



Deep Freeze Mac and CoreStorage

Technical Paper

Last modified: March 2017

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Overview

What is Core Storage?

In 2011 Apple began shipping computers running OSX with a feature called Core Storage enabled. Core Storage is an updated logical volume manager included in OSX 10.7 (Lion) and later that enables a number of features to be implemented in OSX including File Vault and Fusion Drives. As of the writing of this document most, if not all, systems running OSX ship with a Core Storage Volume enabled by default.

Why is this a problem for Deep Freeze?

Most applications will not have a problem with an OSX machine running a volume managed by Core Storage as most applications interact with the operating system at the file system level. At the file system level the underlying volume manager is not a huge concern as the operating system takes care of the task of getting the data requested to the applications. Deep Freeze however works with the disks at a physical level and Core Storage completely changes how disks are visible to applications like Deep Freeze.

What can be done?

At this time the only option to allow Deep Freeze Mac to be installed is to either revert the disk so that it is not configured as a Core Storage Volume, or in the case of a system configured with a Fusion Drive to “break” the volume into the separate underlying disks.

This will have the following effects:

- File Vault will not be able to be enabled.
- Machines configured as a Fusion Drive will see the Fusion Drive broken into the underlying components (a small SSD and a larger magnetic hard disk).
- Systems with a 3tb or larger hard disk may have issues running Boot Camp.

Checking for a Core Storage Volume

To verify if a system is configured with a Core Storage Volume you can run the command below in the OSX Terminal;

```
diskutil cs list
```

If a Core Storage Volume is present you will get a output similar to the following;

```
XXXXXXXX:~ XXXXXXXX$ diskutil cs list
CoreStorage logical volume groups (1 found)
|
+-- Logical Volume Group XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXXX
=====
Name:      Macintosh HD
Status:    Online
Size:      499418034176 B (499.4 GB)
Free Space: 159744 B (159.7 KB)
|
+<- Physical Volume XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXXX
| -----
| Index:   0
| Disk:    disk0s2
| Status:  Online
| Size:    499418034176 B (499.4 GB)
|
+>- Logical Volume Family XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXXX
-----
Encryption Type:   AES-XTS
Encryption Status: Unlocked
Conversion Status: Complete
High Level Queries: Fully Secure
|                 Passphrase Required
|                 Accepts New Users
|                 Has Visible Users
|                 Has Volume Key
|
```

+-> Logical Volume XXXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXXX

Disk: disk1
Status: Online
Size (Total): 499065552896 B (499.1 GB)
Revertible: Yes (unlock and decryption required)
Revert Status: Reboot required
LV Name: Macintosh HD
Volume Name: Macintosh HD
Content Hint: Apple_HFS

If no Core Storage Volume is found the following response will be seen;

No CoreStorage logical volume groups found

Reverting a Core Storage Volume

If the Core Storage Volume is listed as Revertible: Yes, or Revertible : Yes (unlock and decryption required) the Core Storage Volume can be reverted using the command below:

```
diskutil cs revert /
```

If the volume is not listed as reversible the Core Storage Volume will need to be removed by breaking the volume into the individual physical disks and re-partitioning the system.

Removing a non-reversible Core Storage Volume

Please note that this process destroys all data stored on a system and is non recoverable. Please ensure that you have taken adequate backups of your data before proceeding.

1. Start the Mac and hold down Option key to select the startup disk, and choose the *Recovery HD*. Alternatively you can hold down Command and R keys to start from the Recovery partition. For more information, refer to Apple's support document.
2. From the Utilities menu, select *Terminal*.
3. On the prompt, type "diskutil cs list" and copy the UUID of the Logical Volume Group. The UUID is a 32 character string listed as part of the Logical Volume Group.
4. Type "diskutil cs delete <UUID>" to remove the CoreStorage volume.
5. Once the operation has completed, quit Terminal and from the OS X Utilities window, and use Disk Utility to reformat the hard drive.
6. After formatting, run Terminal again and execute the command `newfs_hfs` to construct the HFS file system. The goal here is to create HFS volume with allocation block size set to 4096 bytes, so use the following parameters: "newfs_hfs -b 4096 -J [-v volume_name]", where -J tells to create a journaled HFS+ volume, and -v is optional if you want to specify a volume name (default is Untitled).
7. Quit Terminal and from the OS X Utilities window, select Reinstall OS
8. Follow the instruction provided by Apple to reinstall the OS.