

Create a RAID 10 Array Using FreeNAS

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Date: 25th February 2010



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DOCUMENT

This document explains how to create a RAID10 array using a FreeNAS Open source NAS/SAN box. This can be either a physical or virtual node. The example here utilises a VMWare ESX4i virtual machine. This array may then be presented over iSCSI transport to build a Windows 2003 or Windows 2008 cluster. For the purposes of this document the following apply

RAID	Redundant Array of Inexpensive Disks
OS	Operating System
Node	A host computer

1.1 AUDIENCE

The document is intended for engineers wishing to discover more about storage and RAID arrays. It is not expected that the reader is familiar with the FreeNAS OS or storage arrays but expects that FreeNAS is already installed and configured.

2 STORAGE ARRAY TYPES

RAID arrays are sets of redundant disks, hence the name RAID (Redundant Array of Inexpensive Disks). RAID comes in various forms which have expanded since the appearance of more intelligent disk controllers. Common arrays are;

RAID 0 striped

Data is striped across disks, no fault tolerance.

RAID 1 mirrored

Data on disk is mirrored to a second disk

RAID 4 Striping with parity

One disk is dedicated for the parity bits, data is striped data across the remaining disks in the array.

RAID 5 Striping with parity

Stripes data including the parity bits across all disks in the array (distributed parity)

RAID6 Striping with Parity (dual parity)

Extra parity redundancy over RAID5

RAID 0+1 Striping with mirror

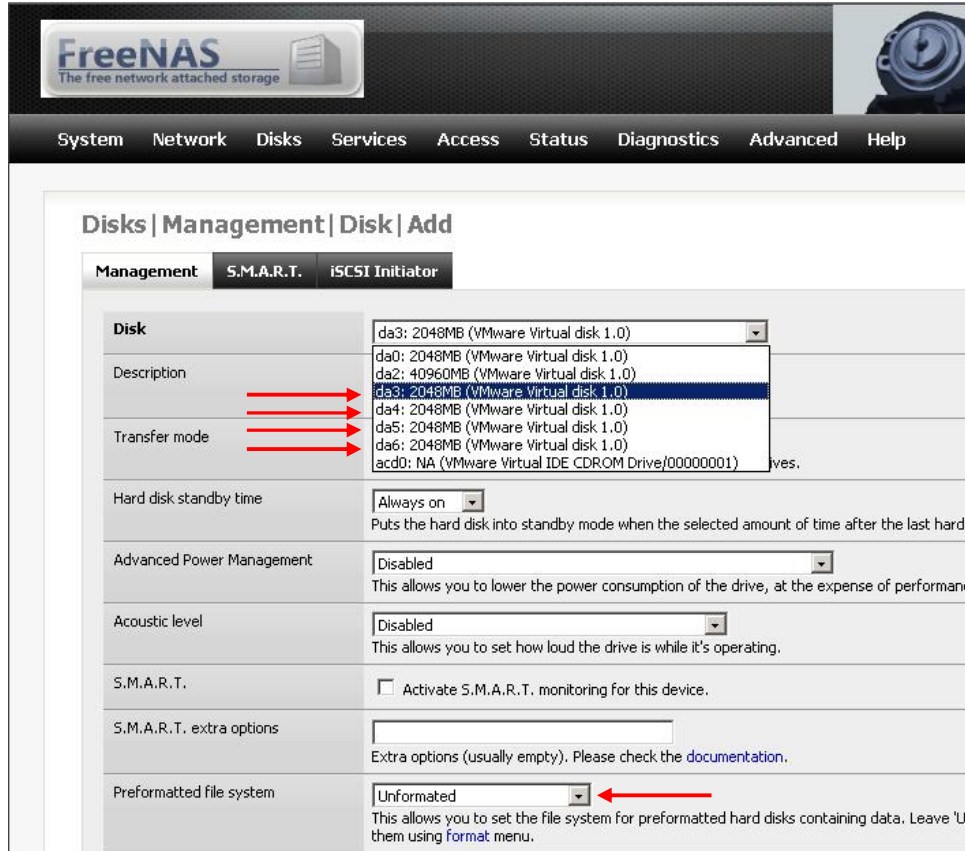
Striped set which is then mirrored

RAID 1+0 Mirror with striping

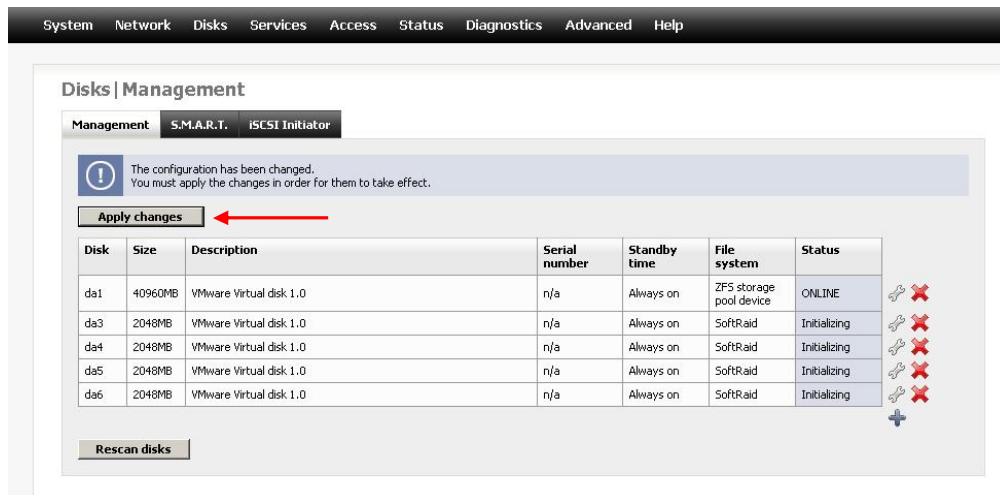
Mirrored disks which are then striped

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Open the FreeNAS management page and go to Disk Management as shown below. We are going to be using the 4 disks 2GB in size.



Add each disk in turn and be sure to click the drop down list box **Preformatted file system** and select **Software RAID** as the format type. Click **Apply changes**



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ed, create the 2 RAID1 arrays (remember RAID10 striped). Shown below is the first RAID1 array, initialize the array+. Click %Apply changes+before continuing.

System Network Disks Services Access Status Diagnostics Advanced Help

Disks | Software RAID | RAID1 | Add

JBOD RAID 0 RAID 1 RAID 5 RAID 0/1/5

Management Tools Information

Raid name: DataR1

Type: RAID 1 (mirroring)

Balance algorithm: Round-robin read
Select your read balance algorithm.

Provider:

- da3 (2048MB, VMware Virtual disk 1.0)
- da4 (2048MB, VMware Virtual disk 1.0)
- da5 (2048MB, VMware Virtual disk 1.0)
- da6 (2048MB, VMware Virtual disk 1.0)

Note: Ctrl-click (or command-click on the Mac) to select multiple entries.

Initialize: Create and initialize RAID.
This will erase ALL data on the selected disks! Do not use this option if you want to add an already existing RAID again.

Add Cancel

RAID1 arrays created! Both arrays should show the %COMPLETE+status.

Disks | Software RAID | RAID1 | Management

JBOD RAID 0 RAID 1 RAID 5 RAID 0/1/5

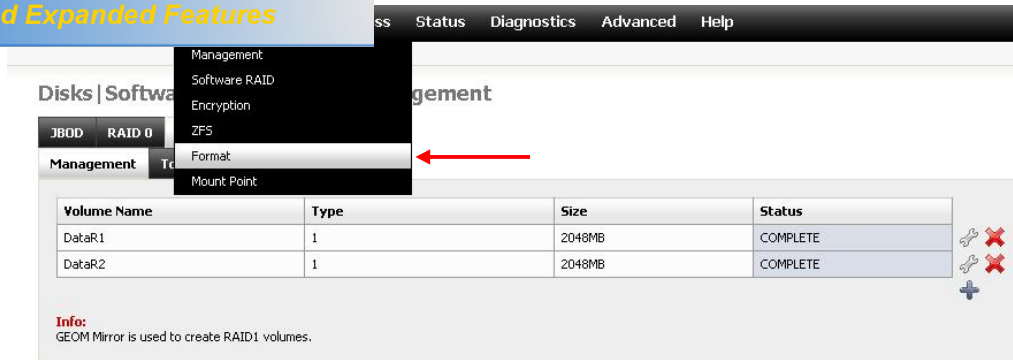
Management Tools Information

Volume Name	Type	Size	Status
DataR1	1	2048MB	COMPLETE
DataR2	1	2048MB	COMPLETE

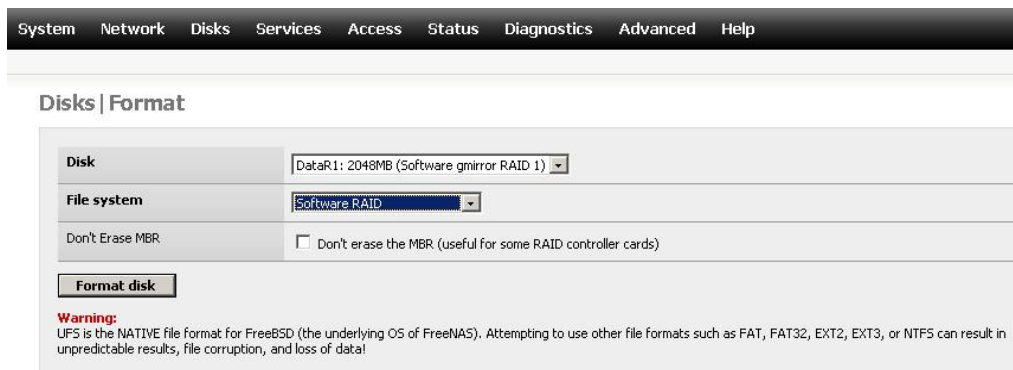
Info:
GEOM Mirror is used to create RAID1 volumes.

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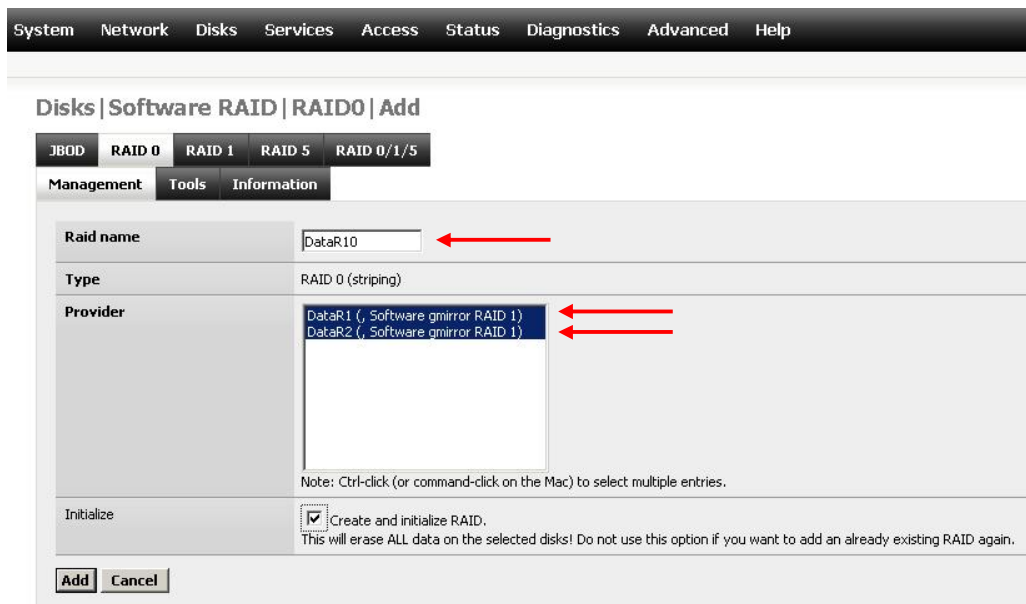
ays from the %Format+menu shown below.



Format them as %Software RAID+as shown below.



Now go to %Disks+then %Software RAID+from the menu and select %RAID0+as shown below. You will see the two RAID1 arrays previously created. Now we need to create a stripe across these arrays.



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Apply changes+you should see the following.

Status Diagnostics Advanced Help

Disks | Software RAID | RAID0 | Management

JBOD RAID 0 RAID 1 RAID 5 RAID 0/1/5

Management Tools Information

Volume Name	Type	Size	Status
DataR10	0	4096MB	UP

Info:
GEOM Stripe is used to create RAID0 volumes.

Now format your new array with the appropriate file system (UFS or ZFS). Add this as an iSCSI target and present to your cluster node!

System Network Disks Services Access Status Diagnostics Advanced Help

Disks | Format

Disk DataR10: 4096MB (Software gstripe RAID 0)

File system ZFS storage pool device

Don't Erase MBR UFS (GPT and Soft Updates) FAT32 EXT2 Software RAID ZFS storage pool device

Format disk

Warning:
UFS is the NATIVE file format for FreeBSD (the underlying OS of FreeNAS). Attempting to use other file formats such as FAT, FAT32, EXT2, EXT3, or NTFS can result in unpredictable results, file corruption, and loss of data!