Presenting FreeNAS

BSDCan 2007

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- Presentation available at:

http://www.freenas.org/bsdcan/

- Special thanks to my employer

for sponsoring my travel:

orange™ Business Services

Silicomp AQL

Plan

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- What is FreeNAS ?
- History
- Problems encountered
- Support chain
- Example of use
- Geom RAID 5
- Roadmap
- Conclusion

What is FreeNAS ?
In a few words

- Embedded OS specialized for NAS (Network Attached Storage) services.
- Based on m0n0wall, upgraded to FreeBSD 6.2 with the firewall features replaced with NAS features.

What is FreeNAS
Features from m0n0wall

- Uses the m0n0wall Web GUI
- Single XML configuration file
- Save/backup configuration file
- OS Upgradable from WebGUI

Appliance oriented

What is FreeNAS ?
Features supported

- Software RAID:
  - RAID 0 with *gstripe/gvinum*
  - RAID 1 with *gmirrror/gvinum*
  - RAID 5 with experimental *graid5* and *gvinum*
  - Advanced RAID: 1+0, 0+1, 5+1, etc... (geom power!)
- JBOD with *gconcat*
- Geom GPT used
- Disk encryption with *geli* (patched for script uses)
- iSCSI target (using file) and initiator
- Zeroconf with *mDNSResponder*

What is FreeNAS ?
Features supported

- Protocols:
  - CIFS with Samba
  - FTP with Pure-FTPd
  - RSYNC: server, client and local (disk to disk)
  - SSH (HPN patched)
  - Unison
  - AFP with NetaTalk
  - UPnP using uShare (ported under FreeBSD with Volker Theile)
- User authentication (but not permission!), and MS-AD integration

What is FreeNAS ?
Minimum hardware requirement

- 96 MB of RAM (with a swap file)
- A FreeBSD supported NIC card
- 64MB hard drive/usb stick/compact flash
- PATA/SATA/SCSI/USB/Firewire/iSCSI hard drives

- Or Virtualise it, using Qemu or VMware, etc.

What is FreeNAS ?
Community

- Started in October 2005
- Two regular developers:
  - Olivier Cochard-Labbé and Volker Theile
- Two Document/FAQ authors and user support:
  - Bob Jaggard and Dan Merschi
- One webmaster:
  - Youri Trioreau
- Many translators:
  - French, German, Italian, Spanish, Chinese, Russian, Japanese, Romanian, Dutch,…
- Mailing lists, forum, subversion on Sourceforge

What is FreeNAS ?
Awards and Donators

- Awards
  - VMware Ultimate Virtual Appliance Challenge: Consumer prize
  - Sourceforge: Project of the month, January 2007
- Donators
  - AMD donated a dual Opteron server
  - FreeBSD (Wilko Bulte) donated a Geode-based appliance
  - Orange Business Services (my employer) contributed my travel expenses for BSDCan2007

History
Why a FreeNAS Server ?

- I needed storage (who doesn't?)
- I was looking to transform one of my PCs into a NAS server and my requirements were:
  - Boot from USB key permitting all 4 PATA drives to be used for data storage
  - Small footprint (64MB maximum)
  - Supporting software RAID 5
- I couldn't find one…..so I built one!

History
Why with FreeBSD ?

- Because I'm a FreeBSD guru ?

  No ...I never use FreeBSD before starting FreeNAS

- Because I think that FreeBSD is the best OS ?

  No...I don't know what is the best OS

- Because FreeBSD have the best filesystem (UFS + Soft updates) that is well suited for a NAS ?

  I discovered the UFS file system in the same time as FreeBSD... And I am still unsure what exactly Soft updates are :-)

Why Then?

- Because I found two of Manuel Kasper's guides, for building an embedded FreeBSD, simple enough for be following by a “never used FreeBSD before” as me.
  - Initially, I took just 2 days for the base build!!
- m0n0wall Developers' Handbook

  http://doc.m0n0.ch/dev/
- miniBSD - reducing FreeBSD

  https://neon1.net/misc/minibsd.html

Problems encountered
FreeBSD as an embedded OS

- No simple circular log
  - Got patched clog from *pfSense*
- No script friendly tools (compared to NetBSD for example)

Problems encountered
FreeBSD used as a NAS

- About 90% of FreeNAS users have MS Windows:
  - FreeBSD's Poor Samba performance is a real problem because users like to benchmark...and FreeNAS has no chance against a Linux based NAS, but its better than some hardware NAS appliances☺
  - Samba corrupts files writing to FAT32 drive (bug kern/39043 existing since june 2002)
- No stable software RAID 5 support.
  - Many issues with *gvinum*.
  - FreeNAS now supports use of experimental *graid5* (created by Arne Wörner) that appears more stable

Problems encountered
FreeNAS base

- Doesn't use *nanobsd*:
  - I discovered nanobsd when I read some BSDcan 2006 presentations researching for this presentation :-)
- Start from “old” but simple m0n0wall in the place of “new” but complex pfSense
  - That was already based on FreeBSD 6 and permit to add packages.
- As a FreeBSD newbie:
  - The configurations files created by FreeNAS are not optimized.
- I'm not an Operating system admin:
  - I must discover and learning each feature before to add them.
- For resume, I re-invend the wheel..
  - but, as a beginner, I build a square wheel!

Problems encountered
Managing an open source Project

- Time consuming...
  - Big impact on my private life:
  - Receiving lot's of user support request regarding project.
- Project Time management
  - How to share what free time I have between answering emails, improving communication, support, bug fix, new features, etc?
- How to answer the question…“I want to contribute, what can I do ?”
    - It's difficult to impose a task on someone.
- User support: Can't reproduce all users problems!

Support Chain

- Think about the Support Chain
  - Before to look for other developers, found volunter for user support!
- End User documentation and FAQs
  - These help run interference for the developers – permits the devs to concentrate more on the code than the ‘nut behind the wheel’
- Multiple Users/multiple hardware combinations
  - A two-edged sword, forces more Feature Requests on the Project, but permits more combinations to be tested.
- Development/Communication Tools
  - Sourceforge Toolkit – Forums, notification via Mailing Lists, SVN, etc. One less thing for a dev to have to think about.

Example of use
Step 1: Installing FreeNAS

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

Enter a number: 9
```

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

Enter a number: 1
```

```
Here is the list of detected CDROM:
acd0 (desc: QEMU CD-ROM/0.9.0)

Enter the name of the CD-ROM drive: acd0
Here is the list of detected disk:
ad0 (desc: QEMU HARDDISK/0.9.0)
ad1 (desc: QEMU HARDDISK/0.9.0)
ad3 (desc: QEMU HARDDISK/0.9.0)

Enter the name of the USB key or CF: ad0

Creating mount point for the CDROM...
Mount CDROM...
Installation...
Unmount CDROM...

FreeNAS has been installed on ad0.
You can now remove the CD-ROM and reboot the PC.

Press ENTER to continue.
```

Example of use
Step 2: Configuring IP address


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

Enter a number: 2
```

```
Do you want to use DHCP? (y/n) n

Enter the new LAN IP address: 192.168.1.10

Subnet masks are entered as bit counts (as in CIDR notation) in FreeNAS.
e.g. 255.255.255.0 = 24
     255.255.0.0   = 16
     255.0.0.0     = 8

Enter the new LAN subnet bit count: 24

The LAN IP address has been set to 192.168.1.10/24.
You can now access the webGUI by opening the following URL
in your browser:

http://192.168.1.10/

Press ENTER to continue.
```

Example of use
Step 3: Access to the Web GUI

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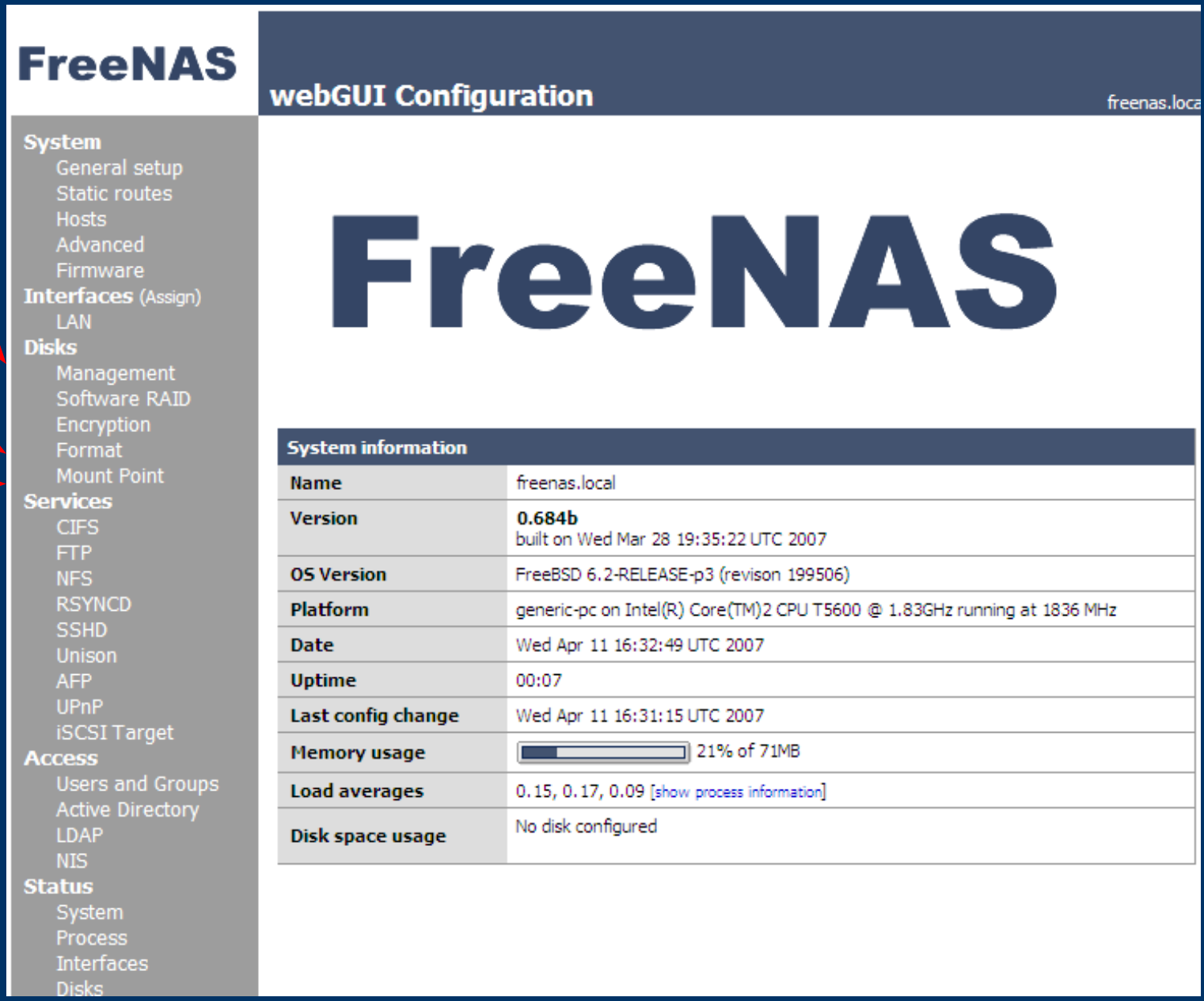
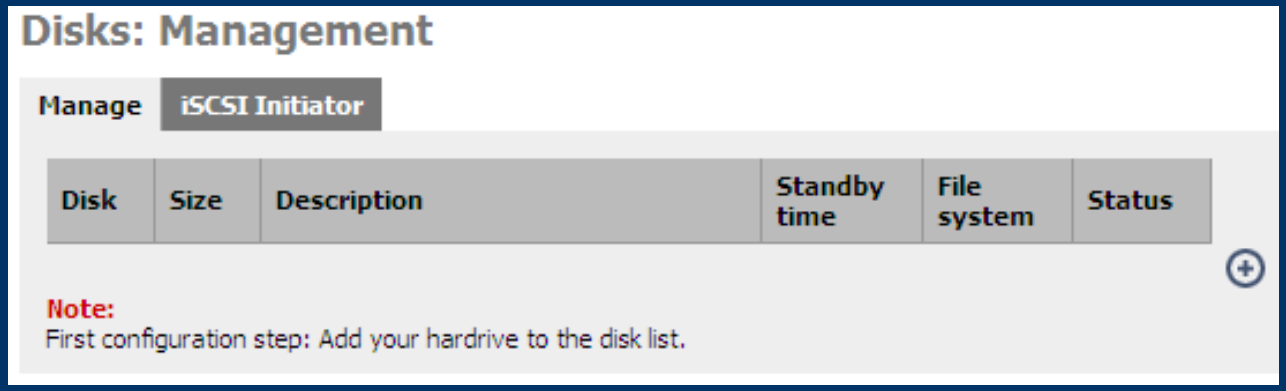
4. Adding disk
5. Formatting
6. Mounting
7. Services

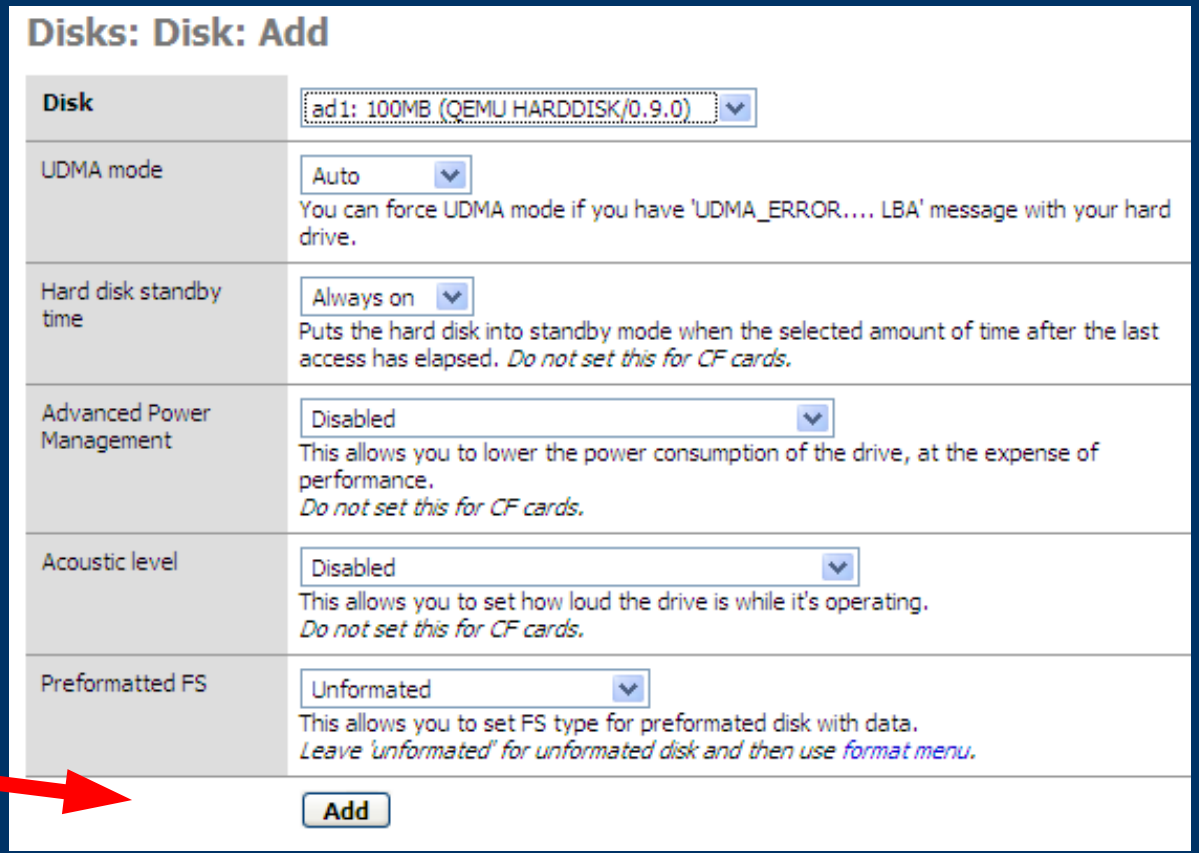


Example of use
Step 4: Adding disk



1. Click on +

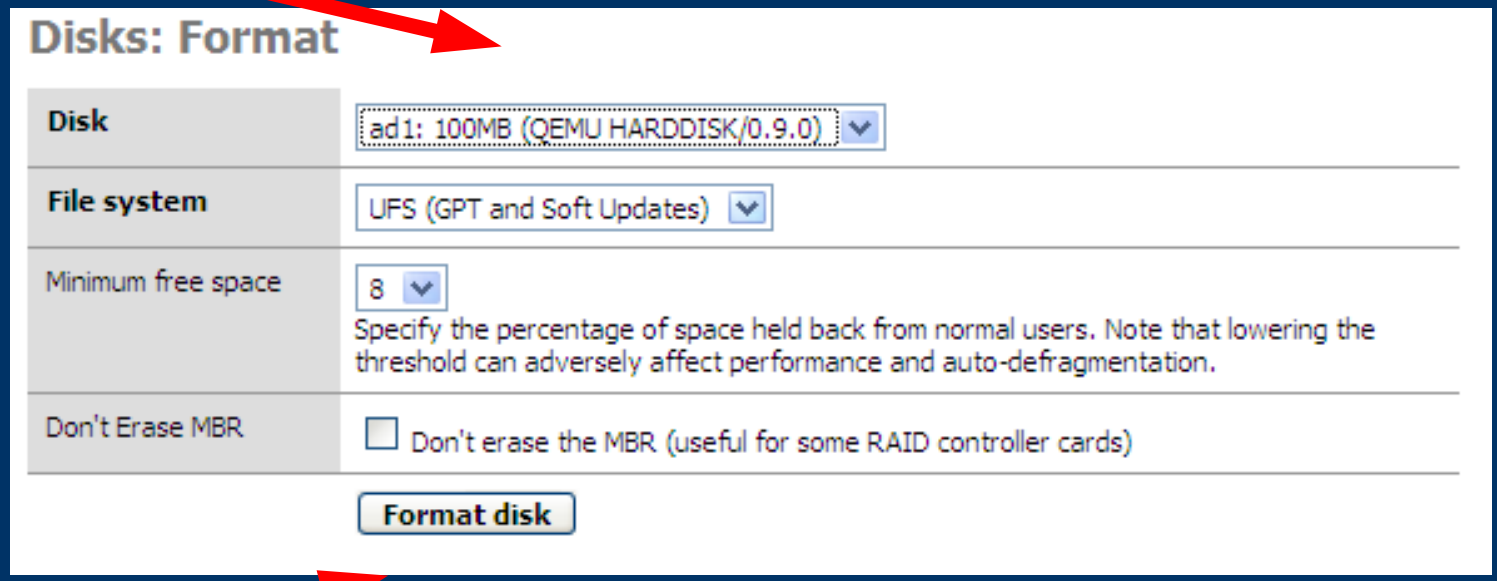
2. Choosing disk



3. Click on “Add”

Example of use
Step 5: Formatting

1. Choose previously added disk



2. Click on Format

Example of use
Step 5: Mounting

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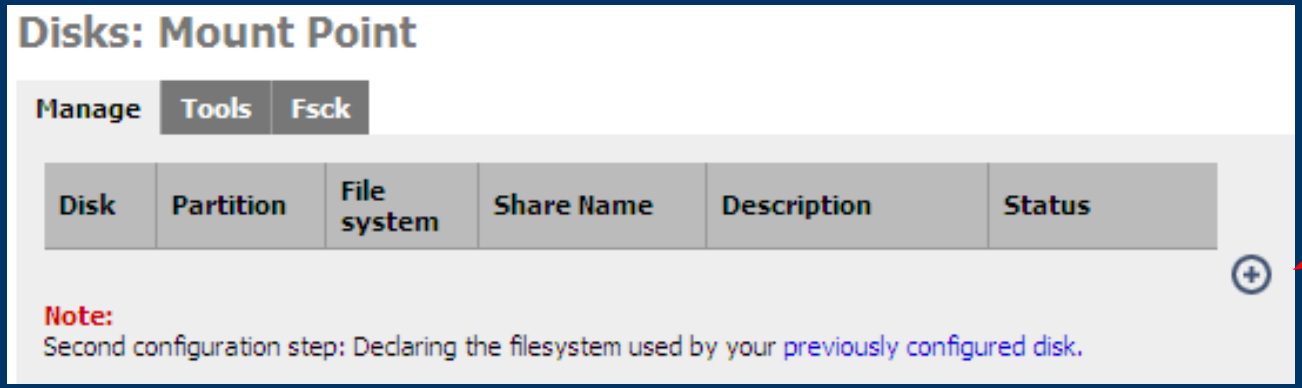
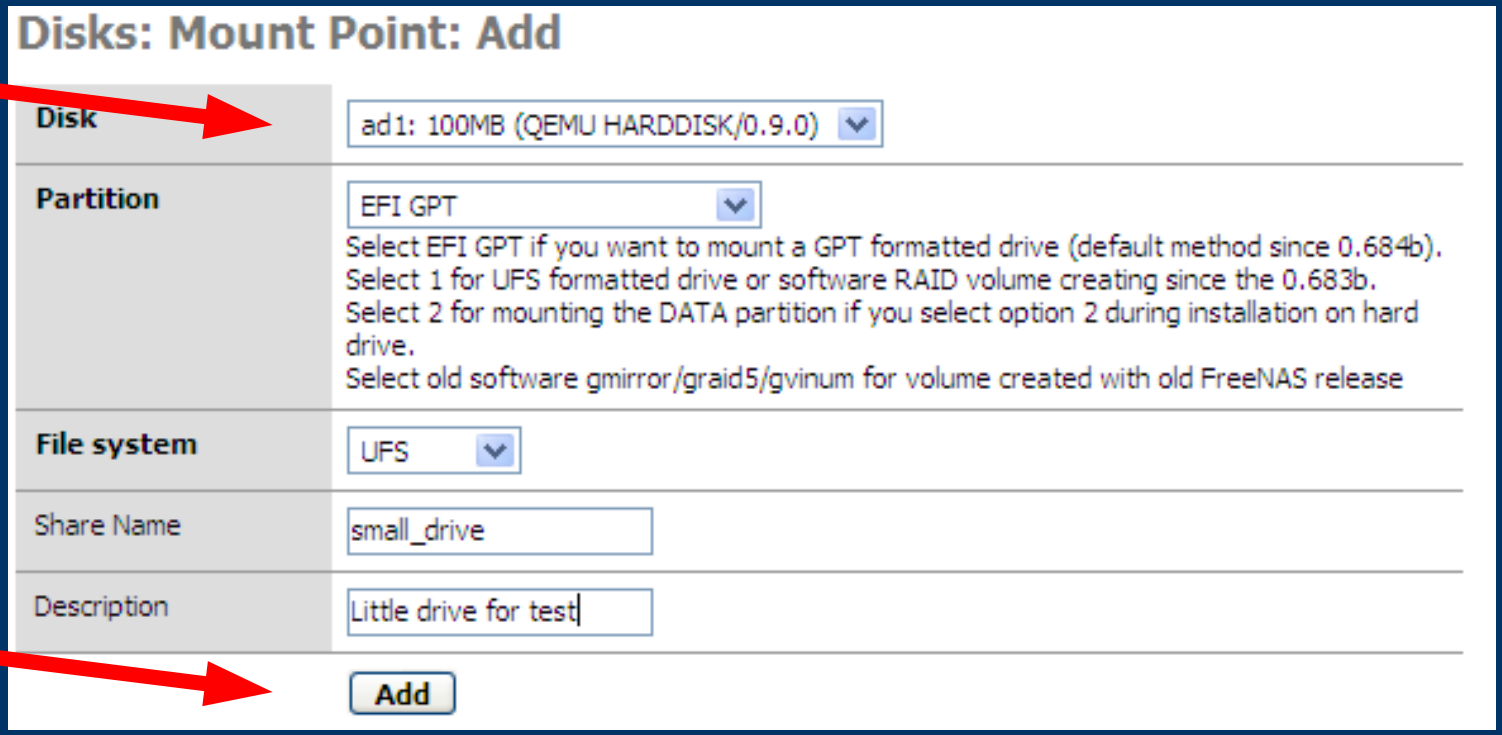


1. Click on +

2. Choosing previously formatted disk



3. Click on Add

Example of use
Step 6: Enabling the services

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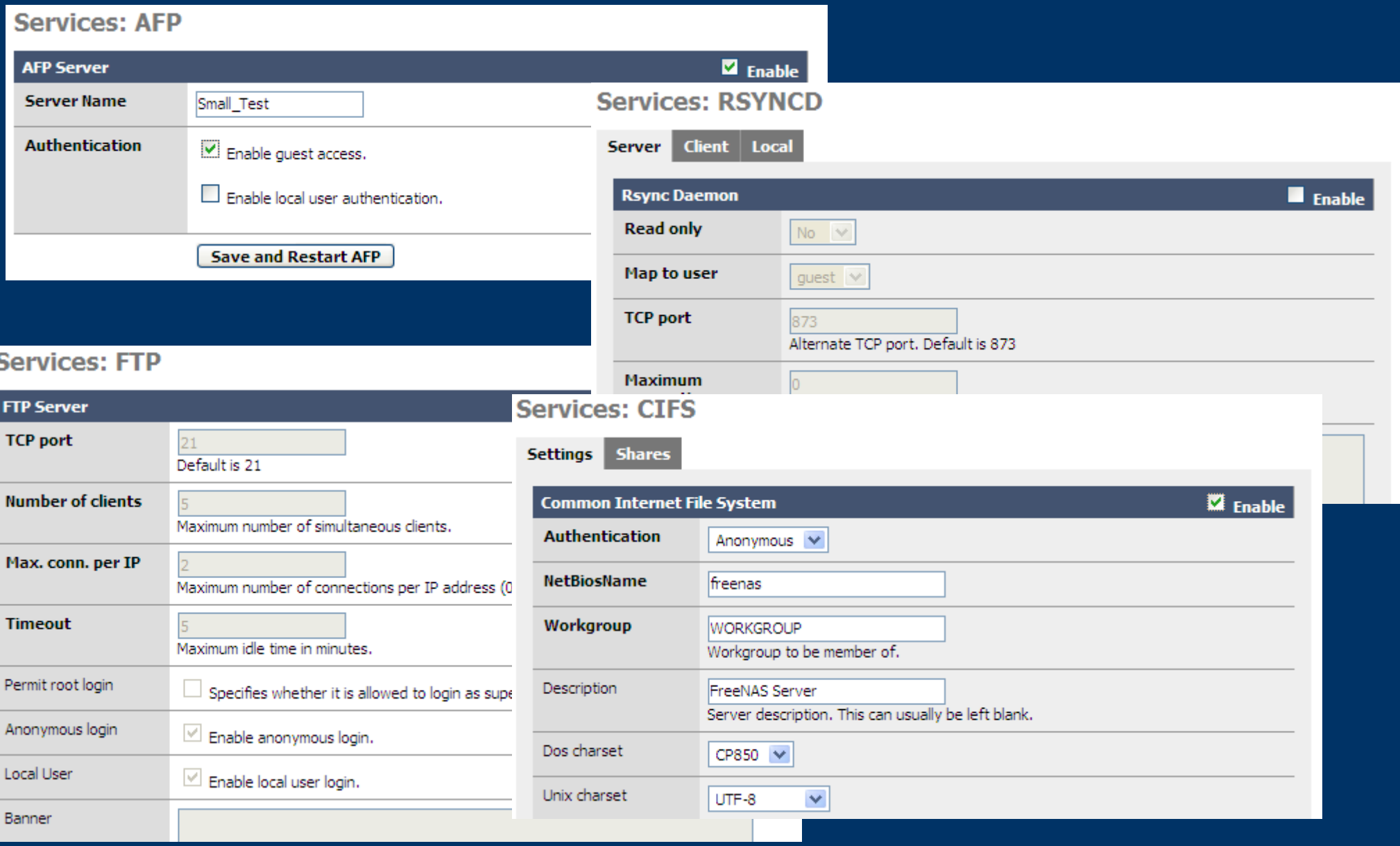

Geom RAID 5

- Permit to increase the array size by replacing each disk one by one without service interruption (excluding growfs impact)
- Faster read requests : RAID0 striping effect
- Slower write requests than RAID0
- Graceful degradation: Quite tolerant against single disk failure

Roadmap

- 0.69: Coming up
- 0.7: user permissions, quotas. All disk management will be reviewed (simpler to configure)
- 0.8: monitoring (SNMP, email alert, etc...)
- 0.9: Bug fixes and stabilizing
- 1.0: The release!

Conclusion
Contributors needed!!

- FreeBSD guru/administrator
  - Tuning and security advices
  - Configuration file check
- PHP Coder
  - Code review
  - Bug fix
- User support
  - There are still lot's of user question on the forum that need a response