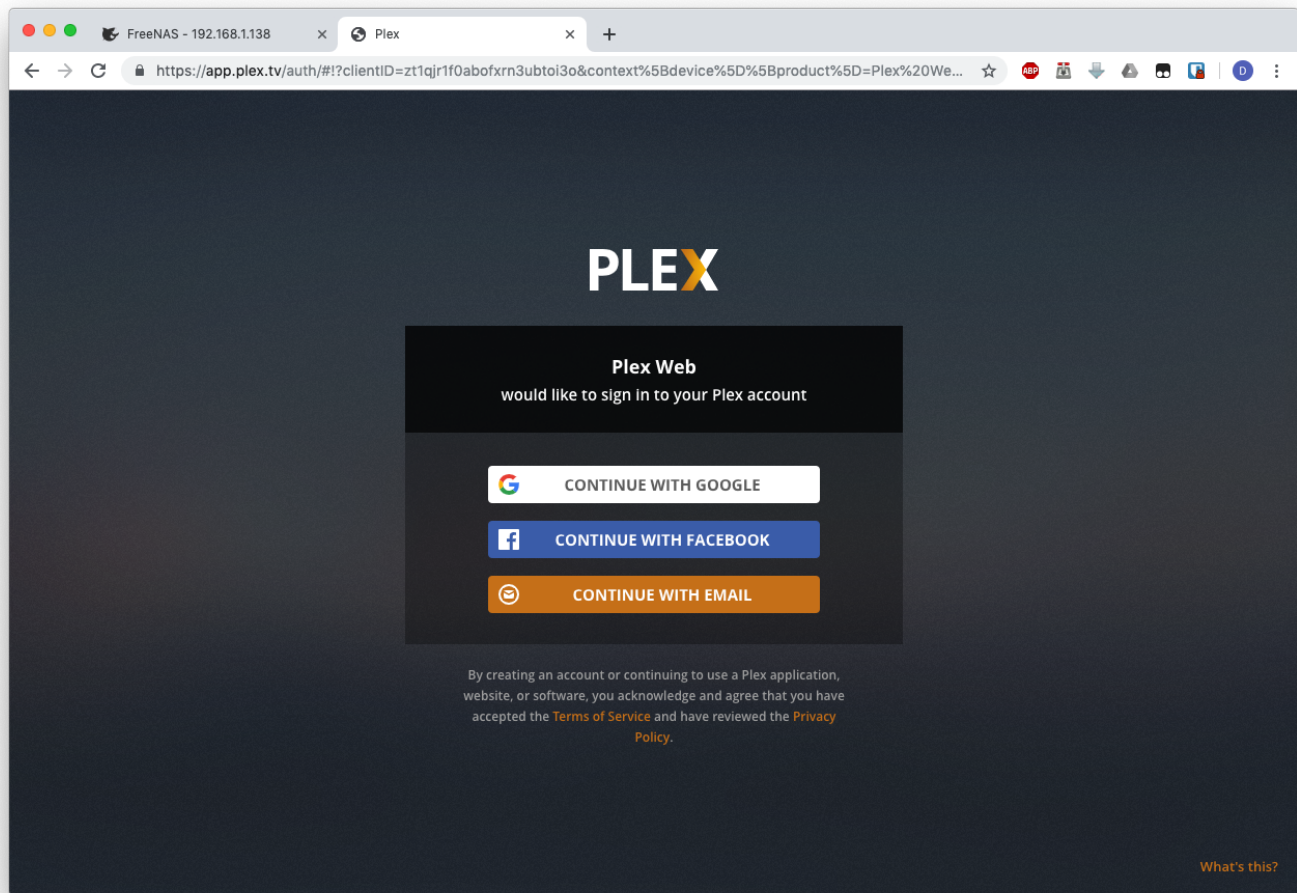
	Status	IPv4 Address	IPv6 Address	Version	Release	
	up	192.168.1.75/24		N/A	11.2-RELEASE-	

1 - 1 of 1

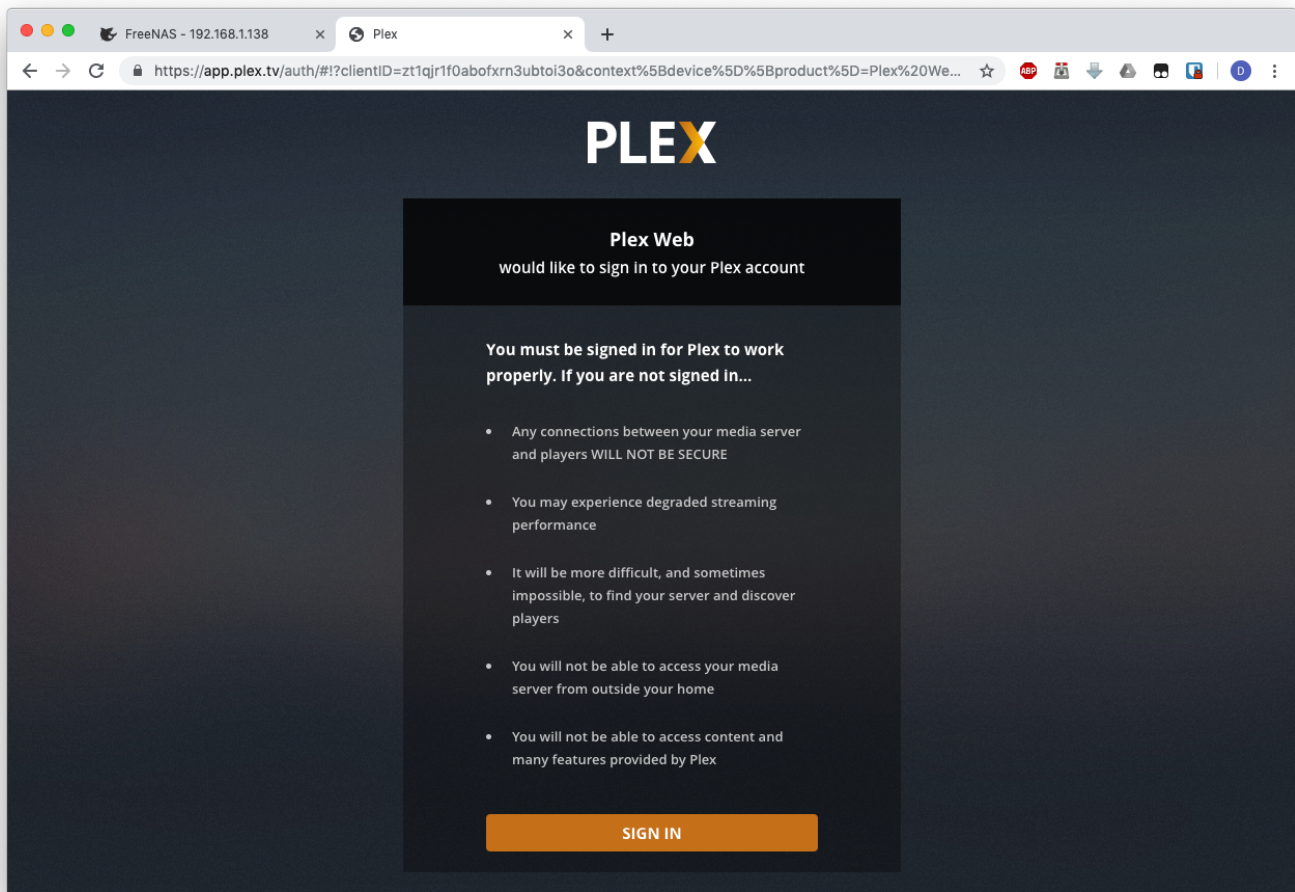
- Restart
- Stop
- Update
- Management
- Delete

Initial Plex Setup

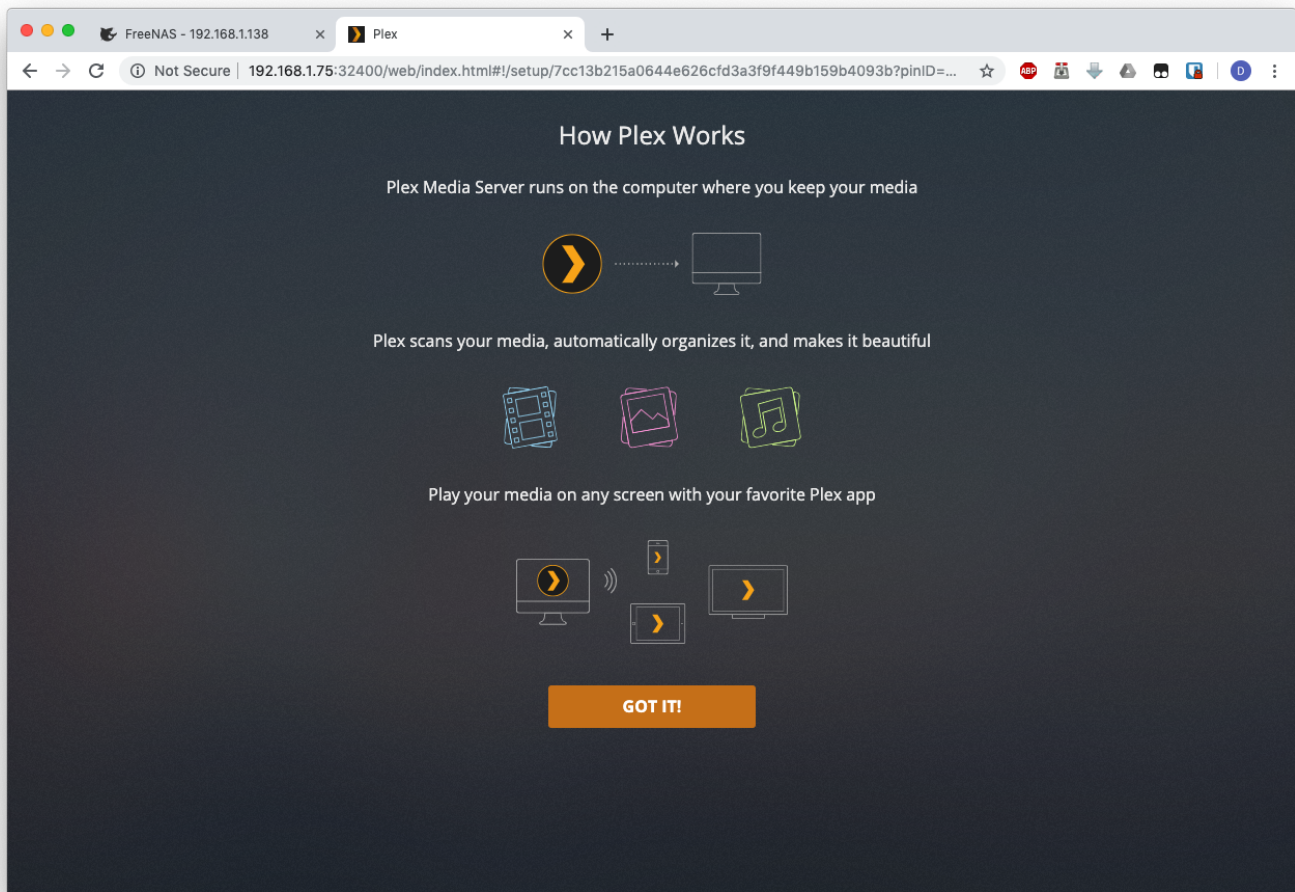
These instructions are current as of 27 May 2019. The Plex interface may change with time. The first time you launch the Plex web interface, it will ask you to log in to your plex.tv account.



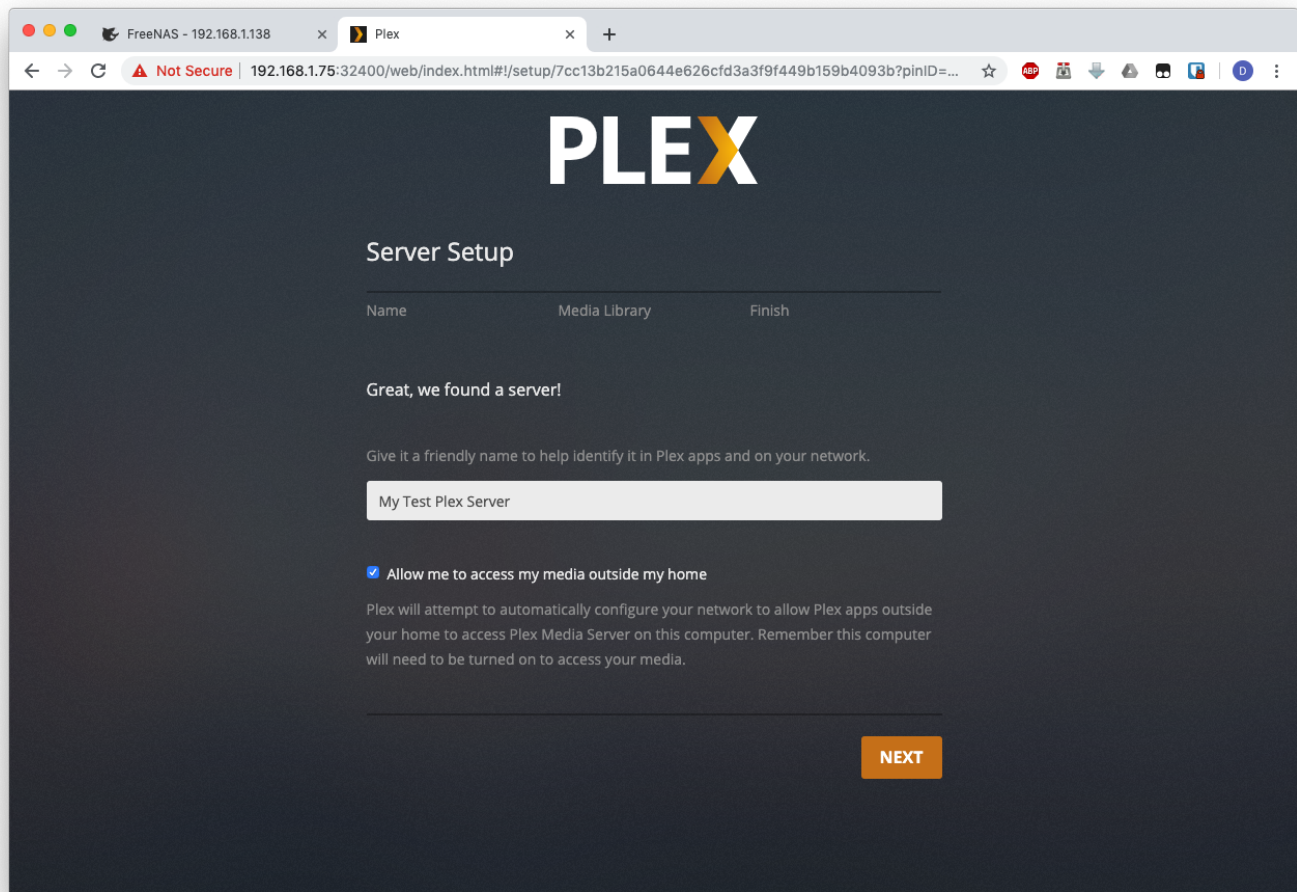
This is not required. To skip this step, click on the tiny text in the bottom-right corner that says "What's this?". You'll see this screen:



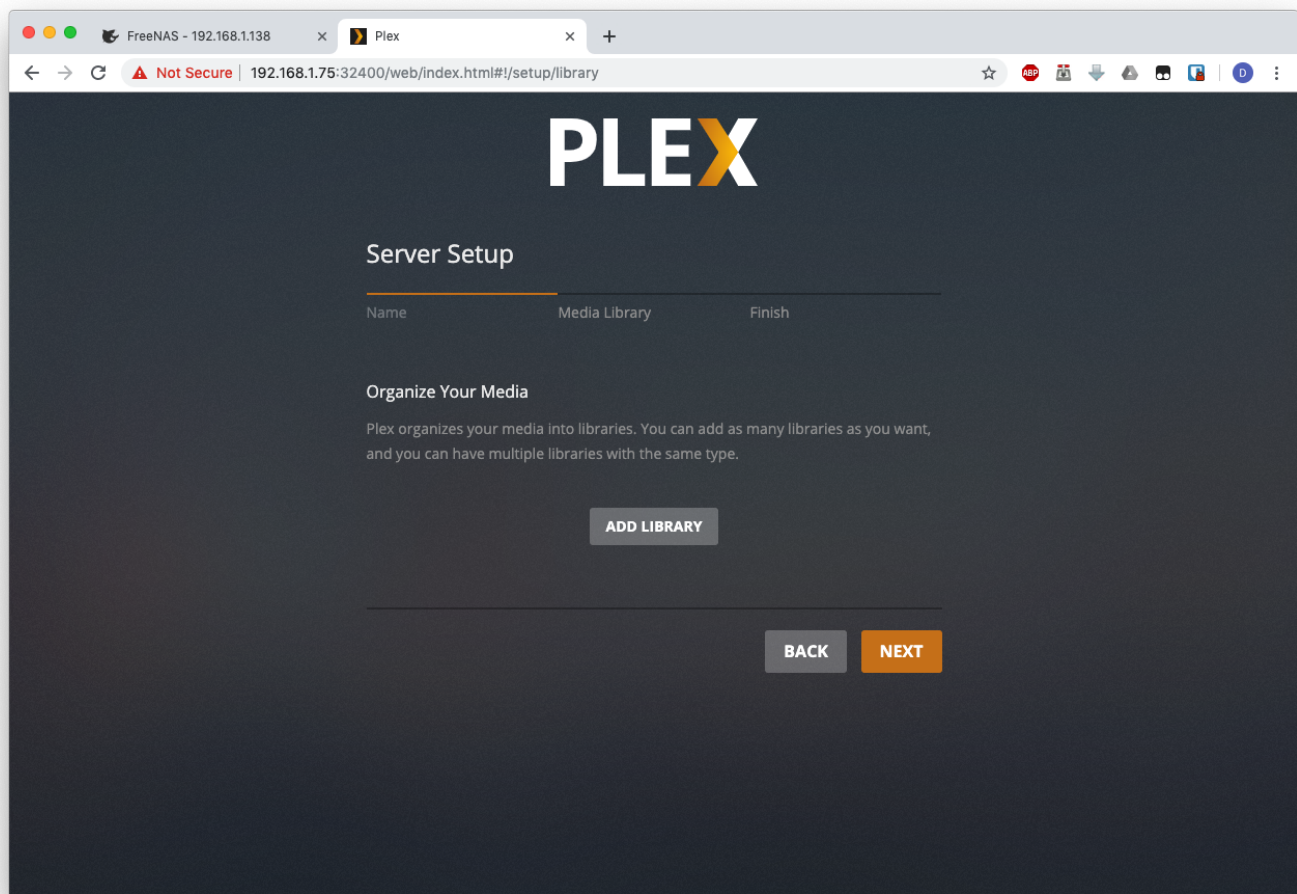
Read the screen and see if you want to register for a free plex.tv account. If not, scroll to the bottom and click on "Skip and accept limited functionality". You'll see a screen explaining how Plex works.



Click "Got it!". You'll see a page explaining the benefits of Plex Pass, which you can close by clicking the X in the upper-right corner.



The next page will ask you to name your server. You can call it anything you like. It will also offer to allow you to access your media outside your home. The security implications of this choice are beyond the scope of this guide. Click “Next” when you're finished.



You'll now be able to set up your media libraries. Click the "Add Library" button to start.


+ Add Library


Select type


Add folders


Advanced


Select your library type


Movies


TV Shows


Music


Photos


Other Videos

Name

Language

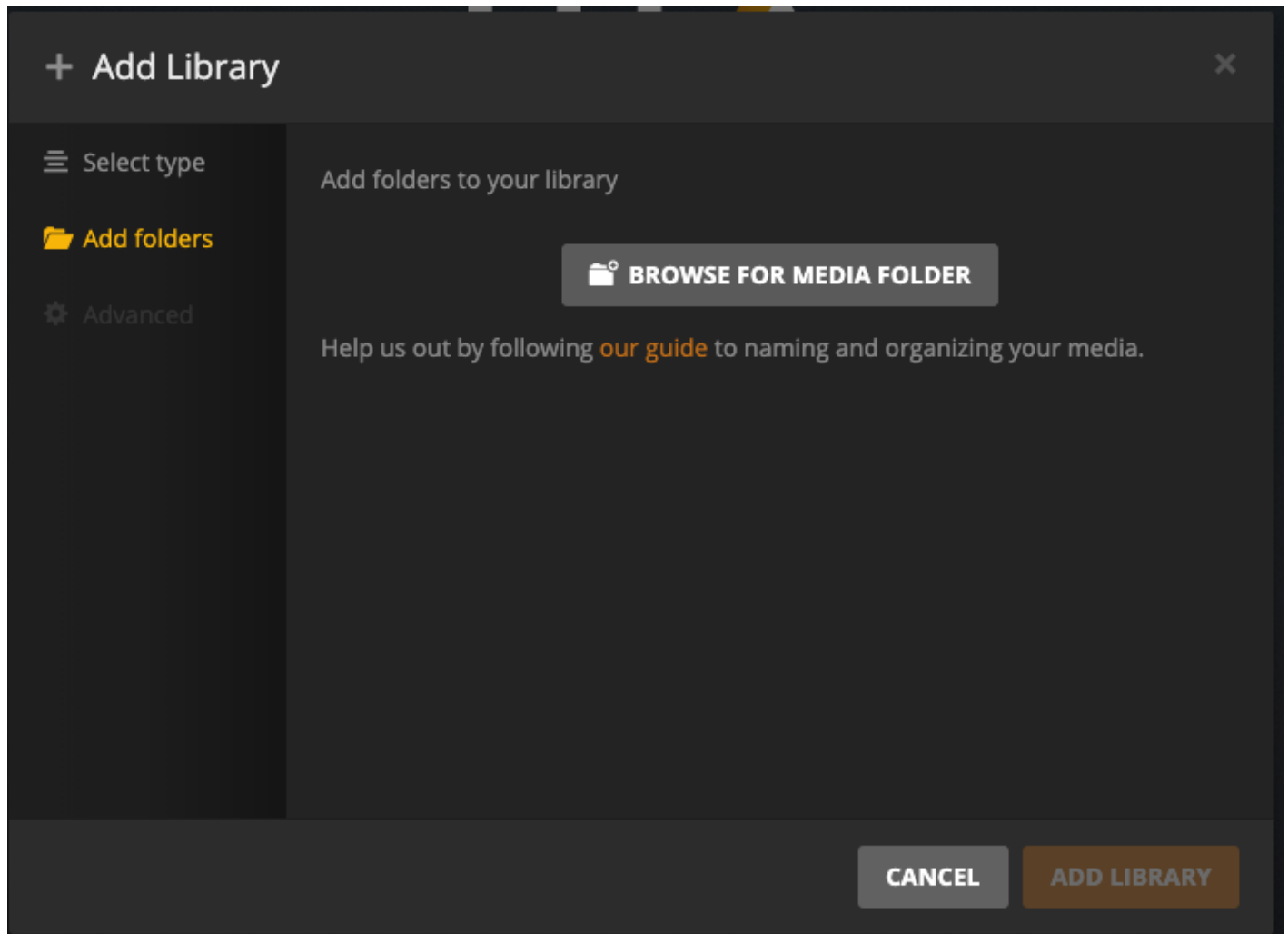
Movies

English

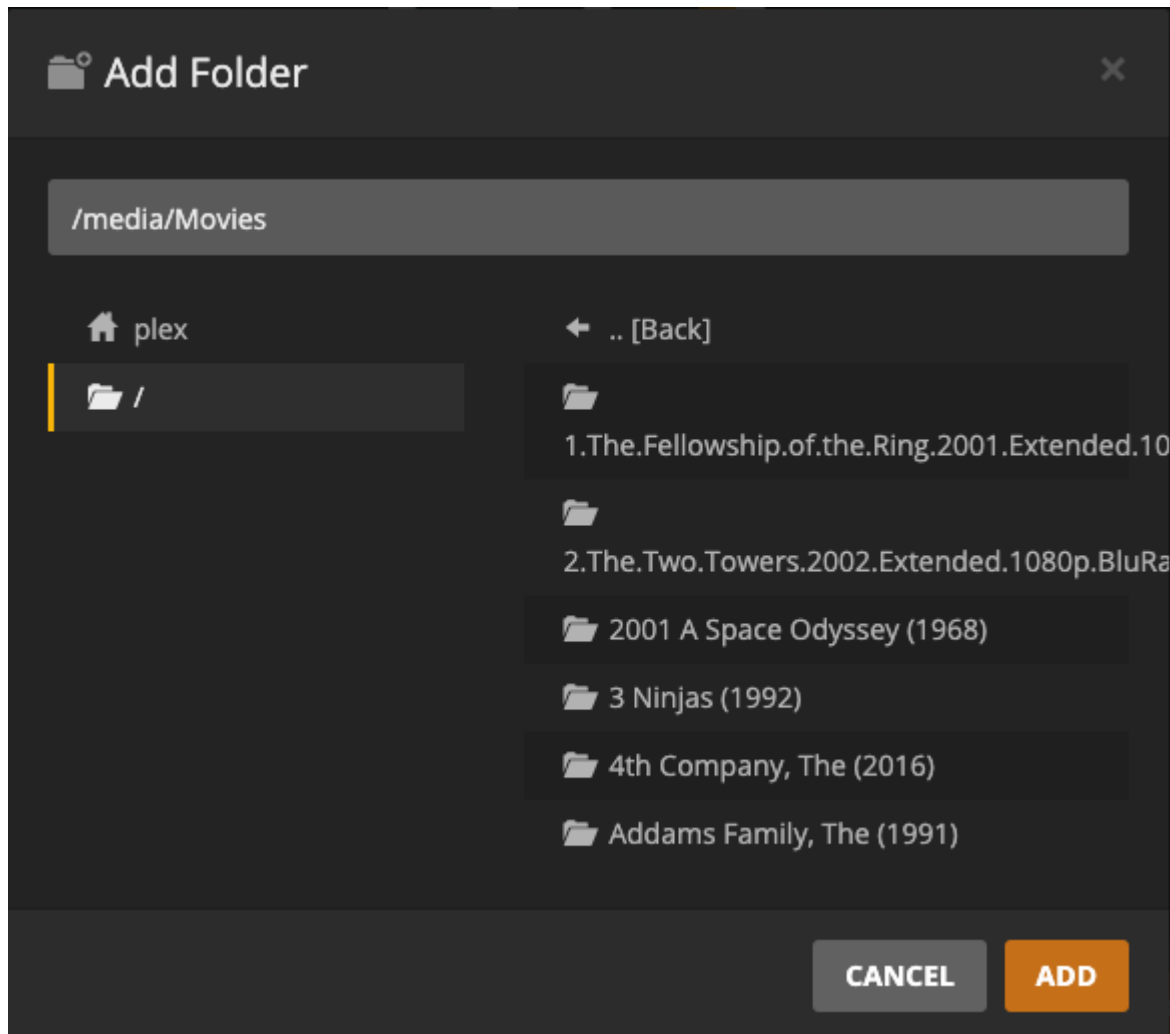
CANCEL

NEXT

Select the media type. For this example, I'll use movies. Name the library and select your language, and click "Next" when you're finished.



Now you'll need to add one or more folders to this library. If you've followed the instructions above, we'll need to add `/media/Movies`. Begin by clicking "Browse for media folder".



Then click to browse to the desired location. If you prefer, you can just type it in at the top of this window. Click “Add” when you've found it. Repeat as necessary to add more folders to this library, if desired. Click the “Add Library” button when you're finished.

Server Setup

Name


Media Library



Finish

Organize Your Media

Plex organizes your media into libraries. You can add as many libraries as you want, and you can have multiple libraries with the same type.

ADD LIBRARY

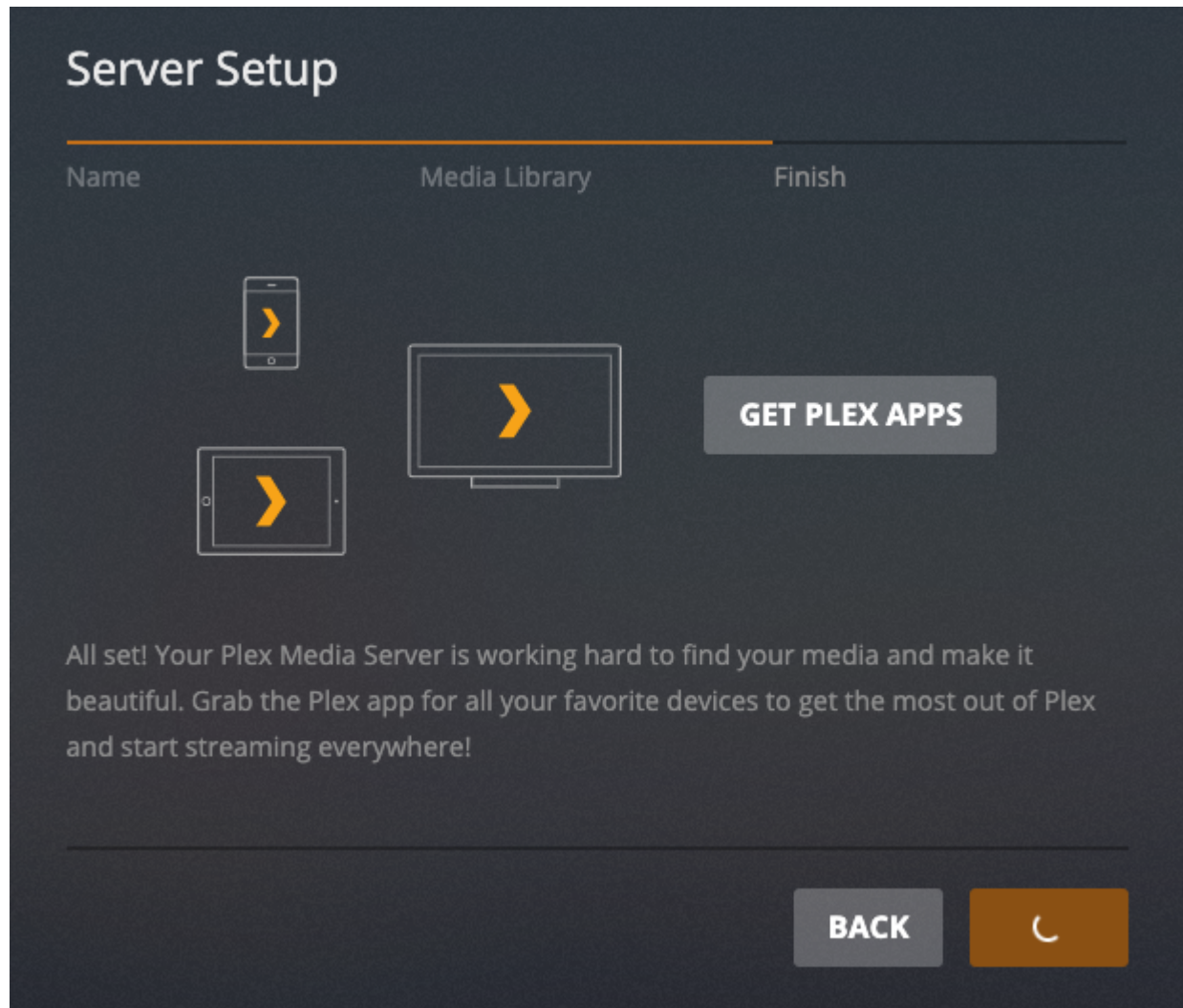
 Movies

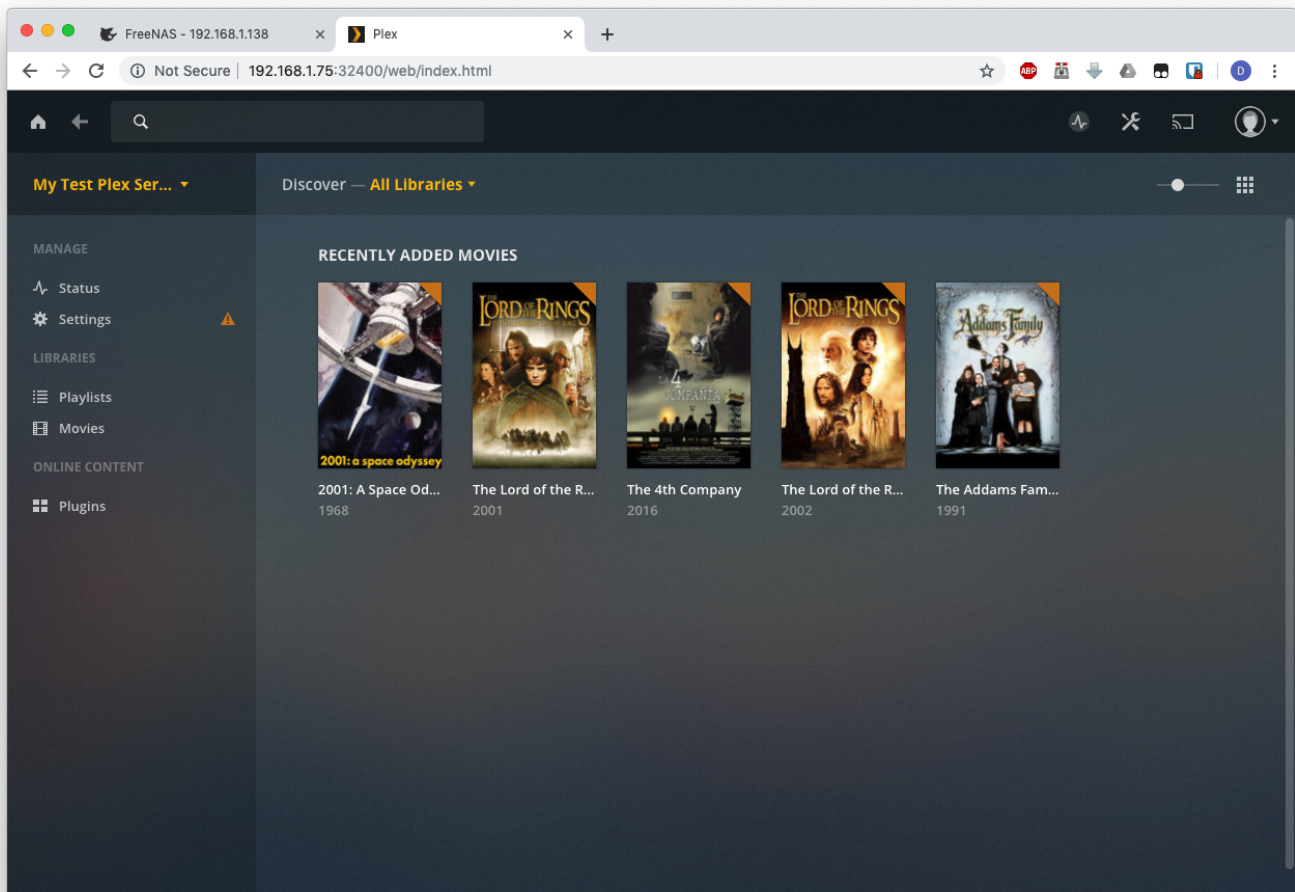
BACK

NEXT

You can add further libraries here (TV, Music, etc.) if desired. Click “Next” when you're done adding libraries.



The system will take a few minutes to set up the server. Once it finishes, you'll see the home screen.



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Permanent link:
https://www.familybrown.org/dokuwiki/doku.php?id=fester112:jails_plex

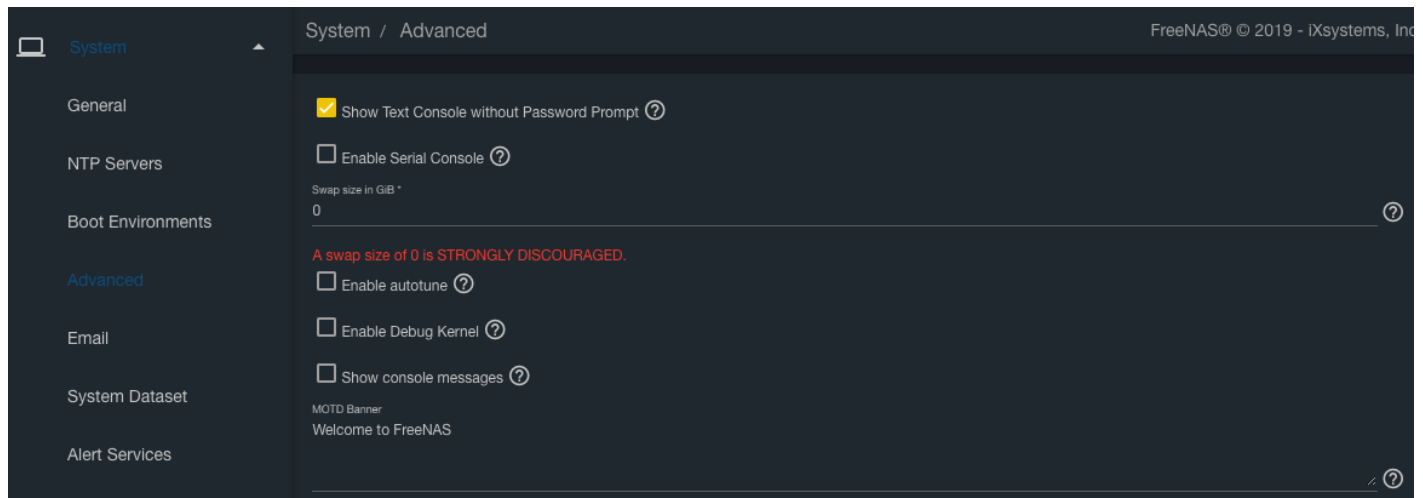
Last update: **2019/05/27 14:44**



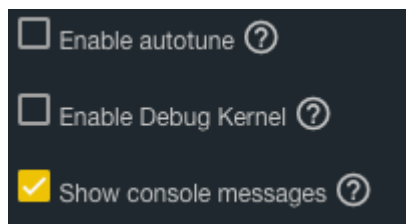
Enabling Console Messages in the Footer of the Web GUI

It can be very useful to enable this function in the FreeNAS web GUI as it gives important messages at the bottom of the page that can help steer you in the right direction when a problem exists.

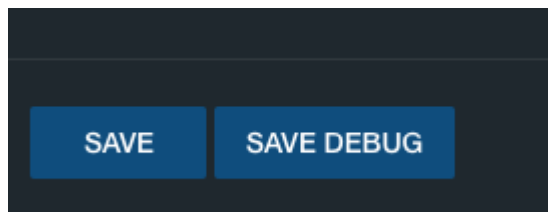
If you want to enable this, click on “System in the left column, then “Advanced”.



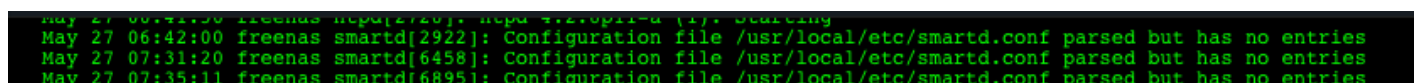
Now put a tick in the tick box next to the “Show Console messages” entry.



Now scroll down the page and click on the “Save” button.



At this point a little text window should appear at the bottom of the FreeNAS web GUI with green text in it, something like this.



That's it. If you click on the small green text area, it will expand to nearly fill your browser window.

Fester changes a couple of other settings whilst in this page but they are not essential and entirely optional. Here they are if you want to use them.

You can type a message in the “MOTD Banner” text box to personalise your server.

As some of you may have already realised, Fester is quite the ladies man and for a paltry fee my book on seduction techniques can be purchased directly from Fester. Here is a short excerpt.

- At no point during courtship should chloroform be involved.
- Do not refer to your girlfriend as “Number 1 f#@k buddy”, apparently it is not romantic.
- Traditionally it is the woman who wears the stockings in the bedroom.

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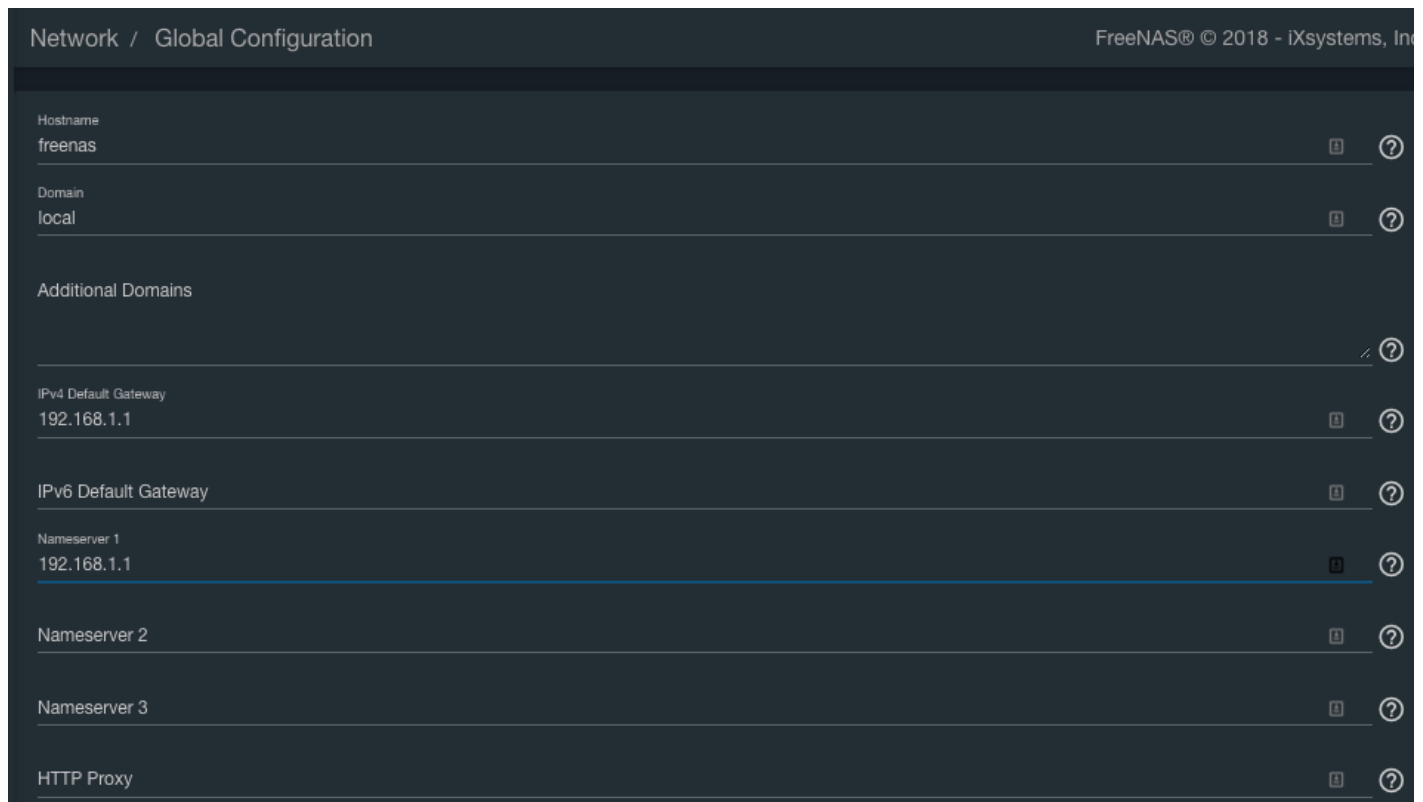
<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:messages>

Last update: **2019/05/27 11:55**



Network Global Configuration

Click “Network” in the left column, then “Global Configuration”.



- Give your server a name by typing into the “Hostname” text box.
- Your server will most likely be on your private network behind the router so the “Domain” should be “local”.
- Input the Default Gateway IP address of your private network into the “IPv4 Default Gateway:” text box (in Fester’s case this is 192.168.1.1).
- In the Nameserver 1:” text box put in the IP address of your ISPs Primary DNS server. You should be able to get this from your router or the ISPs website.
- In the Nameserver 2:” text box put in the IP address of your ISPs Secondary DNS server.
- In the Nameserver 3:” text box put in the IP address of your ISPs Tertiary DNS server. Not all ISPs have a third DNS server so leave it blank if this is the case.
- Now click the “Save” button.

If you do not know, and cannot find, the IP addresses for your ISP's DNS servers, you can use Cloudflare's Public DNS servers. Use 1.1.1.1 for the primary DNS server, and 1.0.0.1 for the secondary.

The server can now find the Primary and Secondary DNS servers. This means web addresses (URLs) can now be resolved to IP addresses.

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<https://www.familybrown.org/dokuwiki/> - **danb35's Wiki**

Permanent link:

<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:networkglobal>

Last update: **2019/05/26 23:26**



Barrier Methods of Protection (Personal Firewalls)

Fester approves of barrier methods of protection and so has always installed a personal software firewall on his computer (not the server, just the client computer).

Don't get confused, I am not referring to the firewall built into your router but an additional software firewall that you install on a personal computer.

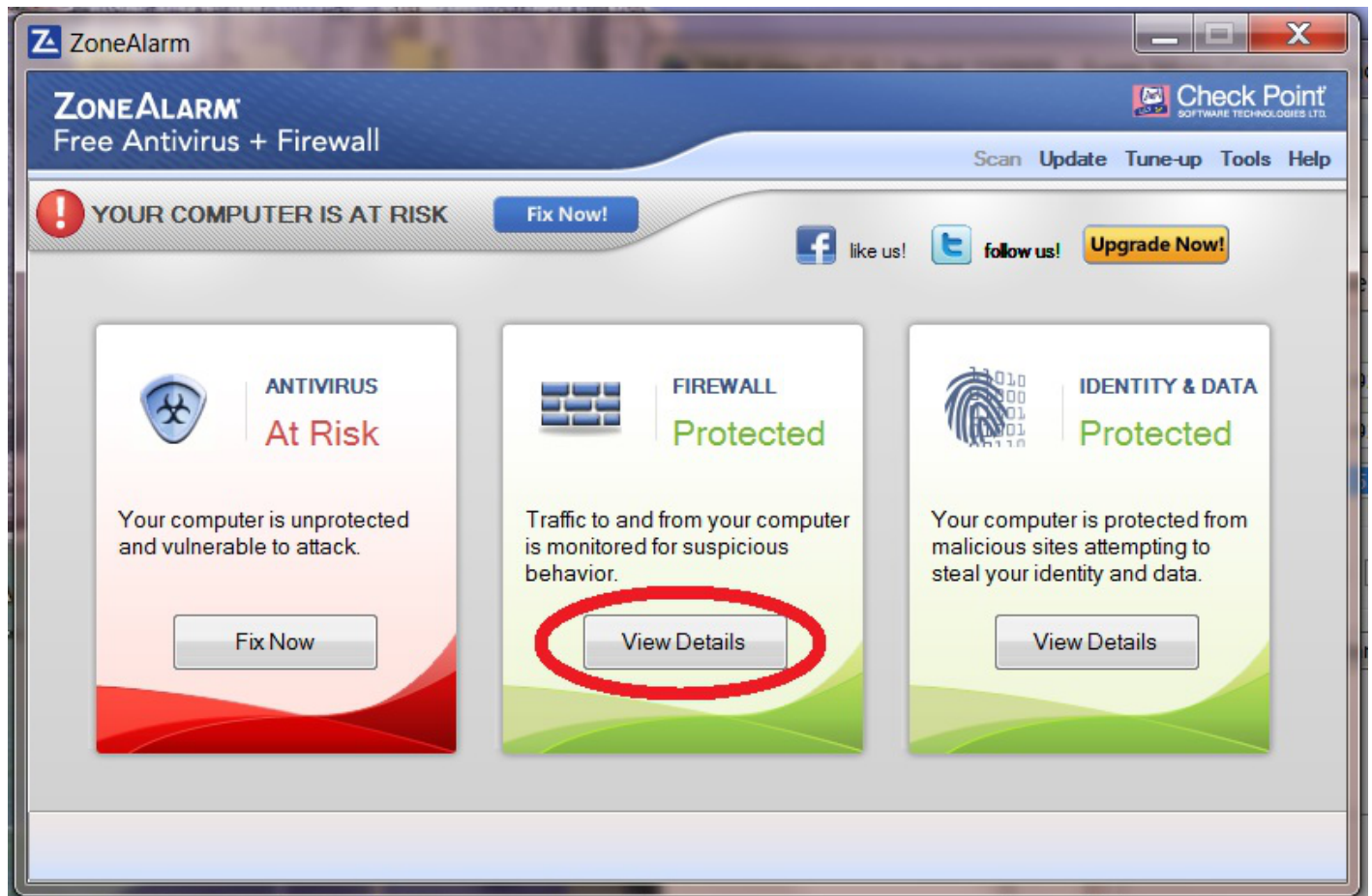
This software firewall will stop any shares created on your server from working on the client. Therefore, we must configure the software firewall to allow the server and client to share nicely.

After much experimentation (netbios names, etc) I got more consistent results by specifying an IP address range within the firewall software that corresponded to the IP address range used by the server.

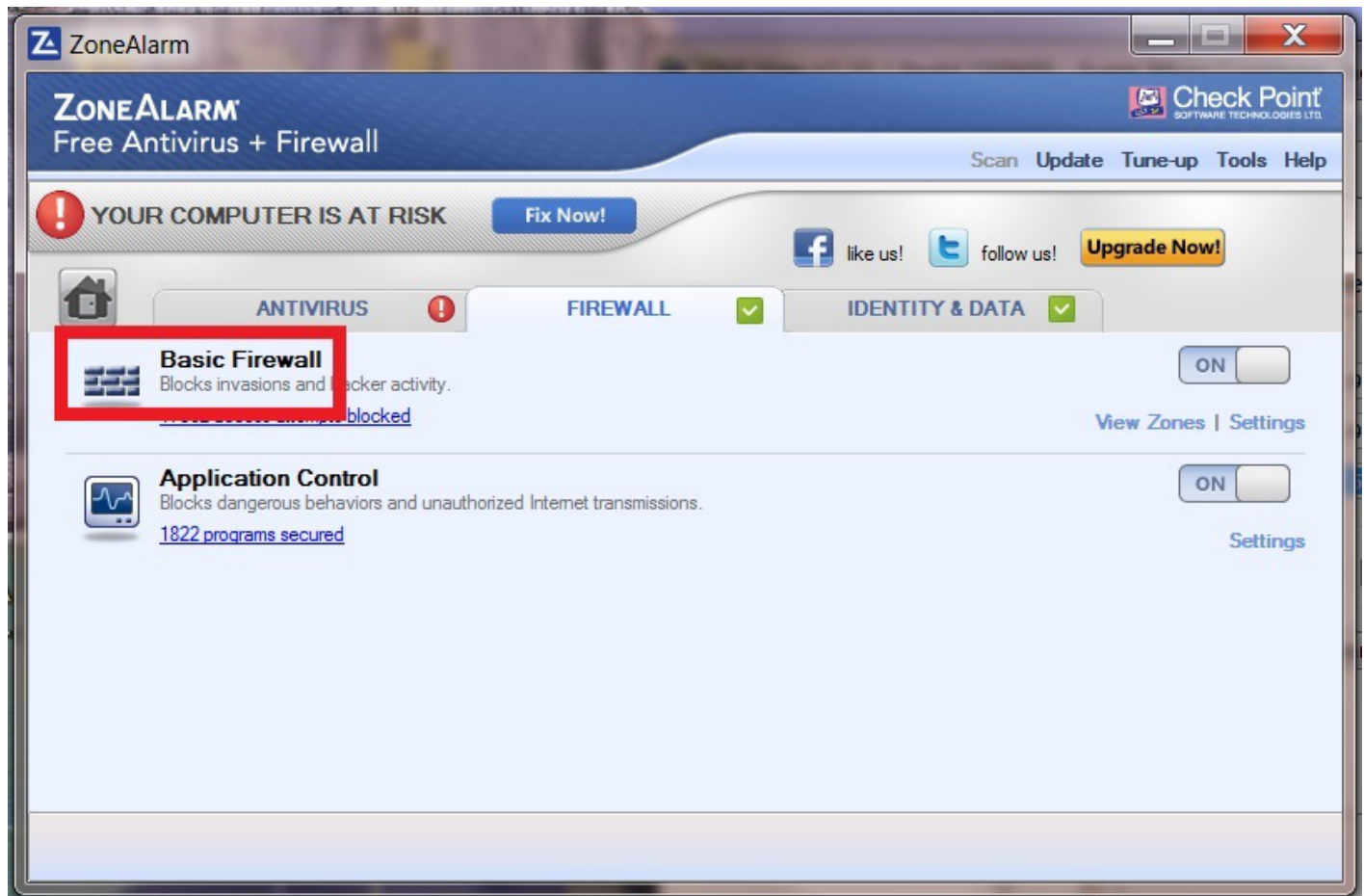
Fester's server IP address range goes from 192.168.0.2 - 192.168.0.49. If we tell the firewall to trust this range of IP addresses then all will be well.

I use Zone Alarm (you might use something different, but the principle will be the same). Here is how to set it up.

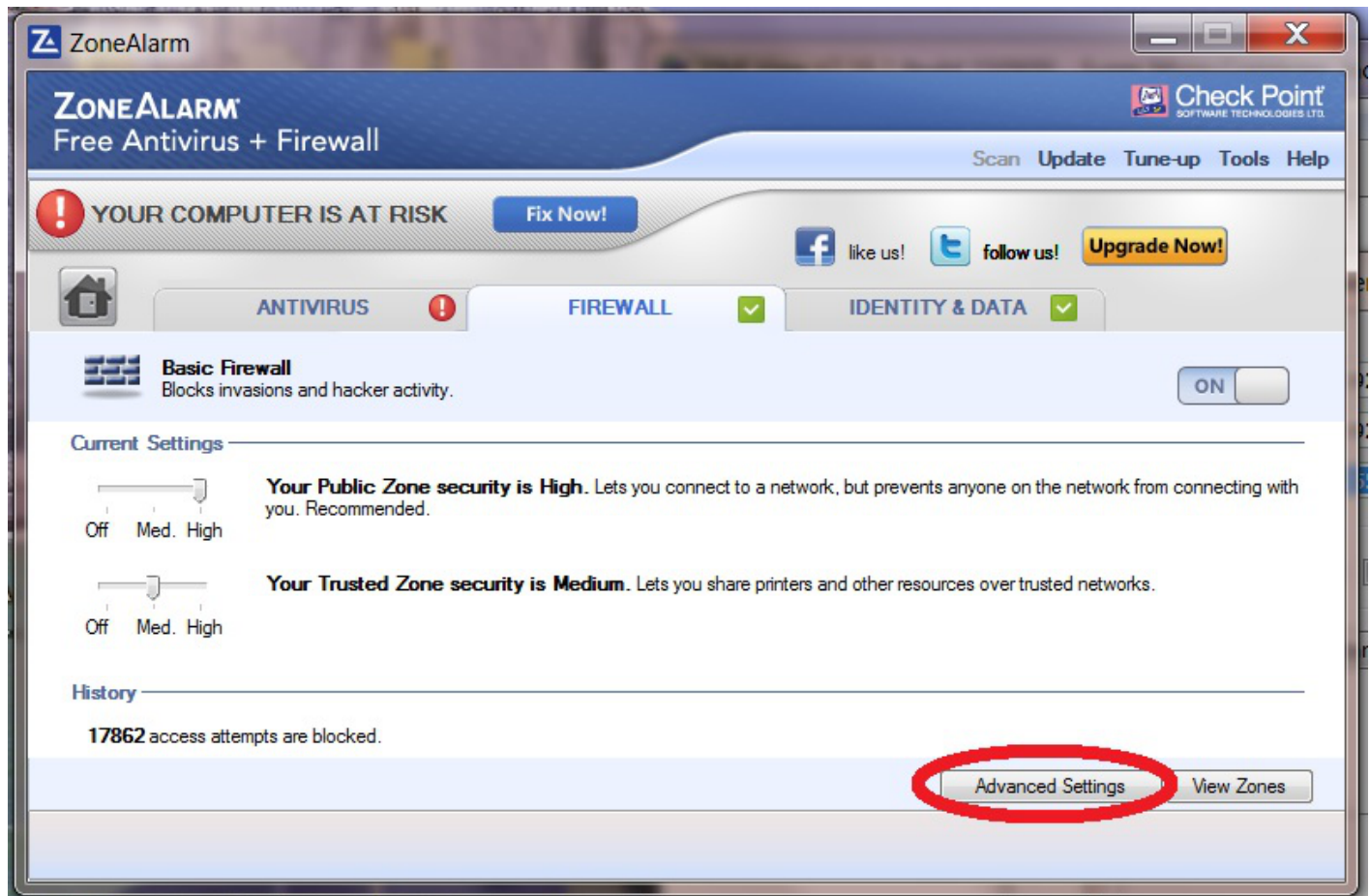
Open Zone Alarm and click "View Details" under firewall.



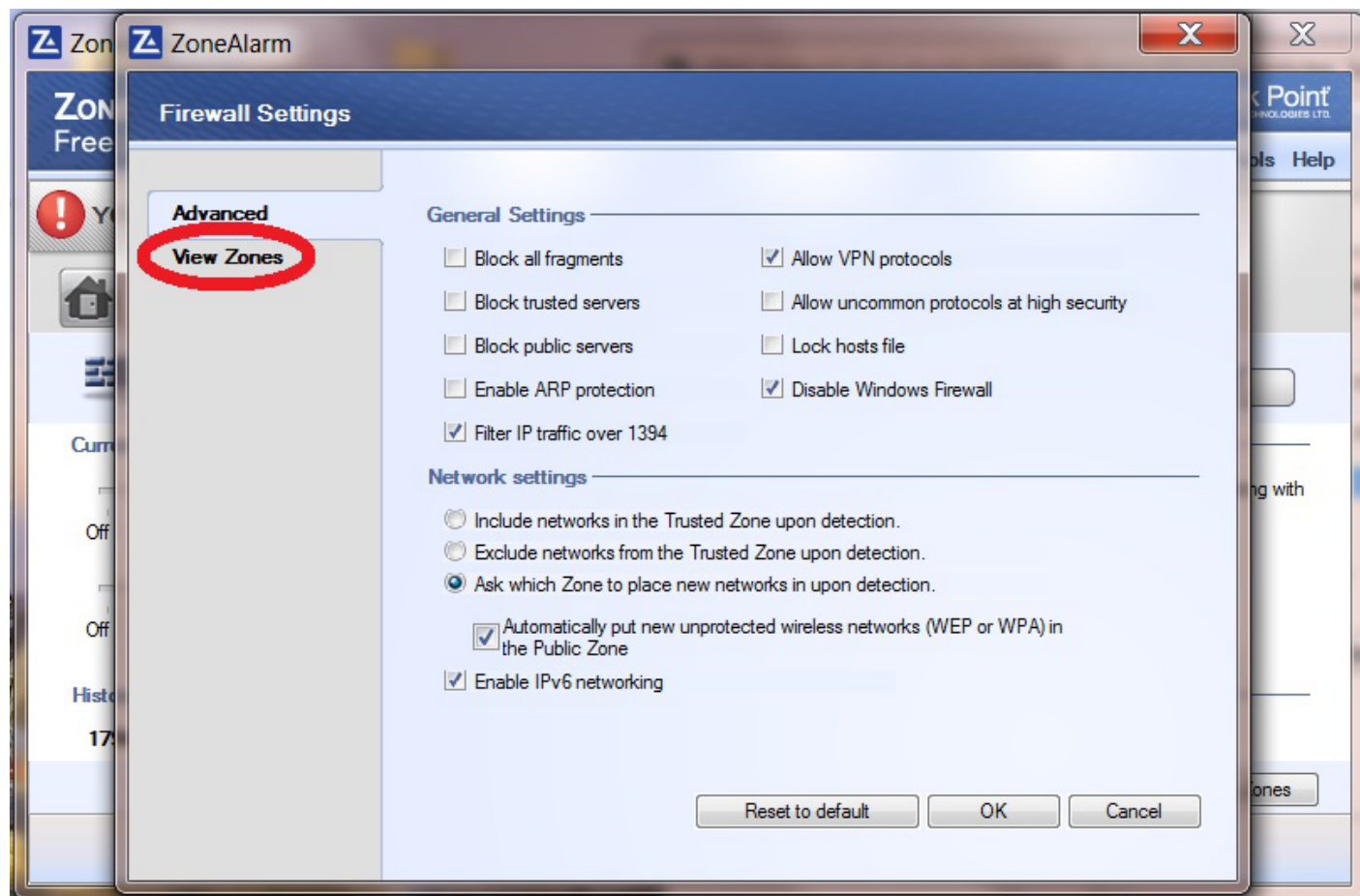
Now click on “Basic Firewall”.



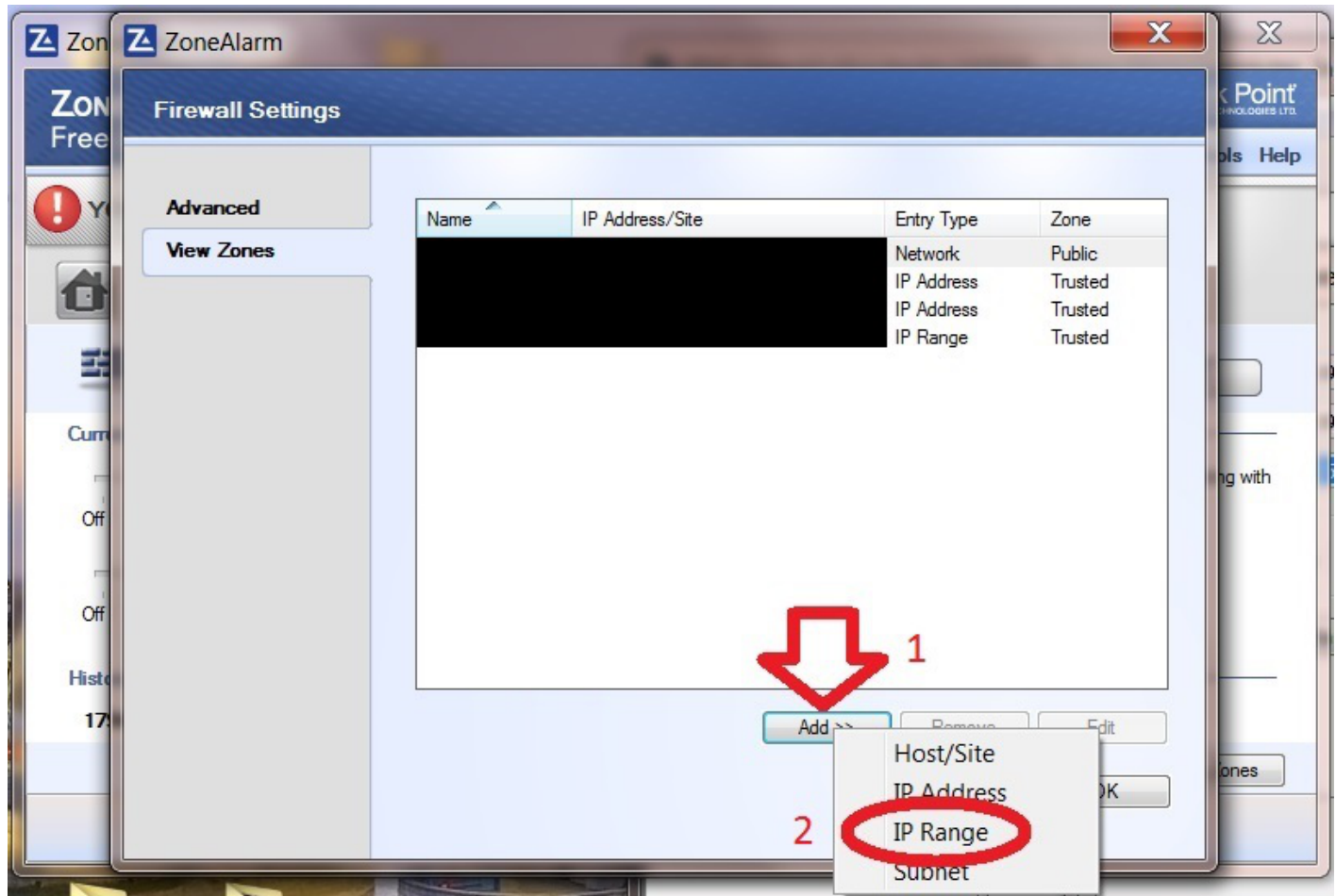
Now click on “Advanced Settings”.



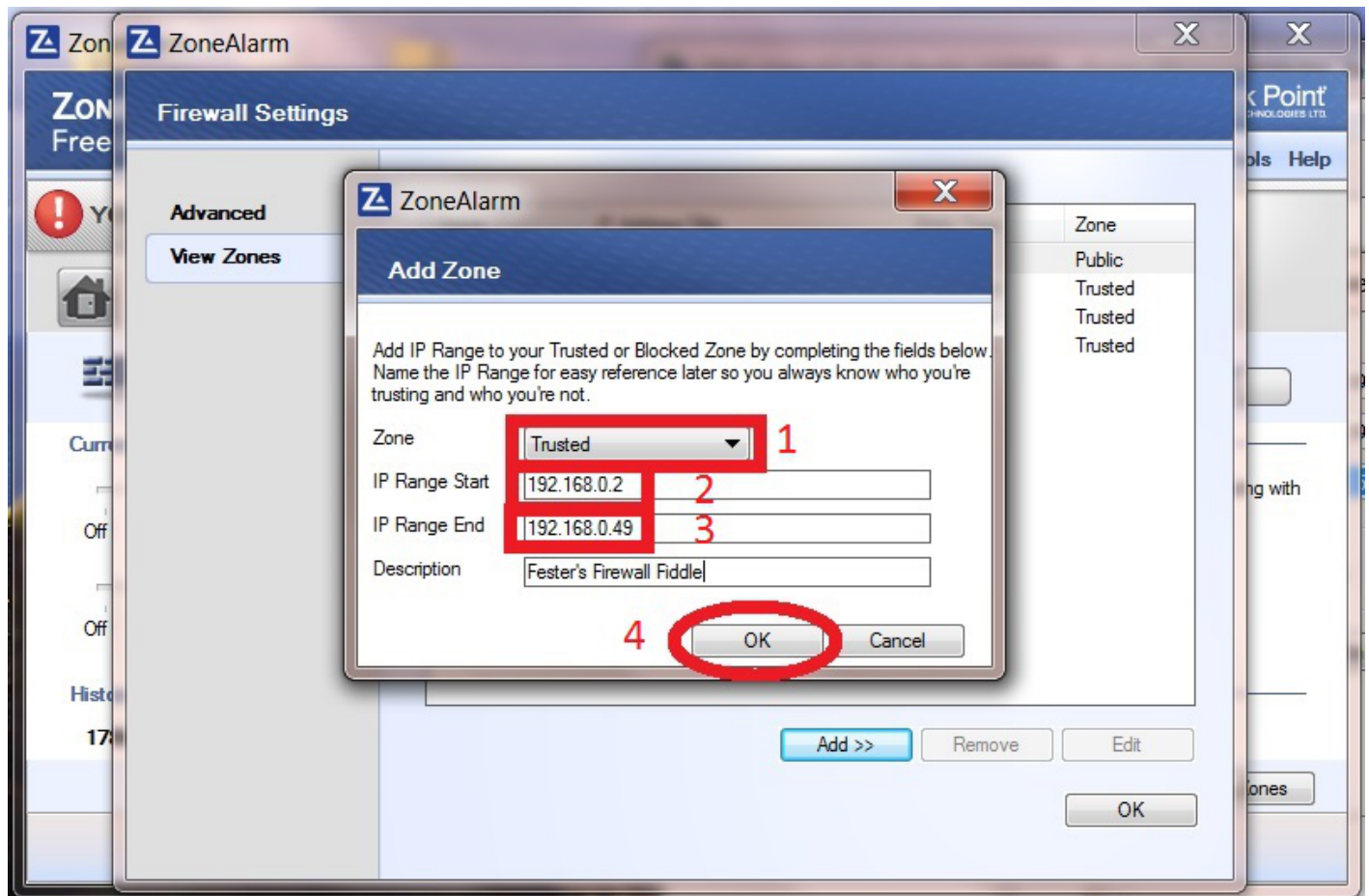
Click on "View Zones".



Click on "Add" (1) and chose "IP Range" (2).



Set the drop down selection box next to "Zone" to "Trusted" (1). Enter the first IP address of your server's IP address range in the "IP Range Start" text box (2) and then enter the last address in your server's range in the text box labelled "IP Range End" (3). Call it something meaningful in the "Description" text box and press OK (4).



That should be the firewall configured.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:prelim_barrier

Last update: **2016/06/08 10:21**



Configuring the BIOS

We now need to configure the BIOS of the server motherboard.

You can do this via a keyboard and monitor attached to the server or through IPMI as outlined in a previous section.

The settings and screen shots are all taken from a Supermicro X10SRH-CLN4F, but most are applicable to most server motherboards (I would imagine).

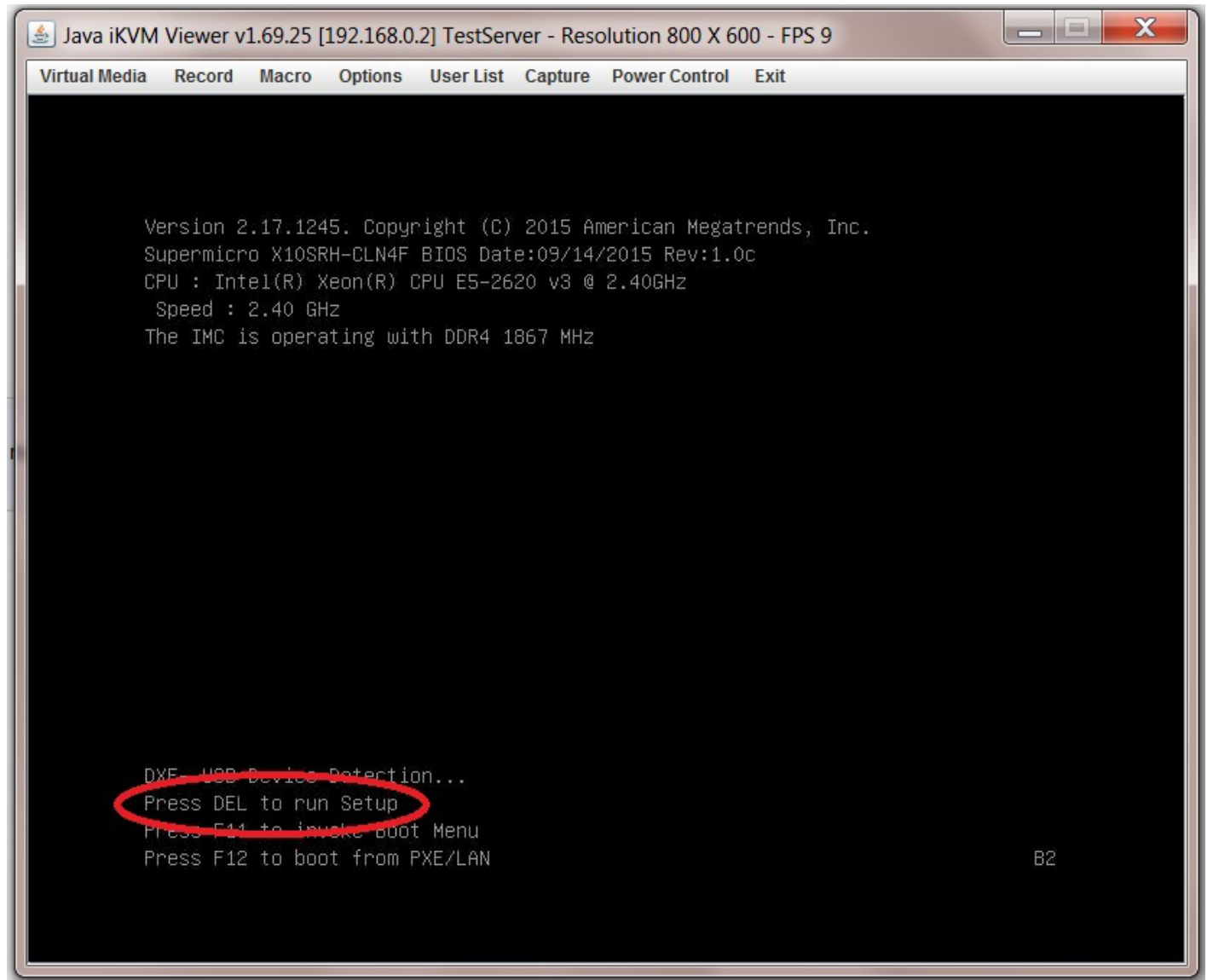
Getting Into Your BIOS

In order to gain access to the motherboard's BIOS the user is required to press a certain key at a certain point in time (usually as the POST messages are displayed).

Consult your motherboard documentation to find out how to gain access to your motherboard's BIOS.

On Fester's motherboard it is done by pressing the "DEL" key at a specific point.

Incidentally, motherboards usually display a screen at some point during the POST process that tells you what key to press, something like this.



When you have access to the BIOS it's time to configure it.

Most BIOS settings are navigated using the " $\leftarrow \rightarrow \uparrow \downarrow$ " keys.

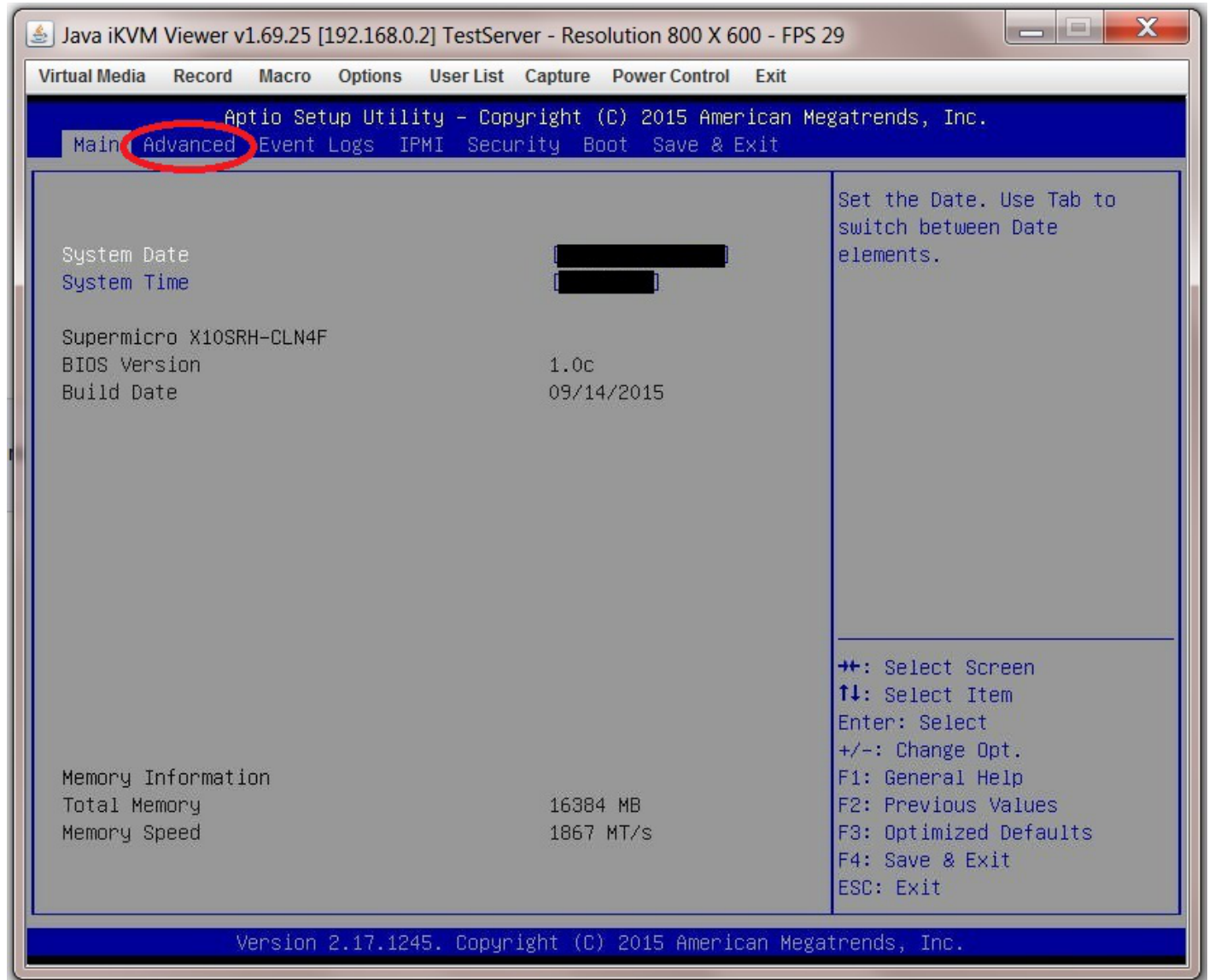
BIOS Settings

Quiet Boot

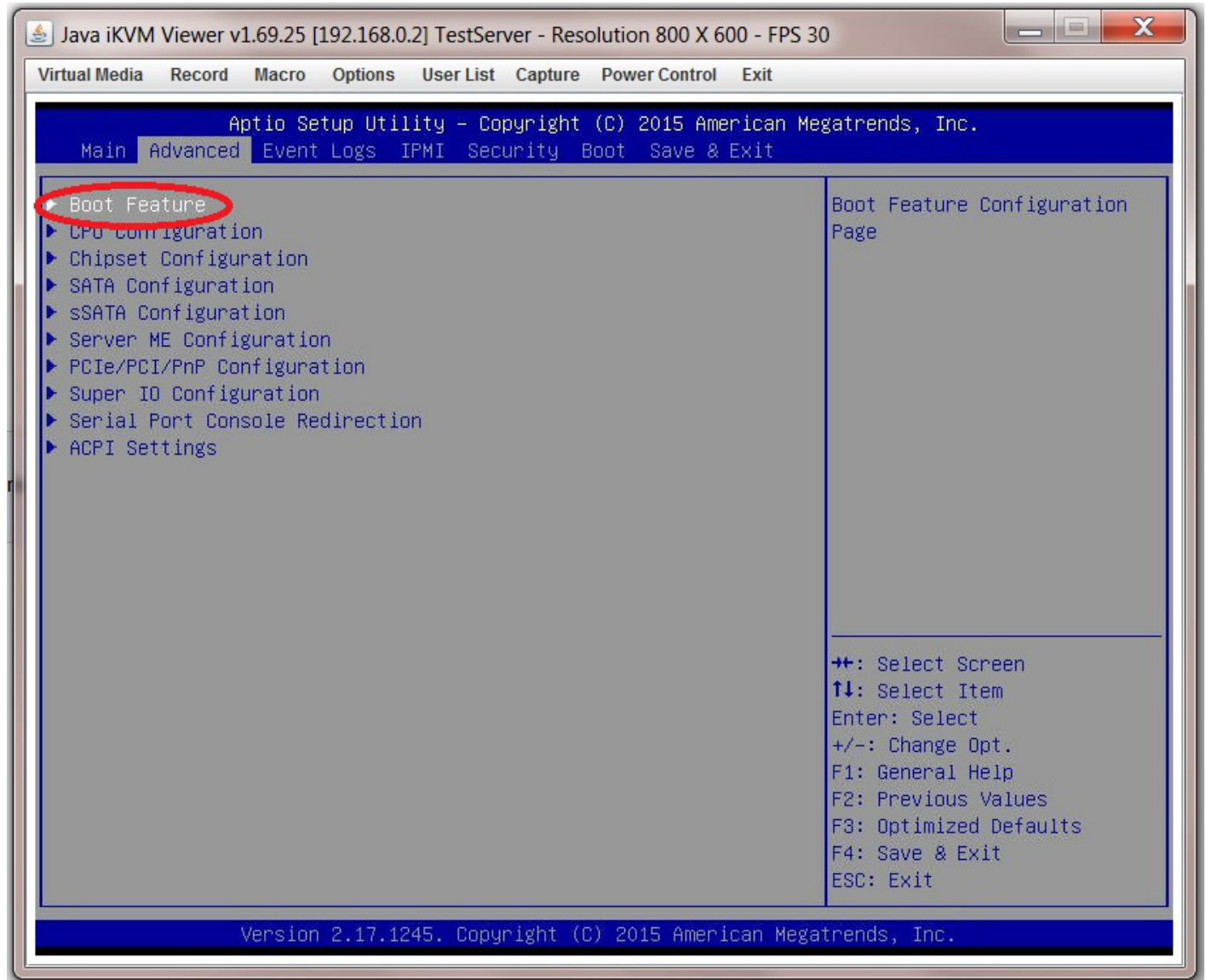
This setting is entirely optional.

It determines if POST messages are displayed on screen or a graphic logo (so the POST messages are hidden from view) when you first turn on the server. Fester likes to see the POST messages so I disabled this function.

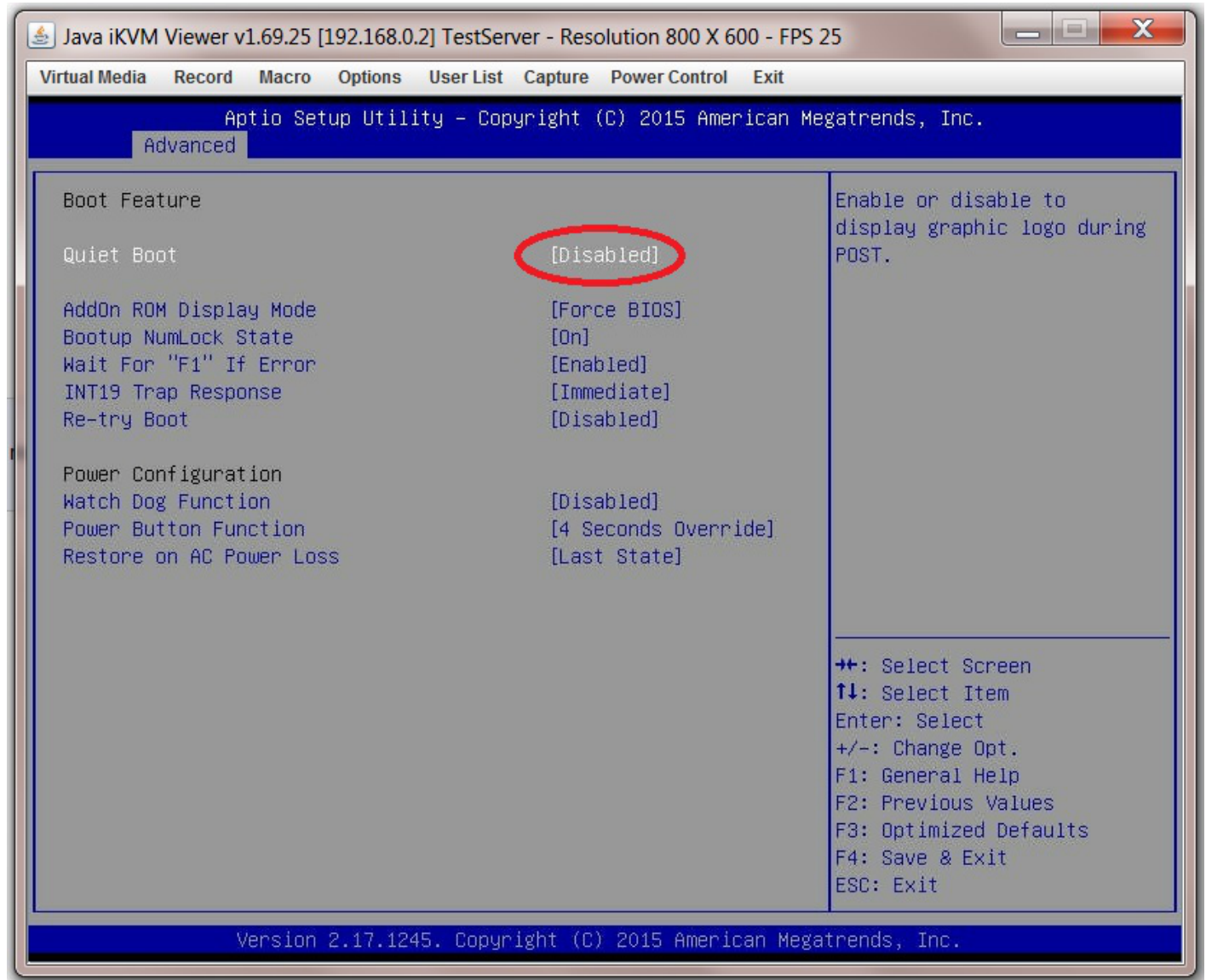
Navigate to the "Advanced" page.



Select the submenu "Boot Feature".



Now go to "Quiet Boot" and select "Disabled".

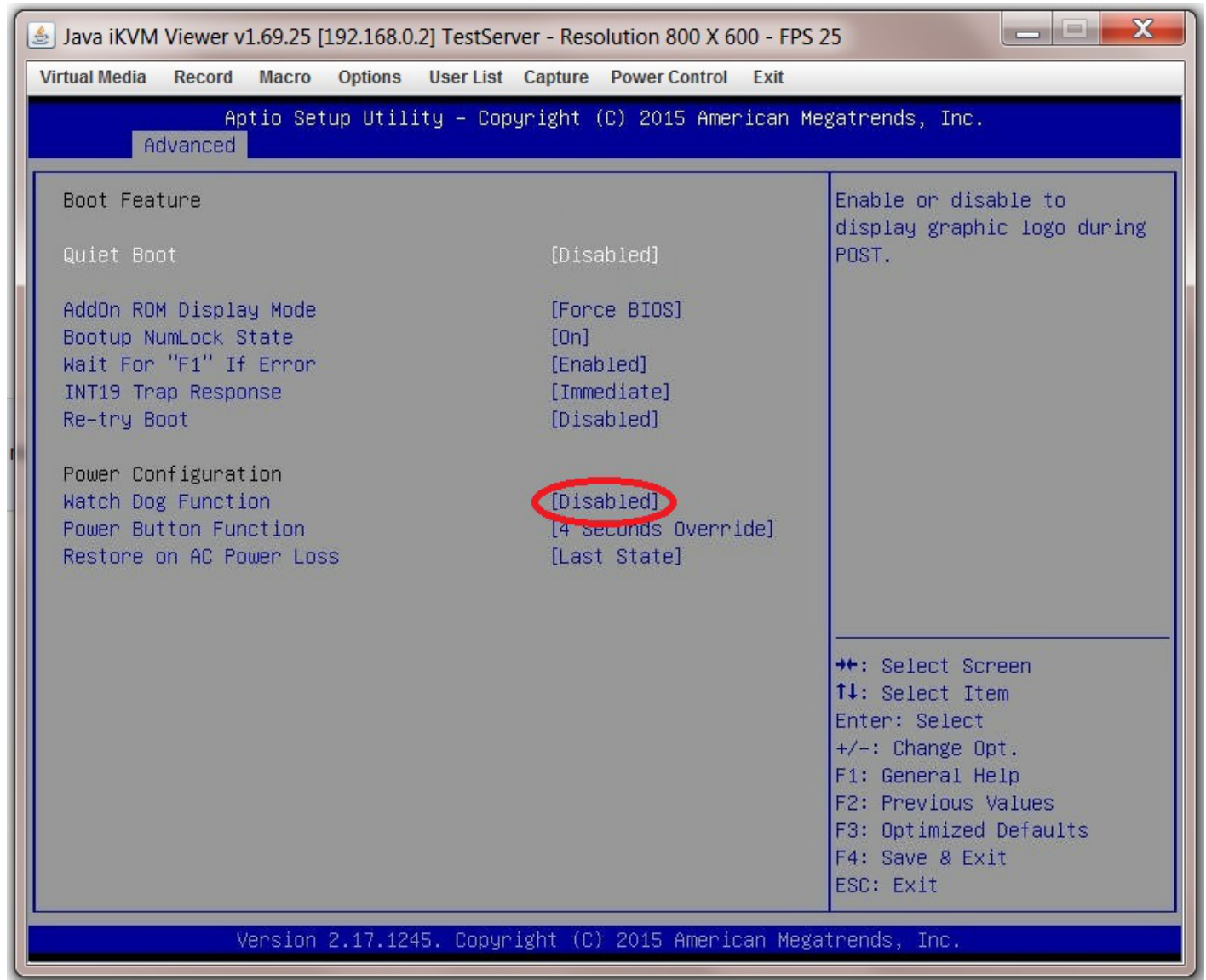


Watch Dog Function

Remain in the “Advanced → Boot Feature” page and select “Watch Dog Function”.

The watch dog function serves to reboot the server if it experiences an error it cannot recover from (and so hangs) for more than 5 minutes. It works by starting a 5 minute count-down timer when the server hangs. When this timer reaches zero the system is forced to reboot.

When I first tried this in FreeNAS it caused my system to spontaneously reboot every 5 minutes even though the system was not hanging, so I disabled it.

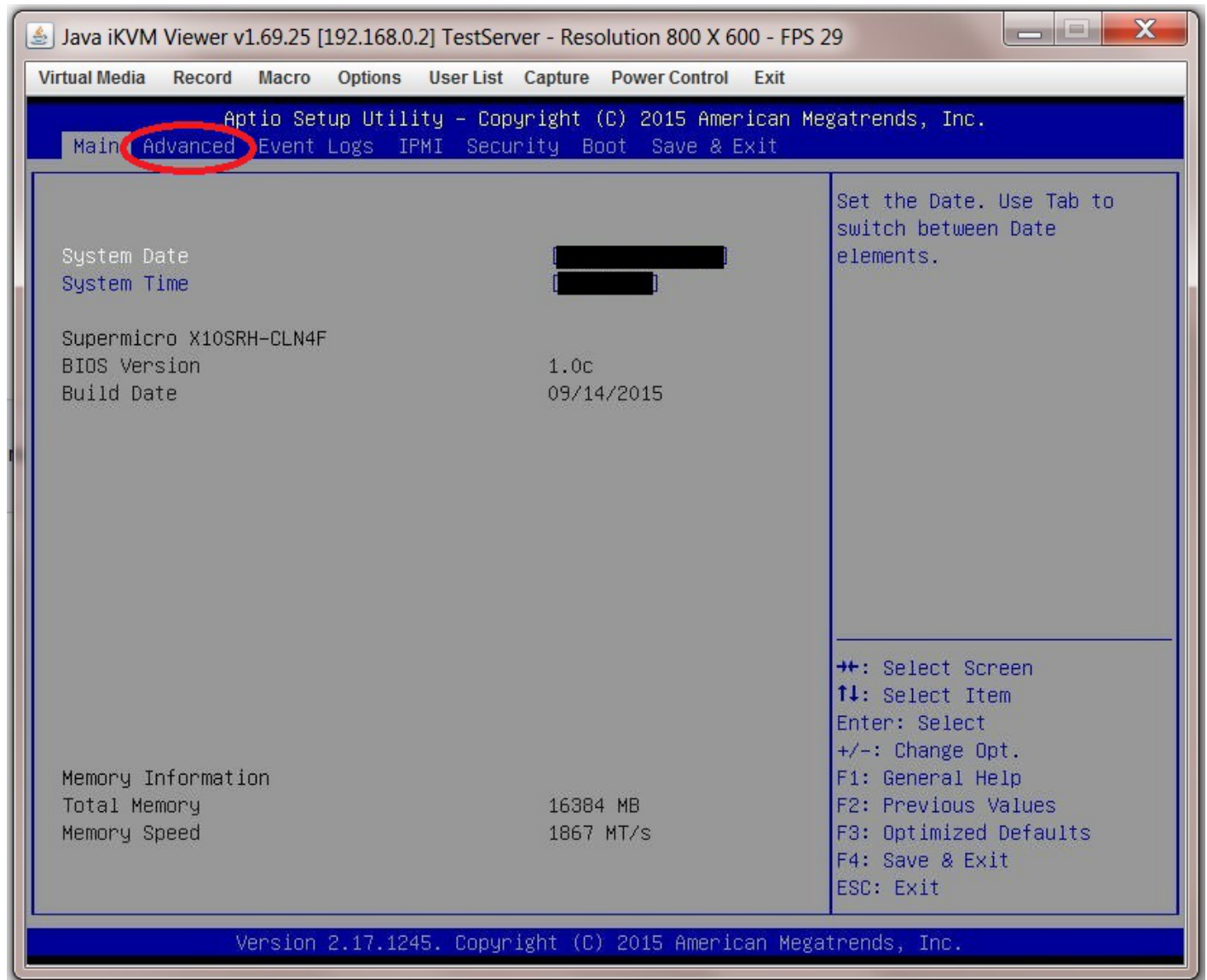


AES-NI Encryption

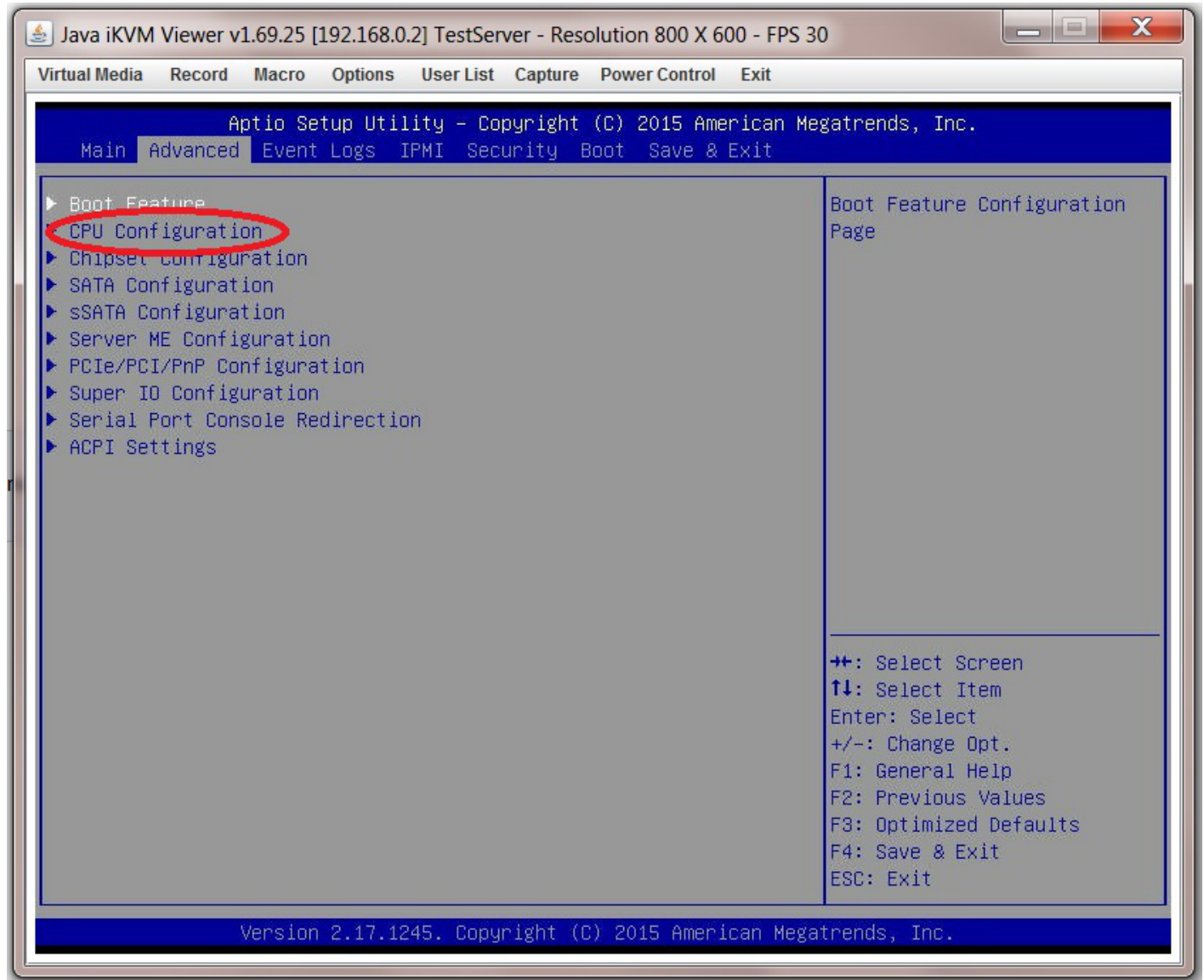
If you intend to encrypt the information on your storage drives then you need to enable this in the BIOS.

This can be useful as it allows a failing HDD in a vdev to be discarded without worrying about wiping the information before disposal.

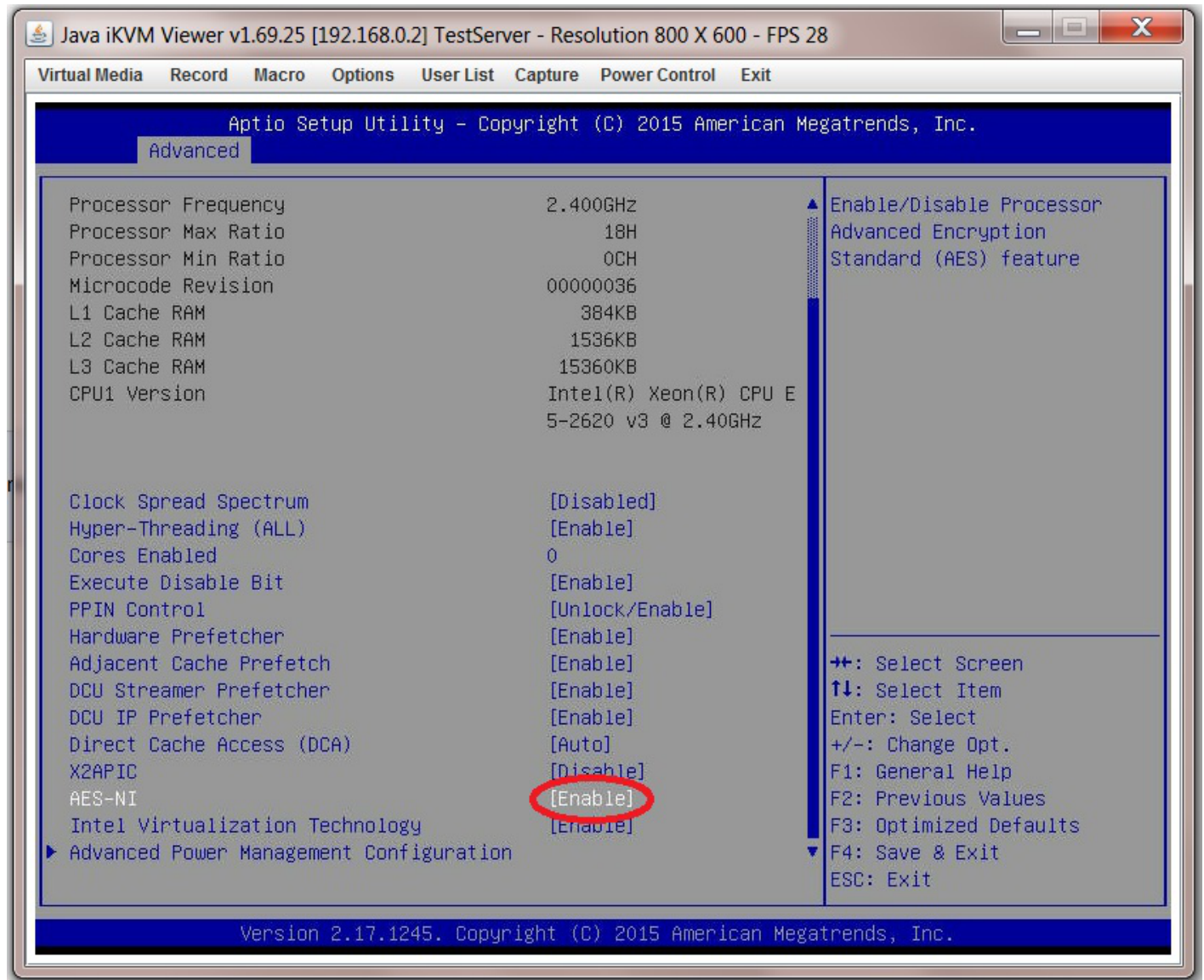
Go to the "Advanced" page.



Now navigate to "CPU Configuration".



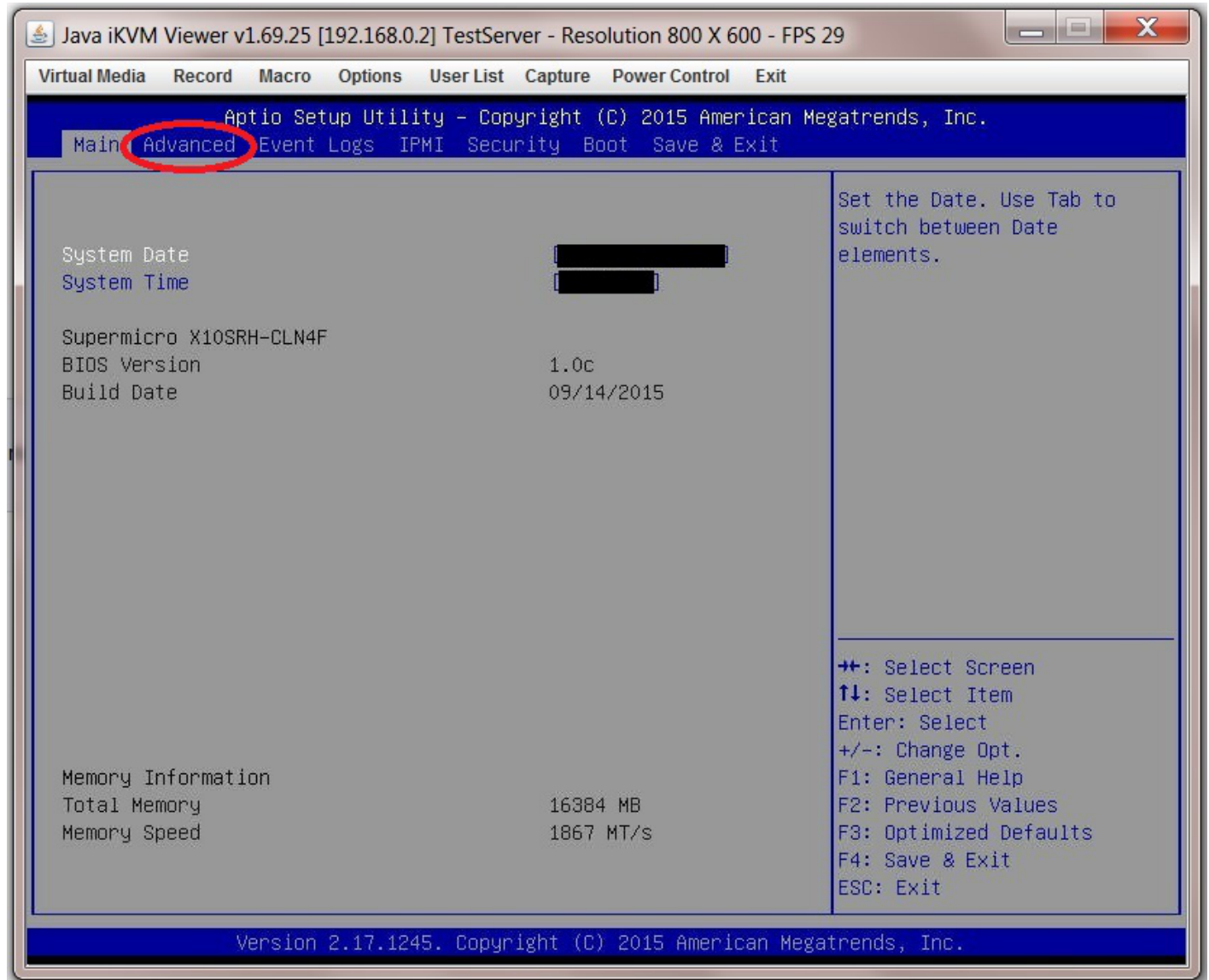
Then scroll down (it is towards the bottom) to "AES-NI" and select "Enable".



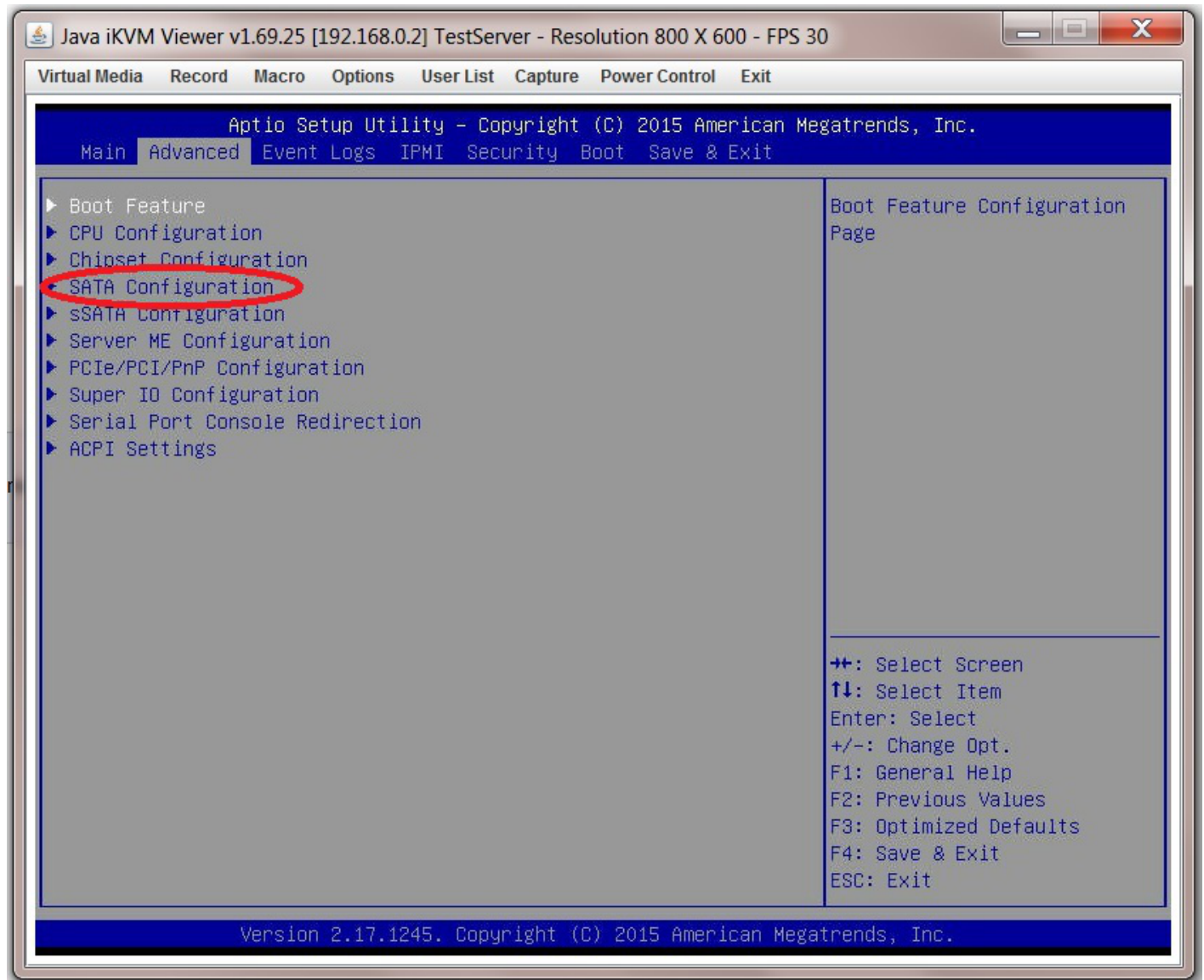
AHCI SATA Configuration

There are certain advantages to putting the SATA controller in AHCI mode. By enabling this option any SATA devices connected to the SATA ports on the motherboard will operate in AHCI mode.

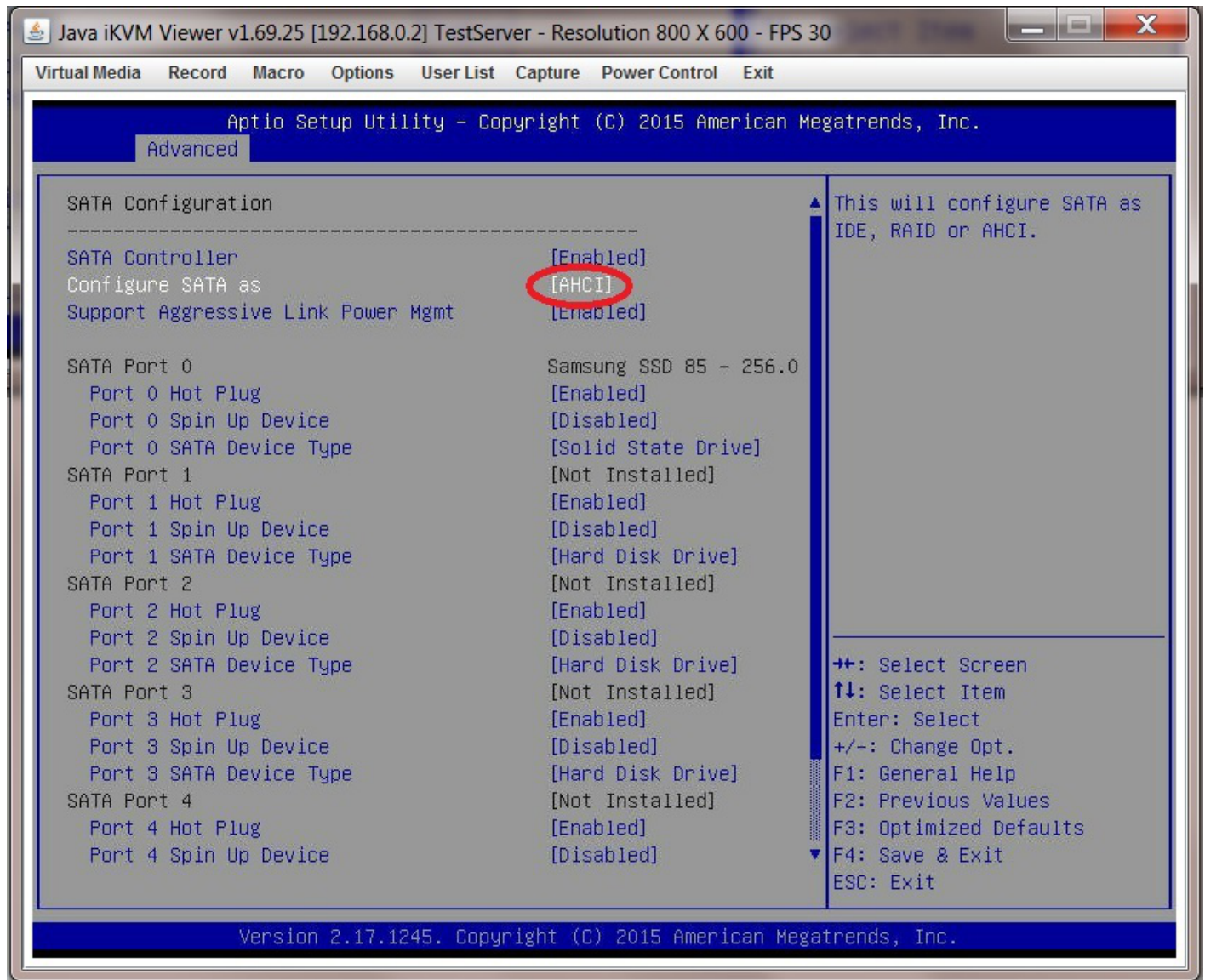
Go to the "Advanced" page.



Now select "SATA Configuration" from the submenu.



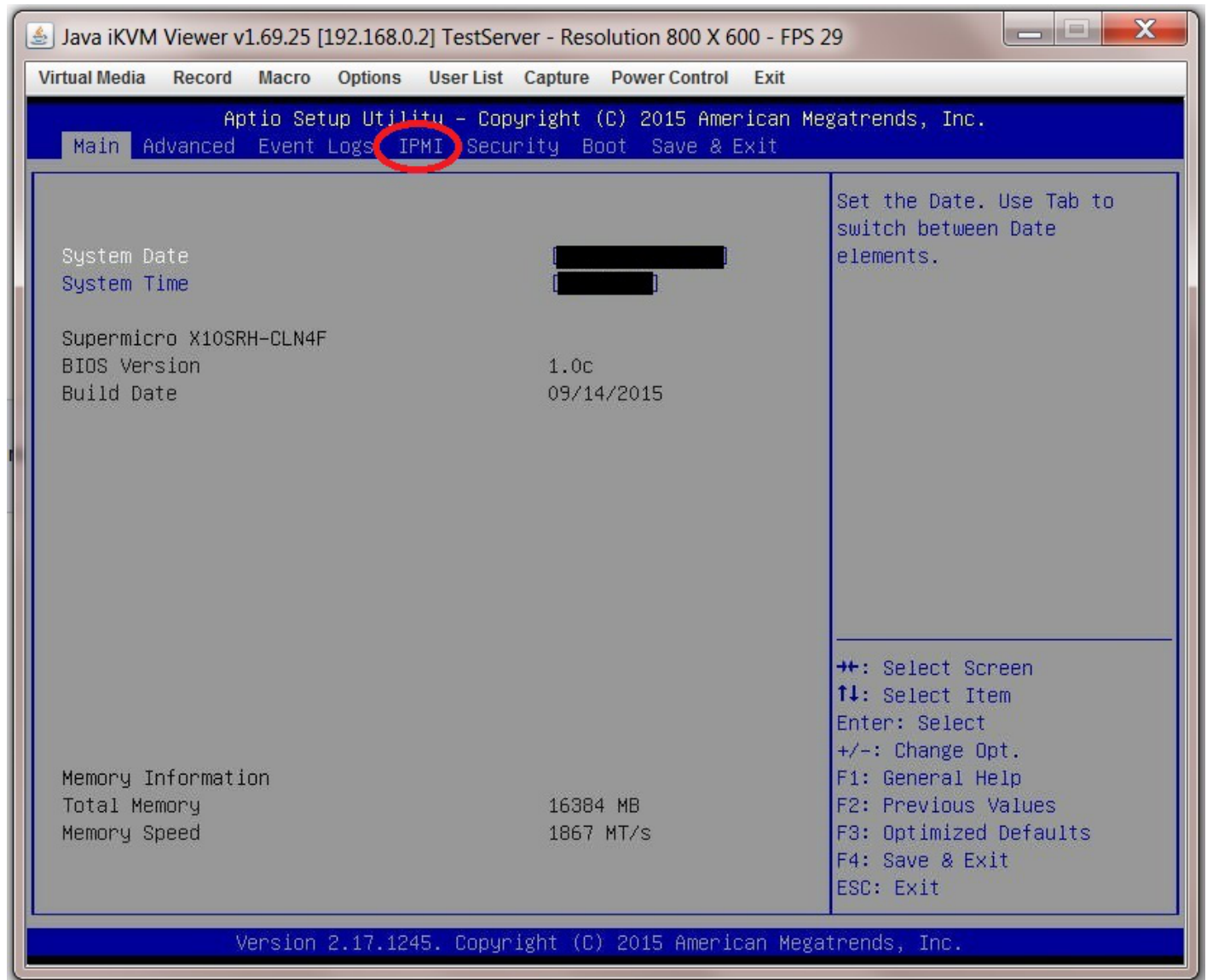
Now navigate to "Configure SATA as" and select "AHCI" from the options.



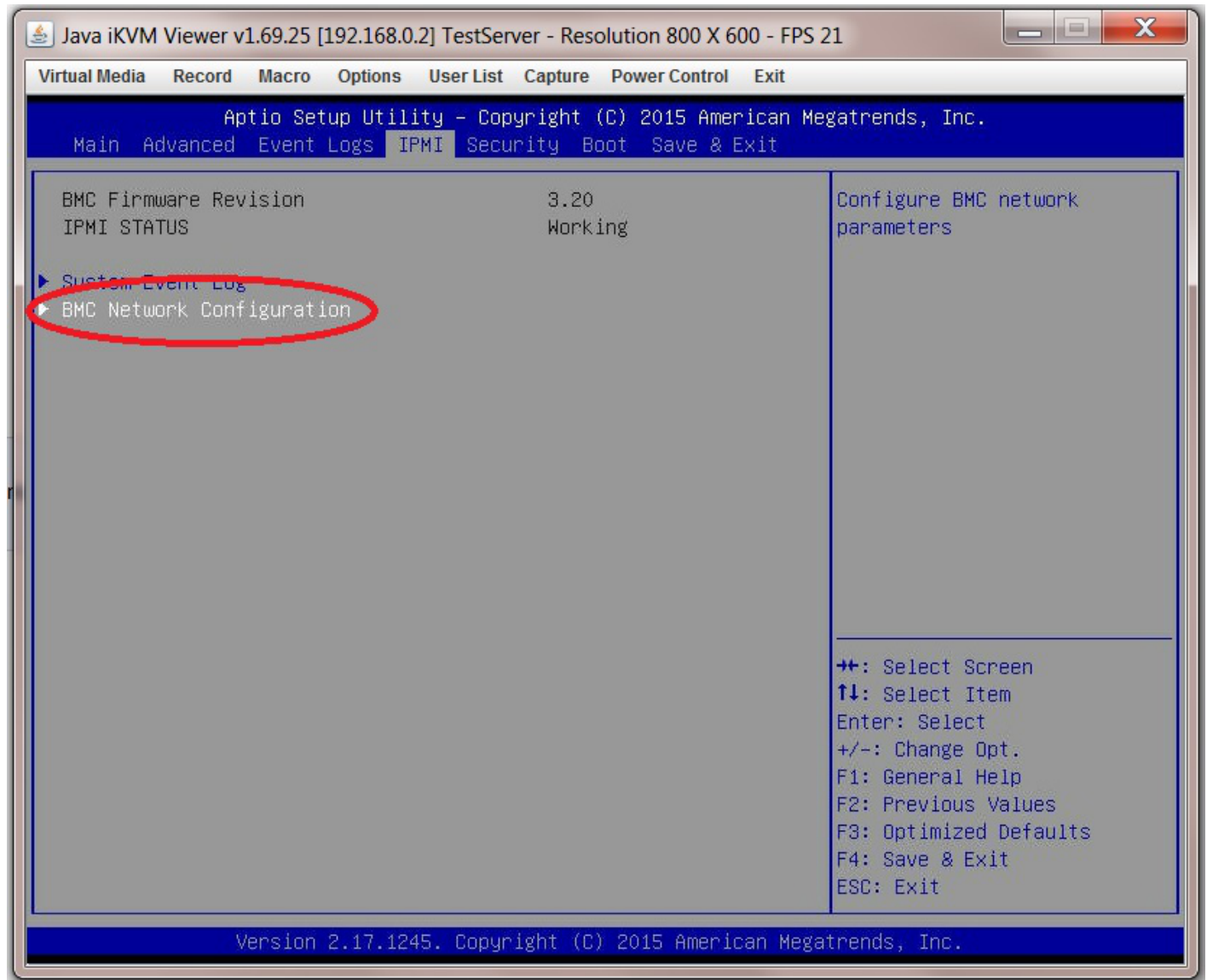
IPMI Configuration

You do not have to configure the IPMI of the server through the BIOS. You can use the IPMI web GUI which I will cover in a later section. However, if you decide to do this through the BIOS the following should help.

Go to the IPMI page.



Now select "BMC Network Configuration" (BMC=Board Management Controller and is the hardware through which IPMI is managed and implemented on the motherboard).



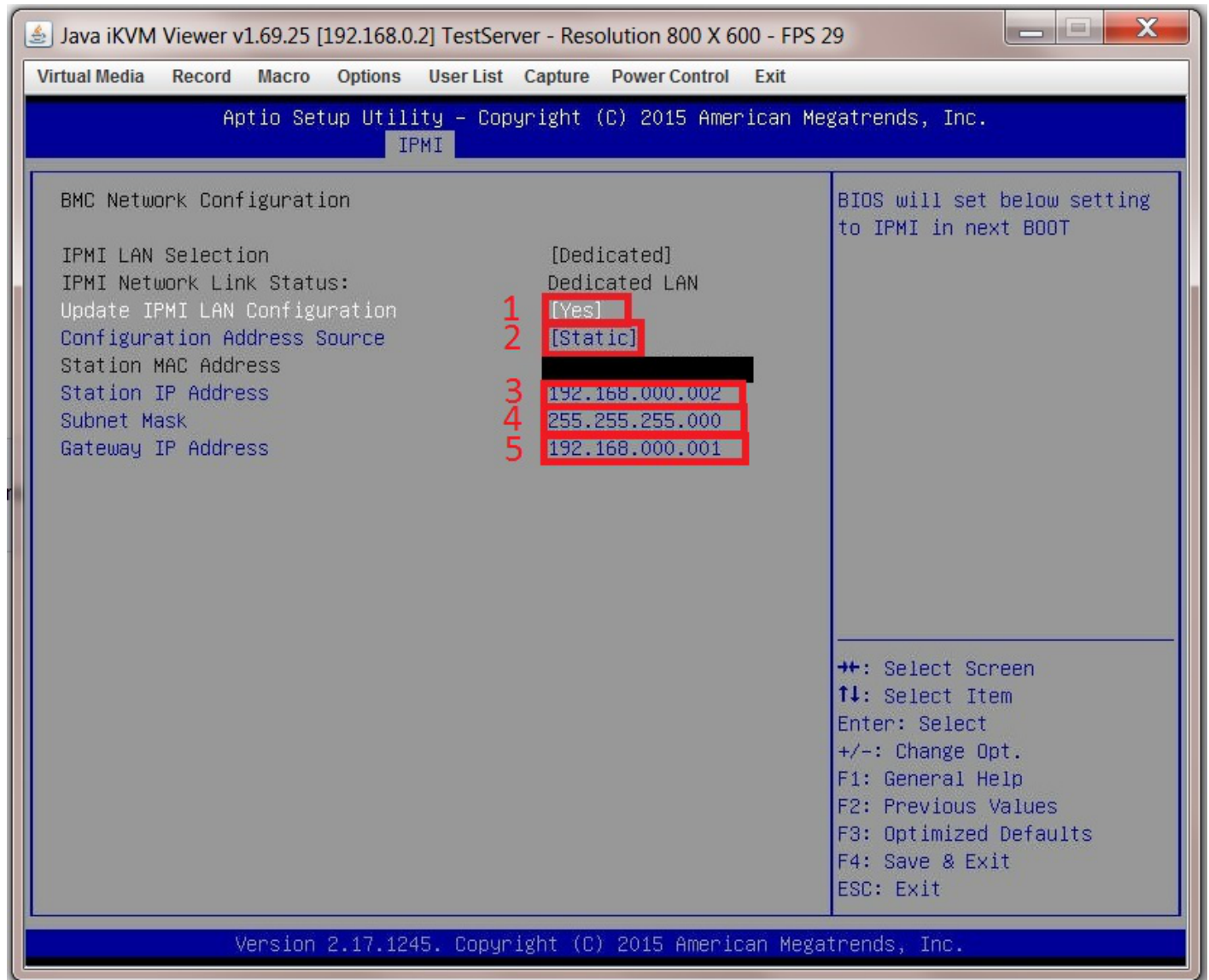
Navigate to the “Update IPMI Lan Configuration” and select “Yes” (1). At this point the greyed out text below should become active (it may go from grey to blue) allowing you to input your own values.

In “Configuration Address Source” select “Static” (2).

In the “Station IP Address” text box (3) type in an IP address of your choosing. Make sure you give it an IP address that is outside the range of the DHCP server in the router (Fester used 192.168.0.2).

Now put in the subnet mask of the private network which you obtained earlier in the “Subnet Mask” text box (4) (Fester’s was 255.255.255.0).

Now place the Default Gateway IP address in the “Gateway IP Address” text box (5) if it is not already there.



You have now assigned a static IP address to the IPMI web GUI. We will now always know where to find the IPMI GUI and it will not change even when the router gets rebooted.

Boot Order Configuration

FreeNAS can be installed in a number of ways. It can be installed from a bootable CD/DVD, a bootable USB stick or even across a network using PXE.

When you boot the server and watch the various pages of information come and go as the server goes through its POST, you may have noticed that a certain key press at the correct time will allow you to boot from an attached storage device of your choice temporarily (i.e. just that one time).

This is fine, but if you install FreeNAS from one particular type of storage device regularly then it might be more convenient to change the boot order of the server.

The boot order is the order in which the motherboard's BIOS will look for an OS or something it can boot

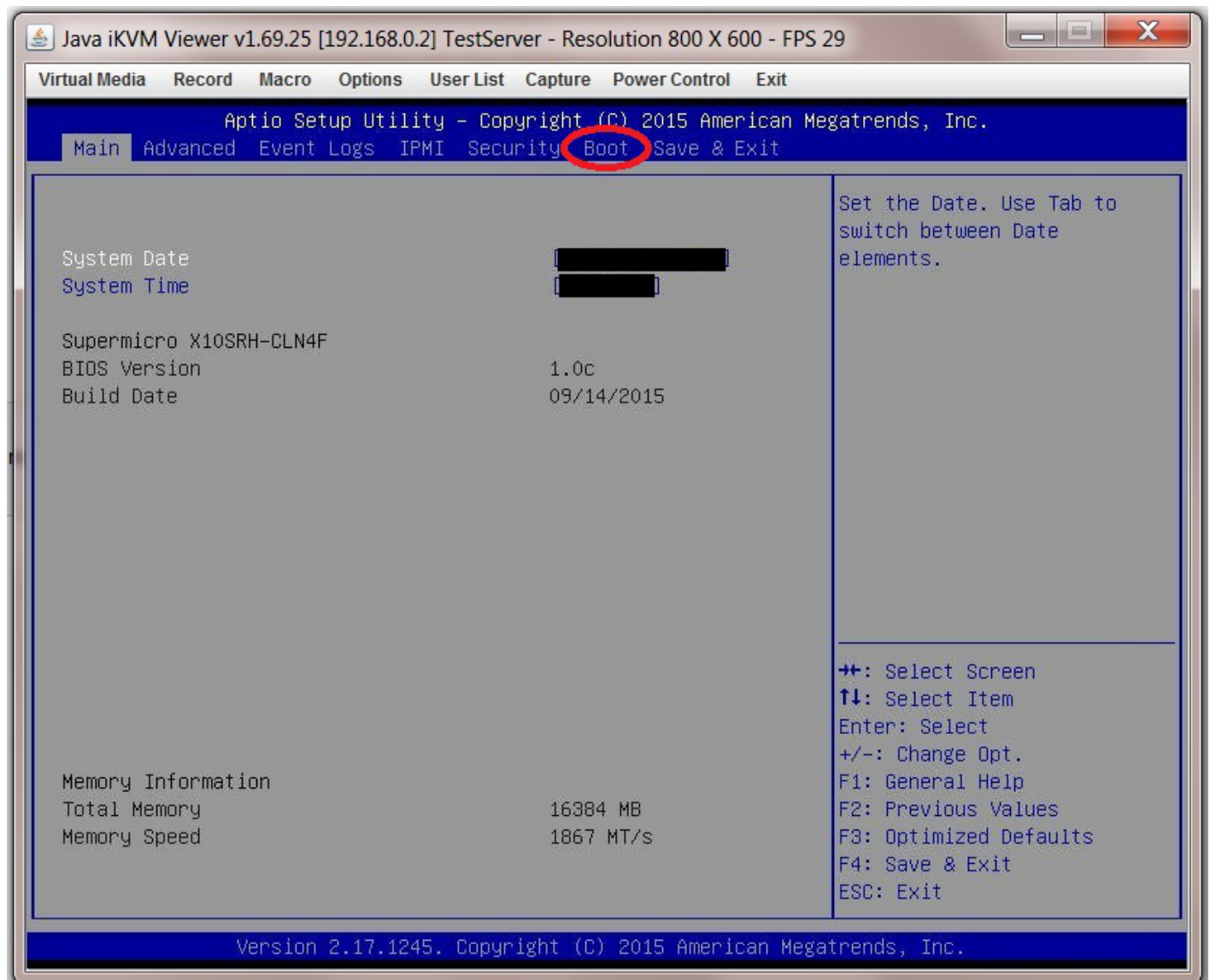
from, on the various storage devices connected to it. This change is persistent (i.e. it applies each time the server is booted).

The regular method by which you install FreeNAS will determine the boot order, if that's how you want to do things.

Fester favours a USB stick so "USB Key" must be the first device selected in the boot order list. Why? If we had the HDD/SDD (with the installed FreeNAS OS on it) listed before the USB key (with the bootable FreeNAS installation program on it) then if we want to reinstall the FreeNAS OS again, a problem would occur. The BIOS will encounter the installed FreeNAS OS on the HDD/SDD before it encounters the bootable FreeNAS installation program on the USB key and reinstallation will not take place (unless you temporarily alter the order through the key press at POST boot up method).

So if you would like to alter the boot order (it's completely optional) this is how you do it.

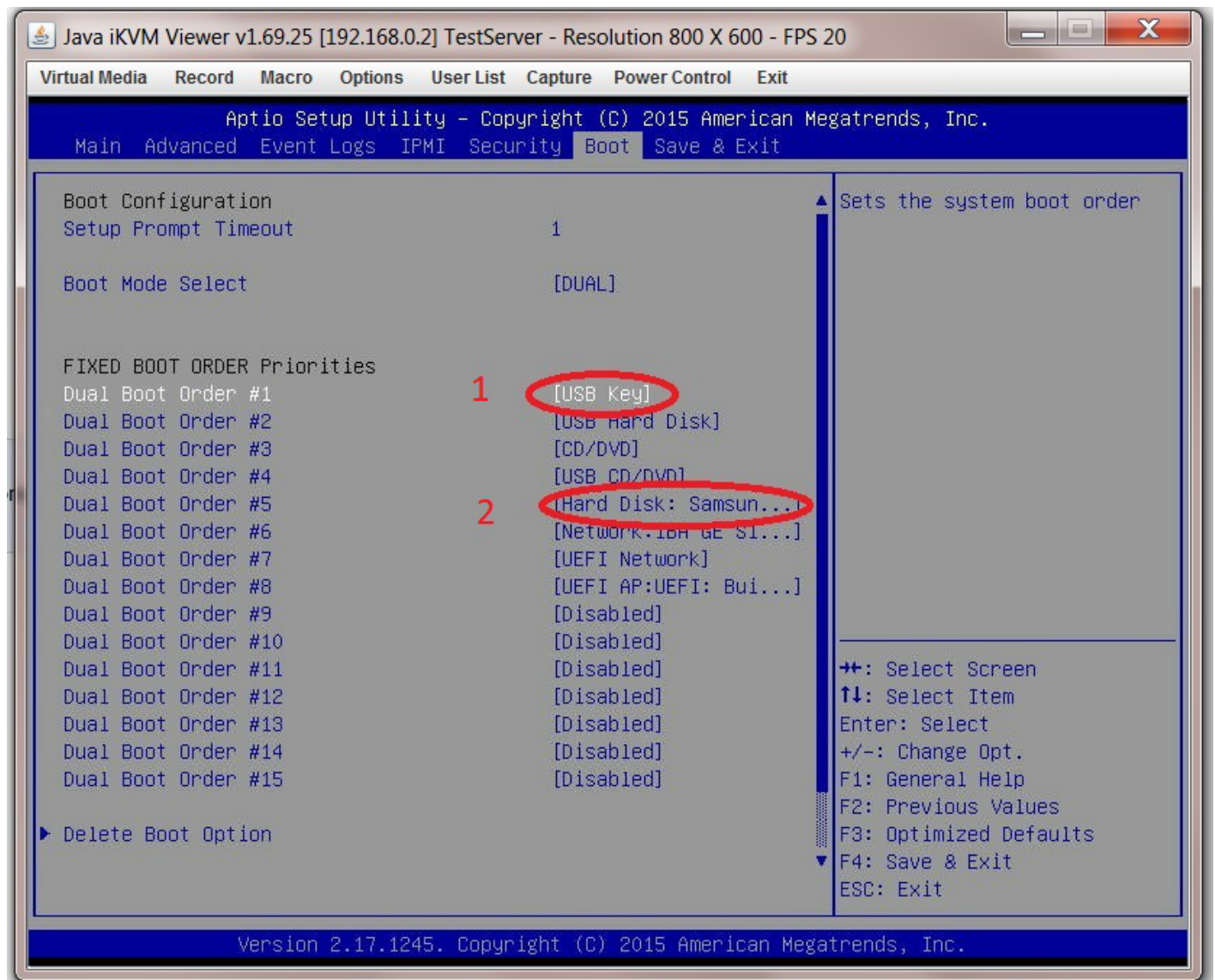
Select the "Boot" page.



Navigate to "Dual Boot Order #1" ("Boot Mode Select" should be set to "Dual" or this part will look

different) and select "USB Key" (1), in Fester's case this is where the bootable FreeNAS installation program will reside.

Notice how the storage device that contains the actual FreeNAS OS appears further down the list, in Fester's case it's the Samsung SSD (2).



There doesn't seem to be a lot of information on the configuration of a server BIOS for a FreeNAS installation. I suspect there are other essential settings that need to be made (e.g. power management, etc), but this is all I could find. If I have missed any please let me know and I will try to include them in the guide or you could replace this or any section with your own?

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:prelim_bios

Last update: 2016/06/10 17:34



Modem/Router Configuration

I connect to the internet through one of these.



It is a modem/router (I will just use the word “router” from here on) with a firewall and DHCP server built into it. I like to call it a POS router (POS=Piece of Shit) because it’s always giving trouble.

This is how most people in the UK connect to the internet, via some sort of ISP supplied box (ISP=Internet Service Provider). Your setup might be different.

Whatever your setup, you need to reserve a group of IP addresses for the server to use. There are good reasons for doing this.

1. By assigning static IP addresses (i.e. not changing) to the server we can always know where to find the IPMI web GUI and the FreeNAS web GUI. If the DHCP server in the router were to automatically assign these IP addresses to the FreeNAS server, then each time the router gets rebooted they could change. We would then need to go and find out what they had changed to, before we could once again use the IPMI and FreeNAS GUIs.
2. The IP addresses for Jails can be kept out of the IP address range of the DHCP server in the router. Jails didn’t work properly for me until I did this.

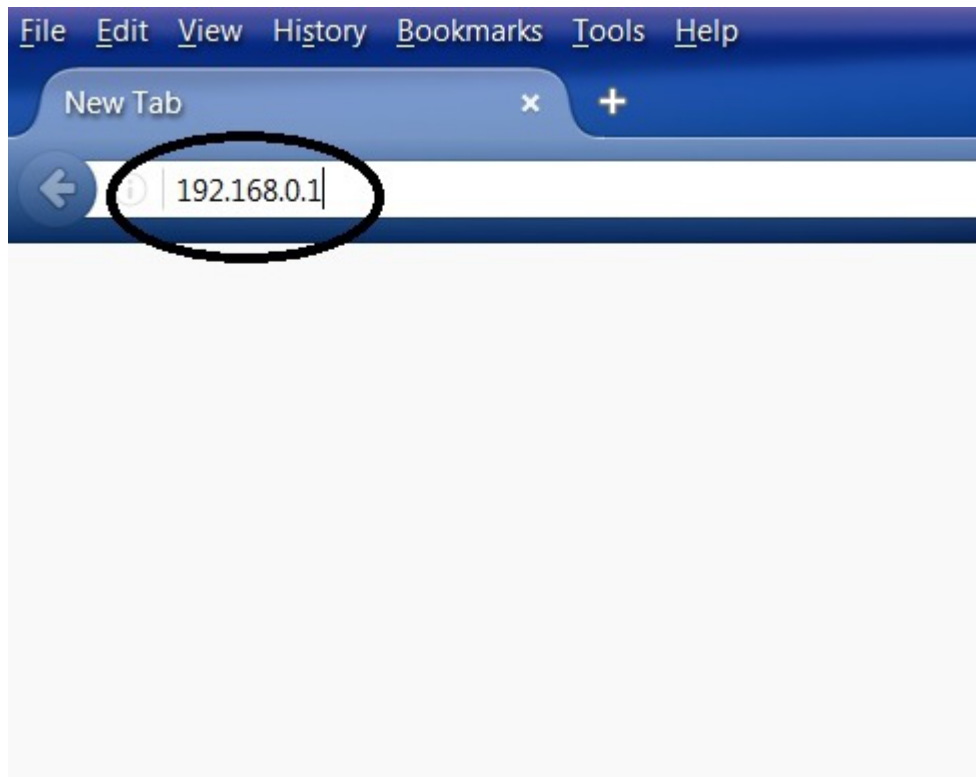
I can’t tell you how to do this for your particular router as each one is different. This is how I did it for my setup, hopefully it will help you.

Type the IP address of your router’s web GUI into your browser.

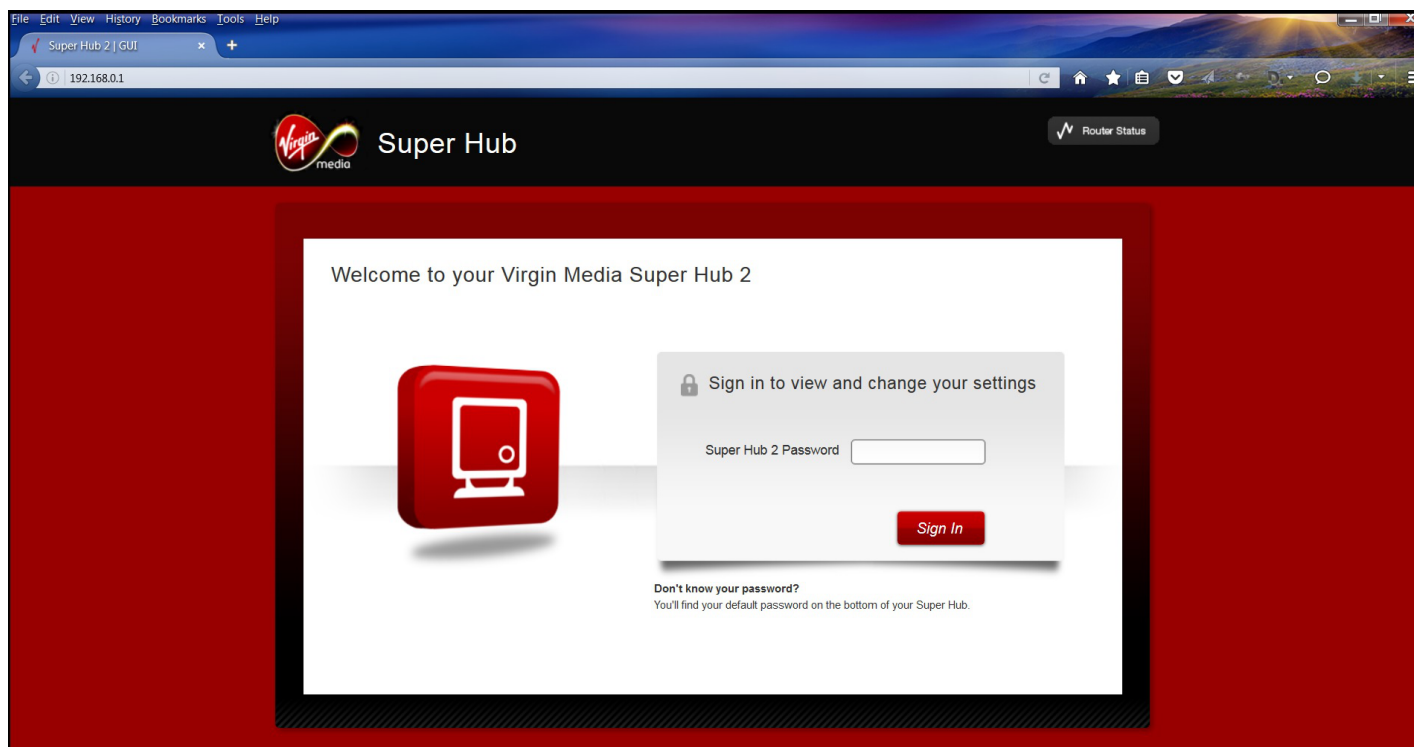
The POS router’s web GUI address is:

192.168.0.1

(Yours might be different)



This brings up the POS router's web GUI.



Now log in to your router.

Your router will have the details of the IP address range of your private network (the ones that sit behind your router's firewall, not the public IP address).

On the POS router these are 192.168.0.0 – 192.168.0.254 (yours might be different).

Plan how you want to arrange the IP addresses and how many you want to reserve.

This is Fester's attempt it may give you some ideas.

I thought about 50 IP addresses would be more than enough (i.e. 192.168.0.0 – 192.168.0.49).

The gateway address on the POS router is 192.168.0.1, so I kept away from this as I thought it might cause an IP address conflict if I used it. Therefore, in practice the IP addresses reserved for the server will start at 192.168.0.2 to avoid the gateway address.

(Notice that the IPv4 Default Gateway IP address and the router's web GUI address match. They are actually one in the same.)

I planned how I would use the IP address range 192.168.0.2 – 192.168.0.49 and made a little table.

IP Address	Usage
192.168.0.2	IPMI of FreeNAS Server
192.168.0.3 – 192.168.0.4	Reserved for Future Servers That Require IPMI
192.168.0.5	NIC Of The FreeNAS Server
192.168.0.6 – 192.168.0.49	Reserved For Future Use (Jails, etc)

I then reserved the first 50 IP addresses for the server by altering the IP address range of the DHCP Server in the POS router accordingly.

This is a slightly backwards way of doing things, but due to the limited options of the POS router this was the only practical way to do it. Your router might offer a more elegant solution than this.

DHCP Settings

[Home](#) [Advanced Settings](#) [DHCP](#) [DHCP Settings](#)

[? Help](#)

LAN IP

IP Address

Subnet Mask 255.255.255.

DHCP

☒ Check to enable or uncheck to disable DHCP

to 254

Max Users

Lease Time

The value in the little box was changed from 0 to 50.

Also make a note of the subnet mask value, it will be needed later.

While I was in there I also set up email alerts so that the router informs me of anything it considers worthy of mention. You may want to consider this.

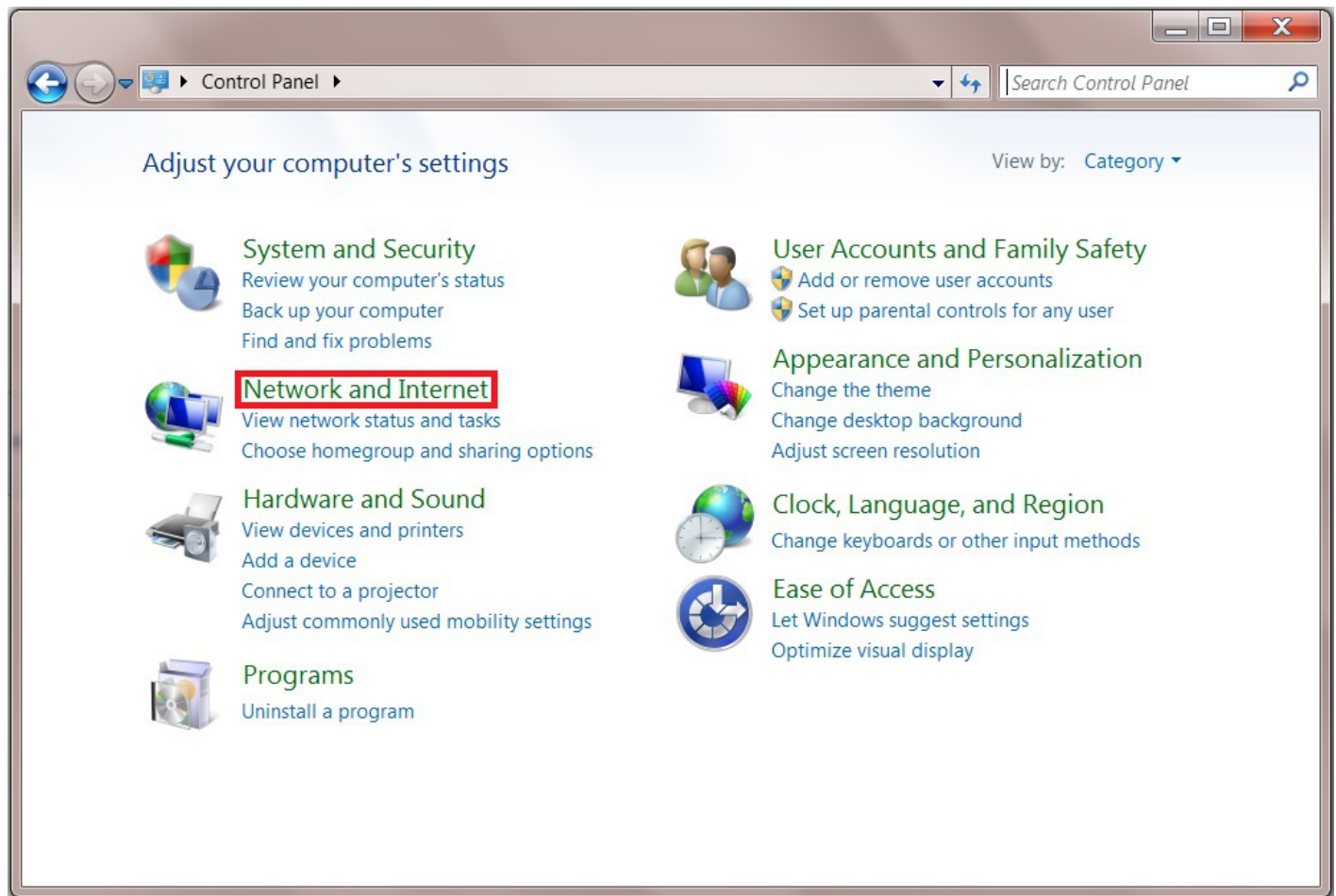
OK, that's the router configured.

But what if you don't know your router's web GUI IP address?

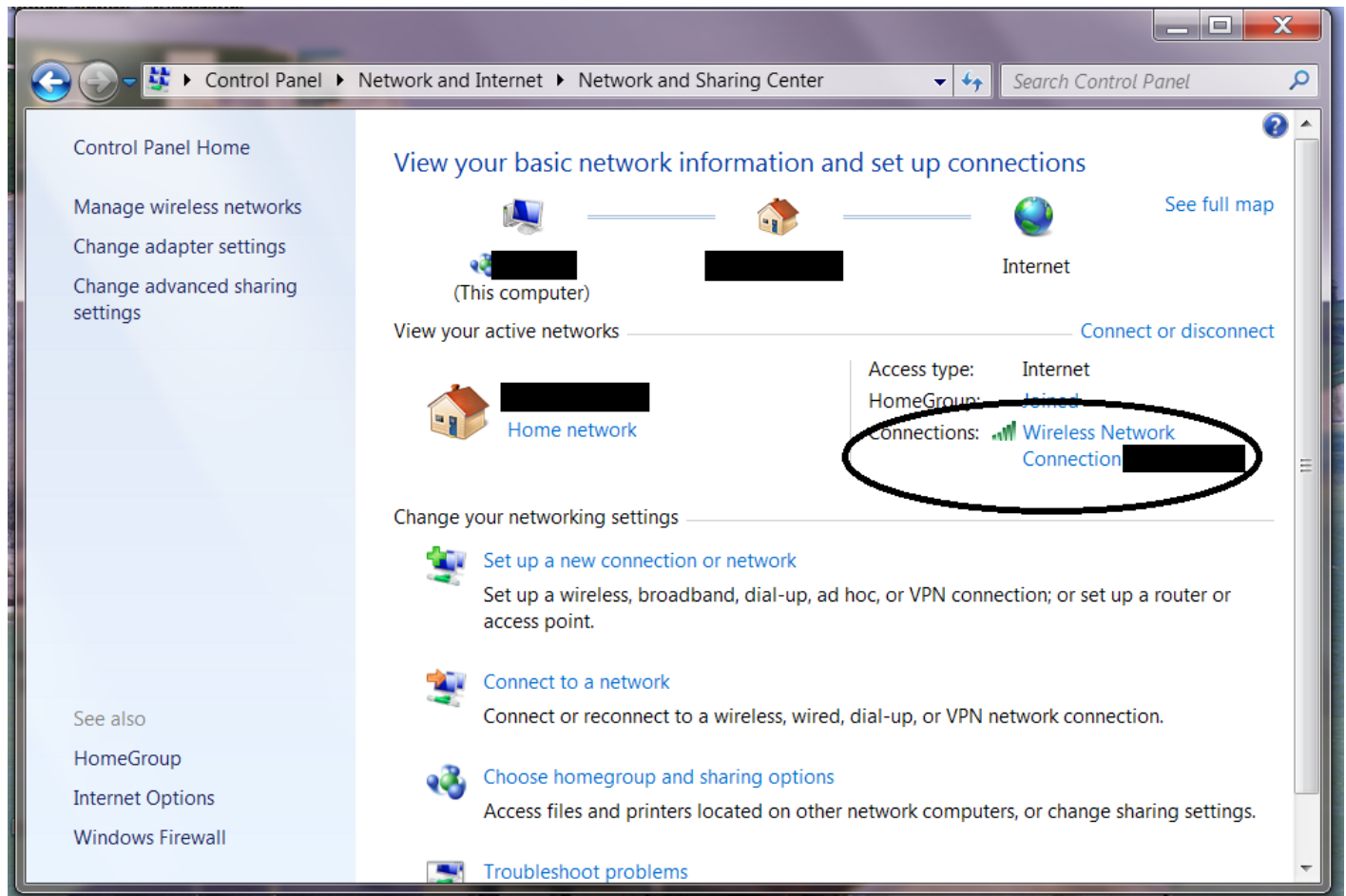
Finding The IP Address Of The Router's GUI On A Windows Machine

If you have a Windows machine available that can connect to the router then you can find out (if your unsure use a machine that connects to the internet this should work).

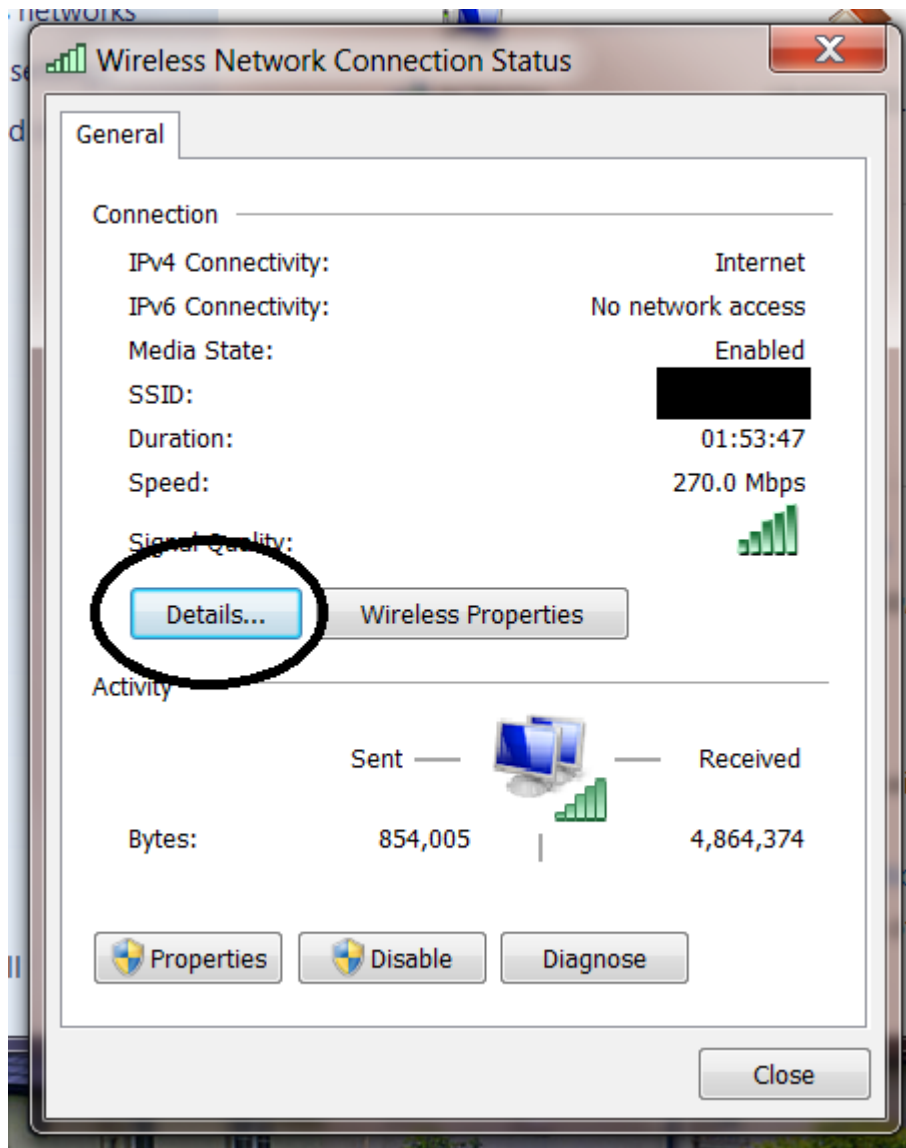
Click on the "Start" button and go into the "Control Panel" in Windows and select "Network and Sharing Centre" (this was on a Windows 7 machine).



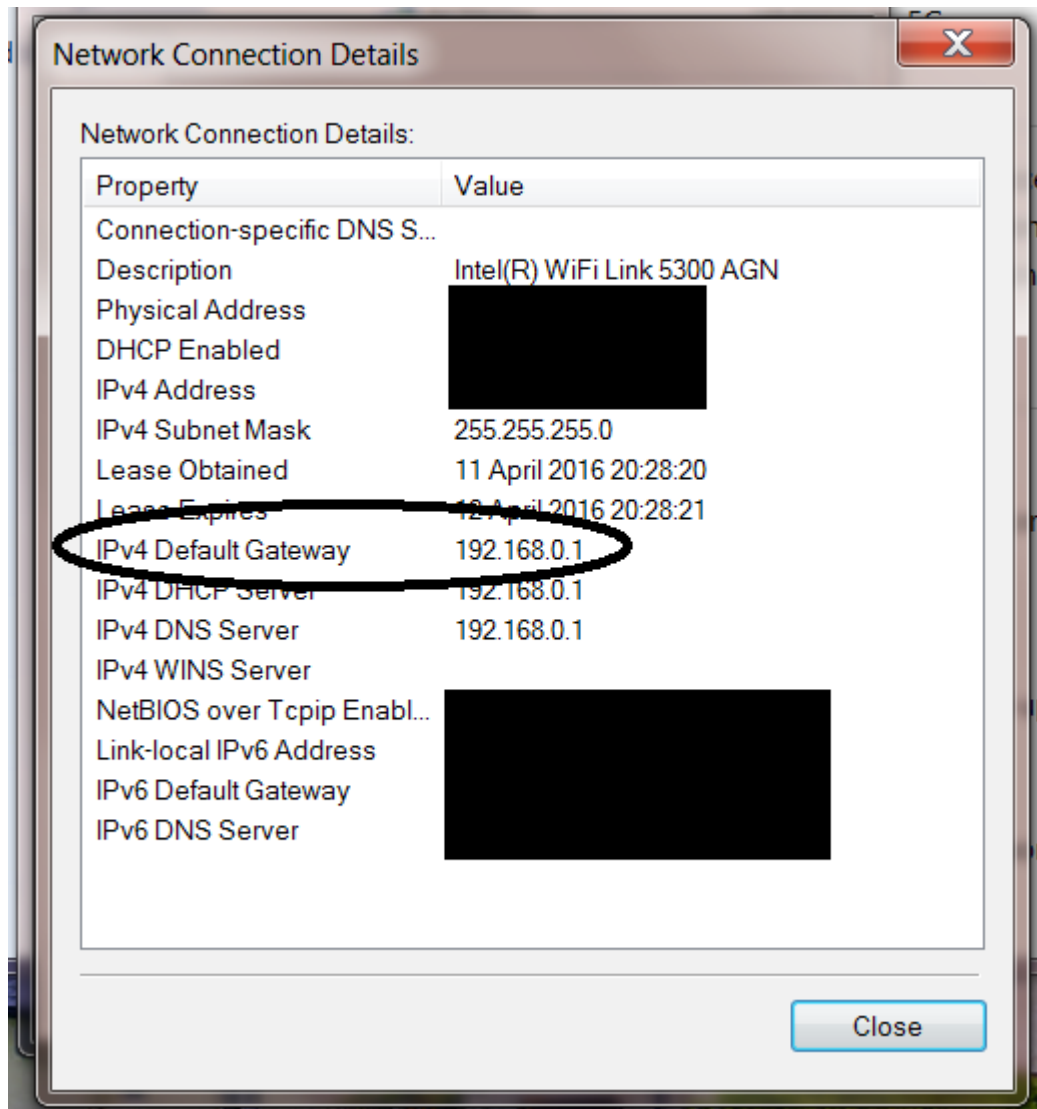
A new window will now pop-up. Click on the blue text next to “Connections”.



Another window will now pop-up. Click on the “Details” button.

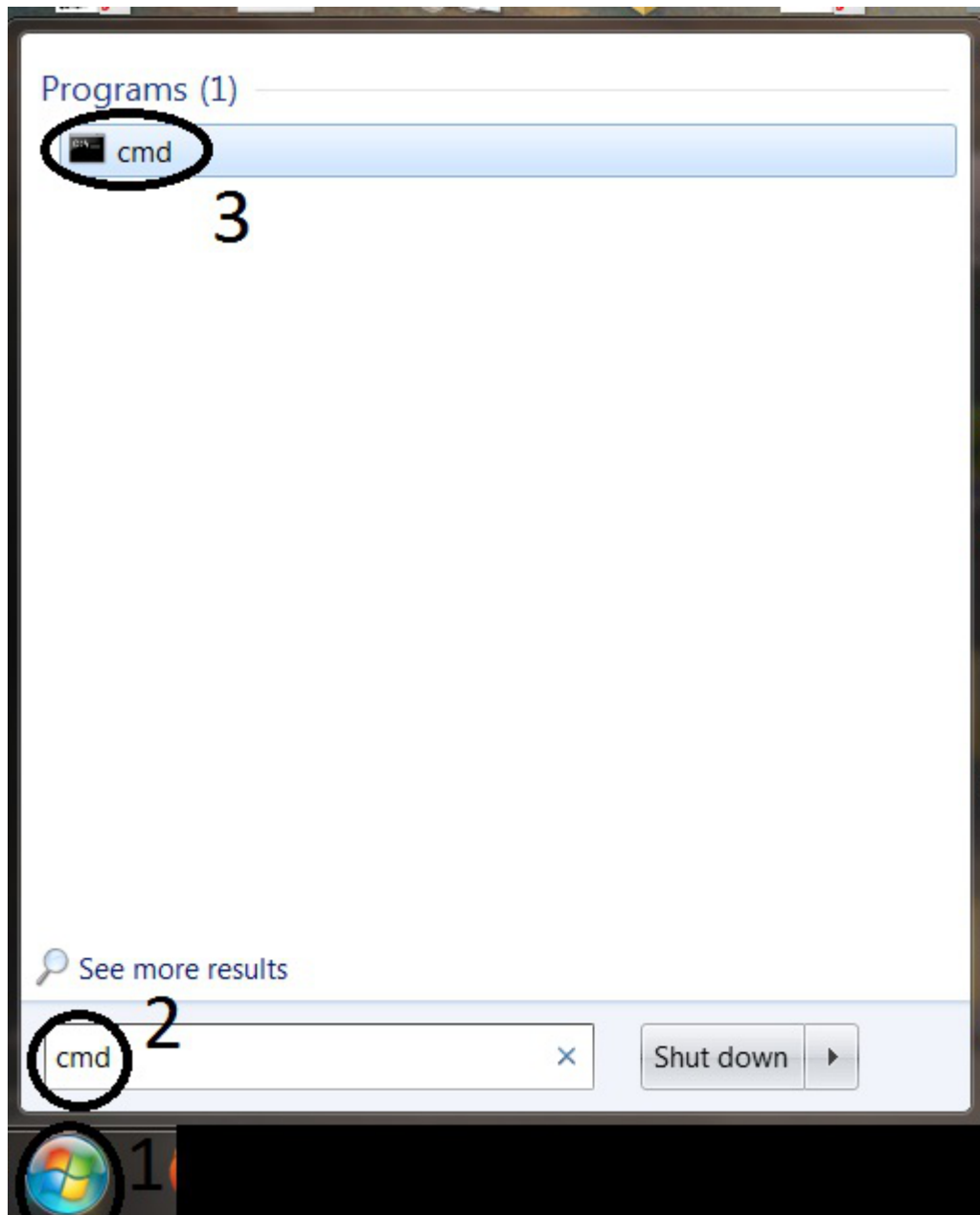


Yet another window will now pop-up. The IP address listed by the "IPv4 Default Gateway" is the one you want.



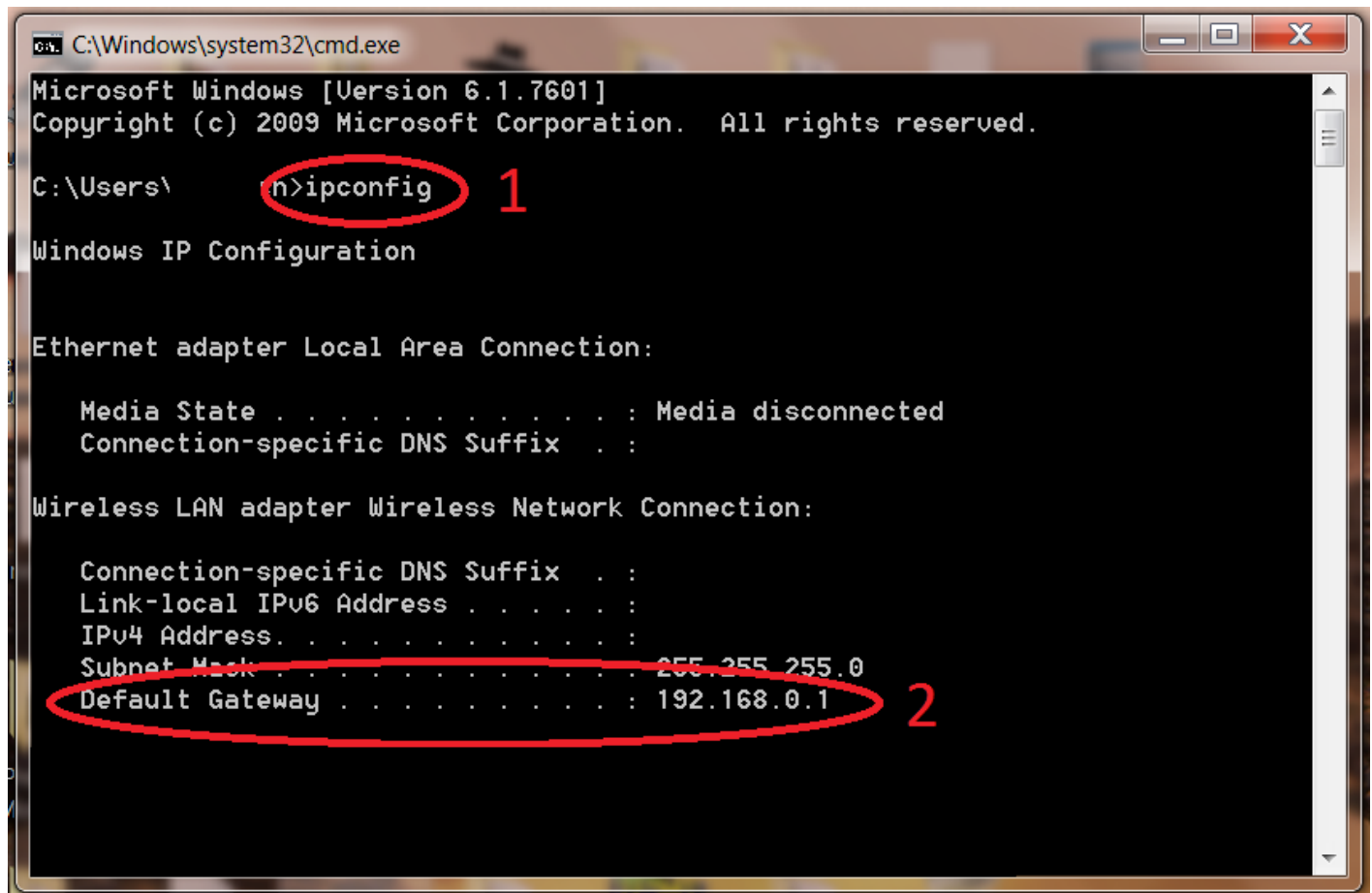
If you don't mind a CLI (Command Line Interface) here is a faster way.

Click on the START button in Windows (1) and type **cmd** in the "Search programs and files" text box (2) and press return, or click on the cmd icon at the top (3).



This should bring up the Windows default command-line interpreter, which is basically a window you can type commands into.

Type in **ipconfig** at the command prompt (1) and then note down the Default Gateway IP address (2), you should get something like this.



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\>ipconfig 1

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter Wireless Network Connection:

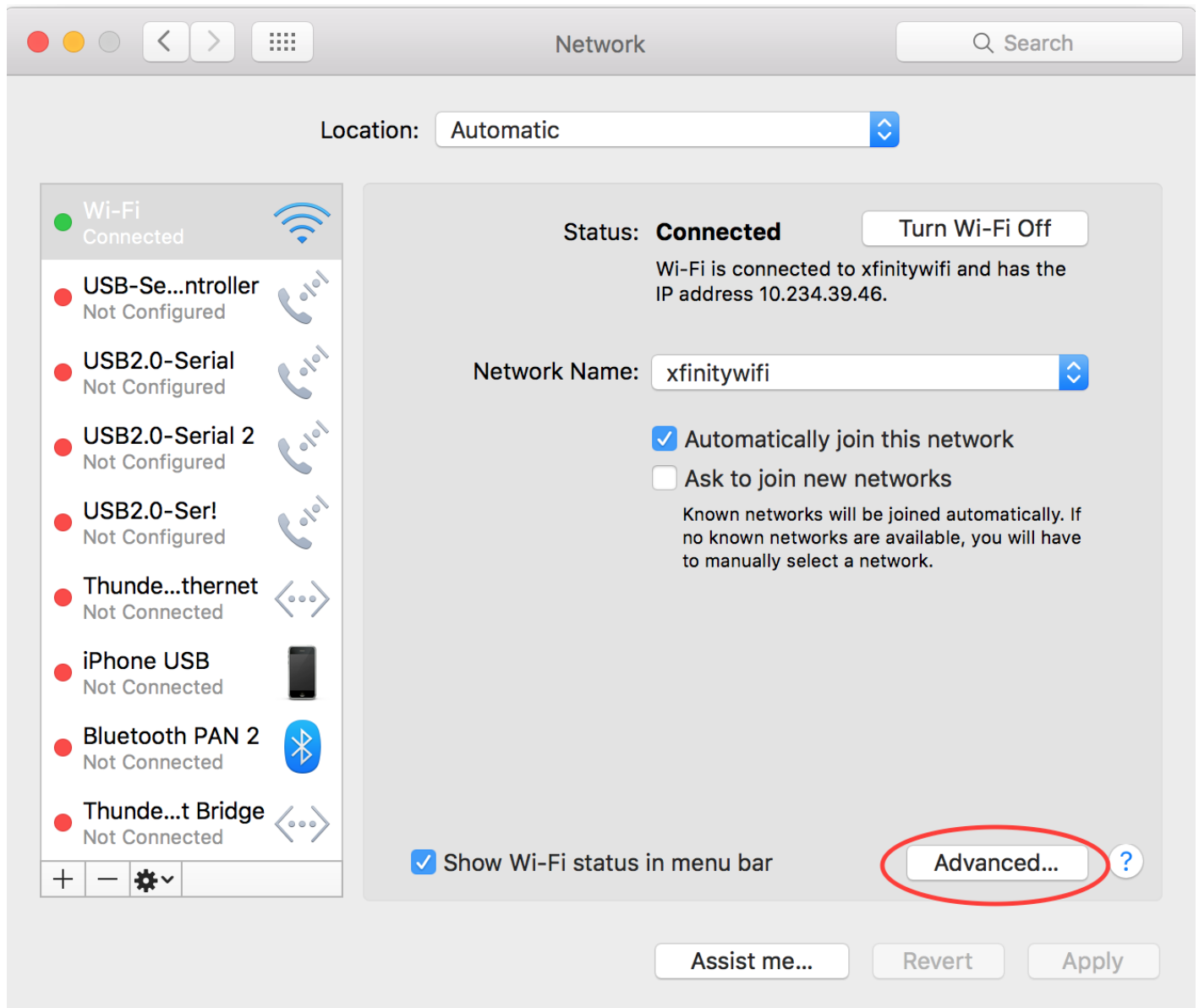
    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . :
    IPv4 Address. . . . . :
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.0.1 2
```

Also make a note of the subnet mask value, it will be needed later (it's just above the Default Gateway).

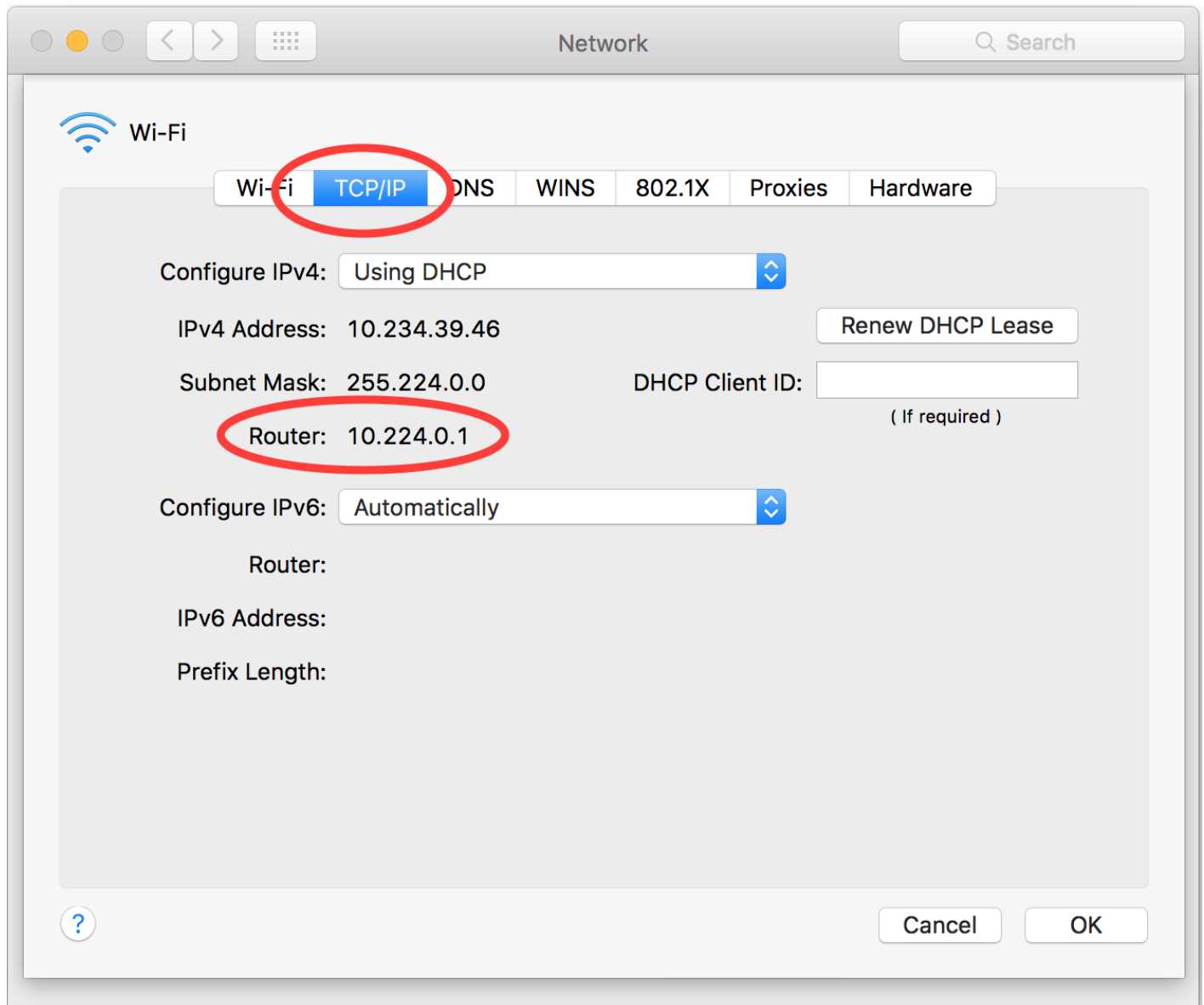
Finding The IP Address Of The Router's GUI On A MAC

On a MAC go to "System Preferences" and click on "Network".

Now click on the "Advanced" button on the screen that appears next.



Select the "TCP/IP" tab on the next screen, and go down the list (it's usually down the bottom) until you come to an entry called "Router". The associated IP address is the one you want.



Finding The IP Address Of The Router's GUI On A Linux Machine

I can't help you here because I don't know how.

If someone would like to provide some information with copyright free screenshots I will try to include it in the guide or you could replace this or any section with your own?

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:prelim_modemrouter

Last update: **2016/06/11 12:15**



Getting Past the POST

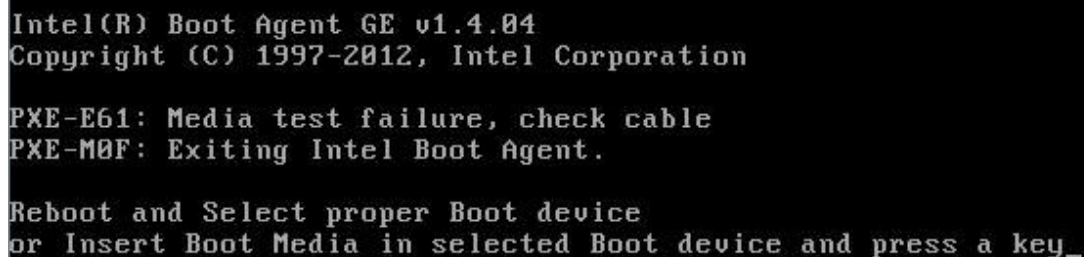
Now that the server is built and you have checked all the connections are good, the memory and any cards you might have installed are properly seated in their sockets, fans are installed correctly and are not obstructed, etc, it's time to see if it clears the POST checks.

POST stands for Power On Self Test and it's basically a series of tests a computer conducts on itself before it allows the OS to boot up. If any of these tests fail, the computer won't successfully complete its POST and the OS doesn't get to boot up.

POST Check With Attached Monitor and Keyboard

The easiest way to check if the server has passed its POST is to connect a monitor and keyboard to it and switch it on.

If all goes well you will see various pieces of information on the screen coming and going. But when everything has settled down you should see a screen that looks something like this.

A screenshot of a server boot screen with a black background and white text. The text reads: 'Intel(R) Boot Agent GE v1.4.04', 'Copyright (C) 1997-2012, Intel Corporation', 'PXE-E61: Media test failure, check cable', 'PXE-M0F: Exiting Intel Boot Agent.', 'Reboot and Select proper Boot device', and 'or Insert Boot Media in selected Boot device and press a key_'.

```
Intel(R) Boot Agent GE v1.4.04
Copyright (C) 1997-2012, Intel Corporation

PXE-E61: Media test failure, check cable
PXE-M0F: Exiting Intel Boot Agent.

Reboot and Select proper Boot device
or Insert Boot Media in selected Boot device and press a key_
```

POST Check with IPMI

Connect the servers IMPI NIC to the router via a network cable (you do not need to connect a monitor or a keyboard) and switch on the server.

The IPMI NIC on Fester's server is this one, yours might be different.

The other end of the cable goes to the network connection/s on the router. On the POS router it is here.

Now switch on and boot up a personal computer that connects to the router, if you use it to connect to the internet then this will probably work, in any case it must be part of your private network.

At this point the IP address for the IPMI web GUI is unknown. This is because we have not assigned a static IP address to it yet, so probably the DHCP server in the router will automatically give it one. Whatever the case, we need to go and find that address.

The easiest method is to log into your router and find it. In the POS router it's in a table listing the currently connected devices (your router might be different).

Now open up your web browser and type in the IP address you got from your router and hit the "return/enter" key. The IPMI web GUI should be displayed. It should look like this.

Now type in the default Username and Password and log in.

Username = ADMIN

Password = ADMIN

(You should seriously consider changing the default Username and Password. If you want to do that now look at the relevant section in this guide.)

You should be looking at a screen like this.

If you get a message about Java needing to be updated just click the "Cancel" button. Go to the "Remote Control" drop down menu and click "Console Redirection".

You should get a screen something like this. Just click "Cancel" regarding the Java update message.

You will probably get a screen like this. If you do, tick the little box (1) and click the "Cancel" button (2).

There should be no more pop-up messages now.

Click the "Launch Console Button" (1). A little window will pop-up, make sure the "Open with" radio button (2) is selected and "Java Web Start Launcher" (3) is selected from the drop down selection box then click "OK" (4).

The JAVA iKVM Viewer window should pop-up (shown with a red box around it here) showing the video on your remote server. You can also enter text via the keyboard.

The previous screen shot shows a blank window, but if the server has cleared its POST you should see in this window something like this.

If for some reason you can't find the IP address for the IPMI web GUI in your router then use an IPMI viewer program to discover it.

IPMI IP Address Discovery Using An IPMI Viewer Program In

Windows

Download an IPMI viewer program and install it.

I used a Supermicro program for this. It is available to download from their ftp web site.

Install the program under an Administrator's account or right click on the installation program and run as an Administrator (have your Administrator's password ready).

When the program is installed run it under an Administrator's account or right click and run as an Administrator.

You should see something like this.

Now click on the "File" (1) drop down menu and click "Discover IPMI Device" (2).

In the little pop-up window put in the start IP address of your private IP address range (in Fester's case that is 192.168.0.1) in the "From" text box (1) and the last address in the range (in Fester's case that is 192.168.0.254) in the "To" text box (2).

In the "Network Mask" text box enter the value of the subnet mask you wrote down earlier (3) (Fester's is 255.255.255.0). If for some reason you could not get that information then click the "Detect" button (4).

The "Search Option" relates to the version of IPMI (Fester's board uses version 2, if you don't know the motherboard manufacturer will be of some help here).

Now click the "Start" button (5) and the program will search for an IPMI device on each IP address in the range specified.

If your search is successful, you should see something like this, with the IP address of the IPMI web GUI clearly shown.

IPMI IP Address Discovery Using An IPMI Viewer Program In Linux

If you are using Linux I can't help you as I don't know how.

If someone would like to provide some information with copyright free screenshots I will try to include it in the guide or you could replace this or any section with your own?

A Possible Problem With Quiet Servers Using Low RPM Fans

If after building your server you notice that the fans in the system are spinning up and then spinning down in a continuous cycle (sounds like the server is trying to achieve flight, then gives up, then has

another go) and is generating event log entries similar to the screen shot shown then take a look at Appendix 4. This may provide some help.

From:

<https://www.familybrown.org/dokuwiki/> - **danb35's Wiki**

Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:prelim_post

Last update: **2016/06/10 02:16**



Prerequisites

There are a number of preliminary things we need to do before the final installation of the FreeNAS OS.

1. Assuming your internet access is via a modem/router setup (this is not always the case), this will need to be configured.
2. Personal firewall configuration.
3. Confirm the finished server clears its POST checks.
4. Configure the server's BIOS.

From:

<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:prelim_prerequisites

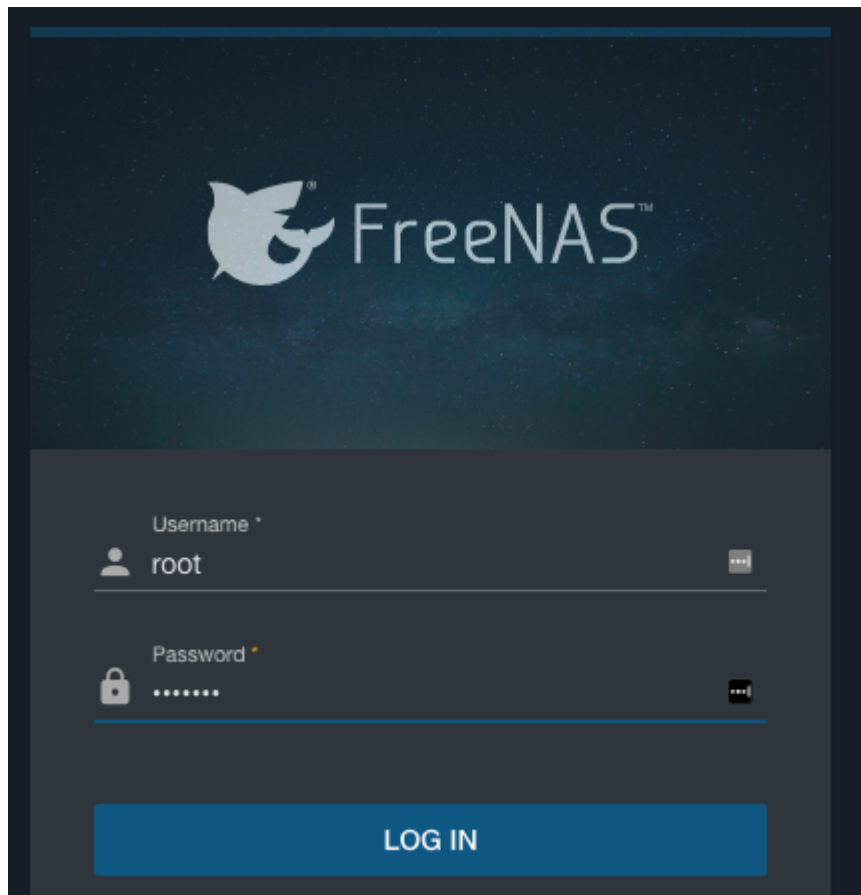
Last update: **2016/06/08 01:00**



Changing the "root" Super User Password

During installation, you had the ability to set a root password. If you entered a strong password at that time, you do not need to reset it now. If you entered no password, or a weak password, you should change it to a secure password. To do this, open your web browser and type in the IP address of the FreeNAS web GUI that you noted down earlier.

The web GUI will present itself and ask for the login details. Enter the username which is **root** (1) and password (2) which is whatever you decided on at installation and click the "Log In" button (3).



Now you are logged into FreeNAS.

The first thing Fester does is give the root user a strong password if that has not been done already at installation. Click **Accounts** in the left column, then **Users**

Username	Home directory	Shell	Full Name	Lock User
root	/root	/bin/csh	root	no
daemon	/root	/usr/sbin/nologin	Owner of many sy	no
operator	/	/usr/sbin/nologin	System &	no

Then click the three vertical dots to the right of the root user, and select **Edit** from the pop-up menu:

Username	Home directory	Shell	Full Name	Lock User	
root	/root	/bin/csh	root	no	Edit

In the “Password:” text box (1) type in your strong password and then type it in again in the “Confirm password” text box (2).

Name & Contact

Full Name *
root

Username
root

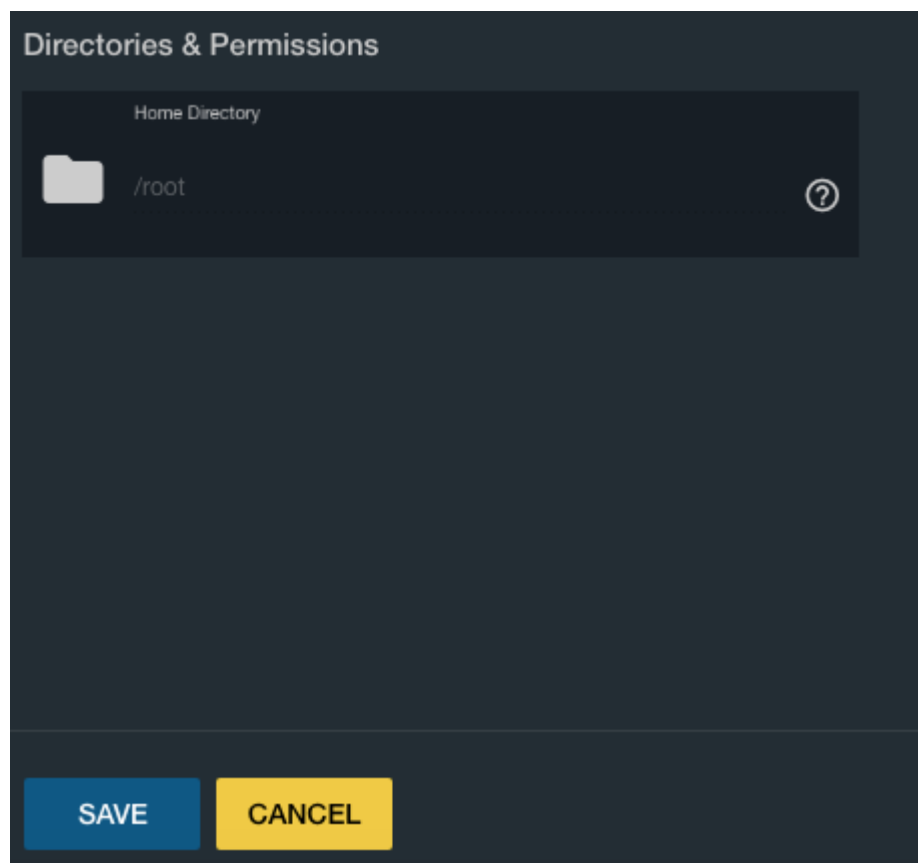
Email

Password 🔒 👁 ?

Confirm Password

The maximum password length in FreeNAS is 128 characters.

Now scroll down and click the “Save” button.



That's the root user password changed.

From:

<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

Permanent link:

https://www.familybrown.org/dokuwiki/doku.php?id=fester112:root_password

Last update: **2019/05/26 22:50**



Scrub Schedules

Maintaining your FreeNAS server is very important. It can be the difference between knowing your server may be developing a problem which gives you some time to take remedial action, or getting up one morning and realising your servers bust and the data has been lost.

Part of a good server maintenance routine is performing regular scrubs of the drives and periodically running SMART tests.

There are a few things you need to know before starting.

1. Do not schedule scrubs and SMART tests to run at the same time. This can cause the scrub to never complete.
2. Only one SMART test at a time can be run on the same disk. We cannot have a scenario were the Long test and the Short test are running simultaneously on the same drive.
3. Scrubs and SMART tests are almost pointless on SSDs (Fester does not know why. I can see why surface scans and badblocks tests would be a waste of time, but not scrubs and some types of SMART tests. If anyone knows why let me know and I will try to include it in the guide.).

When considering scrubs and SMART tests all manner of questions arise. What tests should be done? How often?

It is also immediately clear that when scheduling scrubs and SMART tests we must put some thought into this so the two do not coincide with one another.

This should help.

Scrub Schedule For The Boot Device

Click "System" in the left column, then "Boot Environments".

System / Boot Environments

Boot Pool Condition : ONLINE
 Size: 15.9G
 Used: 4.17G(26%)
 Last Scrub Run on: May 27th 2019, 3:46:18 am
 Automatic scrub interval (in days)
 7

SCRUB BOOT POOL BOOT POOL STATUS

On the line marked “Automatic scrub interval (in days)” change the default value from 35 (this is too long) to 7.

That’s it.

Scrub Schedule For The Pool

Click “Tasks” in the left column, then “Scrub Tasks”.

Tasks / Scrub Tasks

FreeNAS® © 2019 - IXsystems, Inc.

Scrub Tasks

Filter Scrub Tasks

COLUMNS ADD

Pool	Threshold days	Description	Minute	Hour	Day of Month
tank	35		00	00	*

1 - 1 of 1

You'll see that a default scrub task has been created for your pool, set to run every 35 days at midnight on Saturday. Unless you have a very high resolution monitor (and a very large browser window), you'll need to scroll sideways **on the scrub schedule itself** to see the rest of this information. There's no

obvious visual indication on the screen that this is necessary, but it is. It will look like this when scrolled to the right:

Scrub Tasks					
<div> <div>Filter Scrub Tasks</div> <div>COLUMNS</div> <div>ADD</div> </div>					
Hour	Day of Month	Month	Day of Week	Enabled	
00	*	*	7	yes	⋮
1 - 1 of 1					

You have two choices here.

You can edit the default scrub schedule by clicking on the three vertical dots to the far right, then “Edit” in the pop-up menu, and populating the settings within with new ones that will follow shortly.

Or you can delete it by clicking on the three vertical dots to the far right, then “Delete” in the pop-up menu, and create a new one (Fester prefers to delete and start from scratch).

Scrub Tasks					
<div> <div>Filter Scrub Tasks</div> <div>COLUMNS</div> <div>ADD</div> </div>					
Hour	Day of Month	Month	Day of Week	Enabled	
00	*	*	7	yes	⋮
1 - 1 of 1					

Edit

Delete

If you deleted the default scrub schedule then click the “Add” button.

Whatever option you decided on before a window will pop up.

- Select the pool the schedule applies to from the “Pool” drop down selection menu (Fester used tank).
- Set the “Threshold days:” to **10** by typing it into the corresponding text box.
- Give the schedule a meaningful name, if desired in the “Description” text box.
- Fester wants to schedule these tests to run on the 1st and 15th of every month at 02:00am in the morning (the server should not be busy at that time). To do this, under “Schedule the Scrub Task”, select “Custom”.

Tasks / Scrub Tasks / Edit

FreeNAS® © 2019 - Ixsystems, Inc

Hourly (0 * * *)

Daily (0 0 * * *)

Weekly (0 0 * * sun)

Monthly (0 0 1 * *)

Custom (00 00 * * 7)

☒ Enabled ?

SAVE

CANCEL

- You'll see a scheduling window pop up. Under the heading of Minutes/Hours/Days, enter **00** for Minutes, **02** for Hours, and **1,15** for days.
- Notice that, on the calendar on the left, you'll see dates marked on which the scrub will run.
- Click the "Done" button.

Schedule Preview

< >

S M T W T F S

JUL

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13

14

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31

Mon Jul 01 2019 02:00:00 GMT-0400

Mon Jul 15 2019 02:00:00 GMT-0400

Presets

Choose a preset

Daily

Minutes/Hours/Days

Minutes *
00

Hours *
02

Days *
1,15

Months

Jan Feb Mar Apr May Jun

☐ ☐ ☐ ☐ ☐ ☐

Jul Aug Sep Oct Nov Dec

☐ ☐ ☐ ☐ ☐ ☐

Days of Week

S M T W T F S

☐ ☐ ☐ ☐ ☐ ☐ ☐

DONE

You'll be returned to the "Edit Scrub Task" screen, with your newly-defined custom schedule showing. Click "Save".

Pool *

tank

Threshold days *

10

Description

Bi-monthly scrub

Schedule the Scrub Task *

Custom (00 02 1,15 * *)

☒ Enabled ?

SAVE CANCEL

That's the scrub schedule set.

From:
<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

Permanent link:
<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:scrub>

Last update: **2019/05/27 11:19**



Fester's Very Basic One User/One Dataset Experimental Starter Share

Fester is still learning about shares and in particular share permissions.

As Fester learns more I will try to pass on what I have learned by adding to this section and creating additional guides for more “real world” share scenarios (if time permits).

This particular share will not be much use to most people, but it will get you going.

Don't forget the official FreeNAS guide has lots of information on shares. But for now, this will be a very basic share on a FreeNAS system and is designed to get you started so you can experiment with shares.

Share Scenario

This share is designed for one user who wants to access the same share from different client machines.

The client machines will mostly be running Windows (or Mac OS X).

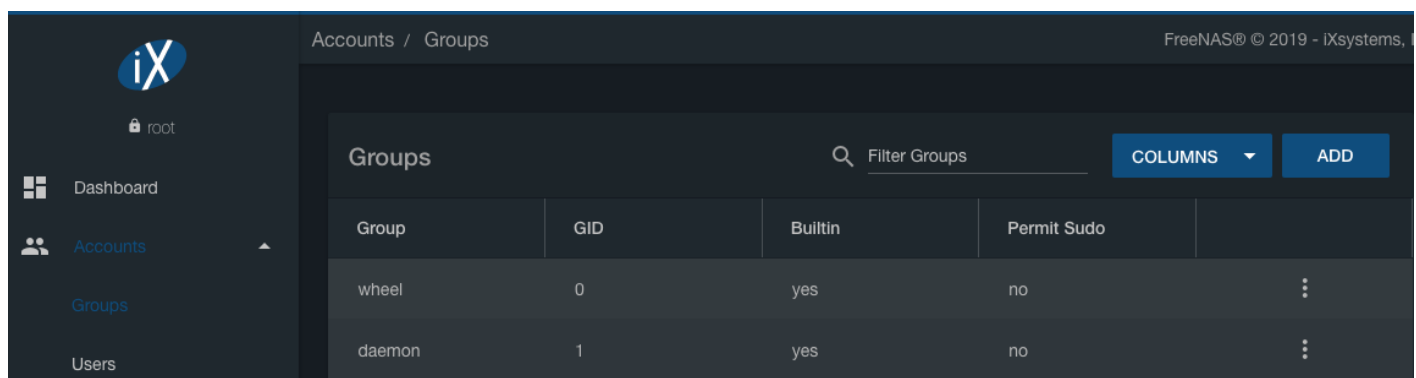
It will utilise one dataset and show you how to share it.

It is designed to get you started with shares so that you can experiment.

Share Creation and Configuration

User Creation

Click “Accounts” in the left column, then “Groups”.



Accounts / Groups

FreeNAS® © 2019 - Ixsystems, Inc.

Groups

Filter Groups

COLUMNS

ADD

Group	GiD	Builtin	Permit Sudo	
wheel	0	yes	no	⋮
daemon	1	yes	no	⋮

Click the “Add” button. A new smaller window will pop up, where we can create a new Group.

Accounts / Groups / Add

GID *
 1001

Name *
 TestGroup

☐ Permit Sudo ?

☐ Allow repeated GIDs ?

SAVE CANCEL

Leave the “Group ID:” at its default value of **1001**.

Now type in a name for the new group in the “Name” text box (because this is a starter share from which you can experiment, Fester used **TestGroup**).

Do not tick the “Permit Sudo:” or “Allow repeated GIDs:” tick boxes.

Now click the “Save” button.

If all goes well an entry should appear in the Account → Groups page. You should see something like this.

Groups Filter Groups COLUMNS ADD

Group	GID	Builtin	Permit Sudo	
TestGroup	1001	no	no	⋮

Now click “Accounts” in the left column, then “Users”.

Accounts / Users FreeNAS® © 2019 - iXsystems, Inc.

Users Filter Users COLUMNS ADD

Username	Home directory	Shell	Full Name	Lock User	
root	/root	/bin/csh	root	no	⋮
daemon	/root	/usr/sbin/nologin	Owner of many sy	no	⋮

Click the “Add” button. A new window will pop up, where we can create a new User.

Accounts / Users / Add

Name & Contact

Full Name *
Test User

Username *
TestUser

Email

Password *

Confirm Password *

ID & Groups

User ID *
1001

☐ New Primary Group ?

Primary Group
TestGroup

Auxiliary Groups

Leave the “User ID:” at its default value of **1001**.

Now type in a name for the new user in the “Username” text box (because this is a starter share from which you can experiment, Fester used **TestUser**).

Untick the “New Primary Group” tick box.

The “Primary Group” drop down selection box should now become active. The group we created earlier (i.e. TestGroup) should be available for selection.

Leave the “Home Directory” text box at the default **/nonexistent**.

Leave “Shell” at its default setting.

Type in a name for the new user (Fester chose **Test User**).

Create a password in the “Password” text box and confirm it by retyping it in the “Confirm Password” text box (because this is a starter share to experiment with Fester just used **12345**. Make sure you use a stronger and less predictable password unless you want Planet Spaceball to steal all your air.)

The screenshot shows the 'TestGroup' configuration window. It has a dark theme. At the top, it says 'TestGroup'. Below that is 'Auxiliary Groups'. The main area is divided into two panels: 'Directories & Permissions' on the left and 'Authentication' on the right. In the 'Directories & Permissions' panel, there is a 'Home Directory' section with a folder icon and the text '/nonexistent'. Below that is a 'Home Directory Permissions' section with a table of permissions. The table has columns for 'Owner', 'Group', and 'Other', and rows for 'Read', 'Write', and 'Execute'. All permissions are checked with yellow checkmarks. At the bottom of this panel are 'SAVE' and 'CANCEL' buttons. The 'Authentication' panel has an 'SSH Public Key' section, an 'Enable password login' section with a 'Yes' button, a 'Shell' section with 'csh', and three checkboxes: 'Lock User' (unchecked), 'Permit Sudo' (unchecked), and 'Microsoft Account' (checked with a yellow checkmark).

	Owner	Group	Other
Read	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Write	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Execute	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Do not tick the “Disable password login:” you will lock yourself out of the share.

Leave the “Lock user:” and “Permit Sudo:” at their default settings of unticked.

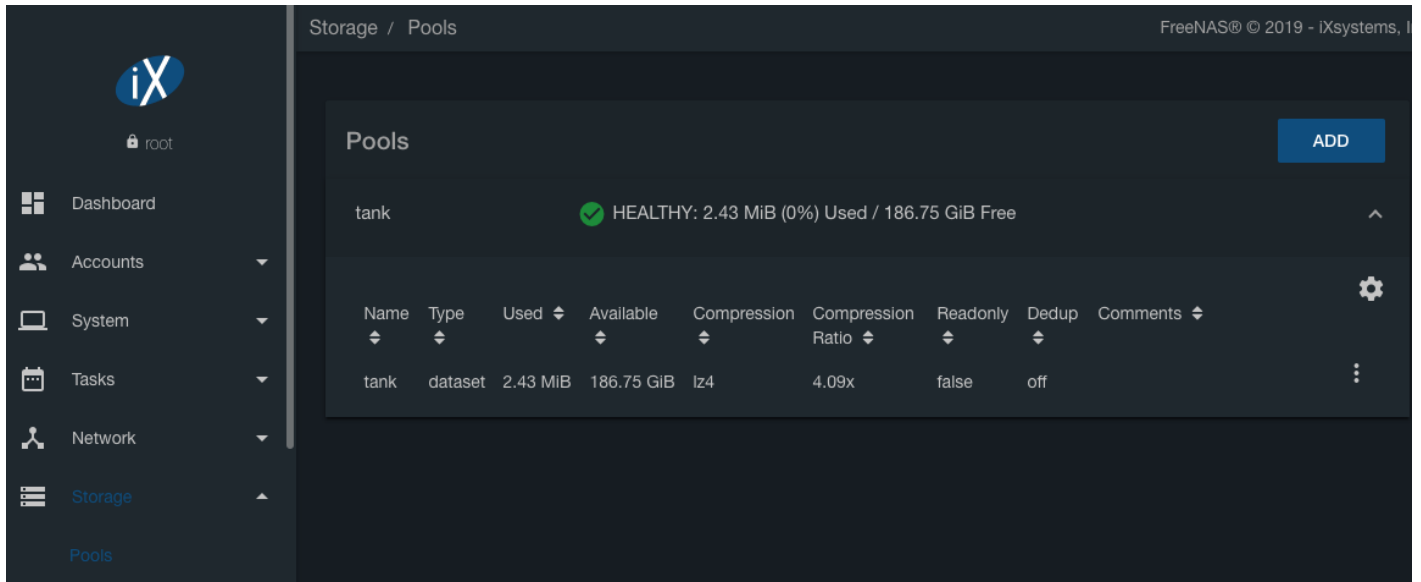
Fester will be accessing this account from a windows machine so I tick the “Microsoft Account:” tick box.

Now click the “Save” button.

Dataset Creation

Now we need to create the dataset.

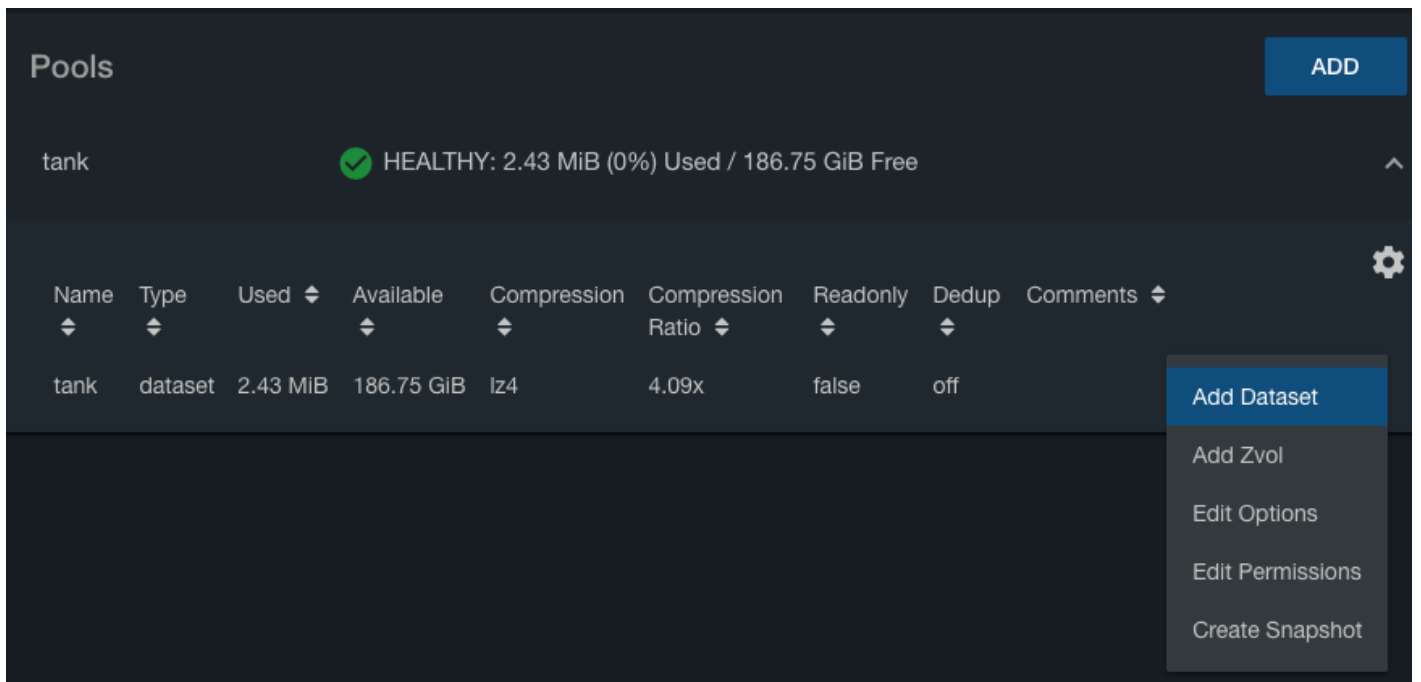
Click “Storage” in the left column, then “Pools”.



The screenshot shows the FreeNAS web interface. On the left is a sidebar with navigation links: Dashboard, Accounts, System, Tasks, Network, Storage (highlighted), and Pools. The main content area is titled 'Storage / Pools' and shows a 'Pools' section with a status bar for the 'tank' pool: 'HEALTHY: 2.43 MiB (0%) Used / 186.75 GiB Free'. Below this is a table with columns: Name, Type, Used, Available, Compression, Compression Ratio, Readonly, Dedup, and Comments. The table contains one row for the 'tank' dataset. To the right of the table is a vertical ellipsis menu icon.

Name	Type	Used	Available	Compression	Compression Ratio	Readonly	Dedup	Comments
tank	dataset	2.43 MiB	186.75 GiB	lz4	4.09x	false	off	

Click the three vertical dots to the right of your pool, and choose “Add Dataset” from the pop-up menu.



This screenshot shows the same FreeNAS interface as the previous one, but with the vertical ellipsis menu open. The menu options are: 'Add Dataset' (highlighted in blue), 'Add Zvol', 'Edit Options', 'Edit Permissions', and 'Create Snapshot'.

Name	Type	Used	Available	Compression	Compression Ratio	Readonly	Dedup	Comments
tank	dataset	2.43 MiB	186.75 GiB	lz4	4.09x	false	off	

- Add Dataset
- Add Zvol
- Edit Options
- Edit Permissions
- Create Snapshot

A new smaller window will pop up for creating the dataset.

Storage / Pools / Add Dataset

Name *

TestShare

Comments

Sync

Inherit (standard)

Compression level

Inherit (lz4)

Share Type ?

☐ Unix

☒ Windows

☐ Mac

Enable Atime

Inherit (on)

ZFS Deduplication

Inherit (off)

Case Sensitivity

Sensitive

SAVE CANCEL ADVANCED MODE

In the “Name” text box give the share a name (because this is a starter share from which you can experiment, Fester used **TestShare**).

Leave the “Compression level:” drop down selection box set to **Inherit (lz4)**.

Set the “Share Type” to whatever suits the type of clients on your network (Fester has mainly Windows machines so I set this to **Windows**).

Leave the “Case Sensitivity” drop down selection box and “Enable Atime” at their default settings as shown.

Now click the “Save” button.

The dataset will now be created and you should see something like this. If you don't see your newly-created dataset, click the > next to your pool name.

Pools

ADD

tank HEALTHY: 2.57 MiB (0%) Used / 186.75 GiB Free

Name	Type	Used	Available	Compression	Compression Ratio	Readonly	Dedup	Comments
▼ tank	dataset	2.57 MiB	186.75 GiB	lz4	3.75x	false	off	
TestShare	dataset	127.88 KiB	186.75 GiB	Inherits (lz4)	1.00x	false	off	

Click the three vertical dots to the right of your dataset, and select “Edit Permissions” from the pop-up menu.

tank HEALTHY: 2.57 MiB (0%) Used / 186.75 GiB Free

Name	Type	Used	Available	Compression	Compression Ratio	Readonly	Dedup	Comments
▼ tank	dataset	2.57 MiB	186.75 GiB	lz4	3.75x	false	off	
TestShare	dataset	127.88 KiB	186.75 GiB	Inherits (lz4)	1.00x	false	off	

Add Dataset

Add Zvol

Edit Options

Edit Permissions

Delete Dataset

Create Snapshot

A new window will pop up for changing the permissions of the new dataset.

The screenshot shows a dark-themed 'Edit Permissions' dialog box. At the top, the breadcrumb 'Storage / Pools / Edit Permissions' is visible. The 'Path' field is set to '/mnt/tank/TestShare'. Under 'ACL Type', the 'Windows' radio button is selected. The 'Apply User' checkbox is checked, and the 'User' dropdown is set to 'TestUser'. The 'Apply Group' checkbox is also checked, and the 'Group' dropdown is set to 'TestGroup'. The 'Apply permissions recursively' checkbox is unchecked. At the bottom, there are 'SAVE' and 'CANCEL' buttons.

Leave the “Apply User” tick box at its default setting (with a tick).

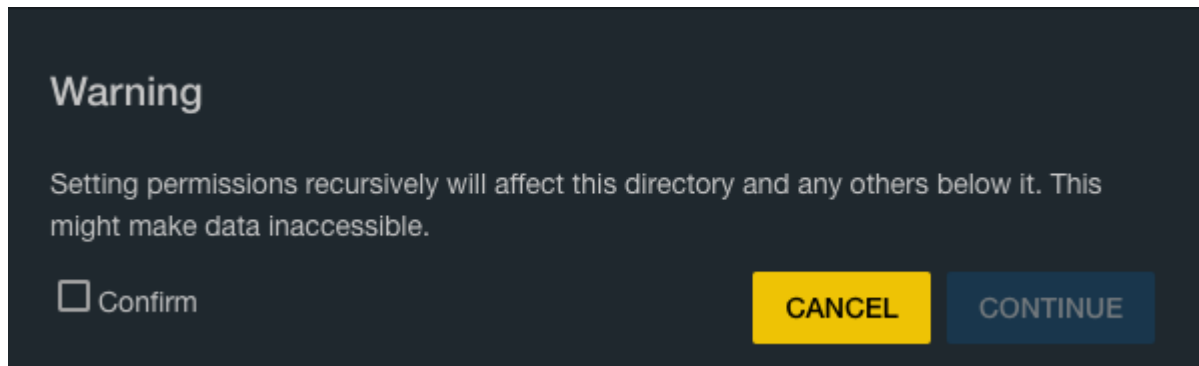
In the “User” drop down selection box select the new user you created a moment ago (in Fester’s case this was TestUser).

Leave the “Apply Group” tick box at its default setting (with a tick).

In the “Group” drop down selection box select the new group you created a moment ago (in Fester’s case this was TestGroup).

Set the “ACL Type” radio button to match the clients on your network (Fester has mostly Windows machines so I set this to **Windows**).

Put a tick in the “Apply permissions recursively” tick box. When you do this, you'll see a pop-up warning box.



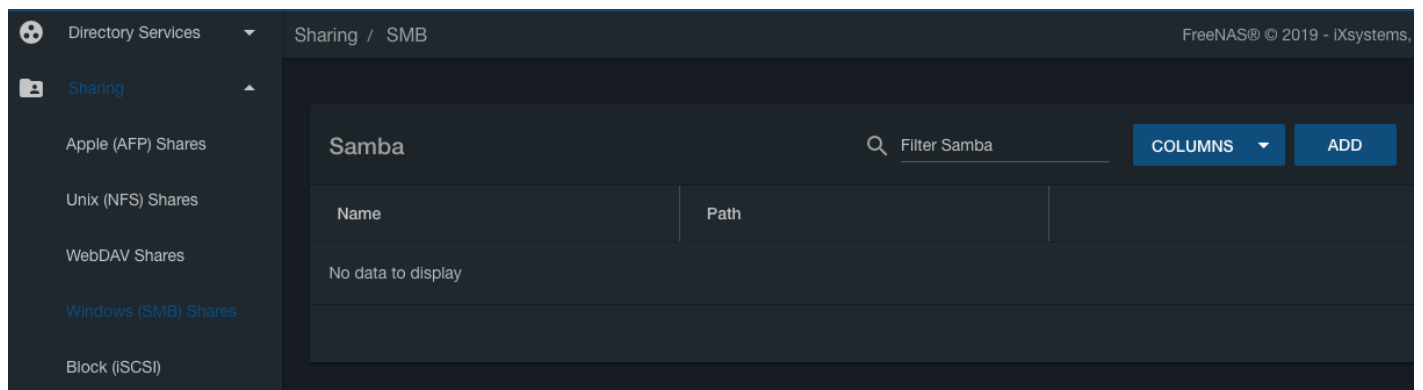
Put a tick in “Confirm”, then click the “Continue” button.

Now click the “Save” button.

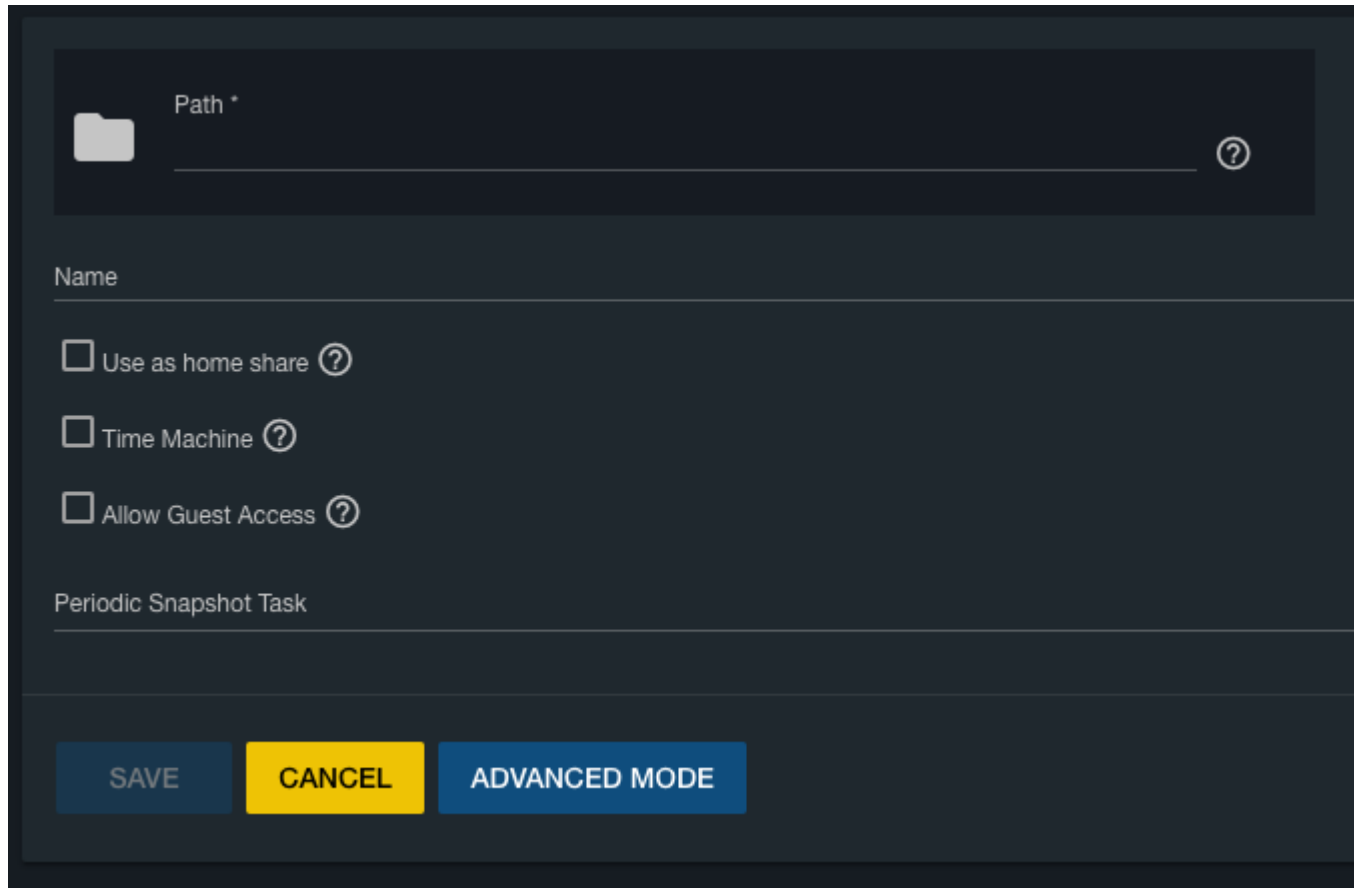
Share Creation

Now we need to create a SMB share. On a network that utilises predominately Windows or macOS clients this is a good choice.

Click “Sharing” in the left column, then “Windows (SMB) Shares”



Click the “Add” button.



A new smaller window will pop up.

In the “Path” section, you can type in the path (it's /mnt/tank/TestShare in this example), or click the folder icon on the left to browse.



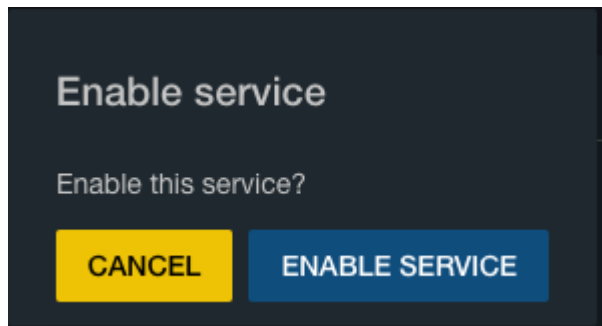
The “Path” text box should now display the chosen dataset.

Do not tick the “Use as home share:” tick box at the moment.

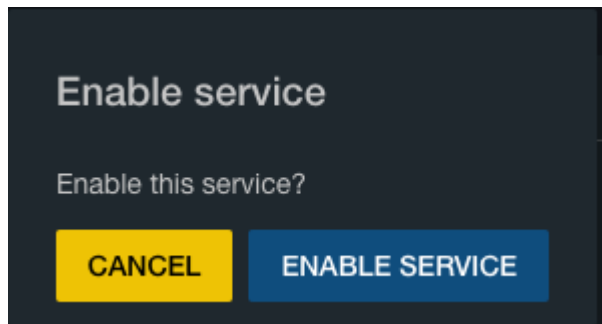
Give the share a name in the “Name” text box.

Do not tick the “Allow Guest Access:” tick box.

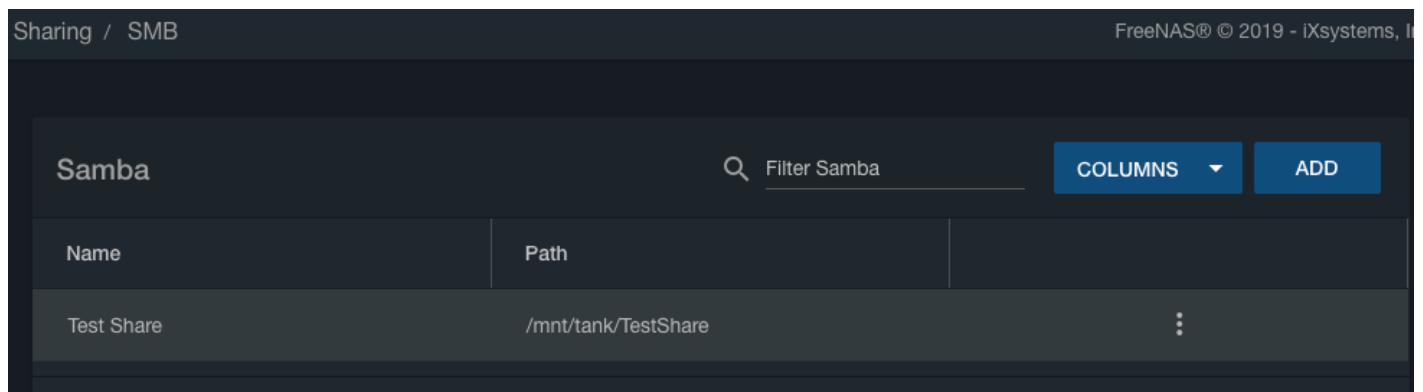
Now click the “Save” button.



You will now be asked if you wish to enable the SMB share service. Click the “Cancel” button.



You should now see your newly-created share.



SMB Configuration

Now click “Services” in the left column, and scroll down to find SMB.

Tasks

Network

Storage

Directory Services

Sharing

Services

Plugins

Jails

Reporting

Filter Service

Name	Running	Start Automatically	Actions
netdata	<div><div></div></div>	<div><div></div></div>	
NFS	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
Rsync	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
S.M.A.R.T.	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
S3	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
SMB	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
SNMP	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>

Click on the little pencil next to the “SMB” service.

A new window will pop up.

Services / SMB FreeNAS® © 2019 - Ixsystems, Inc.

NetBIOS Name *

freenas

NetBIOS Alias

Workgroup *

TESTWORKGROUP

Description

FreeNAS Server

☐ Enable SMB1 support

DOS Charset

CP437

UNIX Charset

UTF-8

Log Level

☐ Use syslog only

☒ Local Master

☐ Domain Logons

☒ Time Server For Domain

The NetBIOS name will already be present in the “NetBIOS Name” text box.

In the “Workgroup” text box (3) type in the name of the workgroup you want to use on the client machines (Fester used **T ESTWORKGROUP** because it is an experimental starter share). If you don’t know your Workgroup then skip to the relevant section on how to do this.

Type in a good name for the SMB share in the “Description” text box.

Do not alter the default values of the “DOS charset”, the “Unix charset” and the “Log level:”.

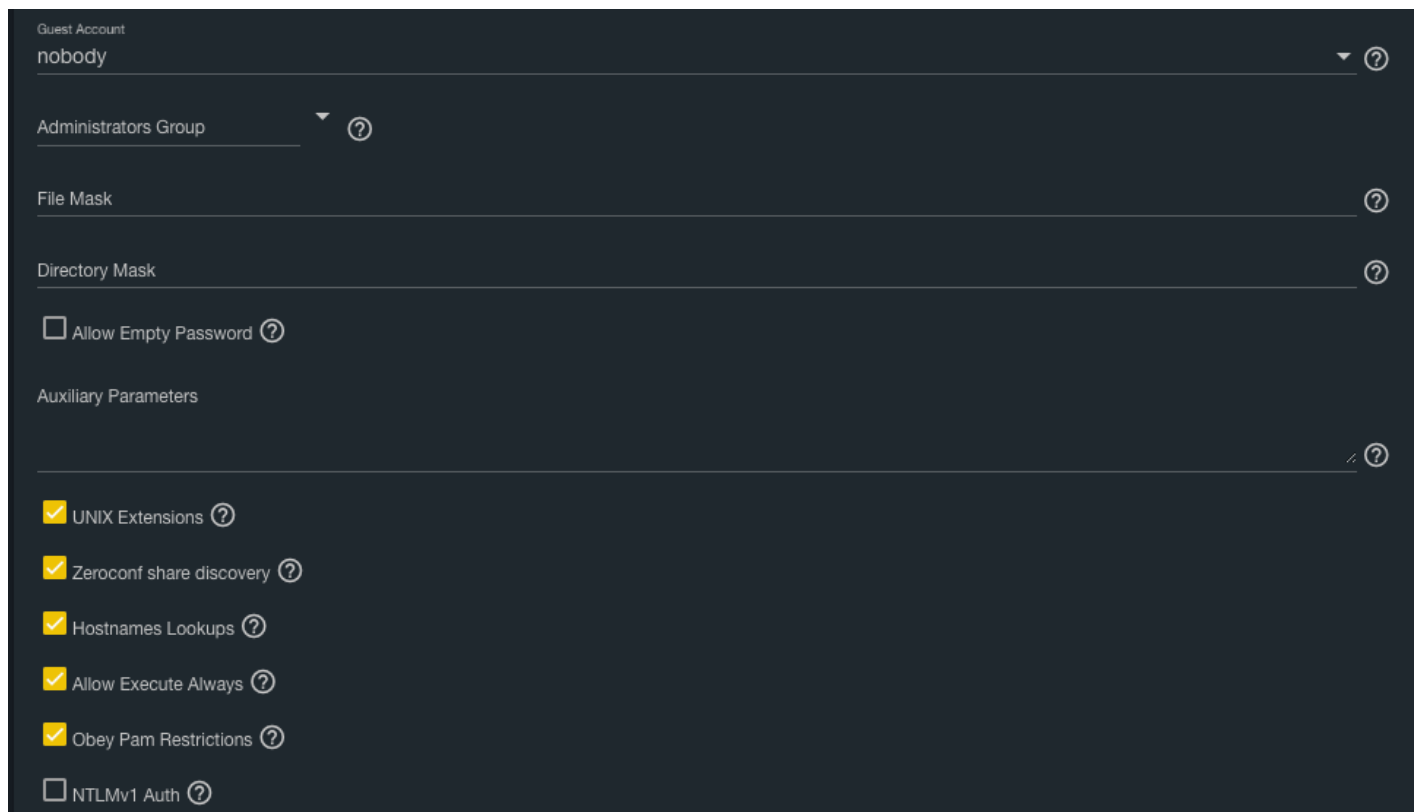
Leave the “Use syslog only” at its default (no tick).

Make sure the “Local Master” tick box is ticked.

Leave “Domain logons” unticked.

Leave “Time Server for Domain” ticked.

Leave “Guest account” at **nobody**.



The screenshot shows a configuration window with a dark background. At the top, 'Guest Account' is set to 'nobody'. Below it, 'Administrators Group' is set to a default value. 'File Mask' and 'Directory Mask' are empty. 'Allow Empty Password' is unchecked. Under 'Auxiliary Parameters', 'UNIX Extensions', 'Zeroconf share discovery', 'Hostnames Lookups', 'Allow Execute Always', and 'Obey Pam Restrictions' are all checked, while 'NTLMv1 Auth' is unchecked. Each setting has a help icon (question mark) to its right.

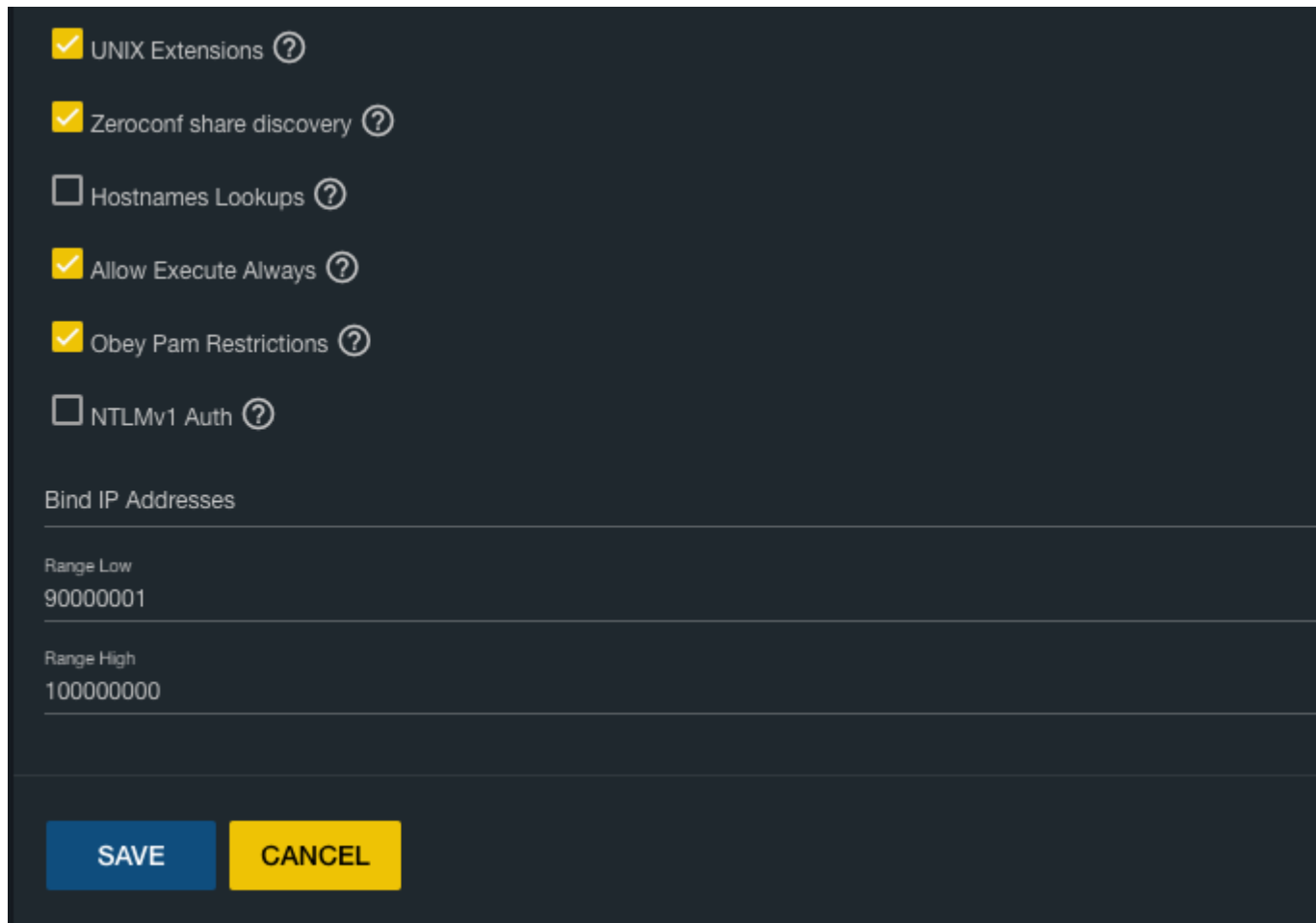
Do not put anything in the “File mask” and “Directory mask” text boxes unless you really understand UNIX permissions (Fester can’t help you here).

Do not tick the “Allow Empty Password” tick box as this weakens the security of the share.

Leave the “Unix Extensions” and “Zeroconf share discovery” tick boxes as they are.

Untick the “Hostnames lookups:” tick box otherwise you will keep getting a name mismatch error.

Leave the “Allow execute always” tick box in its default setting (with a tick).



The screenshot shows a Samba configuration window with a dark background. It contains several settings, each with a checkbox and a help icon (a question mark in a circle). The settings are:
- **UNIX Extensions**: checked (yellow checkmark).
- **Zeroconf share discovery**: checked (yellow checkmark).
- **Hostnames Lookups**: unchecked (white checkbox).
- **Allow Execute Always**: checked (yellow checkmark).
- **Obey Pam Restrictions**: checked (yellow checkmark).
- **NTLMv1 Auth**: unchecked (white checkbox).
Below these is the **Bind IP Addresses** section, which has two text input fields:
- **Range Low**: contains the value 90000001.
- **Range High**: contains the value 100000000.
At the bottom are two buttons: a blue **SAVE** button and a yellow **CANCEL** button.

Fester has no idea what the “Obey pam restrictions:” setting actually does. I just leave it ticked, but I have no idea how it should be set.

Don’t tick any of the IP address text boxes in the “Bind IP Addresses” section.

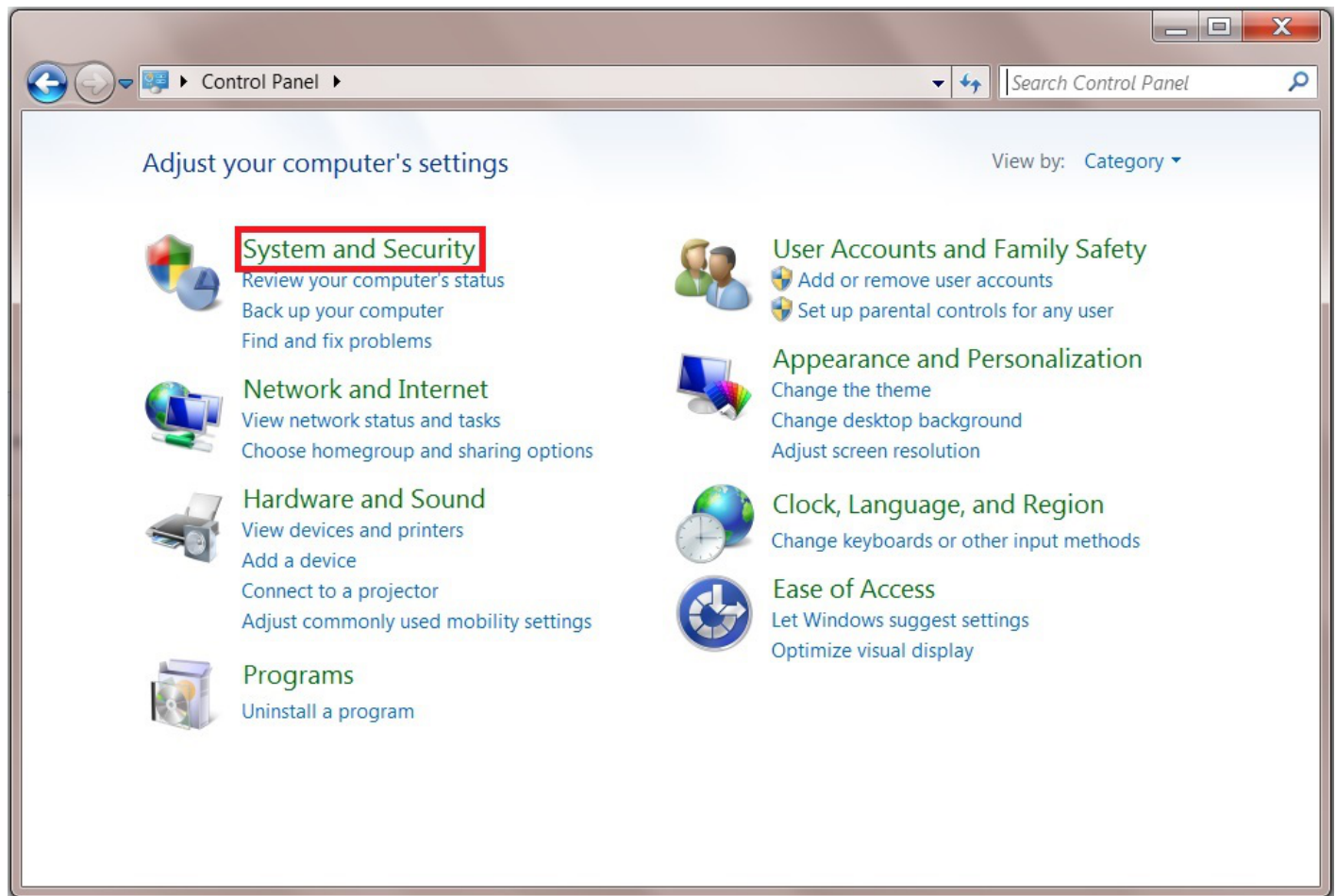
The “Idmap Range Low:” and “Idmap Range High” settings Fester does not touch as I don’t know what they do.

Now click on the “Save” button.

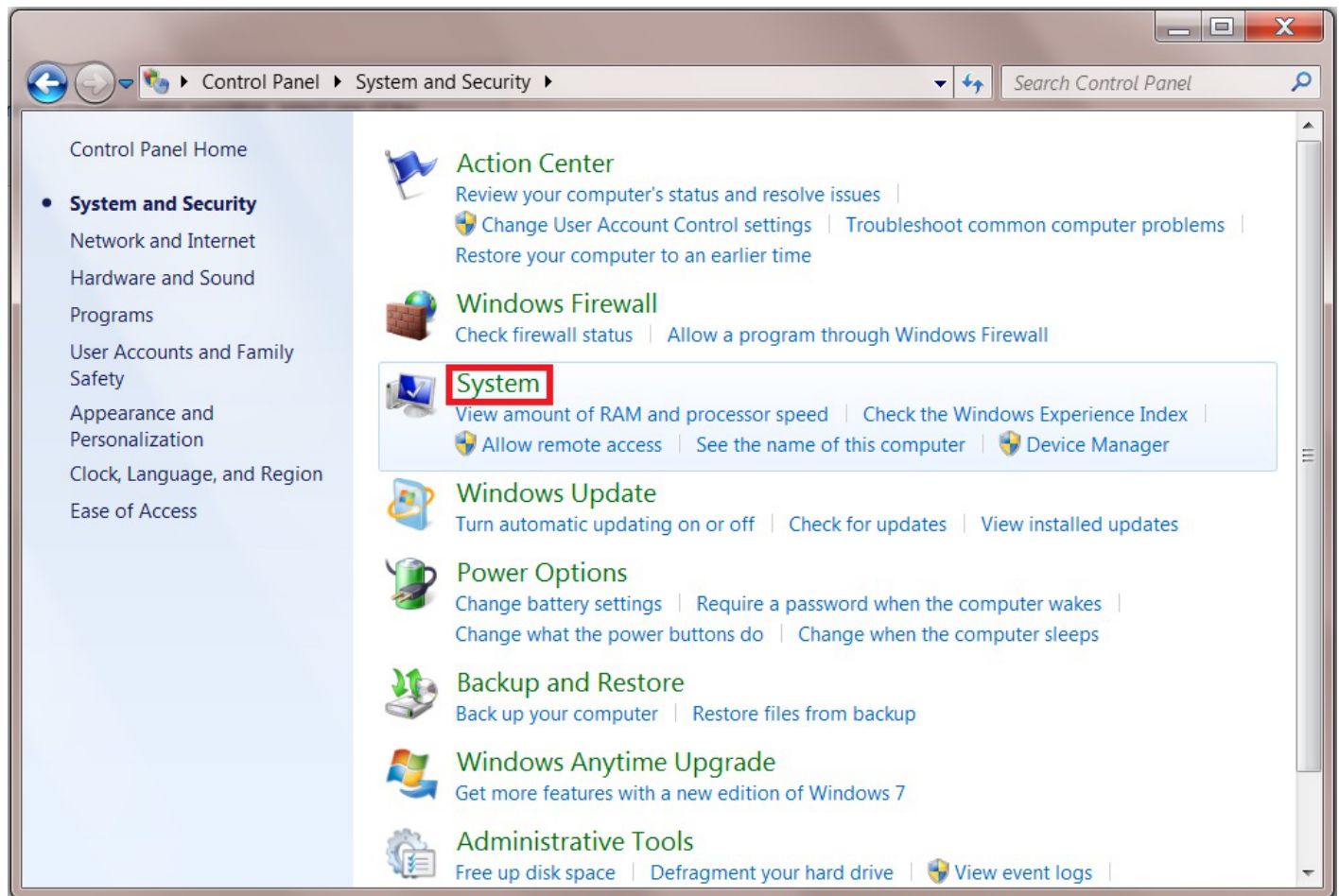
Do not turn on the SMB share service yet. We first need to check if the Workgroup on the Windows client is set correctly.

Windows Client Configuration

Click on the “Start” button and go into the “Control Panel” in Windows and select “System and Security” (this was on a Windows 7 machine).



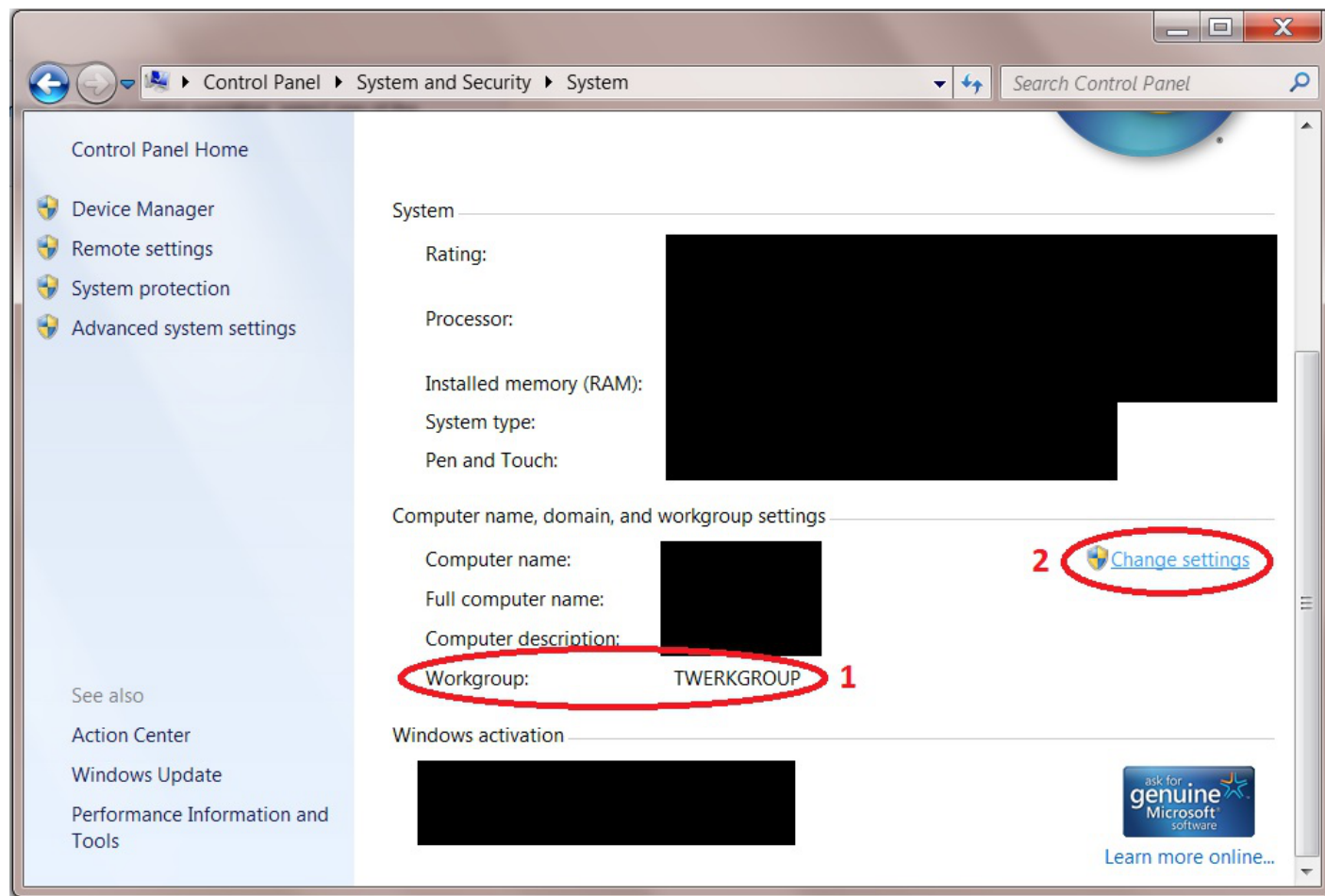
Now click on "System".



In the “System” page we can see the Workgroup is set to **TWERKGROUP** (1). This must be changed to match the Workgroup name you created in the SMB settings a moment ago (in Fester’s case this was TESTWORKGROUP).

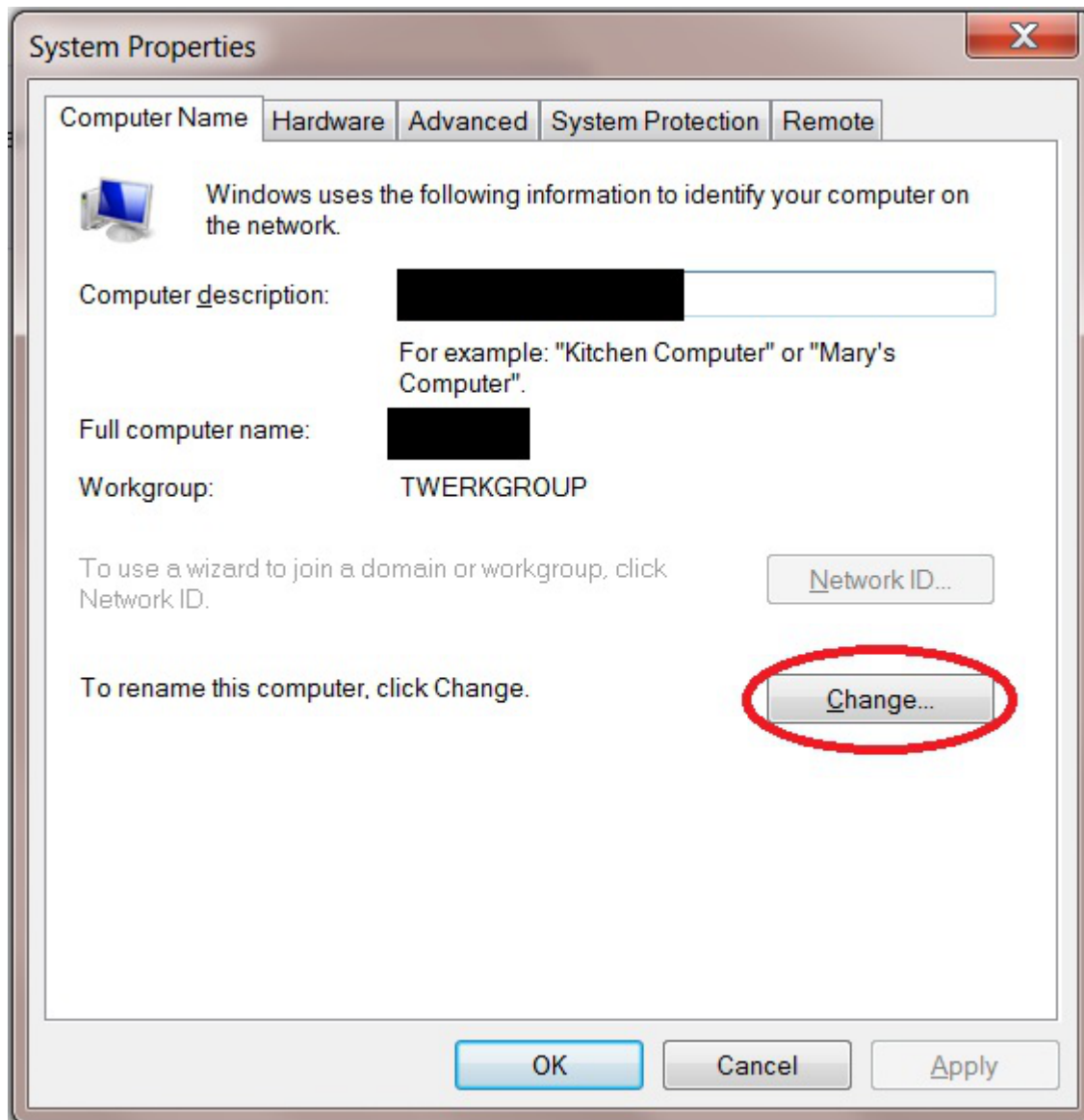
Click on “Change settings” blue text (2) to access the screen where we can change the Workgroup name.

You will probably be asked for the administrator’s password at this point.



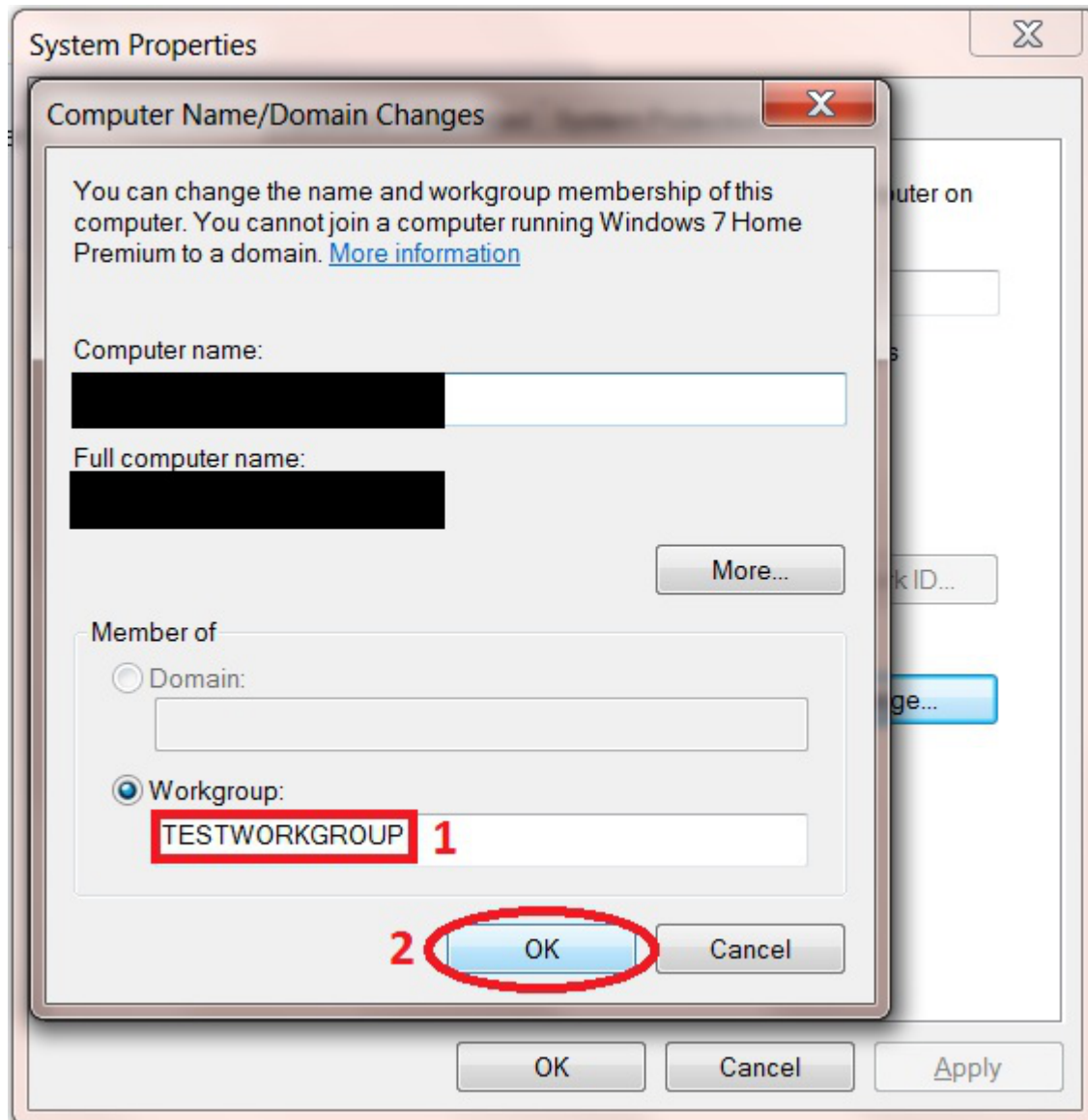
A smaller window will now pop up.

Click on the "Change" button.



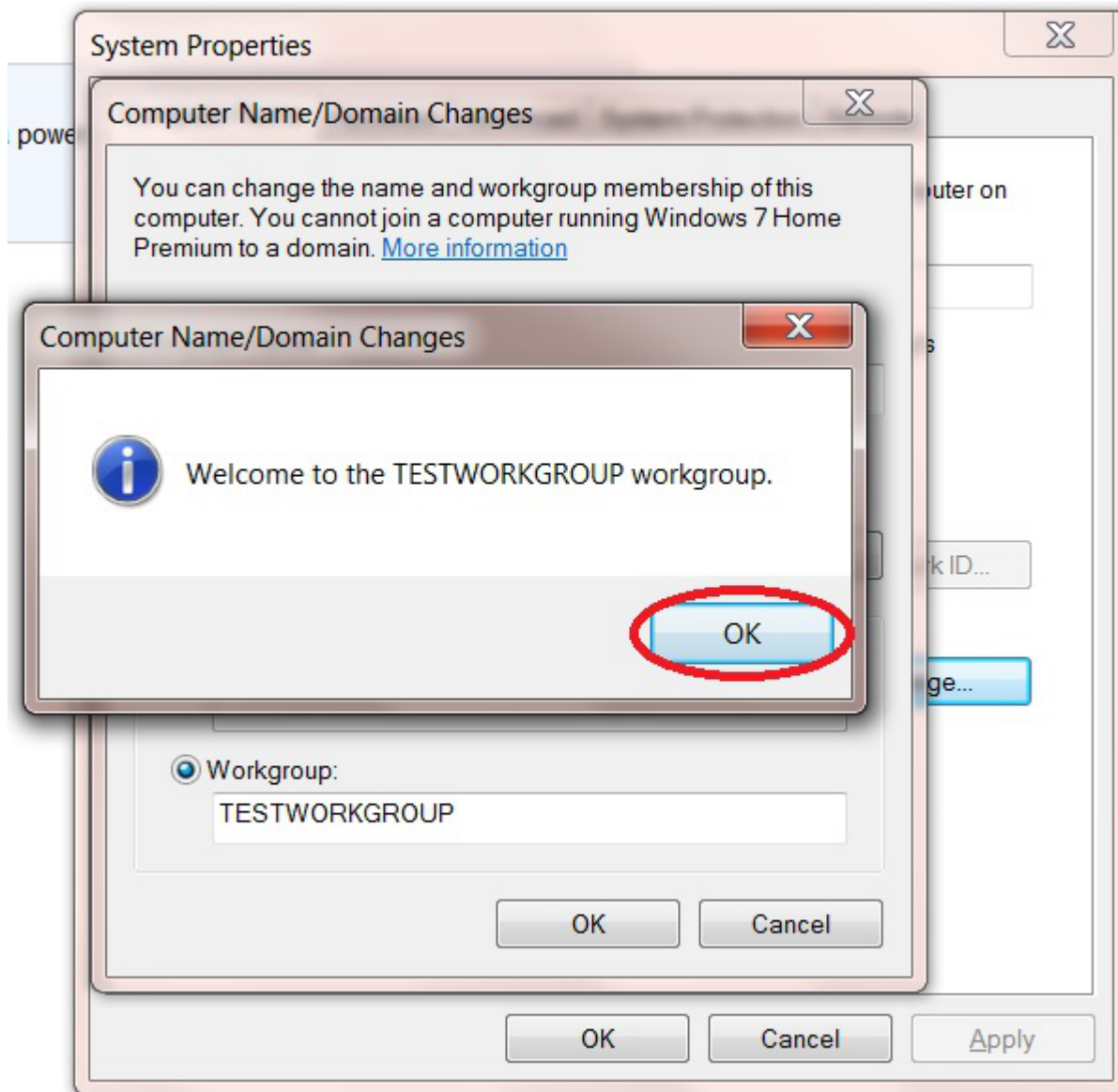
Another window will now pop up.

Change the text in the Workgroup text box (1) to the one you created in the SMB settings page (in Fester's case this was **TESTWORKGROUP**) and click the "OK" button (2).



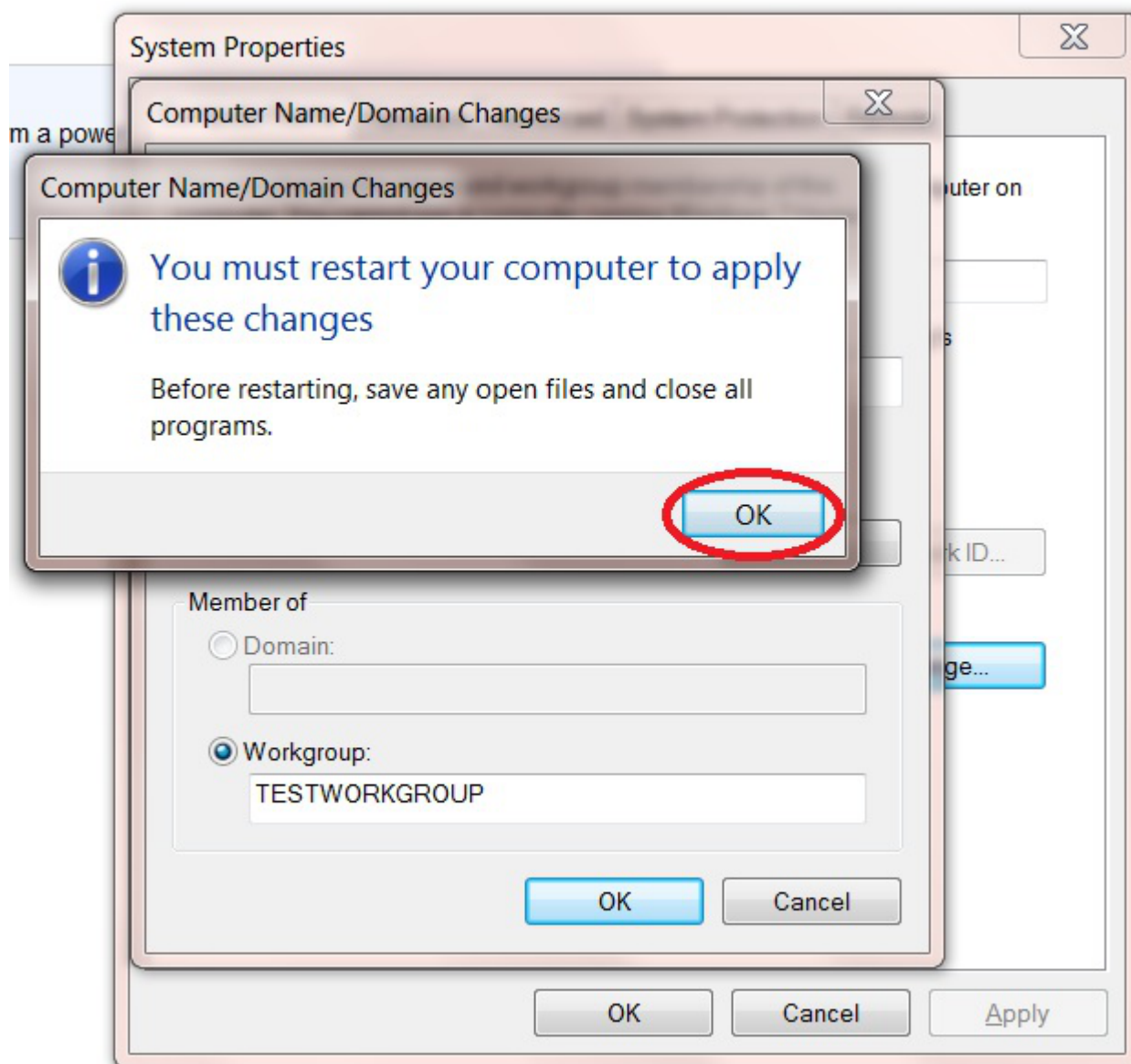
Yet another window will pop up showing the Workgroup has now been changed.

Click the "OK" button.



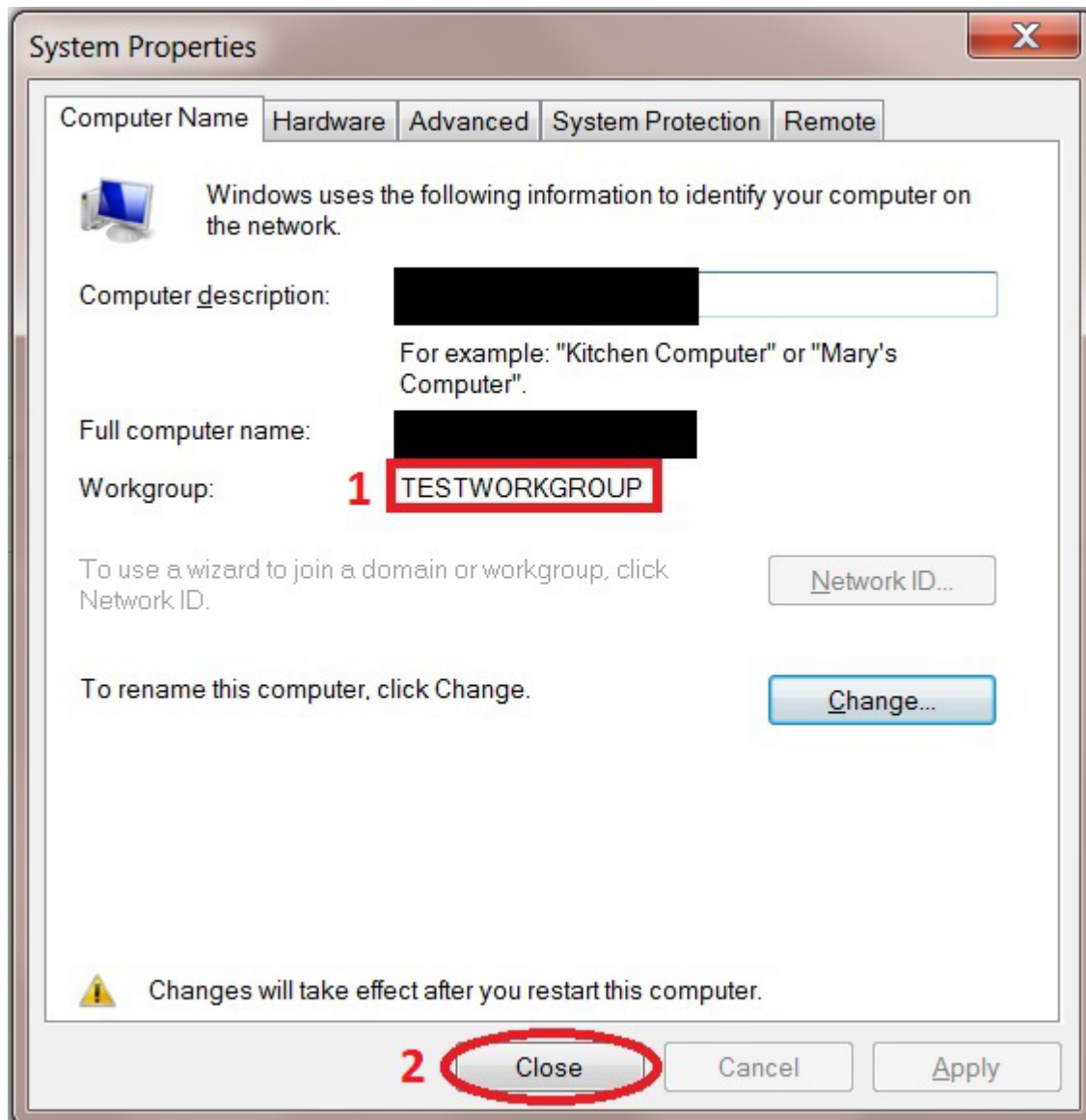
A message window will now appear telling you the changes will be implemented when the computer is restarted.

Click the "OK" button.



As can be seen from the next screen shot the Workgroup has been changed to "TESTWORKGROUP" (1).

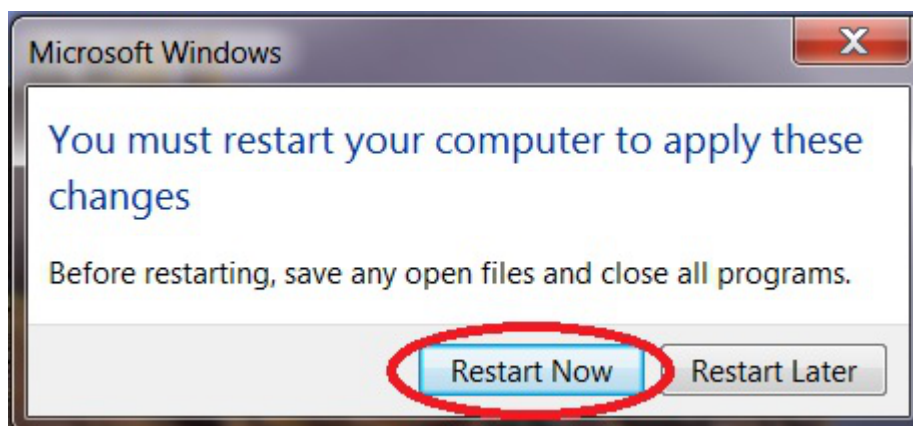
Click the "Close" button (2).



The system will now ask to be restarted. This must be done before going any further.

Close any open windows, save and close any open programs, etc.

Now click on the "Restart Now" button.



That's the Windows Workgroup configured.

The client computer will now reboot, when it does log back into the FreeNAS GUI.

Enable SMB Service

Now click "Services" in the left column, and turn on the SMB share service.



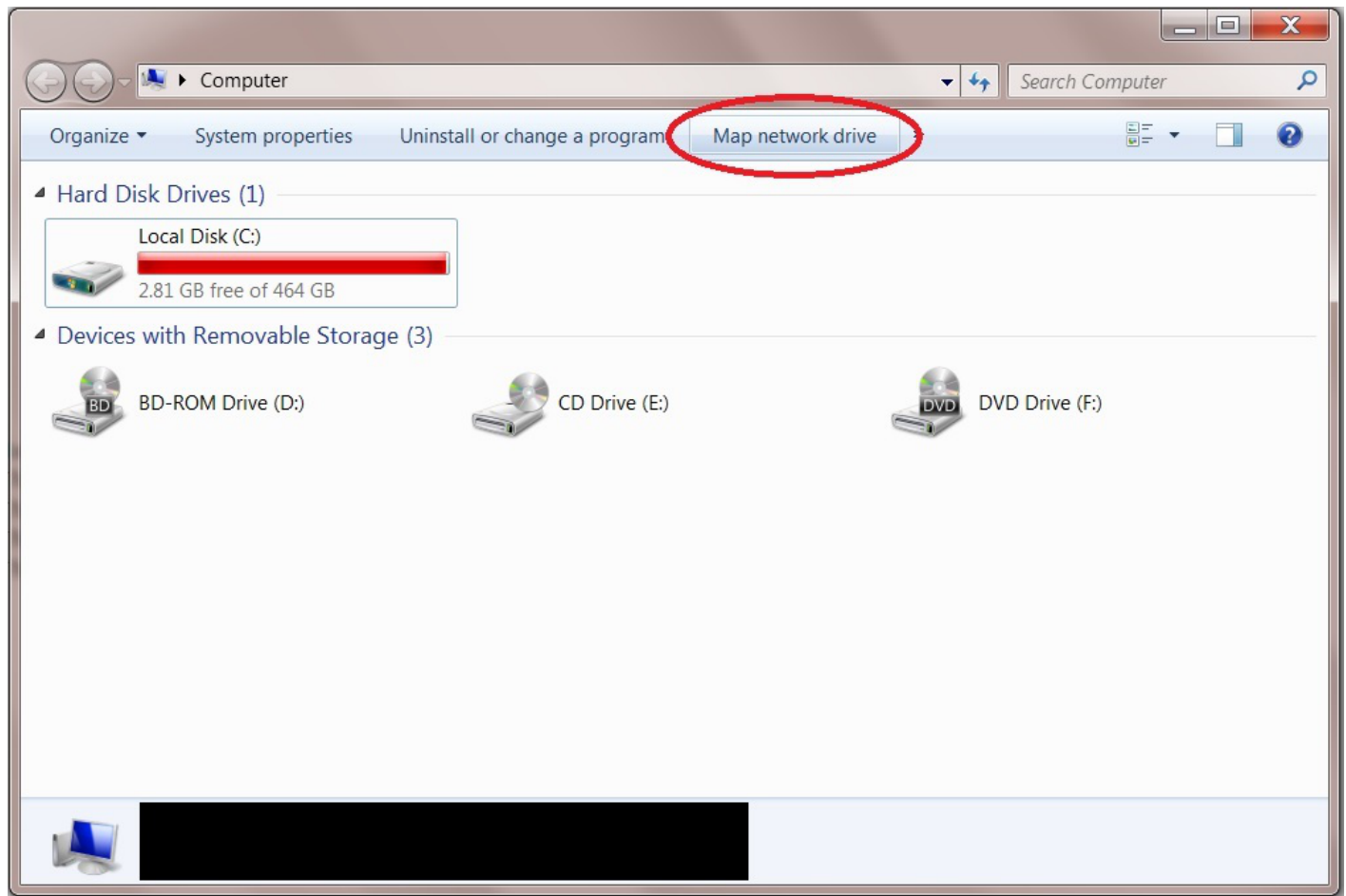
Give the server some time to get the share up and running, then it is time to map the network folder to a drive letter.

Mapping the share to a drive letter

On the Windows client click on the "Start" button and go into "Computer" (this was on a Windows 7 machine).

This should bring up a window that shows all the hard drives and any other devices connected to the Windows computer.

Click on the "Map Network Drive" button.



From the “Drive:” drop down selection box (1) chose the drive letter you wish to assign to the shared folder (Fester accepted the default **Z** letter).

Now click the “Browse...” button (2).

This will cause a window to pop up.

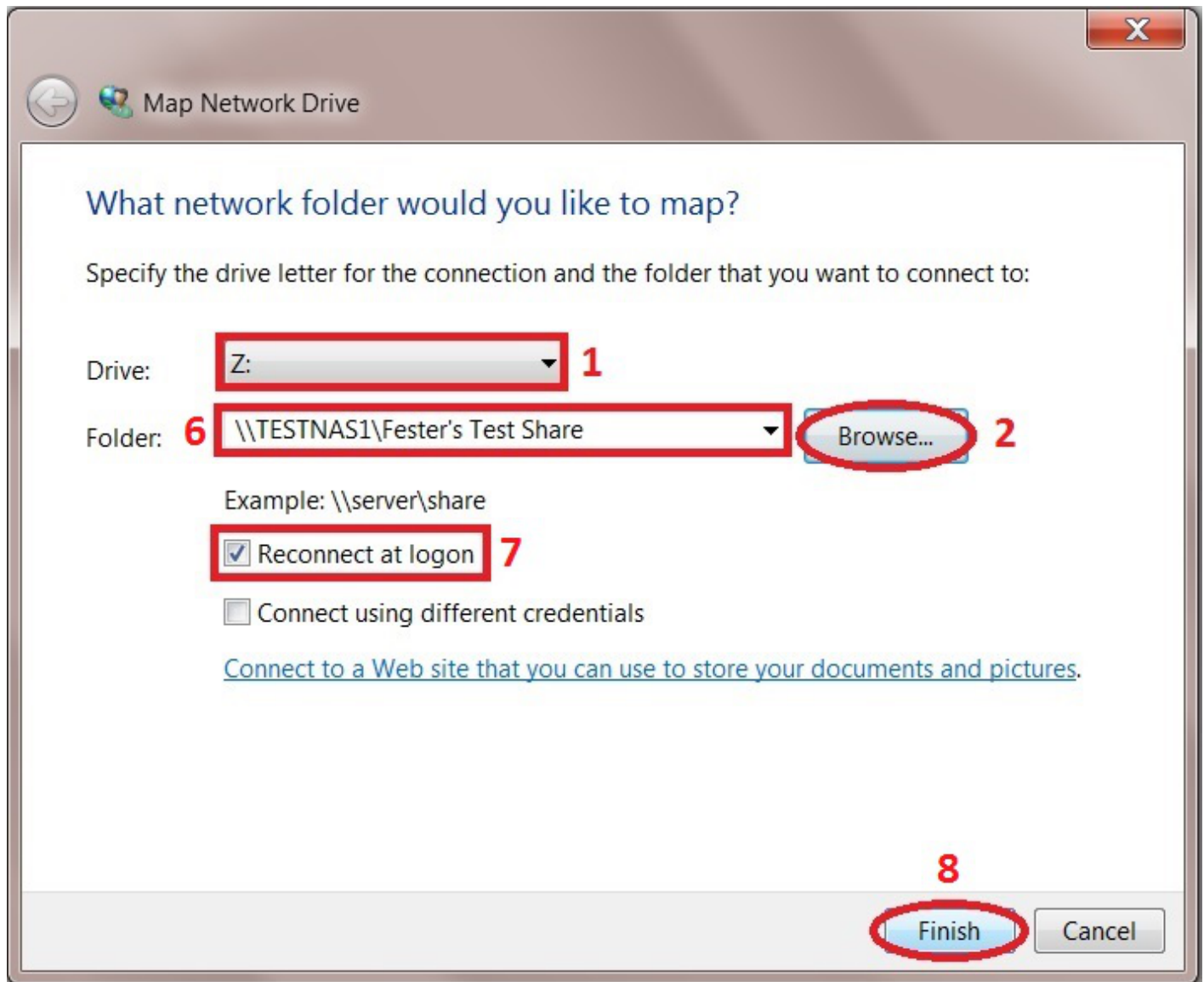
Navigate to the location of the shared folder by clicking on the server (in this case TestNAS1) (3) and then clicking on the shared folder itself (in this case Fester’s TestShare) (4).

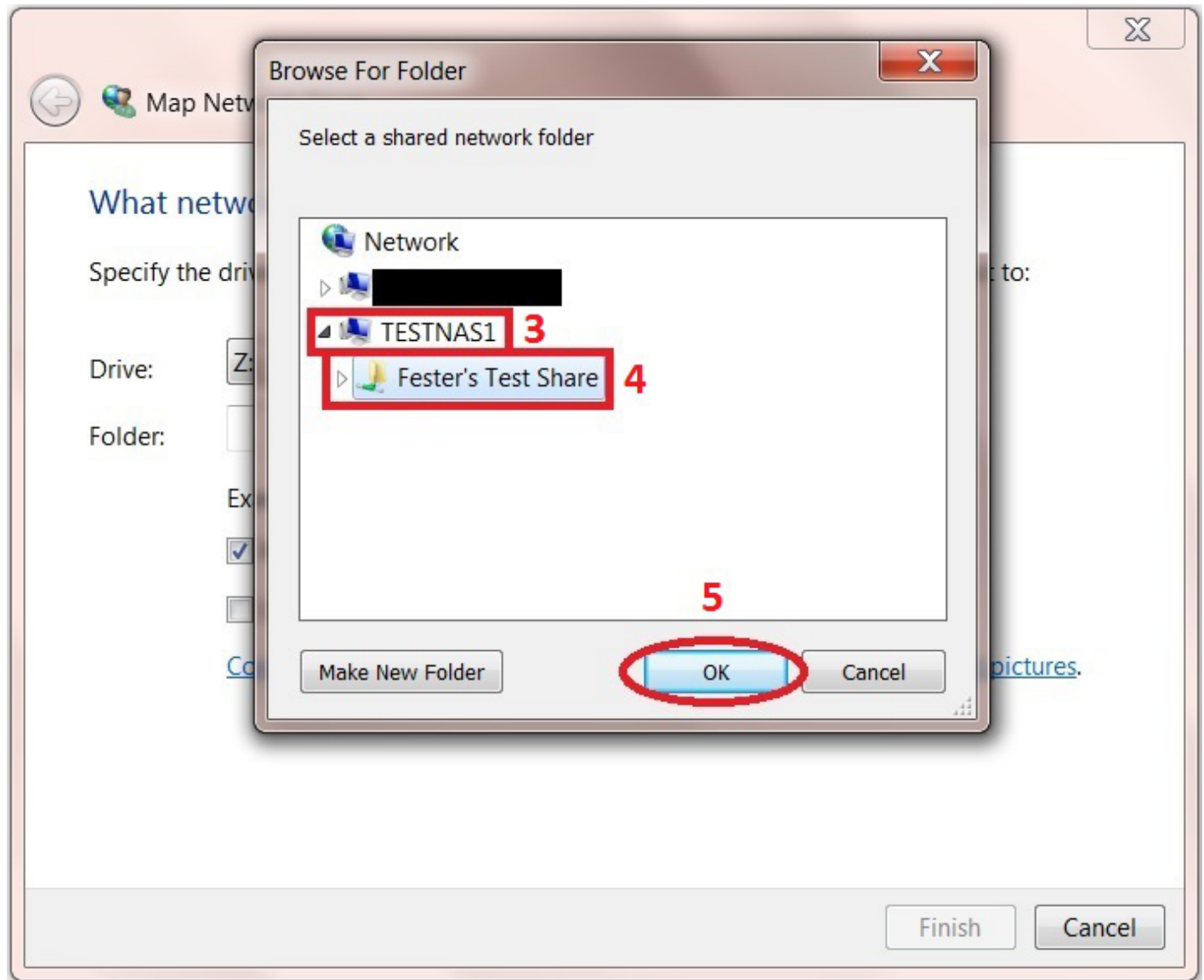
Now click the “OK” button (5).

The shared folder’s path name should appear in the “Folder:” text box (6).

Tick the “Reconnect at logon” Tick box (7).

Now click the “Finish” button (8).





At this point another window will pop up and ask you for the username and password for the share.

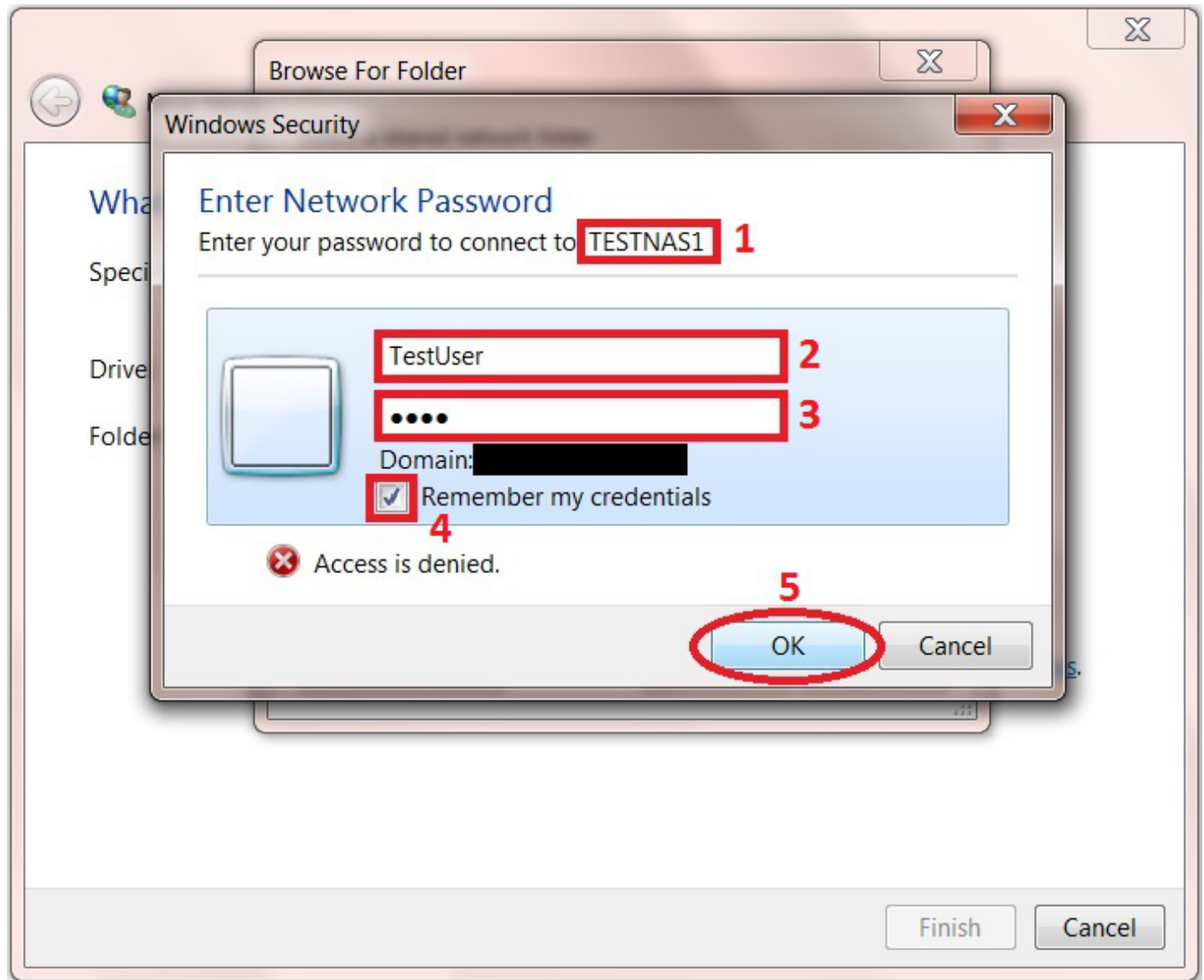
The name of the server is shown next to the text at the top of the window (1).

Type in your username in the first text box (2) (in Fester's case this was **TestUser**).

Now type in your password in the second text box (3) (in Fester's case this was **test**).

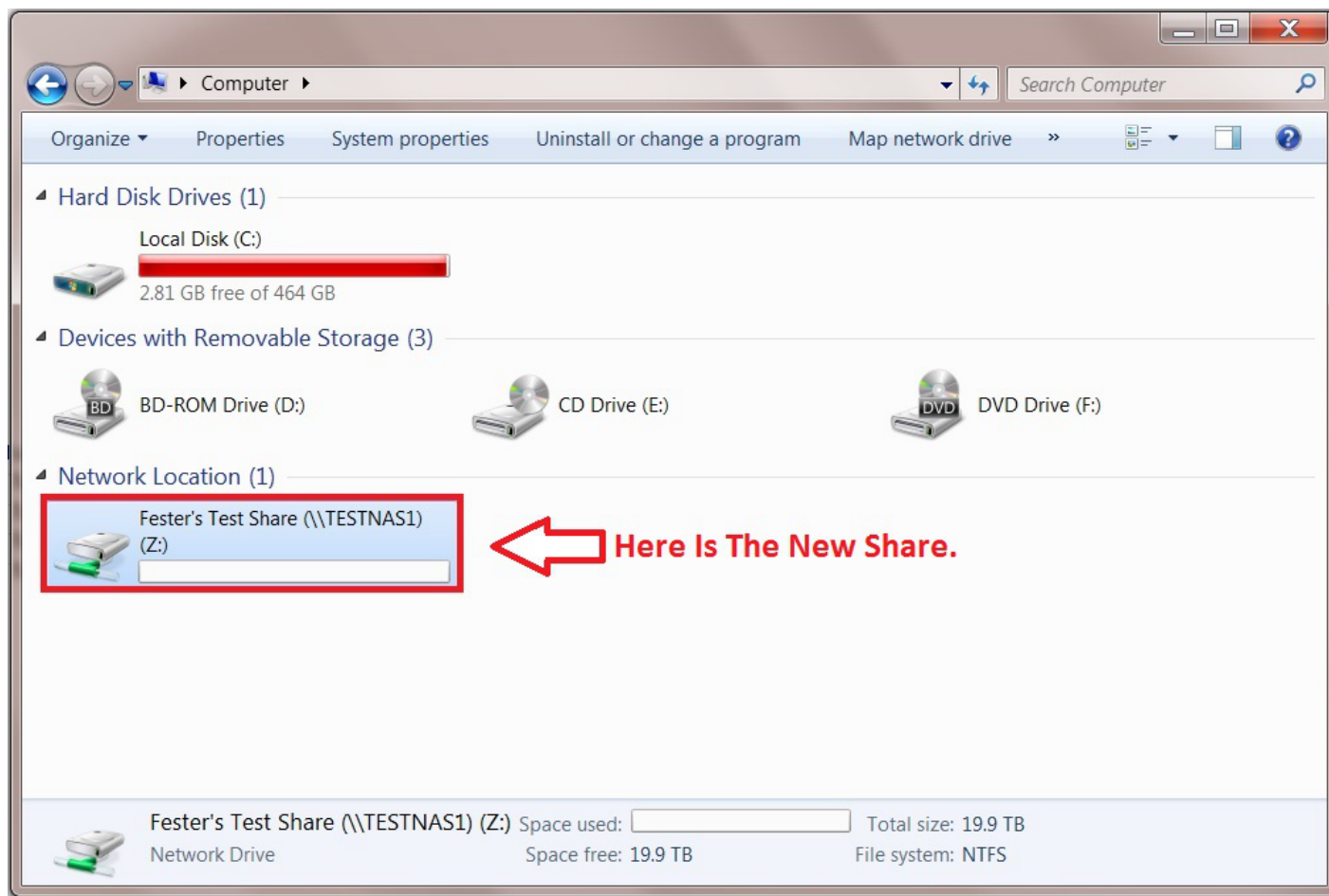
If you don't want to type in your username and password exact time you log into your client machine then tick the "Remember my credentials" tick box (4).

Now click the "OK" button (5).



If all has gone well you should find yourself in the shared folder. Here you can create other folders and save files. Test this to make sure there are no permissions problems.

The shared folder will now appear as another drive on your system and should look something like this.



That's the starter share done.

If you want to play with the permissions for this share then feel free. It is the only real way to learn about these things.

Remember the permissions for a share on Windows clients are in two parts.

Part one is the "Share" permissions and part two is "NTFS" permissions.

Share Permissions

"Share" permissions relate to the permissions of the actual shared folder on the server.

Be very careful changing these. The FreeNAS GUI will stop you making most catastrophic changes to the permissions that would otherwise break the share.

However, if you go behind the GUI to the command prompt you could really mess things up. Do not use the **chmod** command here or you will probably break the share. Use the **getfacl** and **setfacl** commands.

Another way you can alter the "Share" permissions is by using an application that runs on the client specifically for this purpose. I have not used any of these programs so I cannot comment on how useful or easy they are to use. However, you still need to be careful when using them because you are still

going behind the FreeNAS GUI here.

NTFS Permissions

“NTFS” permissions relate to the permissions you set for the shared folder on the client side through the Windows OS.

It is considered good practice (this is debateable) to leave the “Share” permissions as they are and lock down the share using NTFS permissions. This has the advantage of controlling the share regardless of how it is accessed (i.e. locally or via a network).

It is much easier for the beginner and those that are unfamiliar with Linux or FreeBSD to configure permissions in this way as the permissions are controlled by a series of tick boxes (not cryptic commands). As long as you understand what each of the settings mean you should be fine.

However, be careful as it is possible using the “Everyone” group to lock yourself out of the share (Fester did this and could not regain control of the share).

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Last update: **2019/06/20 02:13**



Shares

I decided to make this a separate section of the Fester FreeNAS guide.

I did this because shares cause the most problems for new users of the FreeNAS OS and within this category it is permissions that cause the most problems when it comes to shares.

Also by creating a separate section this will allow others to easily add their share guides after this one. In this way a repository of different share scenarios with different configurations can be accumulated over time.

The user of this guide can then choose the one which suits their purposes best.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:shares_intro

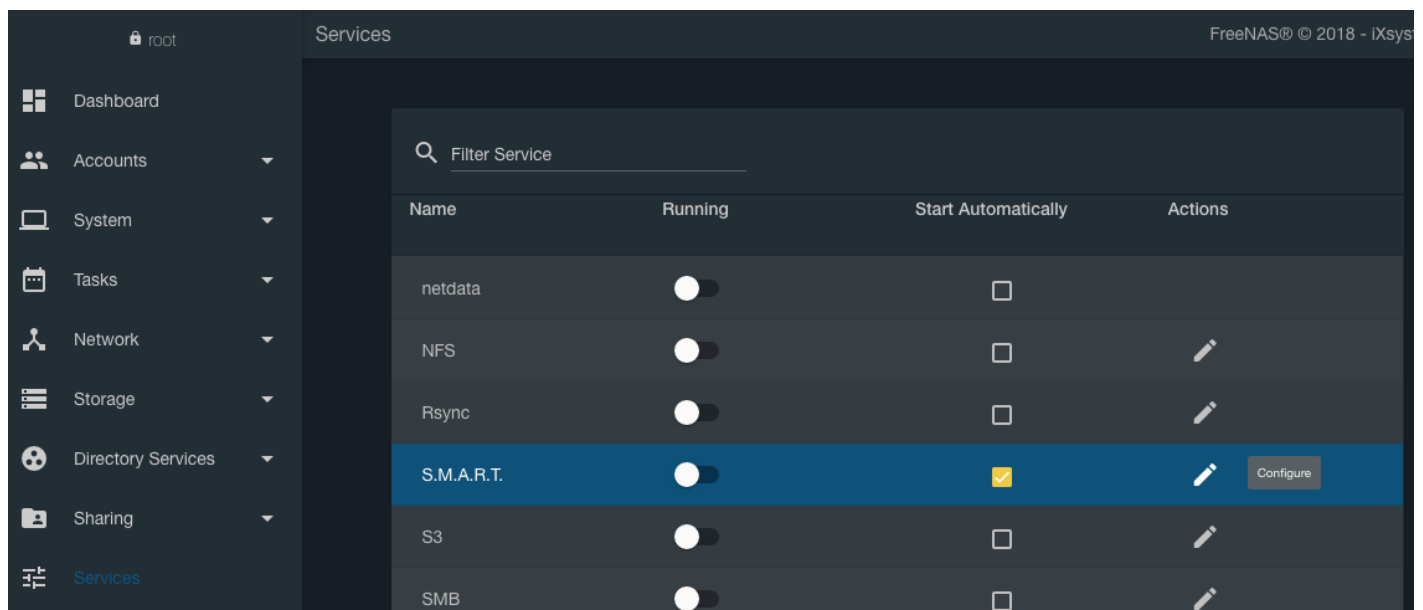
Last update: **2016/06/08 01:08**



Configuration Of The FreeNAS SMART Monitoring Service

I would recommend you set up email notifications before configuring this.

Click “Services” in the left column, scroll down to find “S.M.A.R.T.”, and click the pencil icon to the right.



A window should now pop up.

In the window leave the “Check interval:” set at its default value of 30 minutes.

Fester sets the “Power mode:” drop down selection box to **Never**. This will ensure that the drives are checked no matter what their status.

Leave the “Difference:” and “Informational:” text boxes at their default value of **0**.

Now set the drive temperature warning threshold called “Critical:” by putting the desired value into the corresponding text box. Any figures placed here are in degrees Celsius (Fester favours a figure of 50° C, but the prevailing view among active members of the FreeNAS forums is 40° C). If any of the drives being monitored reaches or exceeds the temperature stated in the text box then the server will issue a warning.

Now enter in the “Email” text box the internal email address of the user the SMART monitor service is to alert (in Fester’s case this is **root@TestNAS1.local**).

Then click the “Save” button.

Services / S.M.A.R.T. FreeNAS® © 2018 - iXsystems, Inc.

Check Interval *
30 ?

Power Mode *
Never ?

Difference *
0 ?

Informational *
0 ?

Critical *
40 ?

Email
me@example.com ?

SAVE **CANCEL**

The final thing is to test it works.

Go back into the SMART service configuration window by clicking on that small spanner icon again.

In the “Critical:” text box enter a value that is way below the ambient temperature of the room in which the server is situated (Fester suggests about 1° C should do it).

Now click the “Save” button and wait.

Due to the fact that the temperature of the HDDs in the server will be higher than the threshold we have set, a warning email should be triggered. When you get the email you know the service is working.

Be sure to return the value in the “Critical:” text box to a more appropriate value when you are done.

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<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

Permanent link:
https://www.familybrown.org/dokuwiki/doku.php?id=fester112:smart_email

Last update: **2019/05/27 00:17**

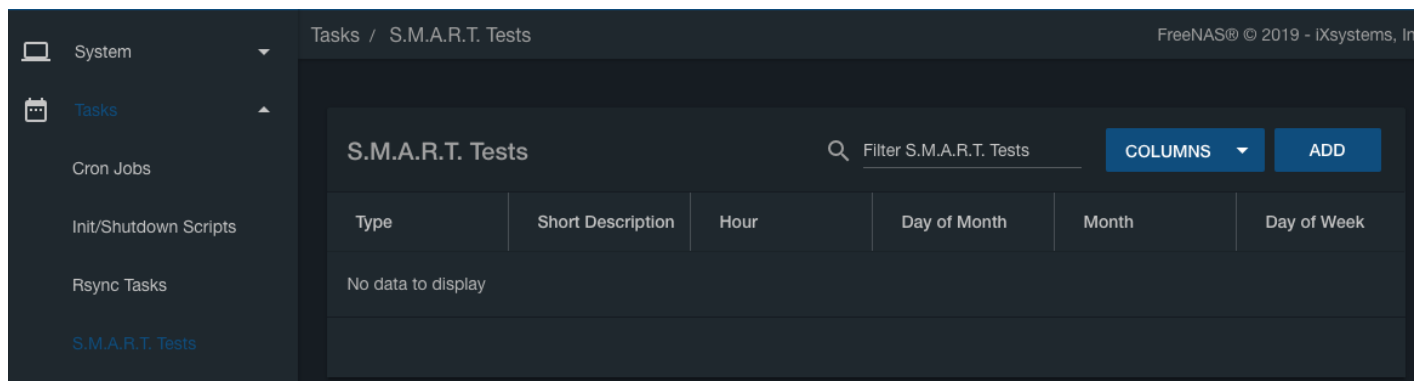


SMART Test Schedule

There are two types of SMART test that require schedules. We need to create a Long SMART test schedule and a Short SMART test schedule.

Long SMART Test Schedule

Click on “Tasks” in the left column, then “S.M.A.R.T. Tests”.



Now click on “Add” button.

A screen will pop up.

A screenshot of the 'S.M.A.R.T. Test' configuration form. It has a dark theme. The form includes a 'Disks *' dropdown menu, a 'Type *' dropdown menu, a 'Short description' text field, and a 'Schedule the S.M.A.R.T. Test *' section with a cron job input field showing 'Daily (0 0 * * *)'. At the bottom are 'SAVE' and 'CANCEL' buttons.

Select the storage drives you want to test from the “Disks” drop-down. Click individually on each disk you want to test.



Select the type of SMART test you want (in this case it is “Long Self-Test”) from the “Type” drop down selection box.

Give the test a name, if desired, in the “Short description” text box.

Fester wants to schedule these tests to run on the 8th and 22nd of every month at 02:00 in the morning (the server should not be busy at that time). To do this, under “Schedule the S.M.A.R.T. Test”, select “Custom”. This will open a scheduling window.

Schedule Preview

S M T W T F S

JUN

1

2 3 4 5 6 7 8

9 10 11 12 13 14 15

16 17 18 19 20 21 22

23 24 25 26 27 28 29

30

Sat Jun 08 2019 02:00:00 GMT-0400

Sat Jun 22 2019 02:00:00 GMT-0400

Presets

Choose a preset

Daily

Hours/Days

Hours *

2

Days *

8,22

Months

Jan	Feb	Mar	Apr	May	Jun
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jul	Aug	Sep	Oct	Nov	Dec
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Days of Week

S	M	T	W	T	F	S
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

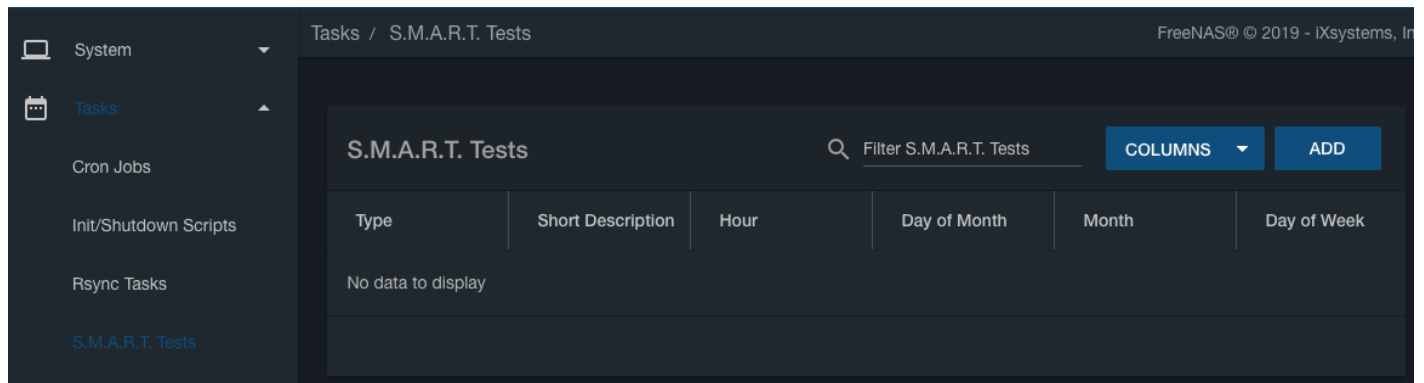
DONE

Under Hours/Days, in Hours, enter **2**. In Days, enter **8,22**. You'll see that the calendar on the left updates to indicate the dates tests will run. Click "Done" to close the scheduler, and "Save" to save this self-test schedule.

That's the long test schedule set.

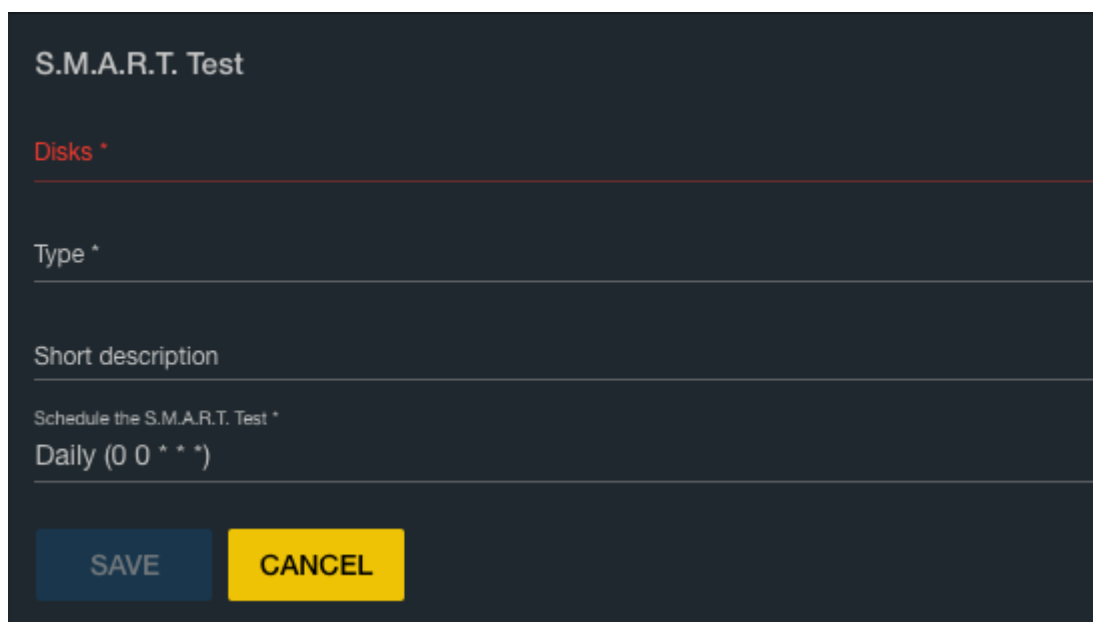
Short SMART Test Schedule

Click on "Tasks" in the left column, then "S.M.A.R.T. Tests".

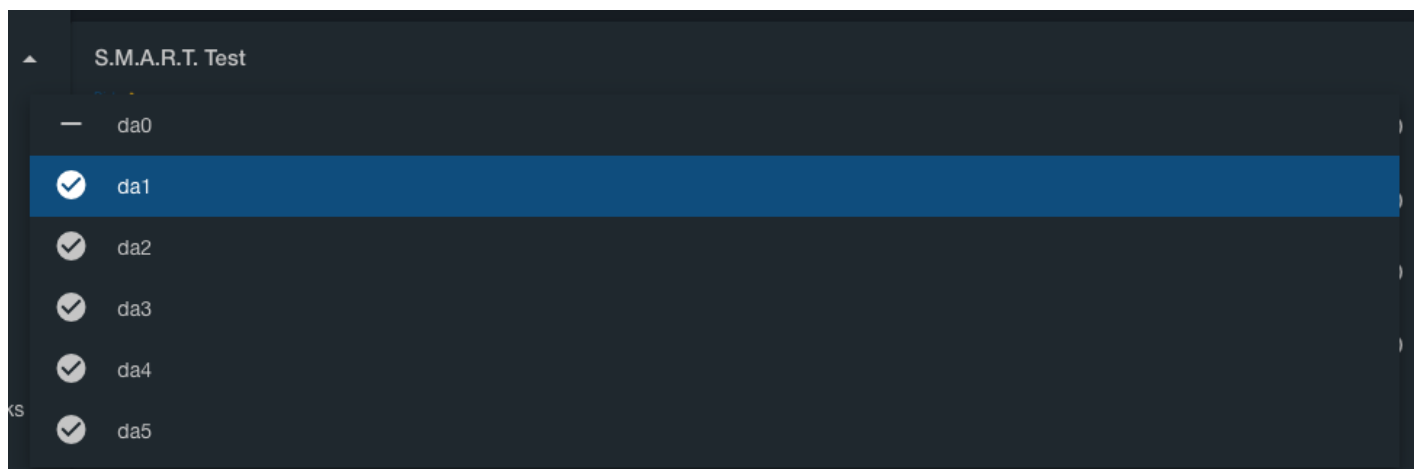


Now click on “Add” button.

A screen will pop up.



Select the storage drives you want to test from the “Disks” drop-down. Click individually on each disk you want to test.



Select the type of SMART test you want (in this case it is “Short Self-Test”) from the “Type” drop down

selection box.

Give the test a name, if desired, in the “Short description” text box.

Fester wants to schedule these tests to run on the 5th, 12th, 19th and 26th of every month at 03:00 in the morning (the server should not be busy at that time). To do this, under “Schedule the S.M.A.R.T. Test”, select “Custom”. This will open a scheduling window.

Schedule Preview

S

M

T

W

T

F

S

JUN

1

2

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4

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12

13

14

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30

Wed Jun 05 2019 03:00:00 GMT-0400

Wed Jun 12 2019 03:00:00 GMT-0400

Wed Jun 19 2019 03:00:00 GMT-0400

Wed Jun 26 2019 03:00:00 GMT-0400

Presets

Choose a preset

Daily

Hours/Days

Hours *

3

Days *

5,12,19,26

Months

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

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Days of Week

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DONE

Under Hours/Days, in Hours, enter **3**. In Days, enter **5,12,19,26**. You'll see that the calendar on the left updates to indicate the dates tests will run. Click “Done” to close the scheduler, and “Save” to save this self-test schedule.

That's the short test schedule set.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:smart_schedule

Last update: **2019/05/27 11:34**



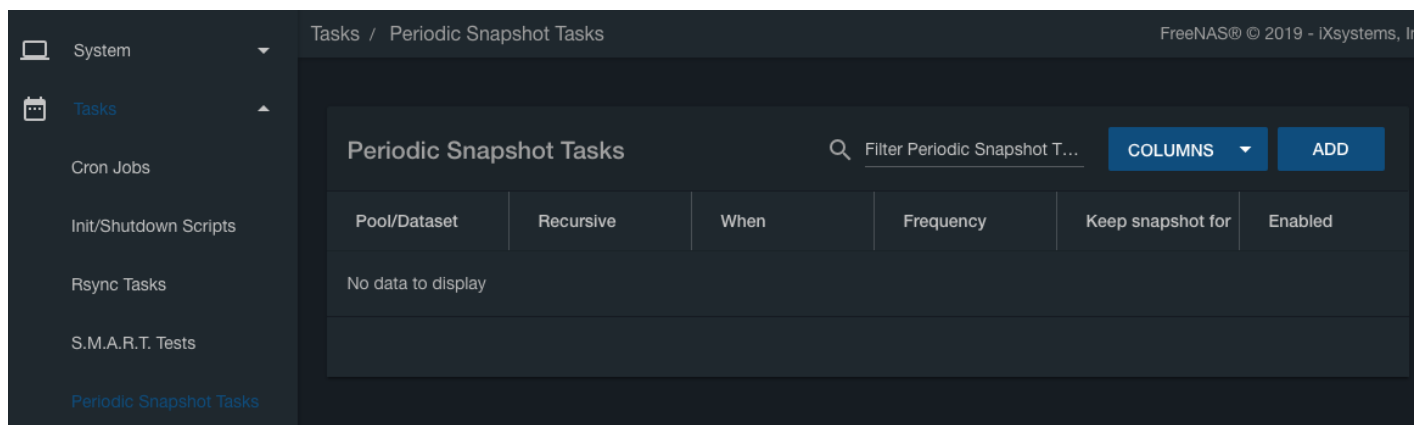
Creating a Periodic Snapshot Task

This is an extremely useful function within FreeNAS. It allows you to travel back in time (without the use of a DeLorean car) to a point when that important file you deleted was still on your FreeNAS system (and Fester's restraining order was not yet in place). OK I am exaggerating about time travel, but this marvelous function does work a bit like that. It takes a snapshot of the volume or any dataset on the FreeNAS system at a particular point in time. A snapshot in this case is basically a file that contains within it all and any changes to the volume or dataset that have occurred since the last snapshot. This allows the volume or dataset to revert back to a particular point in time. A corollary of this is that the files within that volume or dataset also revert back to the condition they were in at the time the snapshot was taken.

Imagine for example you deleted a file from your FreeNAS system two days ago and then discover you now need that file. If a snapshot is available that has the file still present you can roll the volume or dataset back to that time and recover the file using the relevant snapshot (that's freaking cool!).

If you want to set up a periodic snapshot here is how.

Click "Tasks" in the left column, then "Periodic Snapshot Tasks".



Click on the "Add" button.

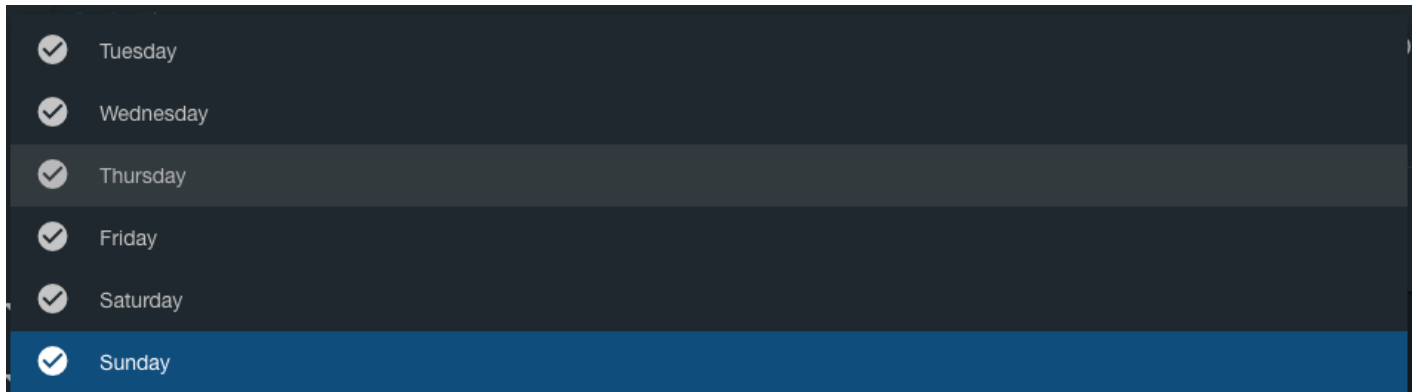
A new window should now pop up.

Fester wants 1 snapshot to be taken every day between the hours of 12:00 midnight and 1:00am in the morning. The server should not be busy at that time (unlike Fester who can be found in the nearest Discotheque in black crush velvet flares and a tangerine orange shirt (with matching cravat) dancing the night away, or as the manager refers to it "frightening the customers", cheeky sod!).

- Select the pool or dataset you want from the "Pool/Dataset:" drop down selection box (in Fester's case this was **tank**).
- Put a tick in the "Recursive" tick box. **Important:** A recursive snapshot includes snapshots of all the "child" datasets within the pool or dataset you selected above. If the Recursive box is not ticked, this snapshot task **will not** include child datasets.
- Determine how long you want the system to keep the snapshot before deleting it by typing a

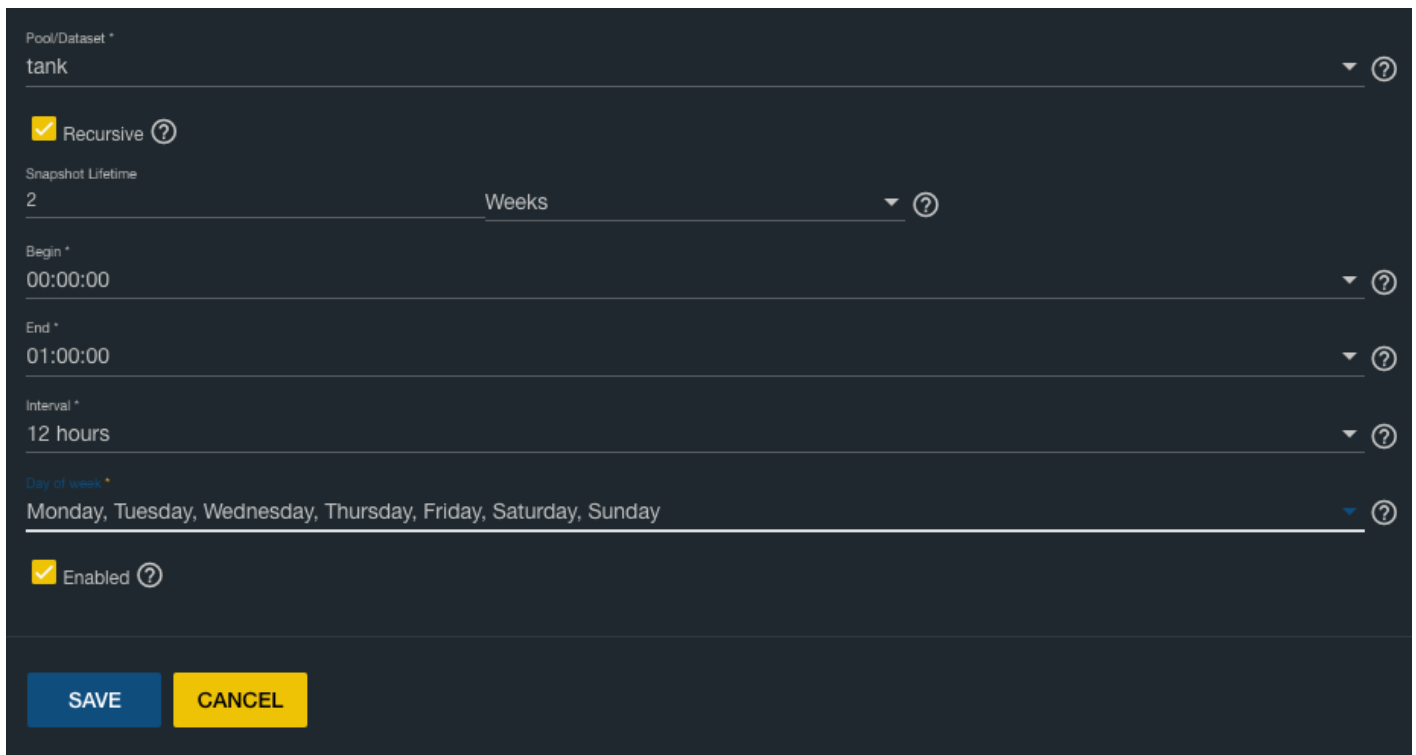
number into the “Lifetime” text box and then selecting the duration unit from hours, days, weeks, months, etc from the drop down selection box (Fester’s snapshot will last 2 weeks before the system deletes it).

- Select the time after which the system will allow a snapshot to be taken in the “Begin” drop down selection box.
- Select the cut off time after which the system is prohibited from making a snapshot from the “End” drop down selection box.
- Select the minimum interval between snapshots from the “Interval” drop down selection box.
- Next put a tick next to every day of the week in the “Day of week” section. By default only weekdays are checked, not weekend days.



A dark-themed interface for selecting days of the week. It features a vertical list of days: Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday. Each day has a white checkmark in a circle to its left. The Sunday row is highlighted with a blue background.

- Make sure the snapshot is enabled by ticking the “Enabled” tick box.
- Now click the “Save” button.



A configuration window titled "Pool/Dataset" for a dataset named "tank". It contains several settings, each with a question mark icon for help:

- Recursive**: Checked with a yellow box.
- Snapshot Lifetime**: Set to "2" with a dropdown menu showing "Weeks".
- Begin**: Set to "00:00:00".
- End**: Set to "01:00:00".
- Interval**: Set to "12 hours".
- Day of week**: A dropdown menu showing "Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday".
- Enabled**: Checked with a yellow box.

At the bottom, there are two buttons: a blue "SAVE" button and a yellow "CANCEL" button.

An entry should be created in the Periodic Snapshot Tasks window and you should see something like this.

Periodic Snapshot Tasks					
Filter Periodic Snapshot T...					
COLUMNS					
ADD					
Pool/Dataset	Recursive	When	Frequency	Keep snapshot for	Enabled
tank	yes	From 00:00:00 to	Every 12 hours	2 week	yes
1 - 1 of 1					

That's periodic snapshots done.

From:

<https://www.familybrown.org/dokuwiki/> - danb35's Wiki

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<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:snapshots>

Last update: **2019/05/27 11:51**



Setting Up an SSH Console

SSH stands for Secure SHell, and is a secure method to connect to a remote computer over a network. There are many advantages to using an SSH console rather than say the shell facility in the FreeNAS GUI.

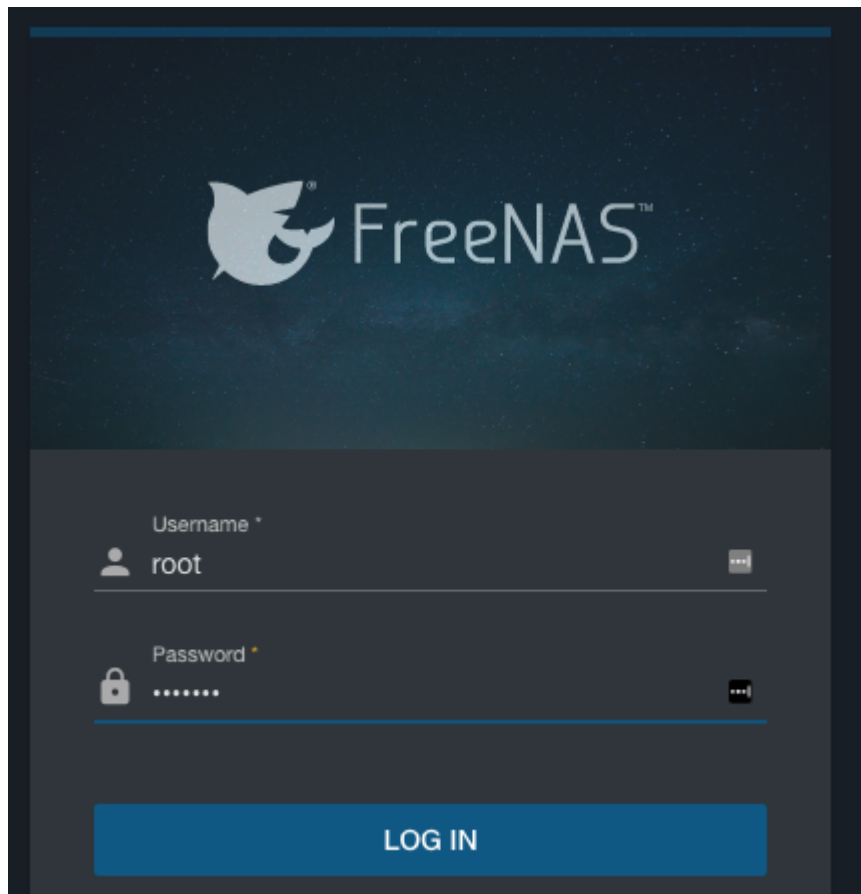
The SSH console is a window that has a scrolling function which means you can go back and view the output in the console. You can also select large bodies of text and copy and paste them. This can be particularly useful when trying to get help from someone as they need to see what you have done. It is also useful when compiling data (i.e. SMART test data).

An SSH console is also very secure in two ways. Firstly it can be configured to require a Public/Private key and a password before you can log in to the session and the server. Secondly the connection between the server and the client is encrypted. This means any information that goes between the two cannot be read directly.

Configure SSH in FreeNAS

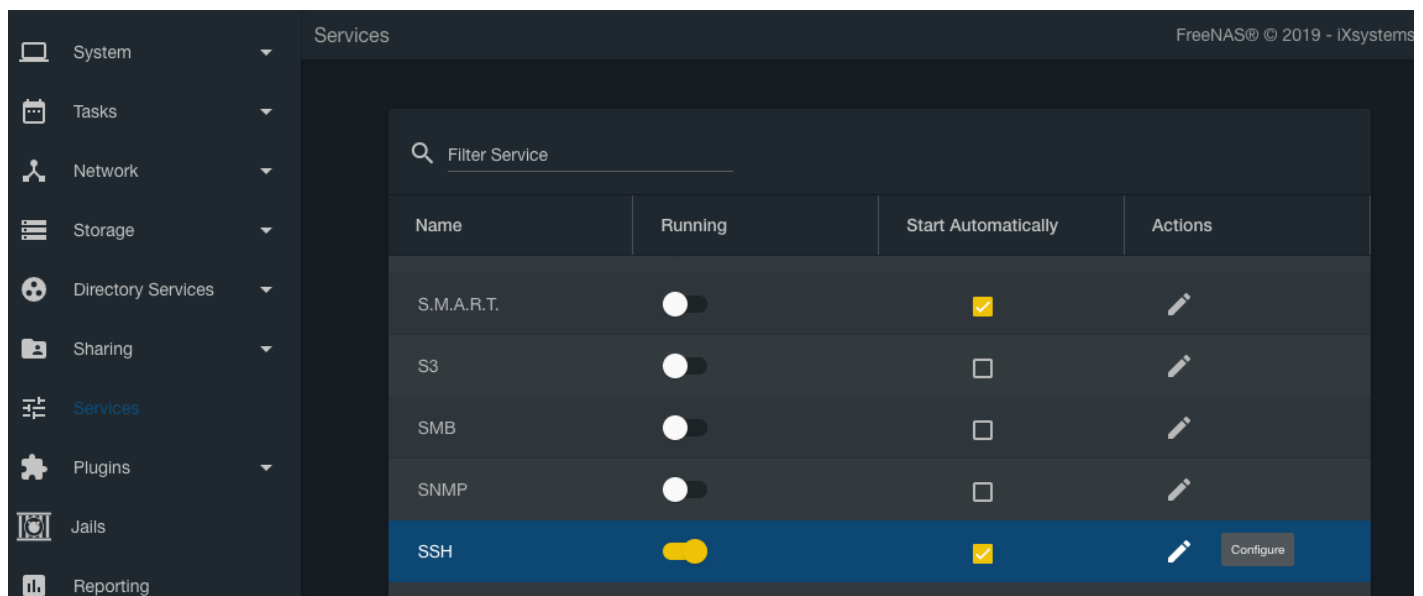
Open your web browser and type in the IP address of the FreeNAS web GUI that you noted down earlier (Fester used 192.168.0.58).

The web GUI will present itself and ask for the login details. Enter the username which is **root** and your password (2) and click the "Log In" button.



Now you are logged into FreeNAS.

- Click “Services” in the left column, then scroll down to SSH.



- Click the pencil icon to the right, then “Configure” from the pop-up menu.
- If you do not want the root user to be able to log in using only a password (i.e., if you want to require a public key, or if you don't want the root user to be able to log in remotely at all), uncheck the “Login as Root with password” tick box.

- If you want to require public key authentication, uncheck the “Allow password authentication” tick box.
- Make sure the remaining tick boxes are unchecked.
- Now click the “Save” button.

Services / SSH

TCP port
22

☒ Log in as root with password ?

☒ Allow password authentication ?

☐ Allow TCP port forwarding ?

☐ Compress connections ?

SAVE CANCEL ADVANCED MODE

Now turn on the SSH service.



Specify SSH Public Key For a User

If you have required public key authentication in the SSH configuration, you'll need to tell FreeNAS what the public key is for each user who will be connecting via SSH. To do that, click on “Accounts” in the left column, then “Users”.

Accounts / Users FreeNAS® © 2019 - iXsystems, Inc.

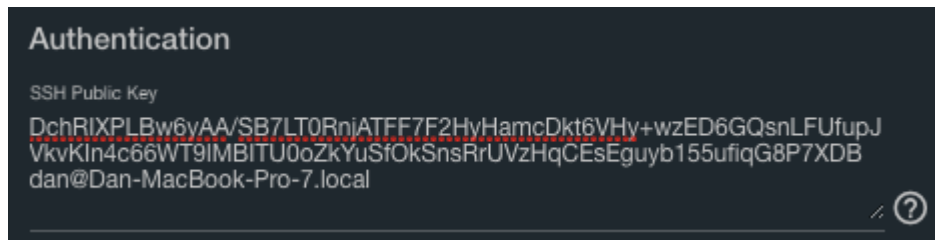
Users Filter Users COLUMNS ADD

Username	Home directory	Shell	Full Name	Lock User	
root	/root	/bin/csh	root	no	⋮
daemon	/root	/usr/sbin/nologin	Owner of many s...	no	⋮

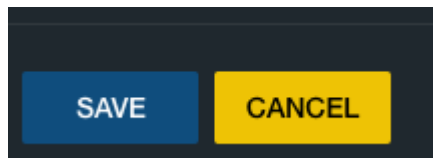
Now click the three vertical dots to the right of the “root” user account and click on “Edit” in the pop-up menu.



The modify user window should now pop up. Scroll down till you come across the “SSH Public Key” entry. Now right click in the blank box next to it and paste in the previously copied public key.



Now click the “Save” button.



Setting up PuTTY in Windows

Modern operating systems ship with an SSH client installed. Unfortunately, Windows, prior to Windows 10, is still not a modern operating system in this regard, so a third-party client will need to be used. Popular clients include [Bitvise](#) and [PuTTY](#).

Public Key Authentication in PuTTY

Switch on and boot up a personal computer that is part of your private network (if you use it to connect to the internet then this will probably work).

Download PuTTY and PuTTYgen to your personal computer (not the server).

Install PuTTY and PuTTYgen under an administrator’s account or right click on their respective installation programs and run as an administrator.

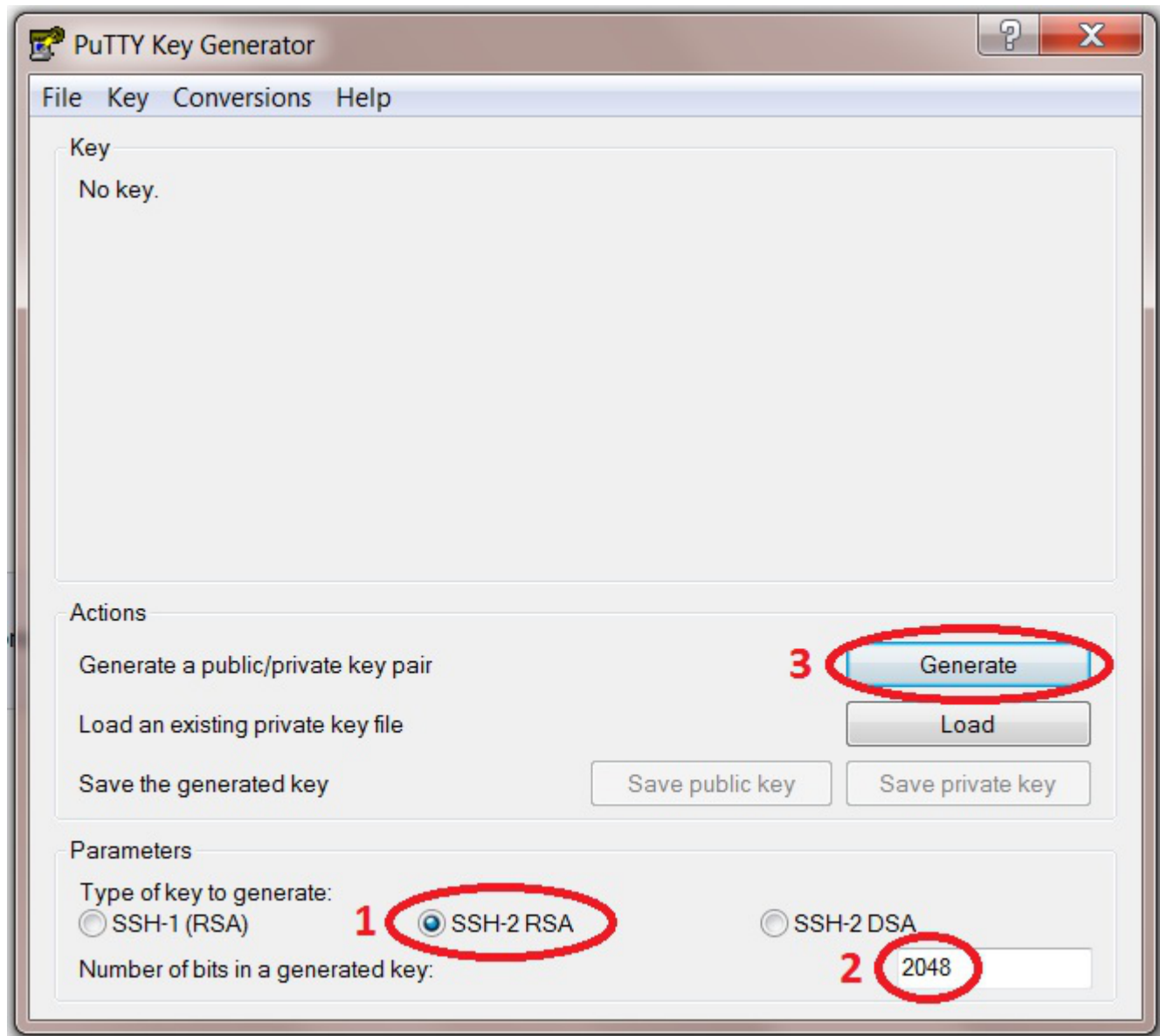
Generating the keypair

When installed run PuTTYgen under an administrator’s account or right click on the program and run as an administrator.

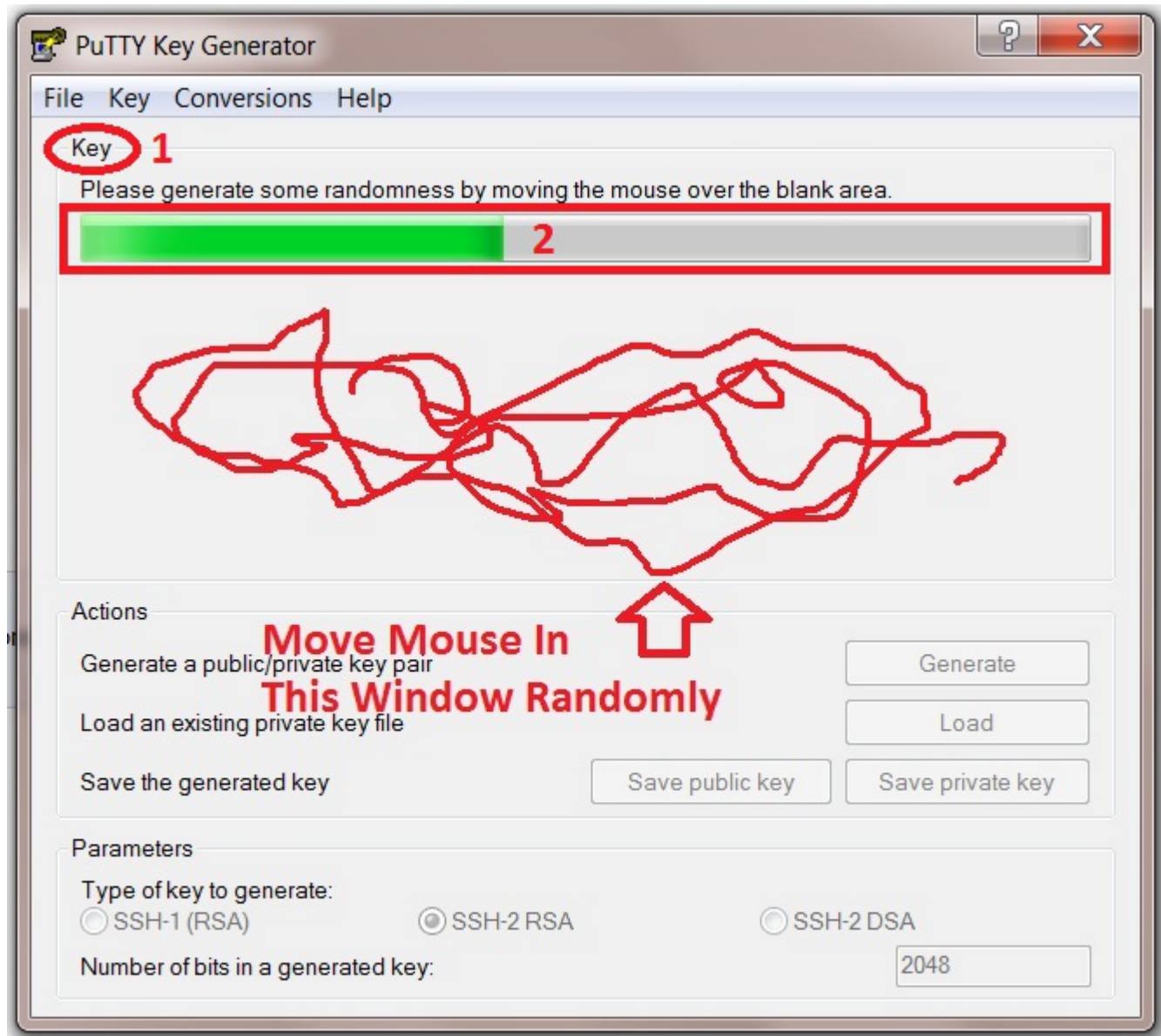
When the PuTTYgen window appears check “SSH-2 RSA” is selected (1), if it isn’t select it.

Next check the “Number of bits in a generated key:” is set to 2048 (2).

Now click the “Generate” button (3).



Now move your mouse in a random way within the box labelled “Key” (1) in PuTTYgen until the green bar fills up (2).



When the green bar is full the key will be generated and a new screen will appear.

In the “Key comment” text box (1) type a comment which will help you identify the key.

Now type in a password for the private key in the “Key passphrase” text box (2), remember it as this will be needed later (Fester just used **test** again).

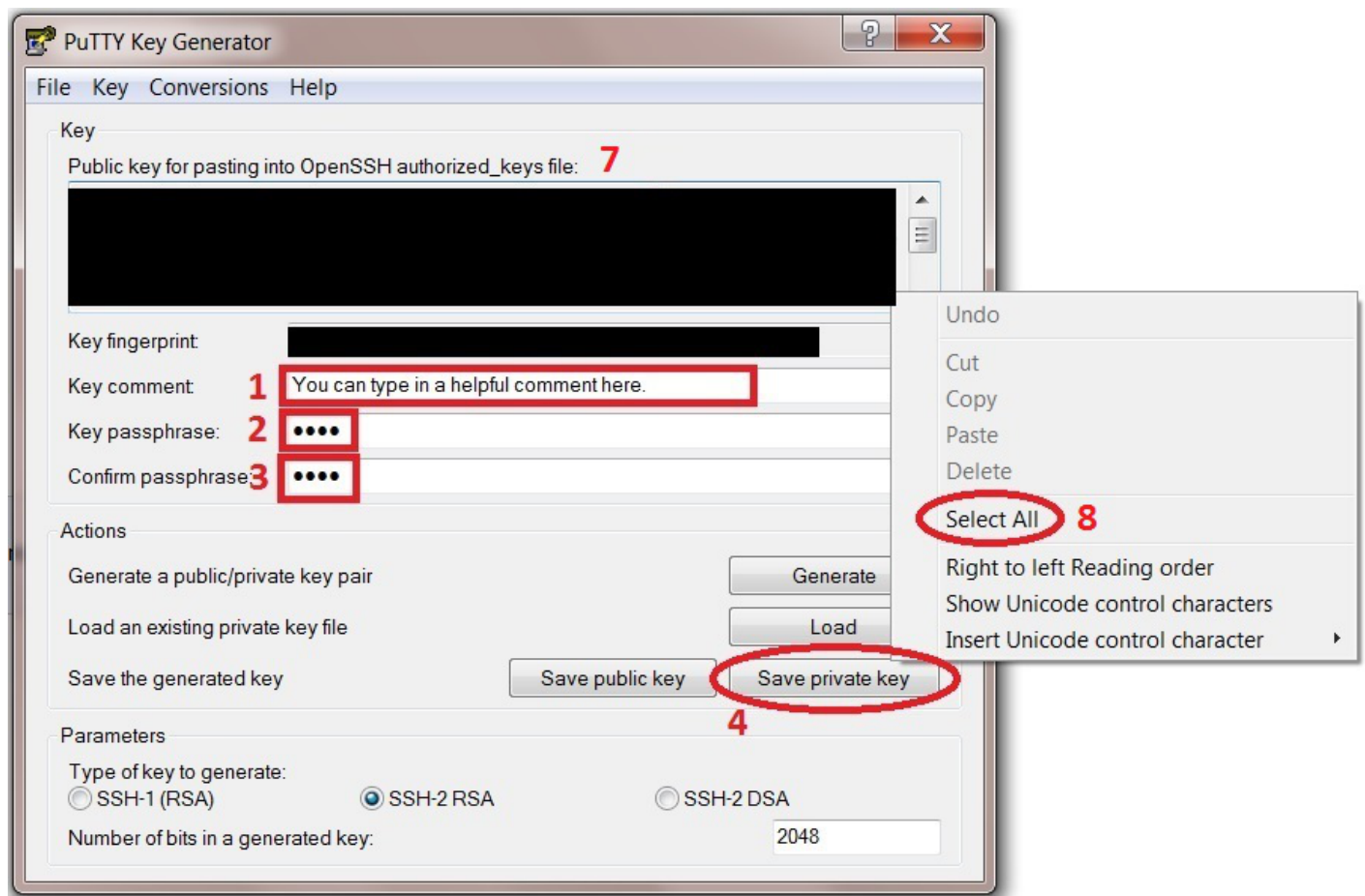
Retype the password into the “Confirm passphrase” text box (3).

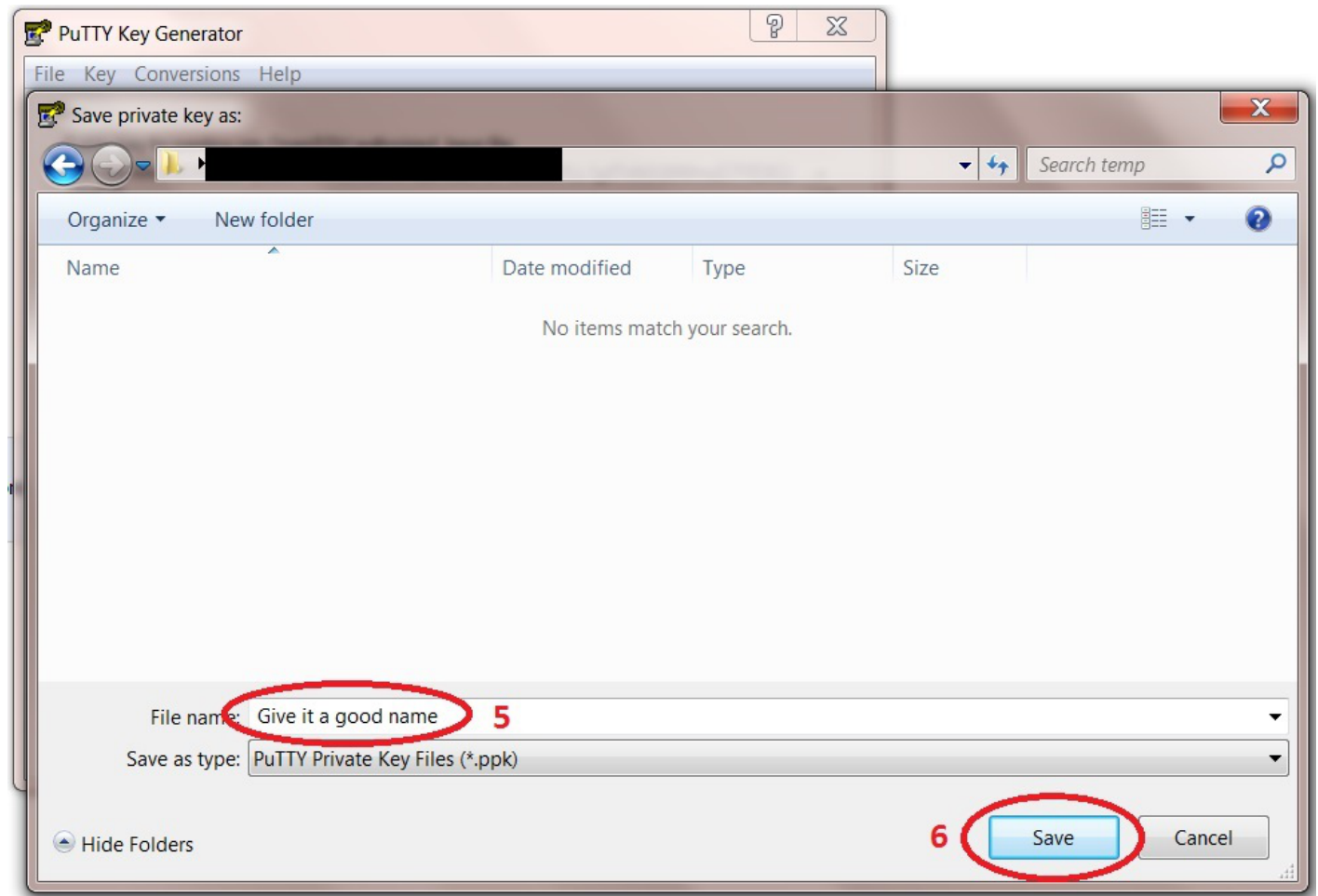
Now save the private key by clicking on the “Save private key” button (4).

An additional window will pop up, navigate to where you would like to save the key, give it a name (5) and click the “Save” button (6). Save it somewhere convenient as this will be needed soon.

Now right click in the “Public key for pasting into OpenSSH authorized_keys file:” window (7) and from the pop up submenu chose “Select All” (8).

The text within this window should become highlighted. Now right click again in this window as you did a moment ago and from the pop up submenu this time select "Copy".





Configuring the connection

Now run PuTTY under an administrator's account or right click on it and run as an administrator.

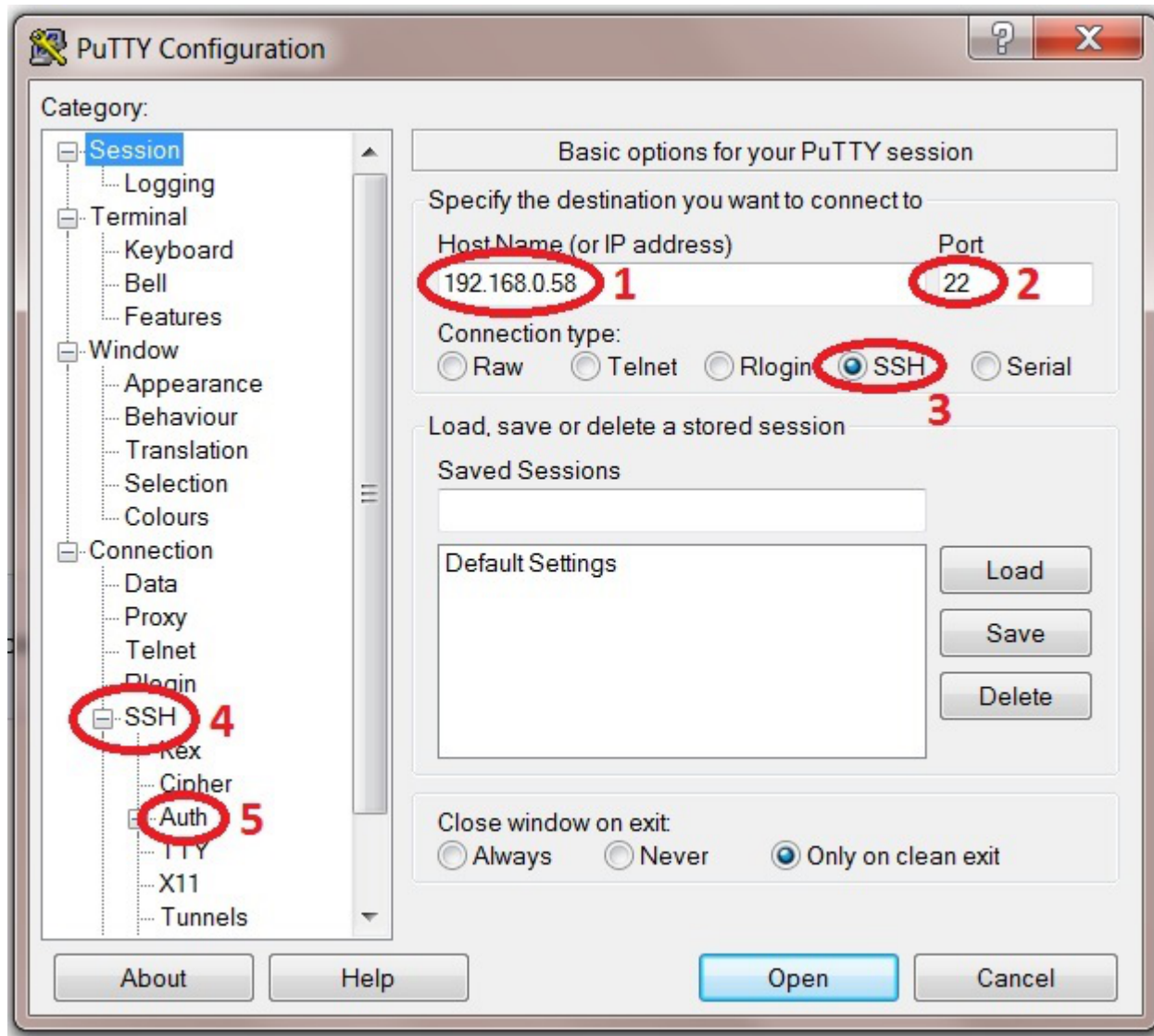
In the "Host Name or (IP address)" box (1) type in the IP address of the FreeNAS web GUI (Fester's was 192.168.0.58).

Check the port number in the "Port" box (2) is set to 22.

The "Connection type:" should be set to SSH (3).

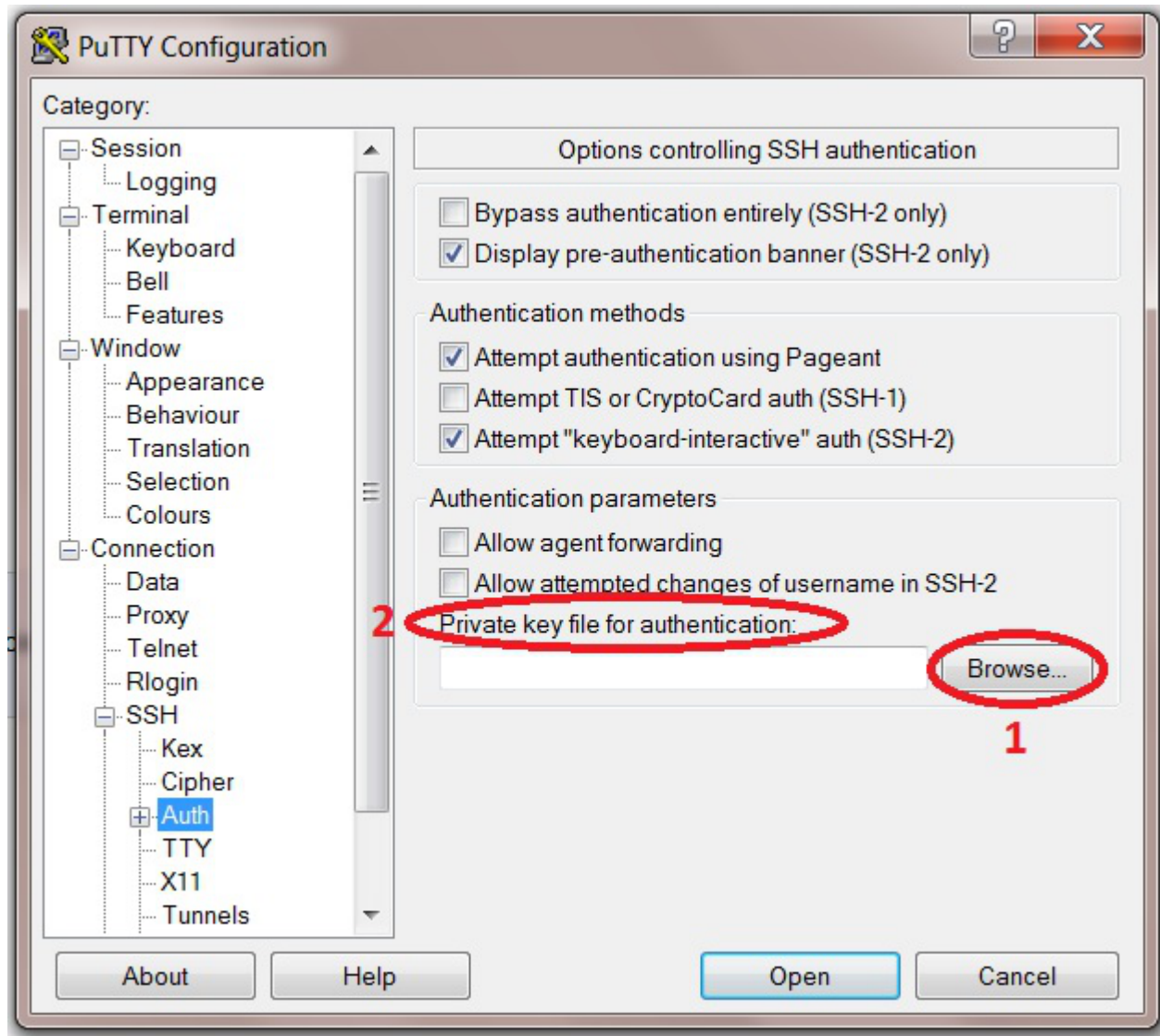
Now in the "Category" window click the small plus symbol "+" next to SSH (4). This should open up this section to reveal subcategories.

Then click on "Auth" (5), not the "+" sign but the actual text itself.

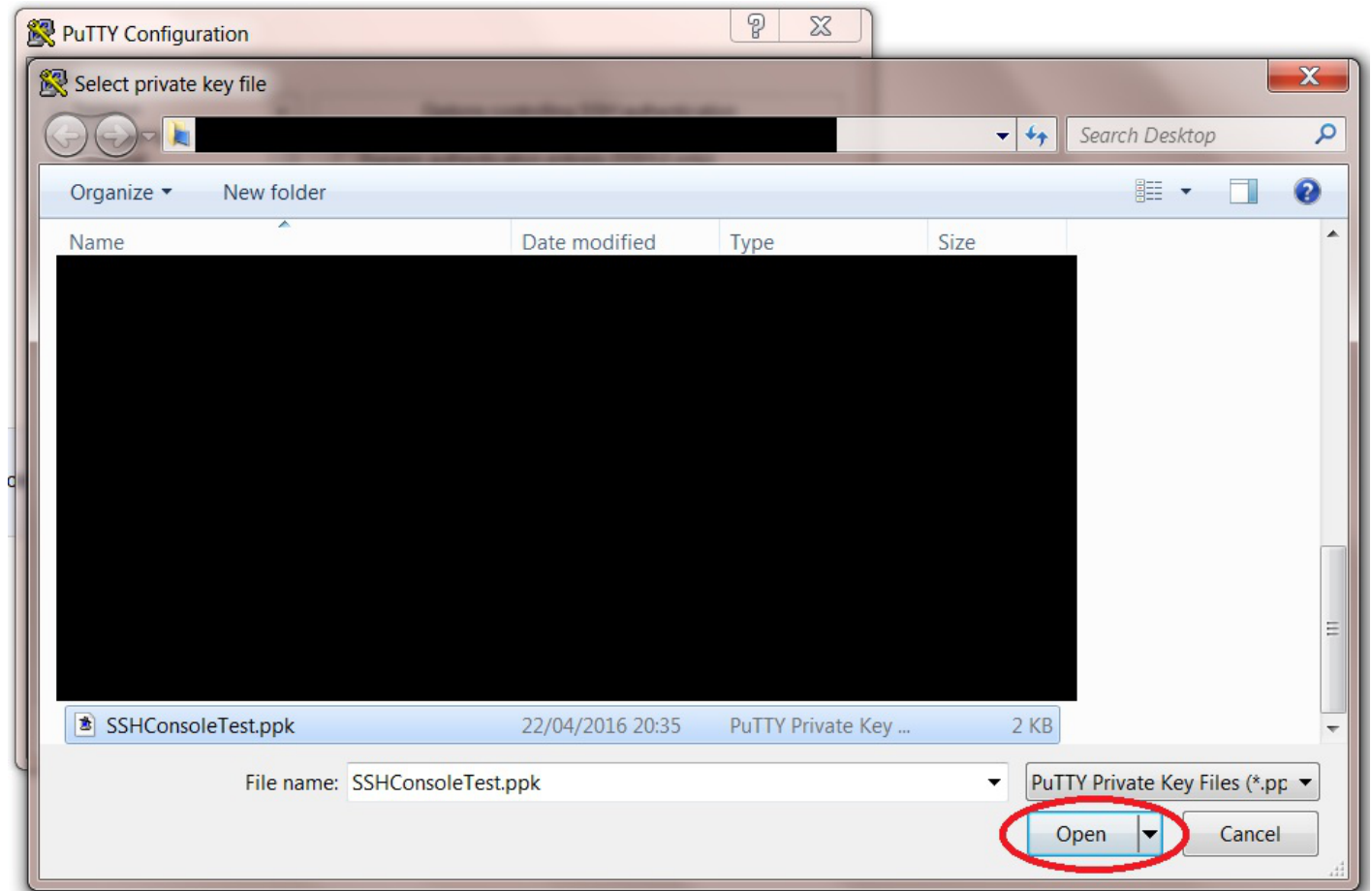


This should take you to a different screen.

On this screen click the "Browse" (1) button next to the "private key file for authentication:" (2).



This will bring up a window in which you can load in the private key into PuTTY. Navigate to where you stored the private key, click on it and then click the "Open" button.



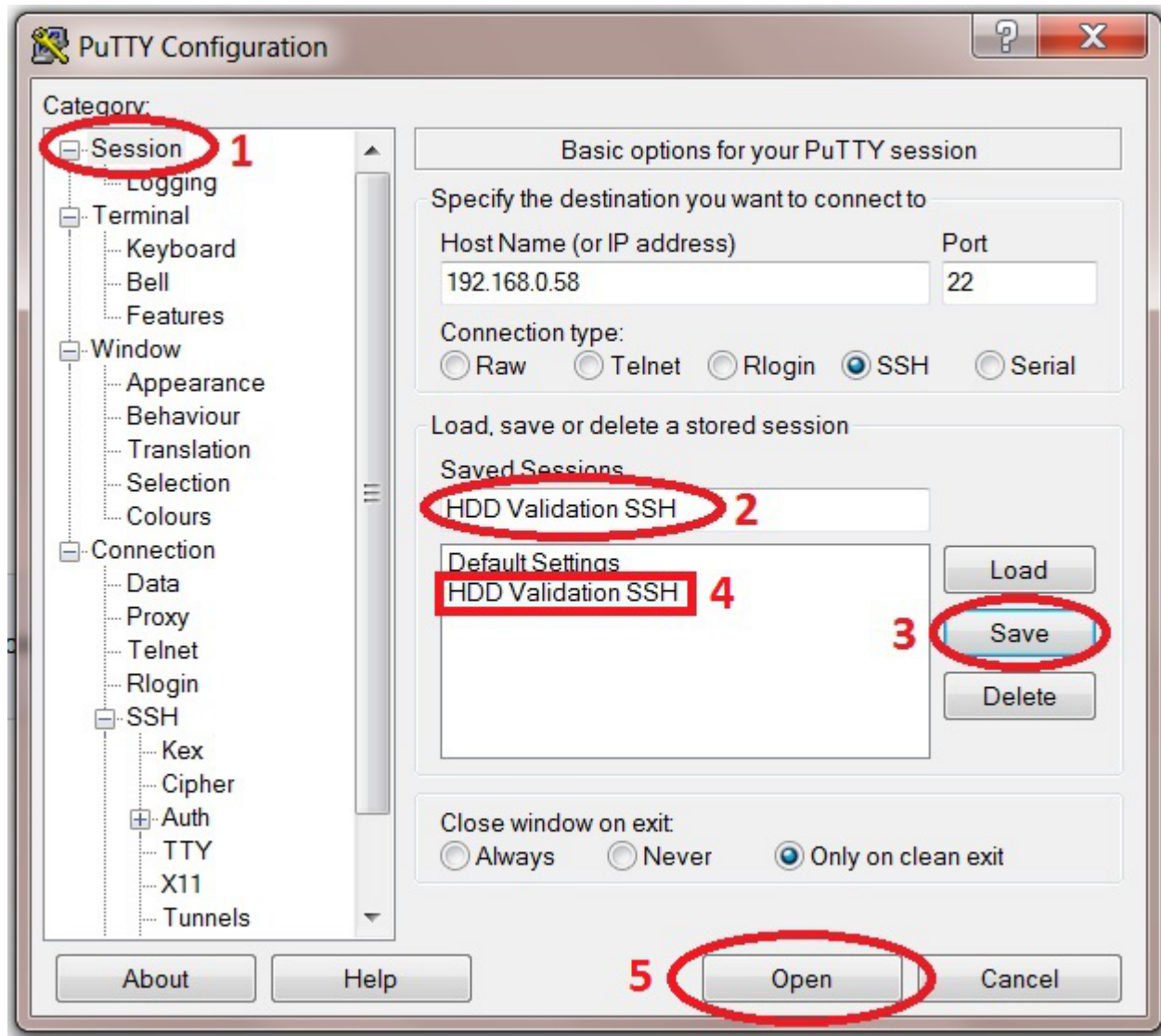
With the key now loaded in, go back to the "Session" category in the "Category" window (1).

It is possible to save the settings of this session. This is a good idea because otherwise we would need to re-enter all the details each time we wanted to start a session in PuTTY.

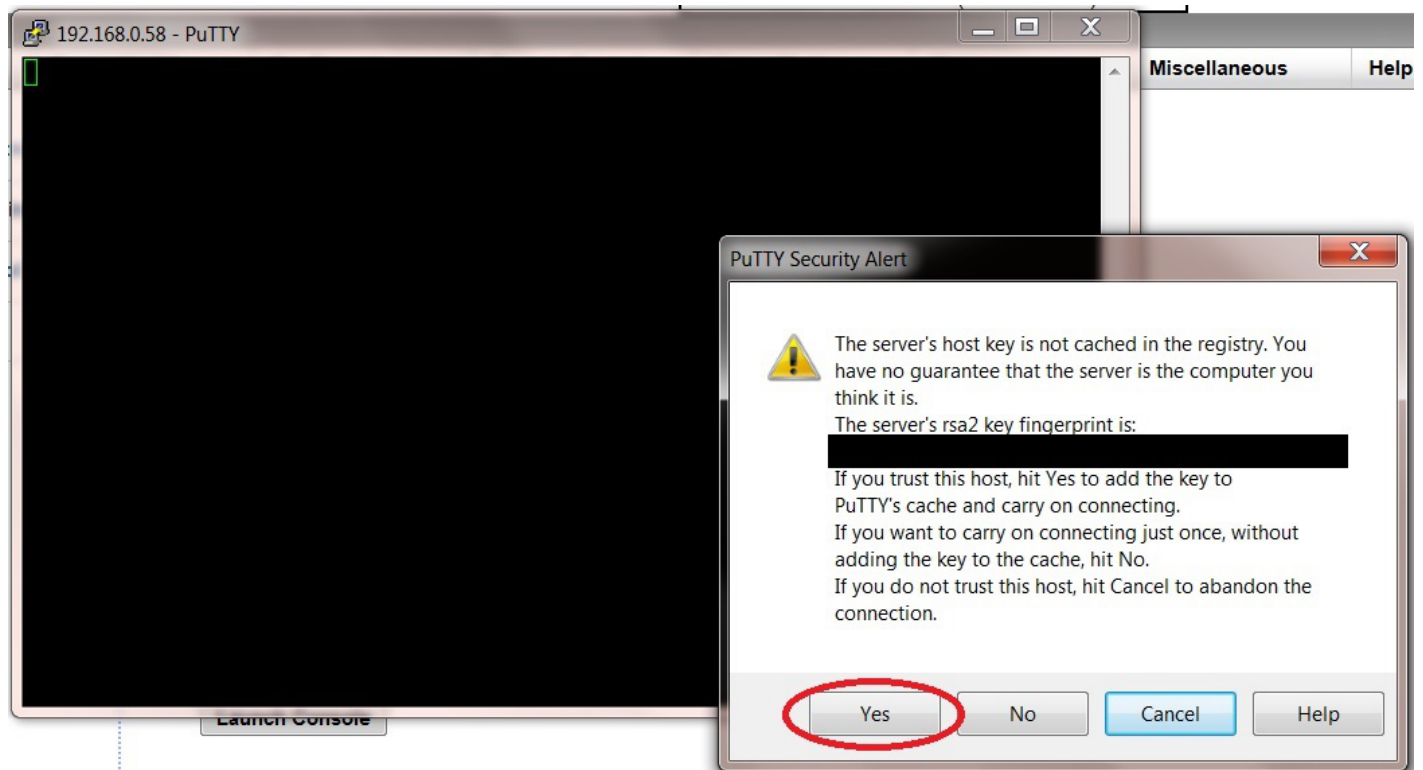
In the "Saved Sessions" box (2) type a good name for the session (Fester called it "HDD Validation SSH").

Now click on the "Save" button (3). The saved session should now appear in the window to the left of this (4).

Now click on the "Open" button (5) to start the session (have the password you created in PuTTYgen standing by).



A PuTTY security alert window should now open. It will show the server's RSA2 key fingerprint and will ask if you trust this host before allowing the connection. Click the "Yes" button.

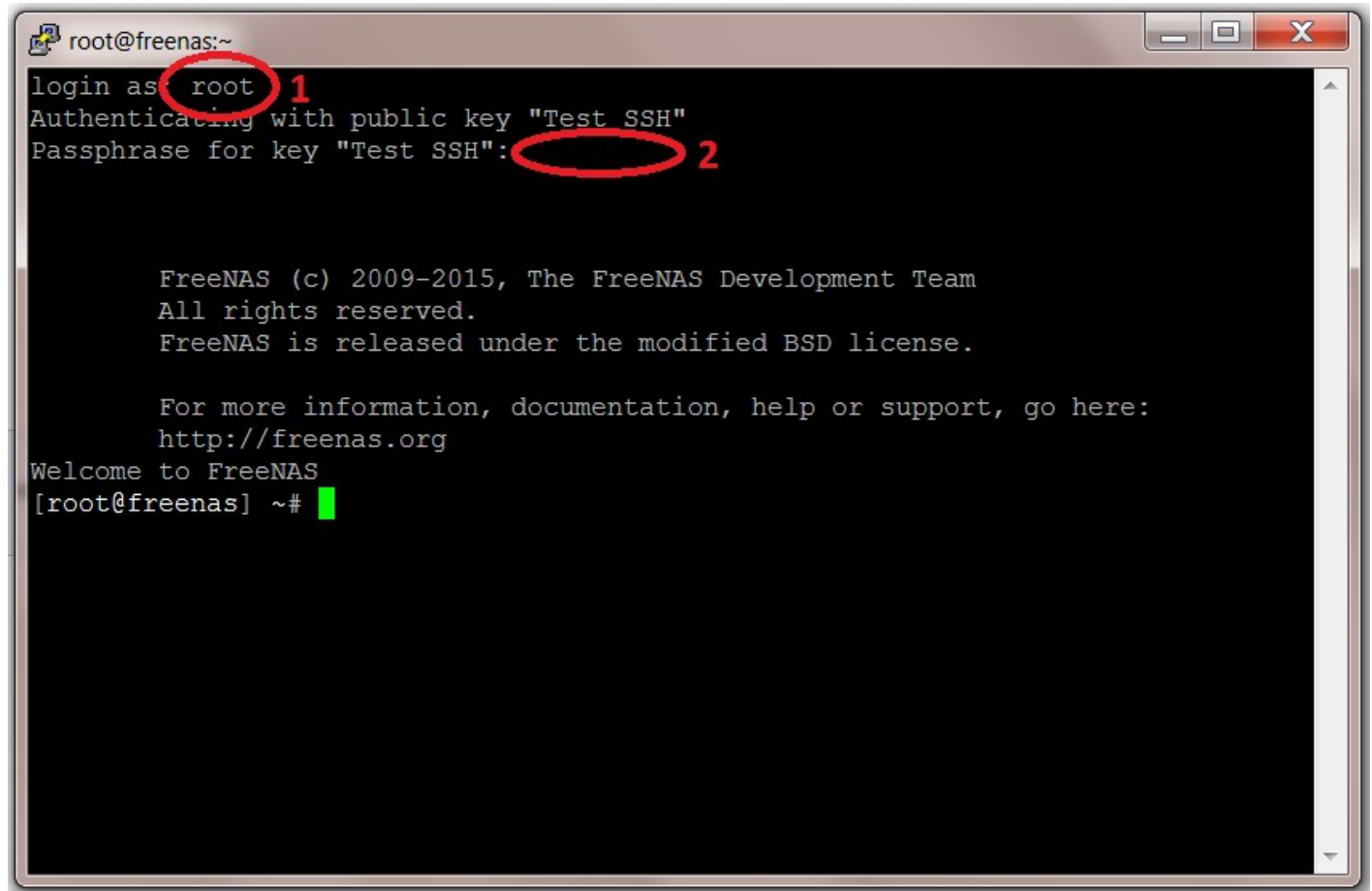


(There is a way to check this by using the RSA2 fingerprint but I can't remember how, if someone lets me know I will try to include it in the guide or you could replace this or any section with your own?)

You will now have access to the PuTTY session as soon as you login. Type the username next to the "Login as:" text (1). In this case it is **root**.

Next you will be asked for the password you created in PuTTYgen. Type it in next to the "Passphrase for key "Test SSH":" text (2) (Fester used **test**).

As you type the password the text will not appear on the screen, this is normal and a security feature.



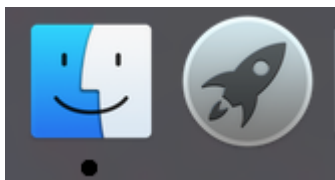
```
root@freenas:~  
login as: root 1  
Authenticating with public key "Test SSH"  
Passphrase for key "Test SSH": 2  
  
FreeNAS (c) 2009-2015, The FreeNAS Development Team  
All rights reserved.  
FreeNAS is released under the modified BSD license.  
  
For more information, documentation, help or support, go here:  
http://freenas.org  
Welcome to FreeNAS  
[root@freenas] ~#
```

To leave the SSH console just type **exit** and the session along with the window will close.

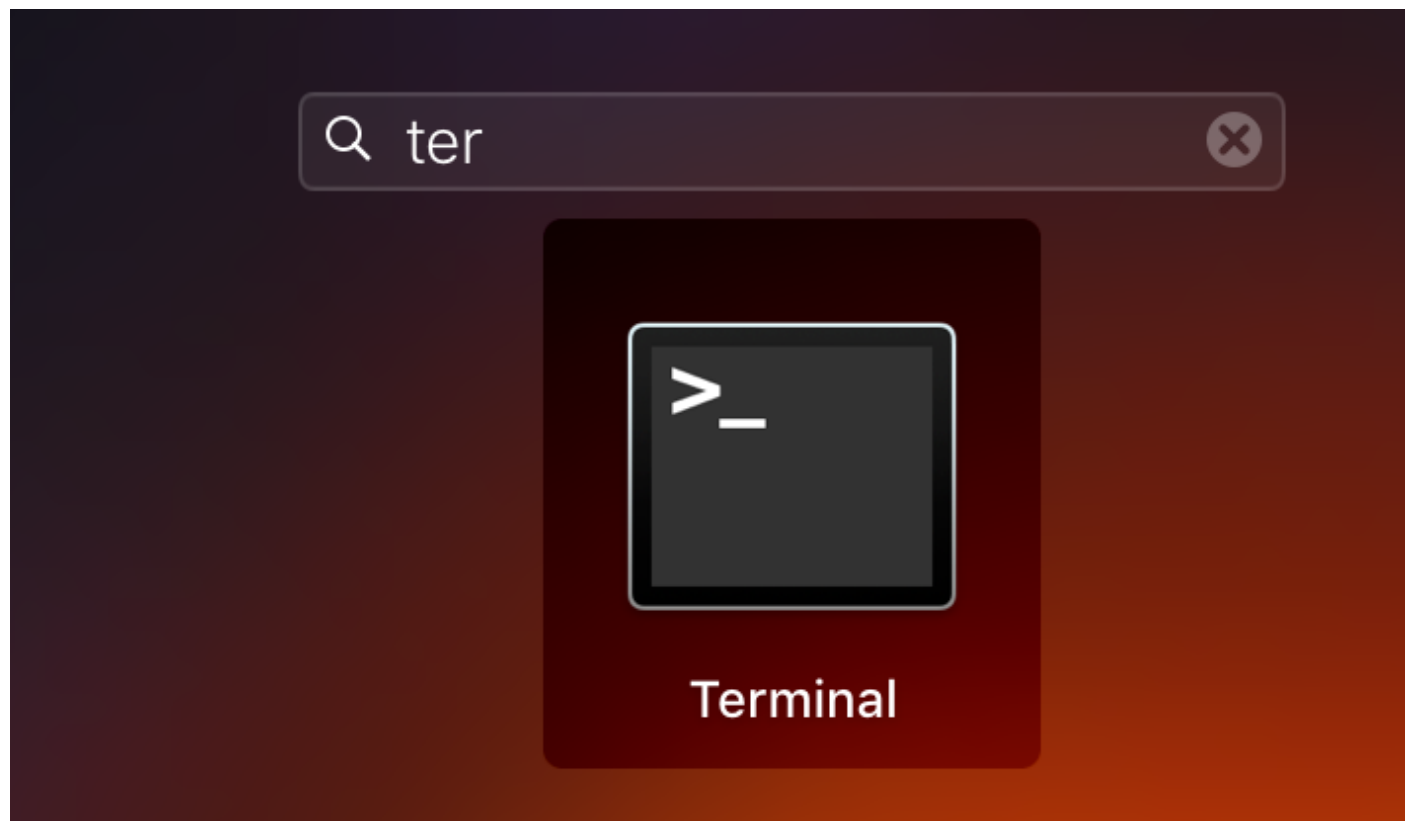
That's the SSH console configured in FreeNAS.

Using SSH on a Mac

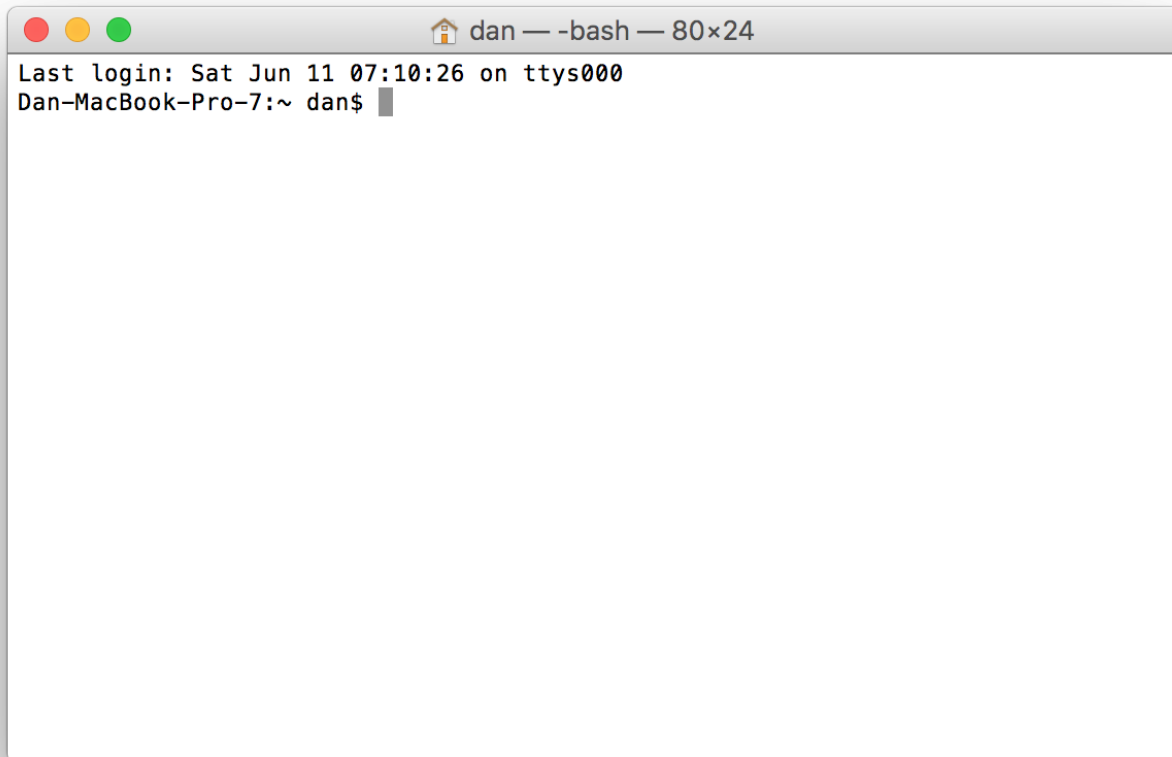
Mac OS X includes an SSH client, but it must be used from the command line. To use it, you'll need to open a terminal window. Start by clicking the launchpad button in your dock (it looks like a rocket):



Begin typing "Terminal" into the search bar at the top, until you see the Terminal icon below:



Then click on the Terminal icon. You'll see a window like this:



To connect to a server using SSH, you can simply type

```
ssh user@host
```

Where “user” and “host” are the username and hostname, respectively, that you want to connect to. For example,

```
ssh root@freenas
```

Or you can use an IP address:

```
ssh root@192.168.0.5
```

If you have required public key authentication on your FreeNAS server, you'll need to generate a keypair. To do this, type

```
ssh-keygen -t rsa
```

...and simply accept the defaults. The result will look like this:

```

Dan-MacBook-Pro-7:~ dan$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/Users/dan/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /Users/dan/.ssh/id_rsa.
Your public key has been saved in /Users/dan/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:ZB0ZFqEWWJuCgEWIyFd/Thk5K0uncH8LT06w0CSdRdk dan@Dan-MacBook-Pro-7.local
The key's randomart image is:
+---[RSA 2048]---+
|+=+ .. +*.B=      |
|=. o o+o E+.      |
|  . . +oB+o       |
|    ..o=+         |
|    ..+ .S.       |
|    .oo..o        |
|    oo+o o        |
|    ...*.         |
|    .+.          |
+-----[SHA256]-----+
Dan-MacBook-Pro-7:~ dan$ █

```

The system will prompt you for a passphrase; this is optional. If you enter a passphrase, you will need to enter it every time you use this keypair (i.e., every time you use ssh). If you leave the passphrase blank, you won't need to enter it when you connect to a remote server, but neither will a thief who manages to steal your computer. You'll now need to view your public key, to enter it in the FreeNAS configuration. To do that, type

```
cat .ssh/id_rsa.pub
```

The result will look like this:

```

ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQACxoFuJ2Px8sIA0zla1FXjnG+af2kRNhj/FcQ5nh0n6F2LepgX
f/4SQFjx5BwAD88H6/06lTaUAqprxKS4m33SKN7poH6RaeIfbJXwjJ/o0Cx0QbugGAeMKjH0Bg4fsHw
vqGLT7o0lcQ0ubmGBZlSx9R9IFNmndLAru+Z5gjuAwKCXGw2dxVqbq2IwB3jEoA3bbo8gy6Dso5wV75
0EC+dYlB/lQrxW/uscgPjpi1XCFVuWtajyz9jujakR1uHuRRphsp56GXVTovwM3P6h52ADDhr5vkfsk
GKgMETj940x5+MFbmBvC9iIMIErGLfWIAQY+8NjosQYfieU5U48oDmDb dan@Dan-MacBook-
Pro-7.local

```

Copy this, all on line line, and paste it into your FreeNAS configuration.

Using SSH on Linux

SSH on Linux works just like SSH on a Mac. Follow the instructions above.

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https://www.familybrown.org/dokuwiki/doku.php?id=fester112:ssh_setup

Last update: **2019/05/27 12:06**



Configuring a Static IP Address

So far we have relied upon the DHCP server built into the router to assign IP addresses to the NICs in the server. This is inconvenient for reasons already outlined.

So let us assign static IP addresses to these NICs. This will ensure that the FreeNAS web GUI IP address will no longer change. This is much more expedient when administering a server.

Make sure it is outside of the range of the DHCP server.

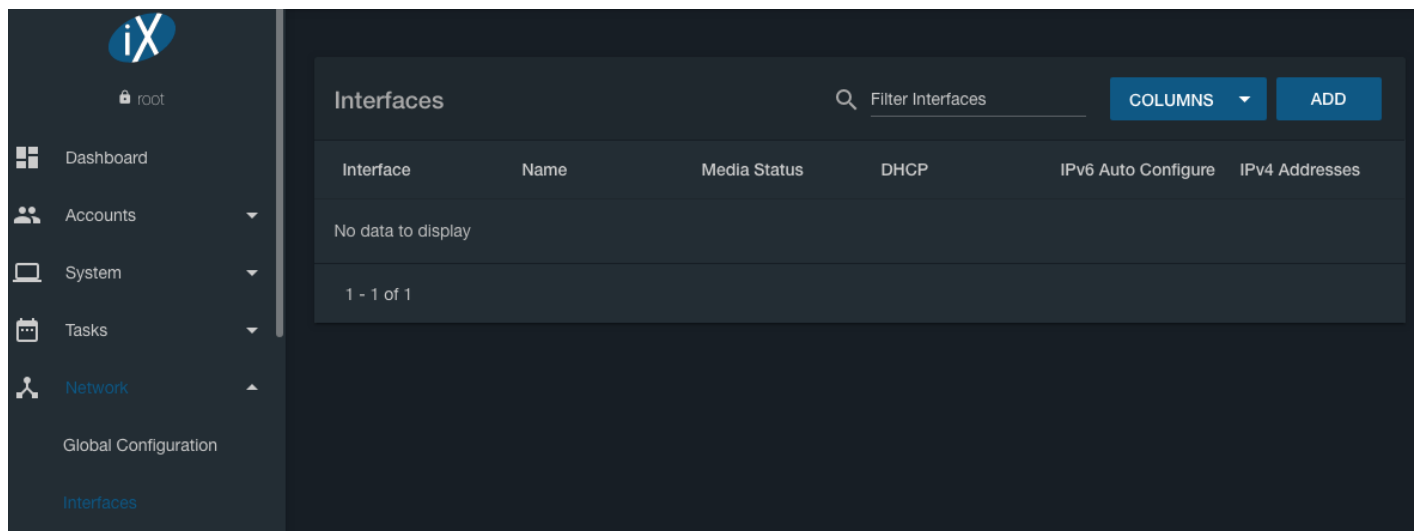
There are two ways to do this. You can do it via the FreeNAS web GUI. This is the preferred method in most cases.

The other way is via the console, either directly at the server with a keyboard and monitor, or using an IPMI remote console viewer. This can be useful if you're unable to reach the web GUI.

I have included both methods in the guide so you can see which works best for you.

Configuring Static IP Addresses Via The FreeNAS GUI

Click on “Network” in the left column, and then “Interfaces”.



Click the **Add** button in the upper right. The “Add Interface” window will pop up.

In this window select the NIC you wish to configure from the “NIC:” drop down selection box.

Give the NIC a name if you wish in the “Interface name:” text box.

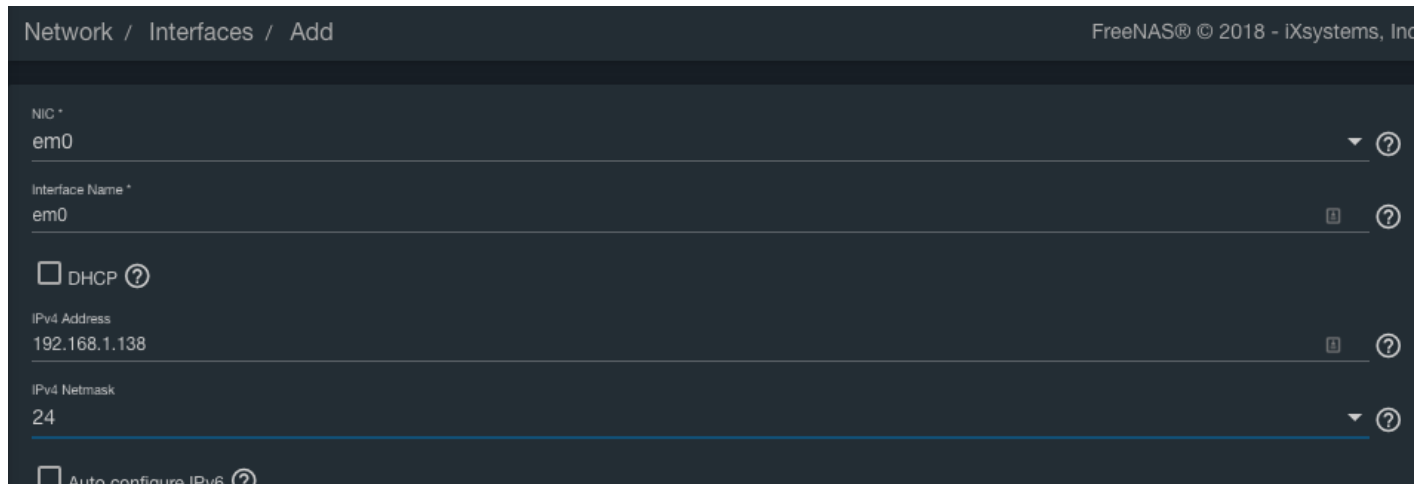
Do not tick the “DHCP:” tick box.

Now assign the static IP address to the NIC in the “IPv4 Address:” text box (in Fester’s case this is

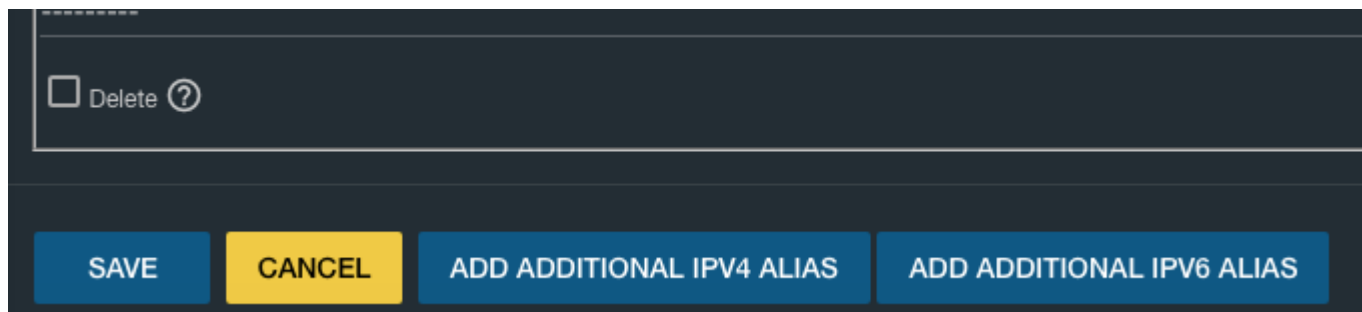
192.168.1.138).

Select from the “IPv4 Netmask:” drop down menu (7) the correct value for the subnet mask of your private network (Fester’s is 24, and this will be correct for most cases).

My ISP does not use IPv6 at present so there is nothing to configure for this.

The screenshot shows the 'Add' interface for network configuration in the FreeNAS web GUI. The breadcrumb trail at the top is 'Network / Interfaces / Add'. The form includes fields for 'NIC' (set to 'em0'), 'Interface Name' (set to 'em0'), 'DHCP' (unchecked), 'IPv4 Address' (set to '192.168.1.138'), and 'IPv4 Netmask' (set to '24'). There is also an unchecked checkbox for 'Auto-configure IPv6'. Each field has a help icon (question mark) to its right.

Now scroll down to the bottom of this window and click the “Save” button.

The screenshot shows the bottom portion of the configuration window. It features a 'Delete' checkbox with a help icon. Below this are four buttons: 'SAVE' (blue), 'CANCEL' (yellow), 'ADD ADDITIONAL IPV4 ALIAS' (blue), and 'ADD ADDITIONAL IPV6 ALIAS' (blue).

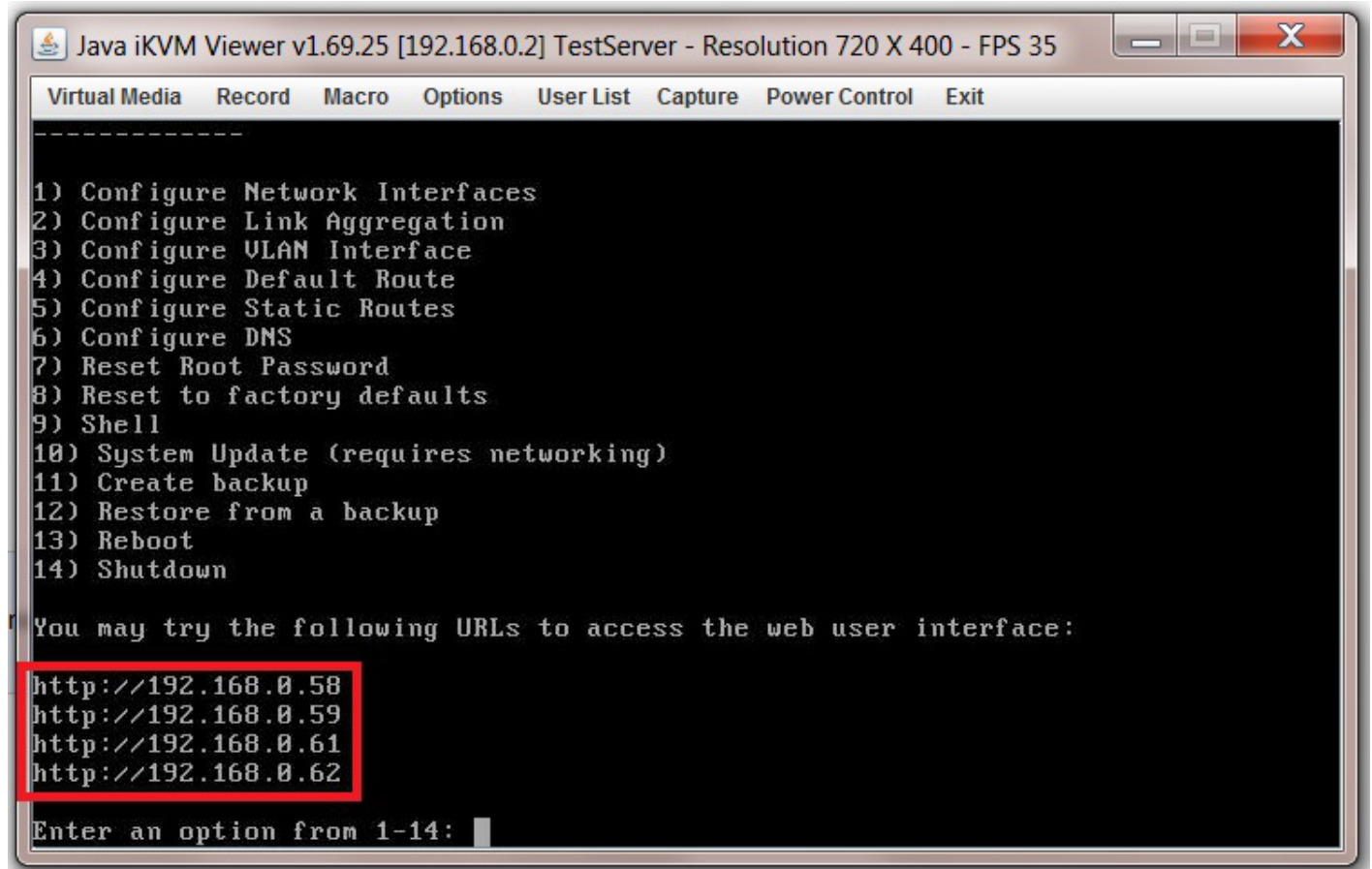
If you attempt to configure a second NIC with an IP address on the same subnet as the first within the FreeNAS web GUI, you will get an error that looks like this:

The network 192.168.0.0/24 is already in use by another NIC.

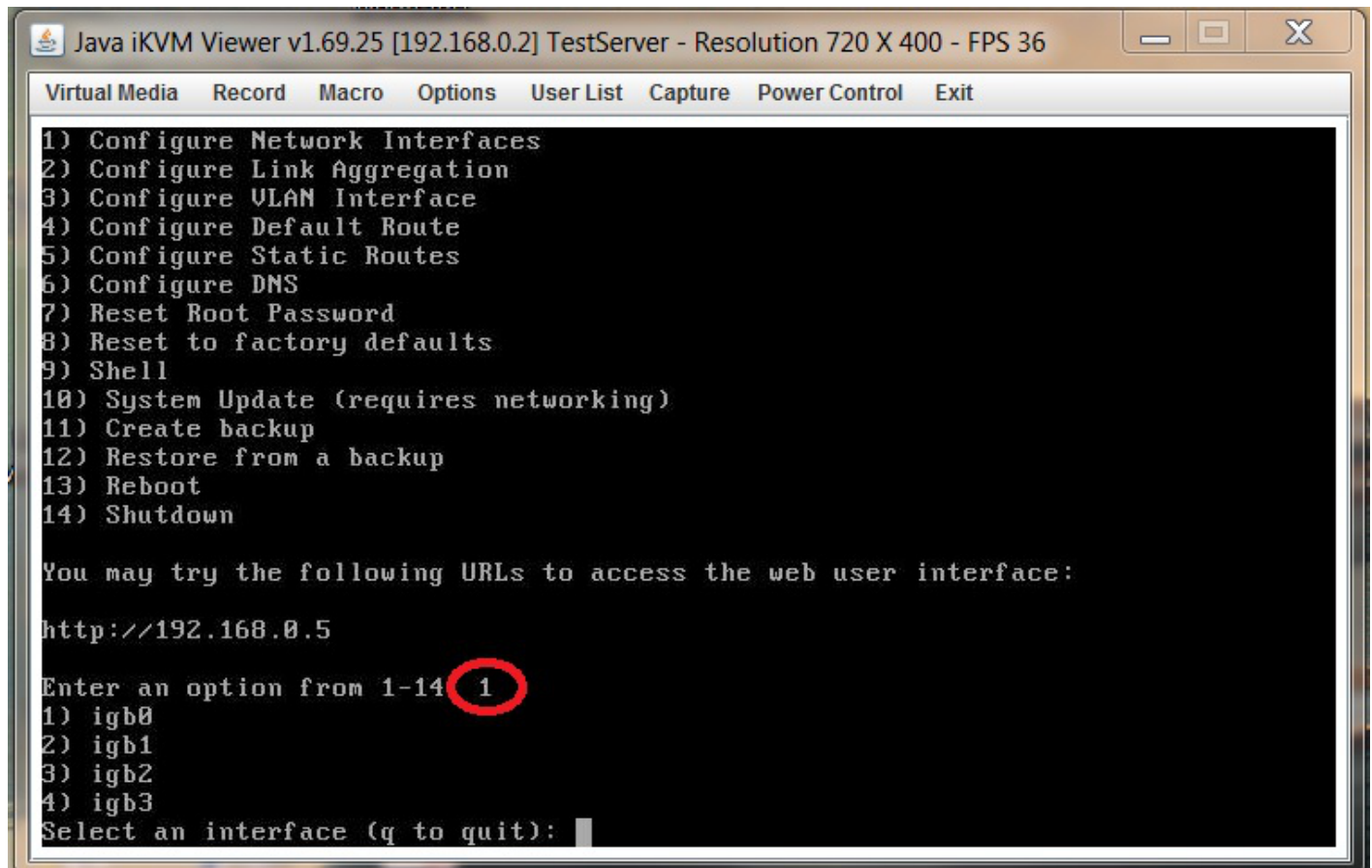
This is because multiple interfaces on the same subnet is an invalid configuration. For an explanation of why this is the case, see [this resource](#) on the FreeNAS Forums.

Configuring Static IP Addresses Using The FreeNAS Console Setup

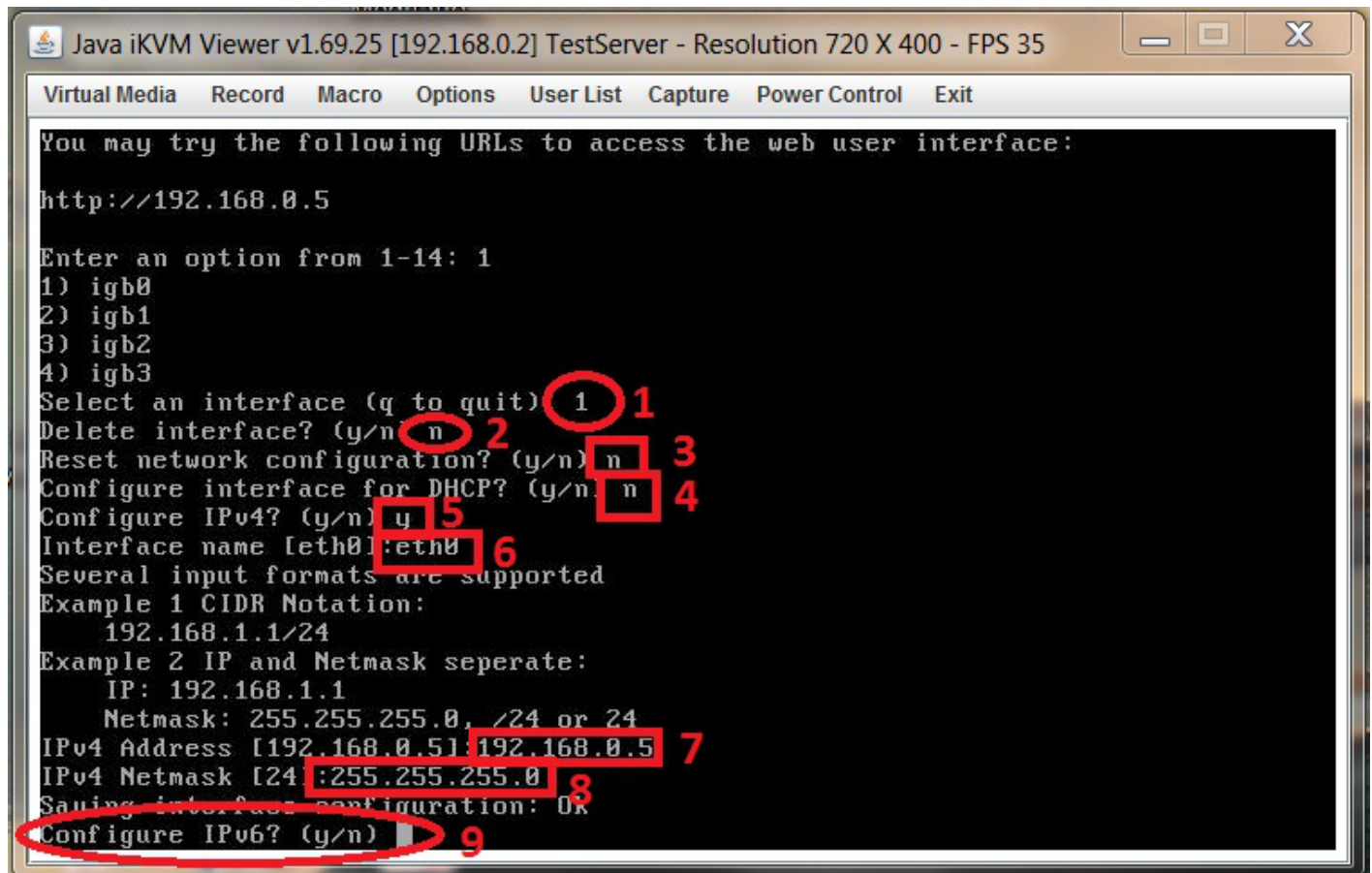
Start the IPMI remote console viewer, or connect a keyboard and monitor to your server. You should see a screen similar to this.



For "Enter an option from 1-14:" enter **1** and press the "Return/Enter" key.



- Input the number that corresponds to the NIC you wish to configure in "Select an interface (q to quit):" (1).
- Input **n** for "Delete Interface? (y/n):" (2).
- Input **n** for "Reset network configuration? (y/n):" (3).
- Input **n** for "Configure interface for DHCP? (y/n):" (4).
- Input **y** for "Configure IPv4? (y/n):" (5).
- Give the NIC a name if you wish at "Interface name:" (6). If you don't want to give it a name then leave it empty and press the "Return/Enter" key.
- Type in the static IP address you require at "IPv4 Address:" (7).
- Now enter the subnet mask of the private network at "IPv4 Netmask:" (8).
- The console should confirm that the configuration has been saved with an "OK".
- If you don't need or use IPv6, then just type **n** at "Configure IPv6? (y/n):" (9).



```
Java iKVM Viewer v1.69.25 [192.168.0.2] TestServer - Resolution 720 X 400 - FPS 35
Virtual Media  Record  Macro  Options  User List  Capture  Power Control  Exit

You may try the following URLs to access the web user interface:
http://192.168.0.5

Enter an option from 1-14: 1
1) igb0
2) igb1
3) igb2
4) igb3
Select an interface (q to quit) 1
Delete interface? (y/n) n
Reset network configuration? (y/n) n
Configure interface for DHCP? (y/n) n
Configure IPv4? (y/n) y
Interface name [eth0]: eth0
Several input formats are supported
Example 1 CIDR Notation:
192.168.1.1/24
Example 2 IP and Netmask separate:
IP: 192.168.1.1
Netmask: 255.255.255.0, /24 or 24
IPv4 Address [192.168.0.5]: 192.168.0.5
IPv4 Netmask [24]: 255.255.255.0
Saving interface configuration: Ok
Configure IPv6? (y/n)
```

The screenshot shows a terminal window titled "Java iKVM Viewer v1.69.25 [192.168.0.2] TestServer - Resolution 720 X 400 - FPS 35". The menu bar includes "Virtual Media", "Record", "Macro", "Options", "User List", "Capture", "Power Control", and "Exit". The terminal displays a series of prompts for configuring a network interface. Red annotations are used to highlight specific parts of the configuration process: 1) The first menu option '1' is circled. 2) The 'n' for 'Delete interface?' is circled. 3) The 'n' for 'Reset network configuration?' is circled. 4) The 'n' for 'Configure interface for DHCP?' is circled. 5) The 'y' for 'Configure IPv4?' is circled. 6) The interface name 'eth0' is boxed. 7) The IPv4 address '192.168.0.5' is boxed. 8) The IPv4 netmask '255.255.255.0' is boxed. 9) The 'Configure IPv6?' prompt is circled.

That's the static IP addresses assigned.

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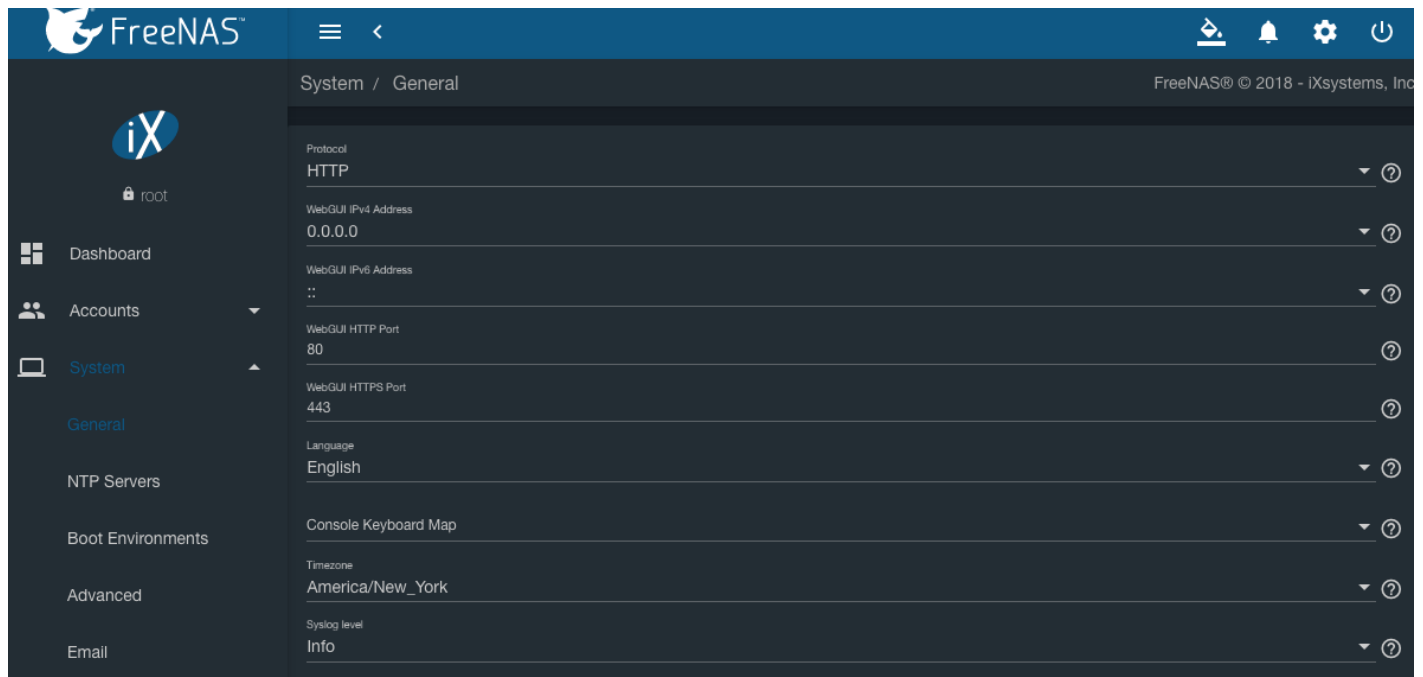
<https://www.familybrown.org/dokuwiki/doku.php?id=fester112:staticip>

Last update: 2019/05/26 22:57

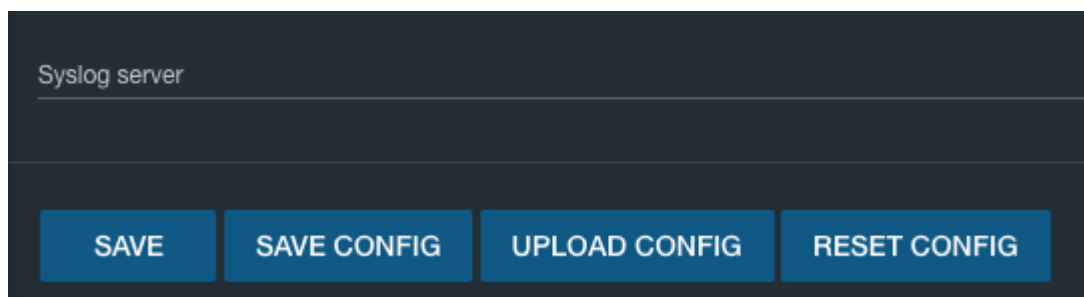


Settings for System -> General

Click **System** in the left column, then **General**.



- In the “General” page select “HTTP” from the “Protocol” drop down menu if it isn’t already selected.
- There is no certificate at this stage.
- Select the static IP address you want the FreeNAS web GUI to bind to from the “WebGUI IPv4 Address:” drop down menu. If you want to be able to get the FreeNAS web GUI on any static IP address you have assigned to the server then select 0.0.0.0 at this point. Ordinarily you should leave this set to 0.0.0.0.
- Leave the WebGUI HTTP port value and the HTTPS port value at their default settings.
- Select the language you require in the “Language (Require UI reload):” drop down menu.
- Pick a keyboard layout that corresponds to your keyboard in the “Console Keyboards Map:” drop down menu (Fester’s keyboard layout corresponds to the UK so I use UK ISO-8859-1).
- Chose the correct time zone for your locality from the “Timezone” drop down menu.
- Now click the “Save” button.



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