



What's New?

in FreeNAS 9.3



FreeNAS

FreeNAS is an open-source, BSD-licensed, network-attached storage (NAS) operating system based on FreeBSD. It uses OpenZFS, the open-source version of ZFS, a self-healing file system which is particularly suited for storage and for maintaining the integrity of the data being stored.

FreeNAS 9.3, which was released in December 2014, adds several new features, many of which take advantage of OpenZFS and recent FreeBSD optimizations. This article provides an overview of some of these features. Refer to the FreeNAS 9.3 User Guide (doc.freenas.org/9.3 <<http://doc.freenas.org/9.3>> <<http://doc.freenas.org/9.3>>) for more information about FreeNAS, its features, and available configuration options.

ZFS on the Boot Device(s)

FreeNAS provides a separation between the boot device, to which the operating system is installed, and the disk(s) used for storage. This means that a problem with the boot device or the operating system itself does not affect the data stored on the storage disk(s), and that data becomes available once the problem with the boot device or operating system is resolved. Traditionally, FreeNAS formatted the boot device with UFS and did not support mirroring of the boot device. While it was easy to recover from a failed boot device, the operation did result in some downtime in order to realize the failure, prepare a new boot device, and boot into it.

Beginning with version 9.3, FreeNAS formats the boot device with ZFS and supports mirrored boot devices, allowing for the system to continue to operate if one of the boot devices in a mirror fails. The current sta-

tus and number of boot device(s) can be viewed in System -> Boot -> Status. Another boot device can be added as a mirror at any time by clicking the "Attach" button in the same screen and selecting the device to add, as seen in the example in Figure 1.

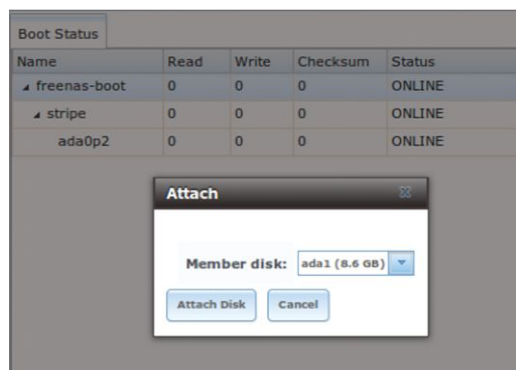


Figure 1 Adding Another Boot Device

The use of ZFS provides an additional feature: boot environments, or the ability to take a snapshot of the operating system itself and to boot into a previous version of the operating system. This feature is integrated into the new update mechanism, described in the next section.

Managing Updates

Beginning with version 9.3, FreeNAS no longer uses point releases to provide security patches, bug fixes, new drivers, or other types of updates. Instead, cryptographically

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signed updates are provided as they become available, providing the administrator flexibility in determining when to apply the available updates. In addition, the update mechanism allows the administrator to track different “trains” or release/development branches. This allows the administrator to “test drive” upcoming releases or to apply a needed feature that is not yet available in the current STABLE branch, yet still roll back to the previous version of the operating system as needed.

Figure 2 provides an example of the System -> Update screen. In this example, the system is currently running the STABLE version of 9.3 and the following trains are available: FreeNAS-10-Nightlies (tracks the upcoming, not-yet-released 10 alpha version), FreeNAS-9.3-Nightlies (tracks nightly, possibly untested changes), and FreeNAS-9.3-STABLE (tracks tested updates).

Once a train is selected, the administrator can click the “Check Now” button to see if any updates are available for that train. Figure 3 shows an example of the results of an update check where several updates are available.

In this example, the numbers in the

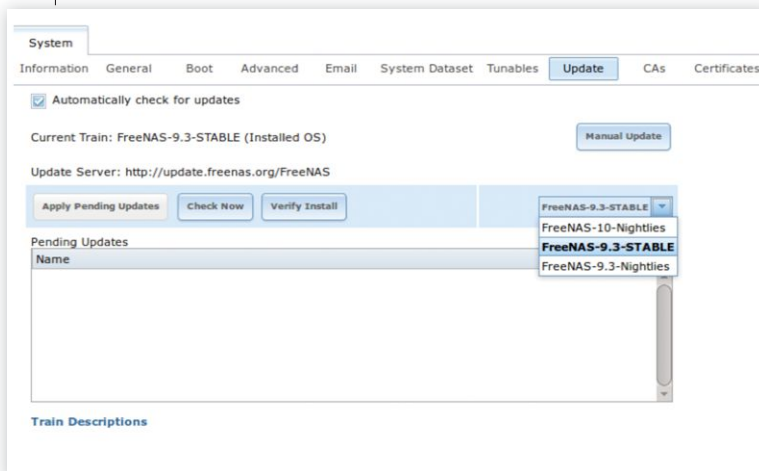


Figure 2 Selecting a Train from Update Manager



Figure 3 Reviewing Available Updates



Figure 4 Selecting a Boot Environment from Boot Menu

Changelog that begin with a # represent the bug report number from bugs.freenas.org. Click the “ChangeLog” hyperlink to open the log of changes in a web browser. Click the “ReleaseNotes” hyperlink to open the 9.3 Release Notes in a web browser.

To download and apply the updates, click the “OK” button. Alternately, most updates require a reboot after they are applied. Uncheck the box “Apply updates after downloading.” This will instruct the system to only download the updates. The updates can then be applied at a time that least impacts users by clicking the “Apply Pending Updates” button shown in Figure 2.

Whenever an update is applied, the system automatically creates a boot environment of the newly updated operating system and adds it as the default entry in the boot menu. In the example shown in Figure 4, the default version of the operating system was installed on November 21 and an update using the 9.3-Nightlies train was applied on November 24. Should an update fail, or the administrator wish to return to a previous version of the operating system, simply reboot and select the desired boot environment to boot into.

Boot Manager

In addition to the automated boot environments created by the system updater, FreeNAS 9.3 includes a boot manager for creating manual boot environments and pruning old boot environments. This configuration screen, shown in Figure 5, can be accessed from System -> Boot.

This screen displays the status of the boot volume and the time and results

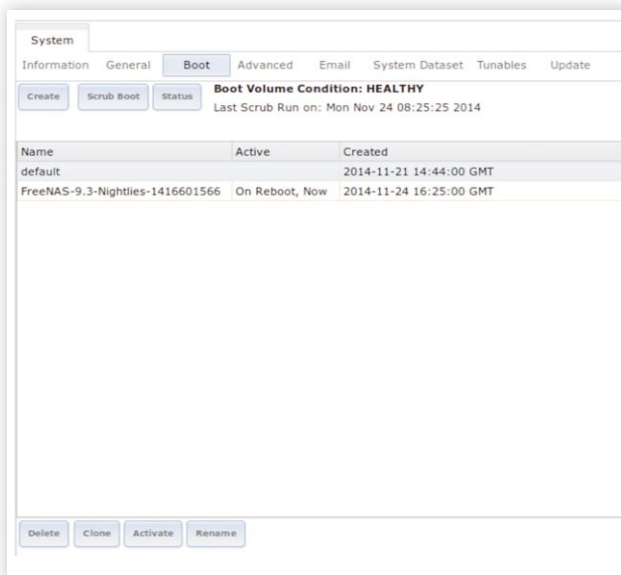


Figure 5 Managing Boot Environments

of the last ZFS scrub of the boot volume. By default, the boot device is scrubbed every 35 days. Click the “Scrub Boot” button to initiate a scrub of the boot volume now. To review the number of devices in the boot volume and the status of each device, click the “Status” button.

If you highlight a boot environment, you can delete, clone, activate (if it is not currently set as the boot default), or rename it. If the boot volume is getting low on space or you have applied many updates, you can delete multiple older boot environments that you do not plan to boot into in the future. To instead create a new environment, click the “Create” button and input the name to appear in the boot menu.

Configuration Wizard

Beginning with 9.3, FreeNAS provides a configuration wizard which runs automatically either after the initial upgrade to or installation of version 9.3. This wizard provides an efficient mechanism for quickly configuring the system in order to reduce the amount of time from initial bootup to serving data over the network. It allows the administrator to:

- Configure the system’s localization, keyboard mapping, and time zone.
- Import an existing ZFS pool or create a new ZFS pool.
- Select a directory service to attach to (Active Directory, LDAP, or NIS) and provide the required credentials.
- Configure CIFS (including guest access), AFP (including Time Machine), NFS, and iSCSI shares. Each share configuration should work “out of

the box” and can be further fine-tuned for more complex scenarios using the FreeNAS graphical administrative interface.

- Set the administrative email address which will receive security run outputs and administrative alerts.
- Configure the system to optionally display console messages at the bottom of the screen to ease troubleshooting.

The wizard can be rerun at any time, making it trivial to add additional shares or directory services. Any configuration performed by the wizard can still be viewed and edited using the configuration screens provided by the FreeNAS GUI.

Certificate Manager

Many of the FreeNAS services support encryption using a certificate. FreeNAS 9.3 provides a graphical certificate manager for creating a certificate authority, importing and creating certificates, self-signing certificates, and creating certificate signing requests. This certificate manager is integrated into the system, meaning that all added certificates are available for use within the configuration screens of the services which support encryption.

Creating a self-signed certificate is as simple as filling in the information in the screen shown in Figure 6.

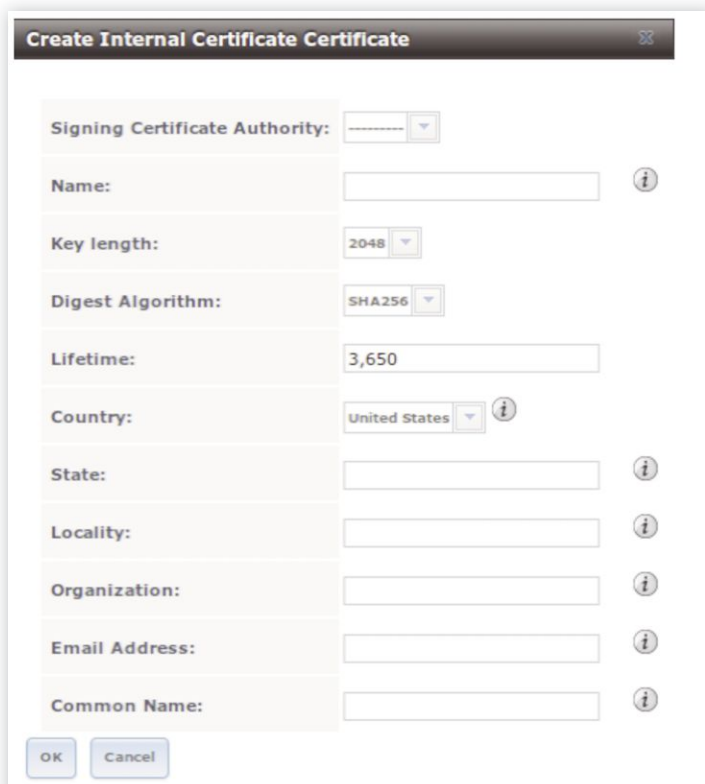


Figure 6 Using Certificate Manager to Create a Self-Signed Certificate

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Figure 7 provides an example of configuring the graphical administrative interface to use HTTPS. In this example, two certificates have been created, one for the web service and one for the ftp service. See Figure 7.

Improved iSCSI/Virtualization Integration

The move to kernel iSCSI, with many performance improvements, and support for all of the VAAI (vStorage APIs for Array Integration) storage primitives greatly enhance FreeNAS integration with virtual datastores. VAAI is an API framework that enables certain storage tasks, such as thin provisioning, to be offloaded from the virtualization hardware to the storage array. The following VAAI primitives are supported in 9.3:

- **unmap:** tells ZFS that the space created by deleted files should be freed. Without unmap, ZFS is unaware of freed space made using a virtualization technology such as VMware or Hyper-V.
- **atomic test and set:** allows a virtual machine to only lock the part of the virtual machine it is using rather than locking the whole LUN, which would prevent other hosts from accessing the same LUN simultaneously.
- **write same:** when allocating virtual machines with thick provisioning, the necessary write of

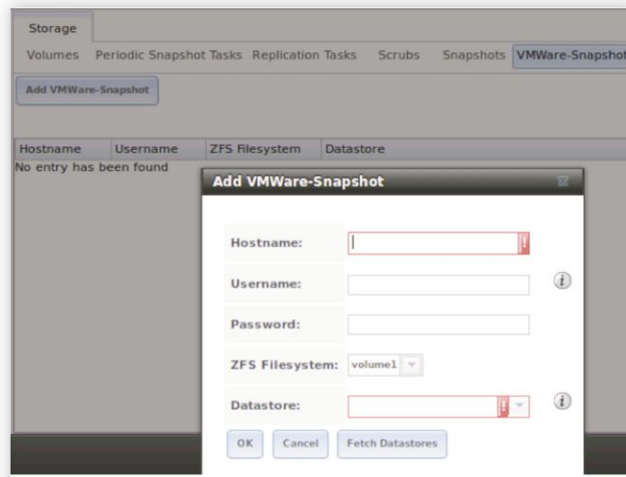


Figure 8 Configuring a VMware Datastore

zeroes is done locally, rather than over the network, so virtual machine creation is much quicker.

- **xcopy:** similar to Microsoft ODX, copies happen locally rather than over the network.
- **stun:** if a volume runs out of space, this feature pauses any running virtual machines so that the space issue can be fixed before any corruption occurs.
- **threshold warning:** the system reports an error when a configurable capacity is reached. In FreeNAS, this threshold can be configured both at the pool level and the zvol (device extent) level.
- **LUN reporting:** the LUN reports that it is thin provisioned.

In addition, ZFS snapshots work correctly when VMware is configured as a datastore. FreeNAS will automatically snapshot any running VMware virtual machines before taking a ZFS snapshot of the dataset or zvol backing that VMware datastore. This means that the resulting ZFS snapshots will contain coherent VMware snapshots. A new configuration screen, found in Storage -> VMWare-Snapshot and shown in Figure 8, can be used to configure the datastore.

Miscellaneous Features

Several other features have been added in 9.3, including:

- A new sharing type, WebDAV, provides authenticated access to the specified volume or dataset from a web browser or webdav client. Encryption or forced encryption can optionally be configured on these shares.
- Kerberized NFSv4 support is now available.
- The LLDP service has been added for providing Ethernet device discovery using IEEE 802.1AB.

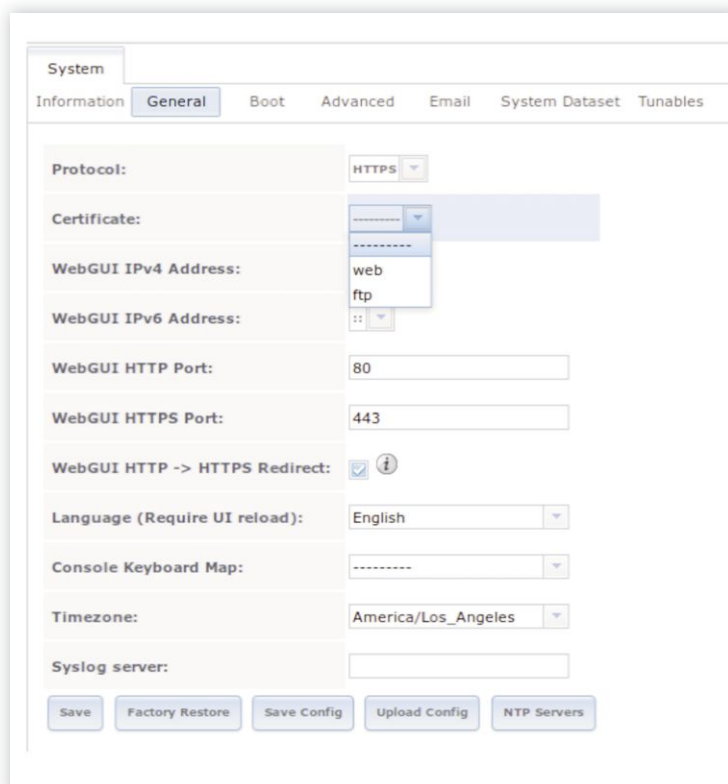


Figure 7 Selecting the Certificate to Use

- The addition of the SSSD service means that multiple directory services are supported.
- SNMP is now provided by Net-SNMP.
- The system logger has been replaced by syslog-ng.
- The ability to manage sysctls, loader.conf values, and rc.conf values has been integrated into one configuration screen (System -> Tunables).
- ZFS pool upgrades can now be performed using the graphical interface. The alert system will indicate when newer OpenZFS feature flags are available.
- Zvols can now be grown using the graphical interface. LUNs can now be grown without the need to first disconnect initiators or stop the iSCSI service.
- Kerberos realms and Kerberos keytabs can now be configured from the graphical interface and, once added, become available in the configuration screens for the directory services that support realms and keytabs.

Summary

FreeNAS continues to add innovative features, making it easier than ever to configure this open-source operating system and integrate

it as a storage solution within any size network. Boot environments reduce the risk of updating the operating system, and the update mechanism provides flexibility when determining when to apply updates. The configuration wizard reduces the amount of time needed to deploy FreeNAS, and the certificate manager makes it easy to create and manage certificates.

This article did not cover all of the features and improvements added to FreeNAS 9.3. Refer to the 9.3 Release Notes and the "What's New in 9.3" section of the FreeNAS 9.3 Users Guide for a more complete list of the new features. ●

Dru Lavigne has been using FreeBSD as her primary platform since 1997 and is the lead documentation writer for the FreeBSD-derived PC-BSD and FreeNAS projects. She is author of *BSD Hacks*, *The Best of FreeBSD Basics*, and *The Definitive Guide to PC-BSD*. She is founder and current Chair of the BSD Certification Group Inc., a nonprofit organization with a mission to create the standard for certifying BSD system administrators, and serves on the Board of the FreeBSD Foundation.

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