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What's New



What's new in CCC 4?

Carbon Copy Cloner 4 was rebuilt from the ground up to bring new features and functionality. Any time an application sees that much change, users that are upgrading are bound to feel a bit lost. This article will present the new features to you and offer tips on how to do the things you were used to doing with CCC 3. If you're still scratching your head over some new functionality, please don't hesitate to [ask us for help <http://bombich.com//software/get_help>](http://bombich.com//software/get_help).

New in CCC 4.1

Introducing Simple Mode

CCC 4.1 includes a new, simplified user interface called **Simple Mode**. Simple Mode significantly reduces the number of user interface elements — the sidebar, toolbar, scheduling selector, and advanced settings are all suppressed, leaving the user with only three primary controls: Source, Destination, Clone button. For users that desire a basic ad hoc clone from one volume to another and do not want to maintain scheduled tasks, this simplified interface is the perfect solution. To use Simple Mode, choose **Simple Mode** from the Carbon Copy Cloner menu.

Related Documentation

- [Simple Mode <http://bombich.com//kb/ccc4/simple-mode>](http://bombich.com//kb/ccc4/simple-mode)

Mini task progress window for all tasks

Many users that upgraded from CCC 3 to CCC 4 missed how CCC used to offer a small window that showed progress indication for scheduled tasks. CCC 4.1 adds this functionality to the CCC User Agent menubar application. When a task is running, choose **Show progress indication for {task name}** from the CCC menubar application to reveal the mini task progress window.

Disable individual tasks, disable all tasks

You can now right-click on a task in the tasks table and choose **Disable** to disable that task (use the same procedure to re-enable it). This is handy if, for example, you're doing some reorganizing on the source or destination volume and don't want the backup task to run until you're finished. You can also disable tasks globally via the CCC menubar application icon. When you choose **Disable all tasks...** from the CCC menubar application menu, CCC will offer to disable the tasks for a specific interval (one hour, two hours, one week, etc.) or until you manually re-enable them. Re-enabling tasks is achieved by simply opening CCC — you'll be prompted to re-enable tasks when CCC opens.

Related Documentation

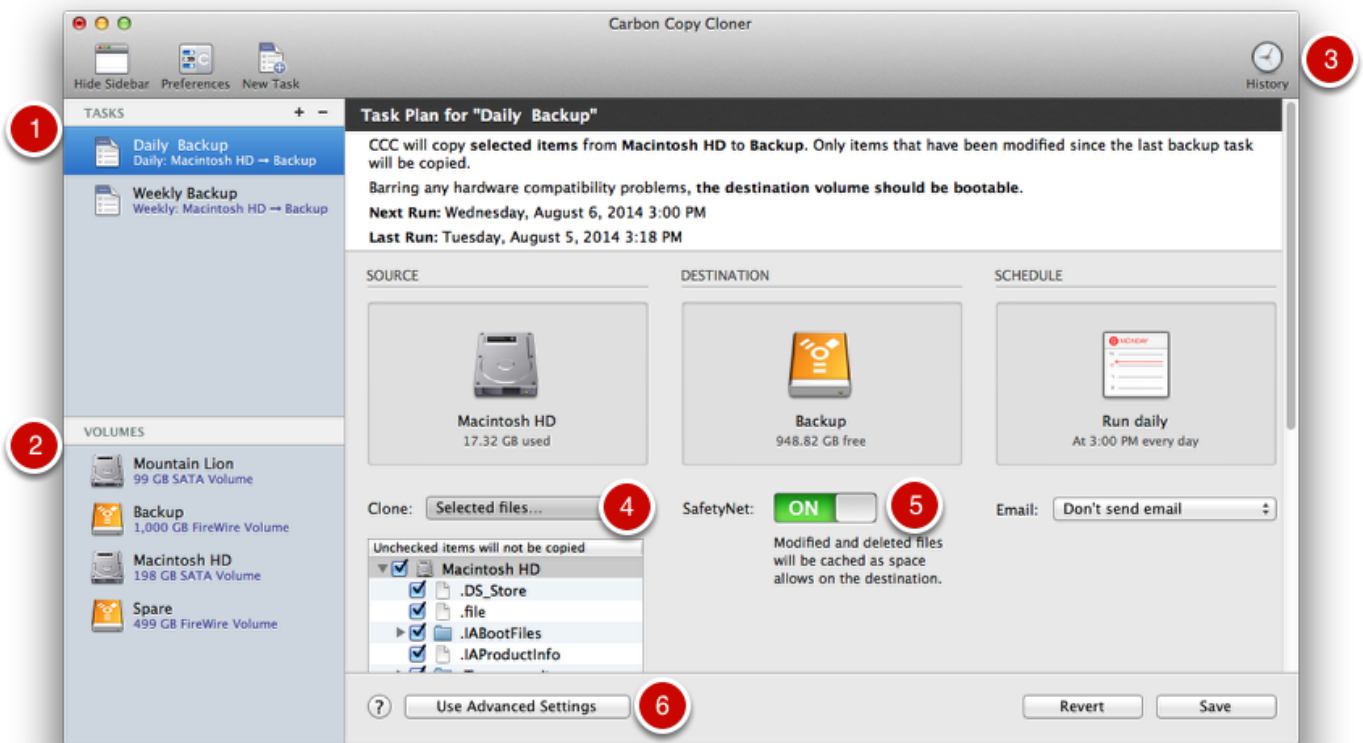
- [Monitoring CCC backup tasks <http://bombich.com//kb/ccc4/monitoring-backup-tasks-ccc-menubar-application>](http://bombich.com//kb/ccc4/monitoring-backup-tasks-ccc-menubar-application)

Window resizing improvements

The task configuration portion of CCC's main window can now be resized horizontally. When resized horizontally, the table of items to exclude will be stretched to make it easier to see the contents of that table. Horizontally resizing the window also allows the user to see the full path of items that are currently being copied when a task is in progress.

New in CCC 4.0

The main task configuration window and the scheduled tasks window are consolidated



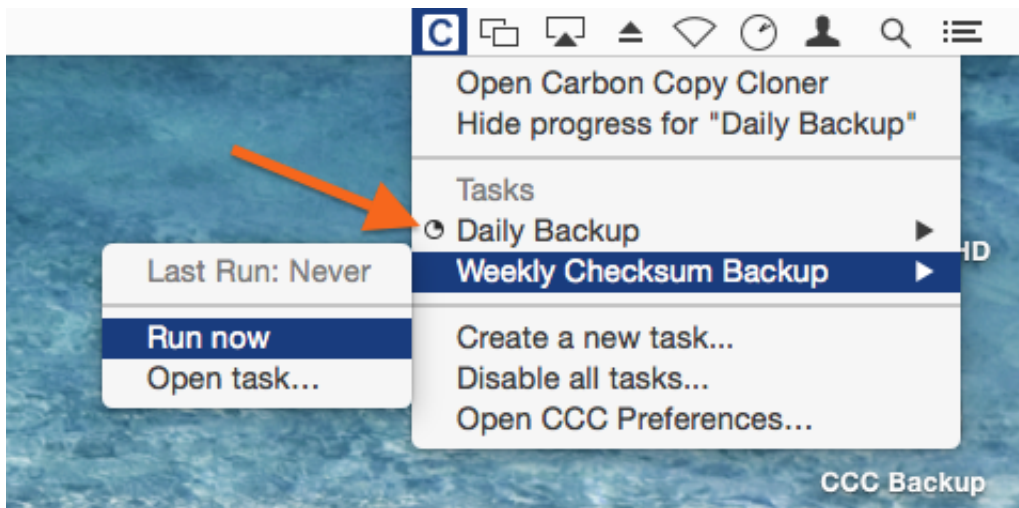
1. Our top feature request for CCC was the ability to edit scheduled tasks, and we deliver that in style with an all-new task configuration window. Tasks can be created, saved, scheduled, and modified, all in the same window.
2. We also brought the functionality of the Disk Center window into the main window. Simply click on a volume in the sidebar to see detailed volume information, see which tasks are associated with that volume and to create a Recovery HD on that volume.
3. A Task History window indicates details about when a task ran and whether it was successful. All history events are listed in one window, and can be sorted by task name, source/destination name, start time, and status.
4. The default task filter has always been a "Copy everything" filter. That notion is now more clear, a **Clone** popup menu indicates whether you're copying everything or selected files.
5. CCC 4 discards the idea of preset configurations that aren't specifically associated with a particular task. The old "Archiving" feature has been renamed to "SafetyNet", and turning it on and off is really simple.
6. Advanced settings are simultaneously less intrusive and more accessible in CCC 4. Simply click the **Use Advanced Settings** button to reveal all of the additional options that were available via the **Customize These Settings** and **Show Advanced Settings** buttons in CCC 3.

Related Documentation

- The Disk Center <<http://bombich.com//kb/ccc4/disk-center>>
- How to find out when a backup last ran: CCC Task History <<http://bombich.com//kb/ccc4/how->

- [find-out-when-backup-last-ran-ccc-task-history>](#)
- [Excluding files and folders from a backup task <http://bombich.com//kb/ccc4/excluding-files-and-folders-from-backup-task>](http://bombich.com//kb/ccc4/excluding-files-and-folders-from-backup-task)
- [Protecting data that is already on your destination volume: The Carbon Copy Cloner SafetyNet <http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet>](http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet)
- [Advanced Settings <http://bombich.com//kb/ccc4/advanced-settings>](http://bombich.com//kb/ccc4/advanced-settings)

Menubar application offers quick access to your tasks



Many users also asked for a menubar application that offers quick access to tasks. The CCC menubar application offers one-click access to start, stop, and defer your tasks -- no password required if you're logged in to an administrator account. You can also see when your tasks last ran, when they are supposed to run next, see the progress of your tasks, and open the task in CCC if you'd like to make changes to it.

Where is the progress window for scheduled tasks?

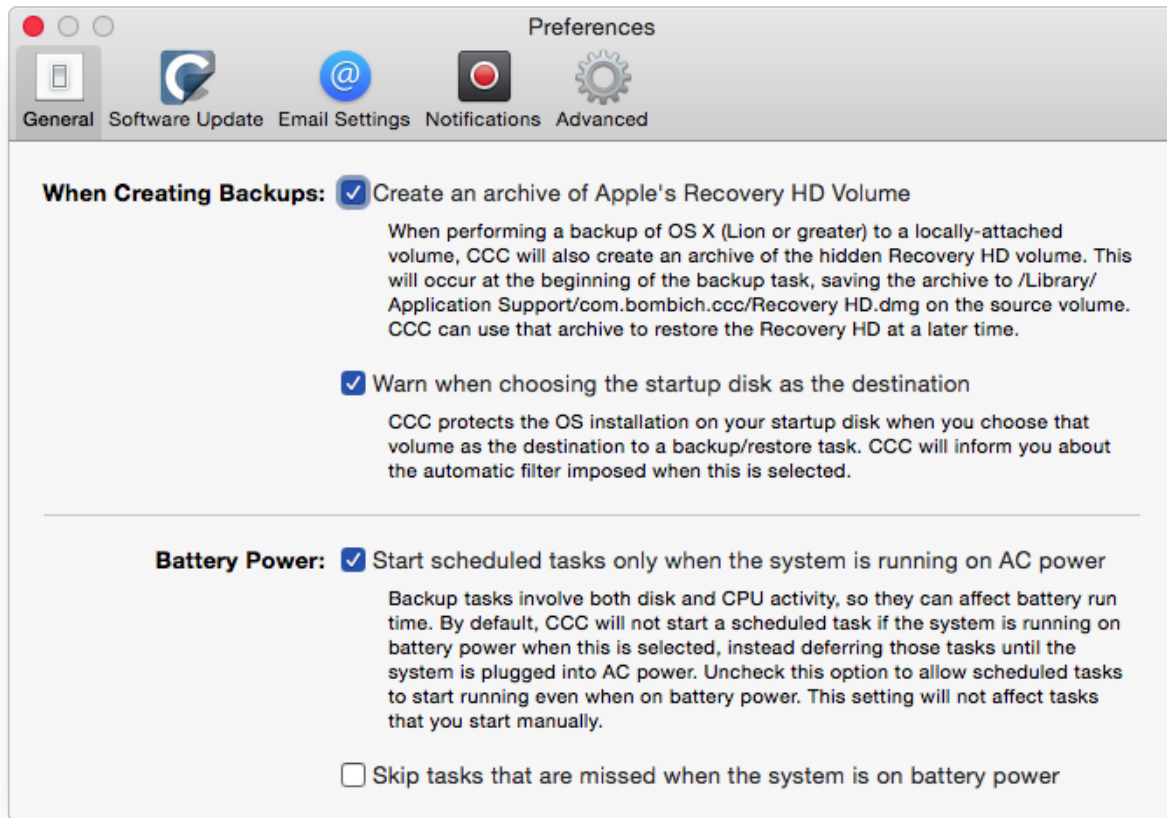
The CCC menubar application replaces the scheduled task progress window from CCC 3.5. Many users were frustrated with the behavior and intrusiveness of that window, so now CCC offers basic progress indication in the menubar application (see the orange arrow in the screenshot above). For the majority of your tasks, you don't need the level of detail that was provided in the CCC 3.5 scheduled task progress window, it existed only because there wasn't a better alternative. If you want to see more detailed progress indication for a particular task, though, you can choose "Open task..." from the menubar application to see the detailed progress indication.

Related Documentation

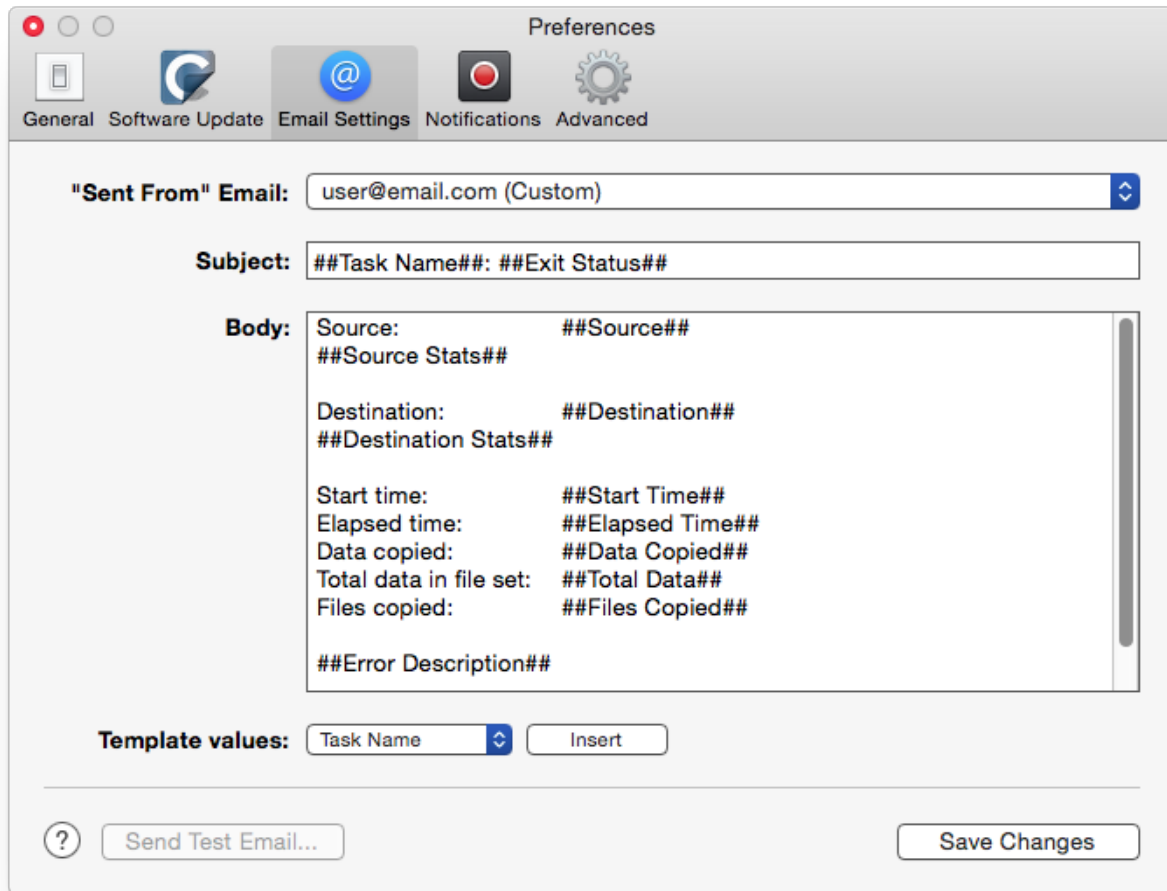
- [Monitoring CCC backup tasks <http://bombich.com//kb/ccc4/monitoring-ccc-backup-tasks>](http://bombich.com//kb/ccc4/monitoring-ccc-backup-tasks)

New global energy-related preferences

CCC now defaults to not starting automated tasks when your laptop is running on battery power. If you're on the go and disconnected from AC power, you might be disconnected from your backup disk too, so you can also configure CCC to skip any tasks that were missed when the system was running on battery power. Click the Preferences button in the toolbar to access these settings.

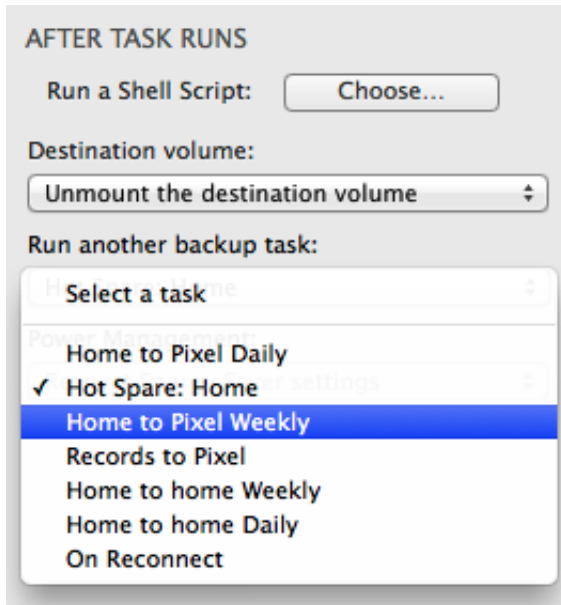


Centralized email settings and a customizable email template



Email settings are also now centralized. Rather than configuring your SMTP account settings for each scheduled task, you can now specify them in CCC's preferences. You can also customize the subject line and the body of the email that gets sent, using template values that CCC will substitute in at run time.

Tasks can be chained together

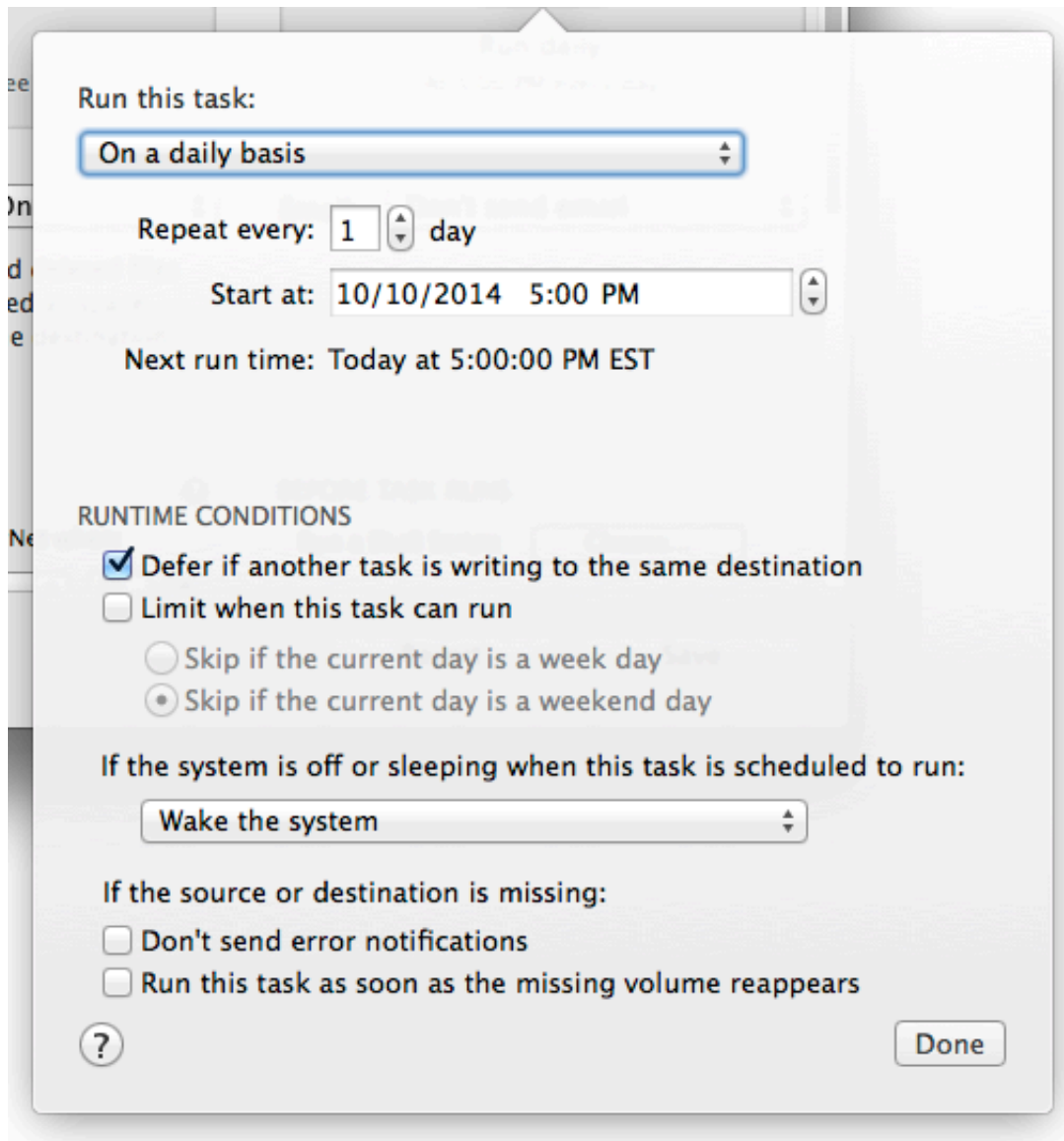


Many people have multiple volumes to back up, and prefer to not have all of them getting backed up at the same time. CCC 3 offered no convenient way to start another backup task when one of the tasks finished. In CCC 4, click the **Use Advanced Settings** button, then simply select another backup task to run after your task runs.

Related Documentation

- [Performing actions Before and After the backup task](http://bombich.com/kb/ccc4/performing-actions-before-and-after-backup-task)
<<http://bombich.com/kb/ccc4/performing-actions-before-and-after-backup-task>>

New runtime conditions offer more control over when and how scheduled tasks run



In addition to the time-based scheduling functionality that CCC offered in the past, tasks can now be configured to *not* run at particular times:

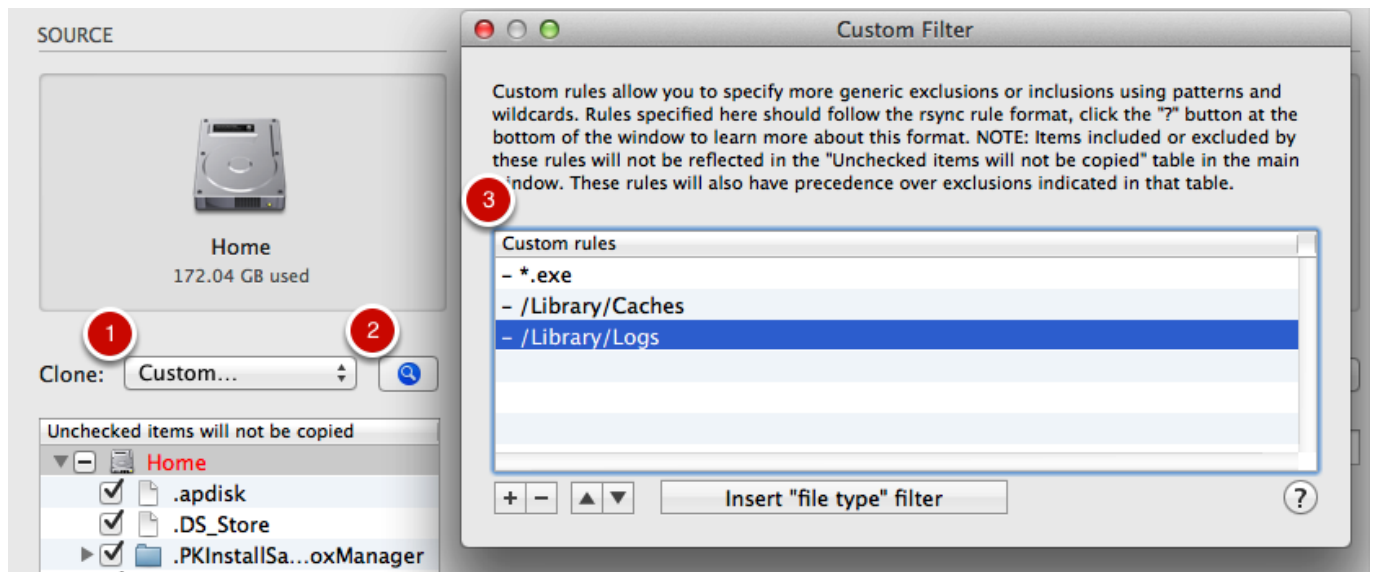
- Tasks can be limited to running only on week days or only on weekend days
- Tasks can be configured to wait for another task to finish if that other task is writing to the same destination
- By default tasks will not start if a laptop is running on battery power, and the task will start as soon as AC power is restored
- Tasks can be configured to wake the system at the scheduled run time, turn on the system if it is off, run when the system next wakes, or to skip a run time if the system is not on and awake.

Additionally, tasks that are configured to run when the source or destination is reattached can be configured to not run if the task has run successfully within the past X days. So, for example, if you detach and reattach your backup disk several times a day, you can configure CCC to run your backup task only once in that day, rather than pestering you every time the disk is reattached.

Related Documentation

- [Configuring Scheduled Task Runtime Conditions <http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions>](http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions)

Improvements to custom filters



The interface for specifying custom filters is greatly simplified. Filters are now explicitly retained per-task, and can easily be modified at a later time. You can also reorder your custom filters, making the management of long filter lists orders of magnitude easier.

To access the advanced filter options, click the "Use Advanced Settings " button at the bottom of the CCC window, then:

1. Choose "Custom..." from the Clone menu
2. Click the Inspector button next to the Clone popup menu
3. Add custom rules

Command-line utility for highly customized manipulation of CCC tasks

CCC now includes a command-line application that allows you to start, stop, and watch the progress of your CCC backup tasks:

```
[user:~] cd /Applications/Carbon\ Copy\ Cloner.app/
[user:/Applications/Carbon Copy Cloner.app] ./Contents/MacOS/ccc
Usage: ccc [options]
ccc --start "My Backup Task" (--watch)
--watch: Keep running and print task output until the task is finished.
ccc --stop "My Backup Task"
ccc --print-schedules
List each task and when it will next run.
ccc --watch ("Task name")
Watch task progress (press Control+C to exit)
Specify a task name to limit task output to the indicated task
[user:/Applications/Carbon Copy Cloner.app] ./Contents/MacOS/ccc --start "Hot Spare: Startup"
--watch
Hot Spare: Startup [Data copied: 0.00 KB, Progress: -1.000000%] Mounting "CCC Backup"...
Hot Spare: Startup [Data copied: 0.00 KB, Progress: -1.000000%] Testing read responsiveness of the
destination...
```

Hot Spare: Startup [Data copied: 0.00 KB, Progress: -1.000000%] Testing write responsiveness of the destination...

Hot Spare: Startup [Data copied: 0.00 KB, Progress: 0.025653%] Comparing files on the source and destination...

Hot Spare: Startup [Data copied: 0.00 KB, Progress: 1.334706%] Comparing files on the source and destination...

Hot Spare: Startup [Data copied: 0.00 KB, Progress: 2.830364%] Comparing files on the source and destination...

Hot Spare: Startup [Data copied: 0.00 KB, Progress: 3.044857%] Comparing files on the source and destination...

Related Documentation

- [Using the ccc Command Line Tool to Start, Stop, and Monitor CCC Backup Tasks <http://bombich.com//kb/ccc4/using-ccc-command-line-tool-start-stop-and-monitor-ccc-backup-tasks>](http://bombich.com//kb/ccc4/using-ccc-command-line-tool-start-stop-and-monitor-ccc-backup-tasks)

Authentication is only required once for administrative users

Authentication is no longer required every time you want to run a task or make changes to its configuration. CCC will require authentication once for an administrative user (e.g. when you save your first task) and then that user will have one-click access to starting, stopping, and configuring tasks. Non-administrative users will be required to authenticate with administrator credentials to start, stop, or modify CCC backup tasks.

Note: This new behavior can be reverted to the CCC 3.5 behavior (e.g. authentication is required every 5 minutes). See the [Modifying CCC's Security Configuration <http://bombich.com//kb/ccc4/modifying-cccs-security-configuration>](http://bombich.com//kb/ccc4/modifying-cccs-security-configuration) section of the documentation for instructions to revert to the old behavior.

How do I exclude files from the backup task?

Previously when you selected a source volume, the **Items to be copied** table would be populated with a list of items on that volume. Most people want to back up everything on their source volume, so we simplified the interface by hiding the list of items to be copied by default. Simply choose **Selected items...** from the **Clone** popup menu to reveal the list of items to be copied.

Where is the "Block Copy" option?

The Block Copy feature is no longer supported in CCC 4. CCC 3 leveraged OS X's built-in Apple Software Restore utility to perform block copies. We had great luck with this utility over the years, but recently it has offered less and less detail about error conditions, so much so that it has become impossible to support when problems occur. CCC's file-level copying utility is generally faster and more reliable than a block copy, especially when media errors are present, so we recommend file-level copies exclusively.

How do I verify the backup? Where did the "checksum" option go?

The **Calculate a checksum for every compared file** advanced option is still available, though it goes by a different name now. To add checksum verification to your backups, click on the **Use Advanced Settings** button, then check the box to **Find and replace corrupted files**.

Can I migrate my CCC 3.x tasks to CCC 4?

Yes! When you open CCC 4 for the first time, it will look for any tasks created by CCC 3.5 and will offer to migrate them. If you skipped past this step, you can choose **Task Migration** from CCC's File menu to get back to that panel.

Why don't I get a "Task Finished" notification?

We received a lot of feedback in the past that CCC's notifications were too intrusive. While we feel strongly that backups are very important, we recognize that backup tasks are secondary to what you're actually using your computer for, so these notifications shouldn't interrupt your work. In CCC 4, we moved all notifications to the Notification Center, where their presentation will follow the preferences you've defined in the Notification Center preference pane. By default, application notifications are presented as "Banners". Banner notifications are presented, then automatically dismissed after a few seconds (this is why you may have missed the task finished notification — it's still there though!). If you would like your CCC notifications to remain on screen until you dismiss them, [configure the "CCC User Agent" notifications <http://bombich.com//kb/ccc4/monitoring-backup-tasks-ccc-menubar-application#notification_preferences>](http://bombich.com//kb/ccc4/monitoring-backup-tasks-ccc-menubar-application#notification_preferences) to be presented as "Alerts" instead.

Related Documentation

- [Upgrading from Carbon Copy Cloner 3.5 to Carbon Copy Cloner 4 <http://bombich.com//kb/ccc4/upgrading-from-carbon-copy-cloner-3.5-carbon-copy-cloner-4>](http://bombich.com//kb/ccc4/upgrading-from-carbon-copy-cloner-3.5-carbon-copy-cloner-4)

Upgrading from Carbon Copy Cloner 3.5 to Carbon Copy Cloner 4

Installing Carbon Copy Cloner 4

If you have not yet installed Carbon Copy Cloner 4 and 3.5 is not prompting you to upgrade, you can manually download and install Carbon Copy Cloner 4. For illustrated directions, please see [How do I download and install Carbon Copy Cloner?](http://bombich.com/kb/cccl4/how-do-i-download-and-install-carbon-copy-cloner) <<http://bombich.com/kb/cccl4/how-do-i-download-and-install-carbon-copy-cloner>>

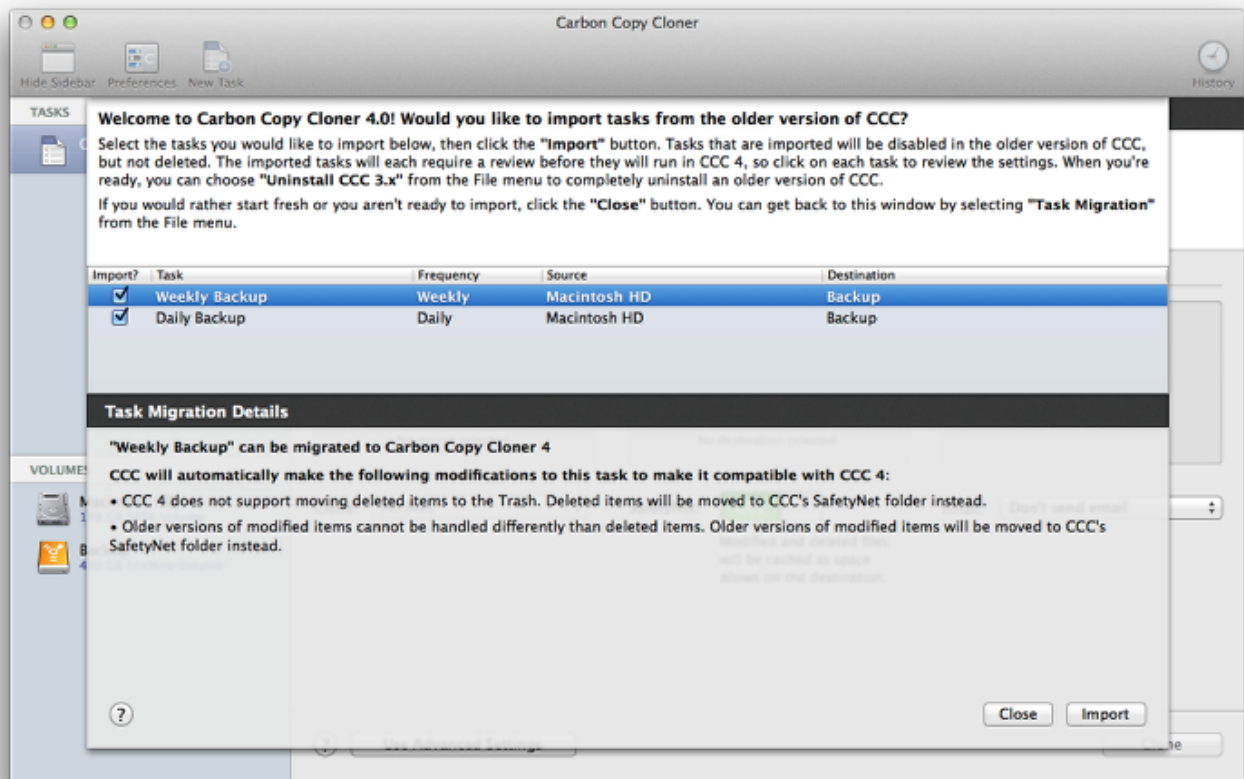
Task Migration Assistant

If you created scheduled tasks with Carbon Copy Cloner 3.5 or later, you will be greeted by the Task Migration Assistant when you open Carbon Copy Cloner 4 for the first time. You can also choose **Task Migration** from CCC's **File** menu to see the Task Migration Assistant.

Click on each task to see notes about changes that CCC will make to the task to ensure its compatibility with CCC 4. Check the box in the **Import** column next to each task that you would like to migrate to CCC 4, then click the **Import** button.

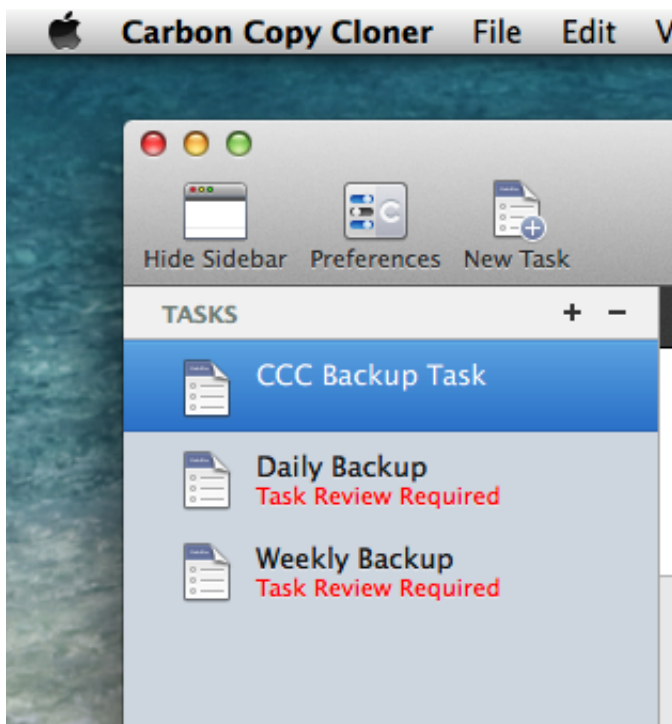
Note: Tasks that are migrated to CCC 4 will be disabled in CCC 3.5.

If you would like to immediately and permanently delete one or more of your older tasks without importing them, simply select those tasks (Command+click to select multiple tasks), then press the **Delete** key.



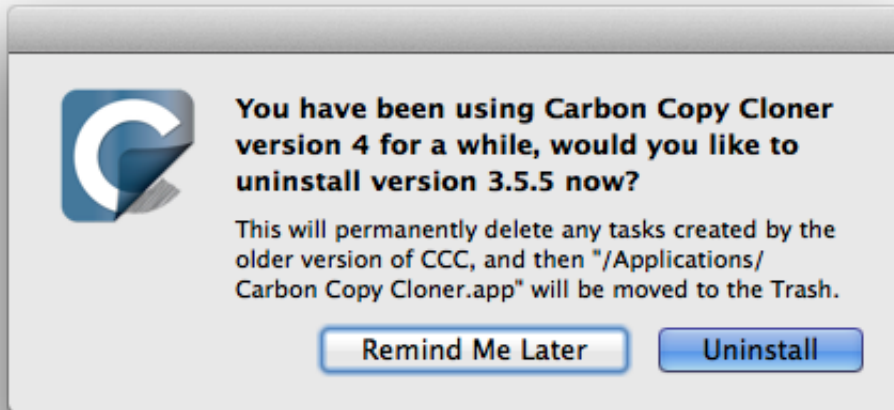
Imported tasks require review

After you have migrated tasks, CCC will indicate that these tasks require review. Click on each task in the sidebar and review the settings. When you are satisfied that the task is configured as desired, click the **Save** button, or choose **Save** from CCC's **File** menu.



Uninstalling the older version of Carbon Copy Cloner

When you import tasks via the Task Migration Assistant, CCC will automatically schedule a 30-day reminder to uninstall the older version of CCC. You can wait for this reminder to appear, or you can choose **Uninstall CCC 3.x...** from CCC's **File** menu to uninstall the older version of CCC immediately.



Carbon Copy Cloner 4 Release Notes

Carbon Copy Cloner 4.1.12

December 8, 2016

- Fixed a minor issue in which the "Elapsed time" value reported in user notifications was incorrect.

Carbon Copy Cloner 4.1.11

December 6, 2016

- Implemented a workaround for a macOS bug in which IOKit retains copies of virtual device objects for some hard drive enclosures when the devices are physically detached from the system. The presence of that remnant leads IOKit to create a new, duplicate device when the hard drive enclosure is reattached to the system. The presence of the duplicate device is usually harmless, but it would lead to errors from CCC backup tasks about duplicate devices having the same unique identifier. This problem appears to be specific to some Western Digital enclosures and occurs primarily on macOS Sierra, though we have seen one report on OS X 10.11.6.
- Fixed a cosmetic issue in which the "time elapsed" value noted in CCC's Task Plan was errantly longer than the actual elapsed time.
- Fixed an issue in which CCC would fail to validate a NAS volume at the beginning of a backup task if the NAS credentials username contains an "@" character.
- macOS Sierra's Finder obstinately refuses to remove system items protected with System Integrity Protection flags even when those items reside on an external volume (and are thus not actually protected). This version of CCC adds a "Delete a SafetyNet Folder" option to CCC's Help menu to help people that want to manually remove items from CCC's SafetyNet folder. Please note that CCC's automated pruning of the SafetyNet folder is unaffected by this Finder-specific matter. CCC will continue to automatically manage the SafetyNet without any additional effort on your part. This new feature is entirely for people that want to **manually** remove system file-containing folders from the SafetyNet.
- Fixed an issue in which CCC would ask for authentication credentials for a NAS volume (e.g. when selecting it as a source or destination) despite that CCC already had the credentials for another sharepoint on the same NAS device.
- Addressed an edge-case scenario in which CCC would report that it was unable to locate the source or destination root folder on a NAS volume when that NAS volume had been mounted by the logged-in user (vs. mounted by CCC at the beginning of the task).
- Fixed an issue in which CCC would report that it lacked a password for the email notifications account if the username for that account contained a "/" character.

Carbon Copy Cloner 4.1.10

September 16, 2016

- CCC 4.1.10 is officially qualified on macOS Sierra. **This update includes non-Sierra-specific changes and is recommended for all CCC 4 users.**
- Developed a workaround for a bug in macOS Sierra in which FileVault could not be enabled on the destination volume.
- To accommodate changes in macOS Sierra, CCC now creates RSA key pairs for use with the Remote Macintosh option. If you create a new Authentication Credentials Installer Package

(ACIP) with this version of CCC, CCC will replace an existing DSA-based key pair on the local Mac. As a result, you must (re)install the ACIP on all remote Macs that you currently have configured in your backup tasks.

- Tasks listed in the postflight task popup menu are now sorted alphabetically.
- Fixed an issue in which creating an empty custom filter would cause the Filters window to misbehave.
- Apple relaxed some restrictions on sparsebundle disk images in macOS Sierra. On these systems, CCC now allows creating and mounting sparsebundle disk images on SMB sharepoints.
- Fixed a logic issue that would cause the "Reset" button to not be displayed when a mounted-disk-image-on-NAS task failed because CCC lacked credentials to mount the underlying NAS volume.
- This update to CCC will migrate CCC's keychain file from the user home folder to a global location. Among other issues, this resolves issues where folks couldn't update the password for a NAS volume associated with a particular task if that task was created while logged in to some other user account. That was an esoteric issue that doesn't seem like it should happen a lot, but the number of reports gave us the impetus to address the matter once and for all.

Carbon Copy Cloner 4.1.9

June 14, 2016

- If a backup task was configured to back up the startup disk, but the user had excluded system files from the backup task, CCC would avoid recreating startup caches on the destination. CCC logged this uninteresting non-event, but the logging of that event was causing a crash. That crash occurred at the very end of a usually-successful backup task, but resulted in a task history event not being recorded. We fixed that crasher.
- CCC 4.1.8 raises a configuration concern if the destination is a USB device larger than 2TB. This update addresses an issue in which CCC would raise that concern for USB devices larger than **2GB**.
- CCC will now unmount (with force, if necessary) the Recovery HD associated with the source volume before attempting to create an archive of that volume. This addresses an issue in which various third-party utilities (especially Antivirus software) would dissent an ordinary unmount request, causing the attempt to archive the Recovery HD to fail.

Carbon Copy Cloner 4.1.8

June 6, 2016

- CCC will now proactively seek out case conflicts on the destination when the source is a case-sensitive volume and the destination is not. When case conflicts occur in filenames, CCC will append a randomized suffix to the conflicting files on the destination (but all files will be copied). When a case conflict occurs in a folder name, the conflicting folder will not be copied. In every case, CCC will report case conflicts at the end of the backup task and offer advice for resolving the issue.
- Some network volumes incorrectly report themselves as case-insensitive despite being backed by a case-sensitive volume. CCC now tests for case-sensitivity on network volumes rather than trusting the value that is reported in their volume attributes. With this change, CCC can now report potential case-conflict scenarios more consistently to the user when configuring a backup task.
- Made some improvements to SMTP account importing from the Internet Accounts database (El Capitan only). Also added an "Edit" button next to the SMTP account popup menu to make it more obvious how to edit those settings.
- Made some improvements to the presentation of Gmail authentication failures. CCC will now



walk the user through the process of creating Gmail app passwords when two-step verification is enabled on the user's Gmail account.

- Added new task history status icons that should be easier to distinguish for users with color vision deficiency.
- Added an "Always show progress window" option to the CCC menubar application menu. That option will always be available now, and closing the mini task progress window will not change that setting.
- Fixed an issue in which the mini task progress window would never be visible if the user had checked the "Hide" button next to CCC User Agent in the Login Items tab of the Users and Groups Preference Pane.
- CCC's privileged helper tool will now dissent a request to unmount a volume if it is currently removing a SafetyNet folder from that volume.
- The free space threshold for deciding whether to compact a sparse disk image is now 25GB or 15% of the capacity of the destination, whichever is larger.
- CCC will wait longer for a preflight disk image compaction task to complete to accommodate slower destination volumes.
- You should never move an application (e.g. from your Downloads folder to the Applications folder) while that application is open. Previously, doing so with CCC could cause it to crash. CCC will now detect if the CCC application file has been moved while CCC is open. If the selected task has unsaved changes, CCC will automatically move the application back to its original location. If that fails, or if there are no unsaved changes, CCC will present a dialog, then quit and reopen itself from the new location.
- Made some improvements to the auto-dismissal of the task finished overlay that's presented within the Task Plan when the selected task has completed. In some cases, that information would be presented, then revoked before the user had a chance to read it. Now it will remain until dismissed.
- The CCC command-line application now has an option to print the task history in CSV format.
- The CCC command-line application can now be invoked to send CCC-badged notifications from a shell script.
- Fixed an issue in which CCC would errantly unmount a FUSE volume at the end of the task if it was mounted with the `allow_root` flag and mounted by the root user (e.g. with "sudo").
- Addressed an issue in which the reminder associated with tasks configured to run on reconnect could be presented earlier than expected.
- The options to not report an error when the source/destination is missing and to run the task as soon as the missing volume reappears were not previously available to tasks configured to run "Manually when I click the Clone button". That was appropriate, except in one case — when that task was invoked via task chaining. Now those options are made available to manual tasks, but only when those tasks are called via task chaining.
- Added a "Task Configuration" token to the Email Template.
- Improved error handling if errors occur during the attempt to mount a disk image when choosing "Restore from disk image" from CCC's Source selector.
- An exit status of 104 will now cause the global preflight script to cancel the backup task and avoid recording a task history event.
- `/.quota.group` and `/.quota.user` are now excluded from the backup task because changing those items on the destination causes the kernel to dissent unmount requests.
- Fixed an issue in which the user could modify a task in CCC, then run the task via the CCC menubar application (which is a separate application from CCC). The task would run with the old settings, though the editor would present UI that suggests that the task is running with the new settings. Now if the user tries to run a task in the edit state via the menubar application, the menubar application will refuse to start the task, present a dialog indicating that the task is being edited, and will then open CCC.
- Fixed a window resizing anomaly that could cause the source selector to be inaccessible.

Carbon Copy Cloner 4.1.7

February 2, 2016

- Fixed a user interface issue affecting Yosemite users, and only the German, Spanish, and Italian localizations in which the progress bar in the mini progress window would occasionally disappear.
- System items placed in CCC's SafetyNet folder will no longer be impossible to remove when booted from the backup volume (only affects El Capitan users).
- Addressed an issue in which CCC could crash on launch immediately after applying a CCC update.
- Fixed a bug that could cause the backup task to fail with a message asking the user to report the problem.
- Fixed an issue in which the file flags on some system files were not getting preserved when using the "Find and replace corrupted files" option.
- Addressed a scenario in which CCC's email notification would not report the destination volume's stats despite the destination being available during the backup task.
- Fixed an issue in which sparse disk image compaction would fail if the disk image was encrypted.
- Addressed an issue in which CCC would errantly report that it was unable to unmount the destination volume.
- Implemented a better workaround for the DiskArbitration service being unready to mount a just-unlocked CoreStorage volume. Rather than applying a delay before trying to mount the volume, CCC will now attempt to mount the volume immediately (which works in most cases). If that mount attempt fails, CCC will impose a 15 second delay, then attempt to mount the CoreStorage volume again.

Carbon Copy Cloner 4.1.6

December 3, 2015

- Fixed a crashing bug introduced in 4.1.5 that would occur when trying to select a folder or disk image on a network volume as the destination to a task.

Carbon Copy Cloner 4.1.5

December 2, 2015

- If a backup task is configured to unmount the destination volume at the end of the backup task, and Spotlight dissents the unmount request, CCC will unmount the destination with more deliberation to overcome the Spotlight dissent. This change should go a long way towards addressing problems with being unable to eject the destination volume after a backup task runs, an issue that has become especially problematic on El Capitan due to Spotlight interference.
- Resolved a hang caused by new behavior introduced in the [10.11.1 security update <https://support.apple.com/en-us/HT205375>](https://support.apple.com/en-us/HT205375). Starting with 10.11.1, attempting to click on the "Allow" or "Always Allow" buttons when prompted to give access to a keychain item will fail if you are accessing the system via screen sharing. CCC now detects whether the event was initiated via a "virtual click", and in those cases will avoid asking for access to an item in your login keychain.
- When prompting for a NAS volume password, CCC now accepts a blank password (after a confirmation prompt).
- El Capitan Finder adds some extended attributes to files while they are being copied by the Finder. In some odd cases, the Finder fails to remove those extended attributes after the copy has completed, and these extended attributes occasionally cause errors when CCC tries to preserve them. CCC no longer tries to preserve these errant extended attributes.



- Fixed a bug that could cause the backup task to fail with a message asking the user to report the problem.
- On some El Capitan systems, the disk arbitration service is not ready to mount an encrypted volume immediately after it is unlocked. This build extends the delay that CCC imposes to work around this same bug that was discovered on Yosemite, and has only gotten worse (rdar://18910971 for anyone that has access and influence). Auto-mounting an encrypted destination should work more reliably now.
- Added a workaround for **enfs** filesystem volumes that don't populate the disk arbitration attribute for a volume name, causing them to be named **Untitled** in CCC's interface.
- The search criteria popup menus in the Task History window are now sorted.
- CCC's User Agent will now revoke **Task Started** notifications when the corresponding **Task Finished** notification for that task is sent. This avoids having two notifications per task. Especially for users that prefer to have CCC notifications presented as Alerts, this will reduce some redundancy and free up some screen real estate.
- CCC's user agent is now more proactive about pointing out automated tasks that have been suspended because the system is booted from a different startup disk.
- Addressed an uncommon race condition in which having CCC load on login could lead to two copies of the CCC menubar application being present.
- Applied an exception handler to work around an [El Capitan bug](http://www.openradar.me/radar?id=4997205924511744) <<http://www.openradar.me/radar?id=4997205924511744>> that could occasionally lead to crashes on launch.
- Paragon NTFS drivers occasionally add a NULL character to the end of their volume names. This makes it through to the interface as a control character (^@) on Mavericks and is otherwise harmless. On Yosemite, a text view will cause the application to hang if the "NSTextShowsControlCharacters" global default is set. This was an uncommon scenario, so we didn't see this problem frequently. On El Capitan, a text view (i.e. the Task Plan text view) causes a hang whether that global setting is applied or not. The result is that CCC will hang when a task is selected that references a Paragon NTFS volume. This update tediously detects and removes these rogue NULL characters before attempting to display a volume name in the Task Plan.
- CCC will no longer report SoftRAID volumes as "not bootable" due to a partitioning problem.
- Improved handling of Keychain write errors when a task is being edited by a user other than the user that created it.
- Task completion notifications offer a bit more granularity on what constitutes "finishing" the task. If a task had more than just transfer errors, we now just say that it failed. This is more appropriate in cases where, for example, the task couldn't proceed at all because the destination was unavailable.
- Ancillary errors (failures that don't affect data backup, e.g. a failure to send an email notification) are now raised to the user's attention, but in a more subtle manner than for transfer-related errors.
- CCC will now attempt to compact a destination sparse disk image if the underlying destination volume has less than 25GB of free space at the beginning of the backup task. This threshold cannot be modified in the user interface (yet), please open a support request if this threshold is too conservative.
- El Capitan paragraph spacing is almost twice that of Yosemite. Made a small change to how the Task Plan text is formatted on El Capitan to improve the space usage of that text view.
- When looking for Recovery HD sources, CCC will now correctly locate Recovery HD archive files that reside on CoreStorage volumes.
- CCC's scheduled task manager now subscribes to "system clock changed" notifications. If the system clock is automatically adjusted, CCC will now reschedule its task timers to accommodate the change. Normally auto adjustments are made on the scale of a few seconds and those changes are unimportant. We have discovered a few cases, however, where larger changes can occur (unrelated to time zone changes, which are handled differently) that can lead to tasks running much earlier or later than expected.

Carbon Copy Cloner 4.1.4

September 1, 2015

- This update is qualified on OS X El Capitan.
- Fixed an issue that would lead CCC to report that its private keychain is not writable when the keychain had not yet been created.
- CCC will no longer allow running another task as a postflight task if the secondary task is disabled.
- SMTP usernames that contain special characters (e.g. "%") are now accommodated.
- The user agent is no longer re-launched after changing the **Show CCC icon in menubar** preference. Especially on OS X 10.11, application launch time can be slow and this delay could lead to scenarios in which the preference became out of sync (e.g. if the user were to change that setting very rapidly).
- Addressed a regression in which CCC occasionally could not skip past unreadable files.
- Updated the procedure used to clone the Recovery HD volume to avoid an error at the end of the task that was specific to El Capitan.
- Fixed a UI anomaly in which the task name field was difficult to edit when another task was running.
- Fixed an issue in which some UI elements in the Scheduler popover appeared to be disabled (but were not) on Yosemite and El Capitan.
- Fixed an issue in which the "Submit Logs" button in CCC's Help window was inaccessible in non-English localizations.
- Fixed a time zone adjustment issue for cases where a task was created in one time zone but then initially scheduled in another time zone.
- When CCC encounters multiple volumes with the same unique identifier, it now presents the names of those volumes when reporting the problem. This should make it easier to resolve this esoteric issue.
- When disabling the SafetyNet, CCC now asks the user if he would like to delete the SafetyNet folder on the destination. This will help avoid some cases of the task failing due to the destination being full.
- Fixed an issue specific to El Capitan in which debug output spewed by Apple's hdiutil utility would be interpreted as errors and cause a disk image creation or mount task to fail.
- Added custom VoiceOver descriptions for the task status images in the Task History window.
- Added a global exclude for the special hidden **.Transporter Library** folder. This proprietary device from Connected Data was causing backup tasks to stall due to a bug in the OSXFUSE code that supports that device.
- Fixed an issue in which the reminder timer associated with an "On Reconnect" task wasn't getting removed when the task was switched to ad hoc.
- Added a workaround for fuse4x filesystems that don't advertise support for files larger than 4GB.

Carbon Copy Cloner 4.1.3

May 19, 2015

- Addressed an issue in which CCC would fail to send an email notification at the end of a backup task, and subsequently fail to record the task event in Task History.
- Time Zone changes that do not have a net effect on the wall time will no longer cause a task to be rescheduled. Additionally, tasks scheduled to run on an hourly basis will no longer be rescheduled to the original hour start time (vs. the next hourly run time adjusted for the time zone change) when a time zone change occurs.

Carbon Copy Cloner 4.1.2

May 6, 2015

- Addressed an issue in which the Preferences window would not open for people using non-English locales.

Carbon Copy Cloner 4.1.1

May 5, 2015

- If you have a pair of folders selected as the source and destination, CCC no longer refuses to allow the user to choose the destination folder as the source (or vice versa). The user is probably swapping the two folders, so instead of preventing this, CCC clears out the opposing settings that would be in conflict.
- Fixed a minor issue with the Uninstall functionality.
- The mini task progress window is now closed when no tasks are running, rather than being made transparent. The previous behavior was intended to avoid a bug in Yosemite in which the user agent application would hang if the window was closed while the display was dimmed. The behavior had the annoying result of creating an unclickable rectangle on the Desktop. We found another way to work around the Yosemite bug that allows us to close the window properly.
- Fixed an issue in which CCC's helper tool was not saving the global preferences to disk after getting a new application path from CCC. This would result in tasks being unable to run after restarting, because the helper tool would have an invalid path for the CCC application bundle.
- Addressed a few minor clipping or translation issues in some of the non-English localization resources.
- The "Don't validate certificate chain" option in the Email Settings section of CCC's Preferences window will now be properly retained.
- Fixed a cosmetic issue in which the path control interface element wasn't getting updated when choosing a new disk image as the destination. The result would be "Macintosh HD > Applications" being indicated as the destination, which could be confusing.

Carbon Copy Cloner 4.1

April 28, 2015

- Added a new task progress window to the CCC User Agent application. You can now choose to display this miniature task progress window by choosing "Show task progress for CCC Backup Task" from the menubar application's menu. This window can automatically appear when tasks start and disappear when tasks complete. The window will show task progress for every task, allowing you to get detailed task progress information without having the main CCC application window open.
- The task configuration portion of the CCC window can now be resized horizontally to make file selection easier when cloning selected files.
- Added a "Simple Mode" in which CCC's interface is limited to the source and destination selectors and the Clone button. For people that want to use CCC only on an ad hoc basis (i.e. not for scheduling tasks), and want only the basic functionality of cloning one local disk to another local disk, Simple Mode delivers that experience. Simple Mode is accessed via the Carbon Copy Cloner menu.
- Addressed several accessibility concerns. All CCC user interface elements should now be accessible via keyboard navigation and with VoiceOver.
- The task list now has a contextual menu, with options to run, disable, duplicate or delete the clicked-upon task.
- Tasks can be disabled globally from the CCC menubar icon. Tasks can be disabled until the

user specifically re-enables them, or automatically re-enabled after a particular period of time.

- User Agent and helper tool behavior improvements. If there are no automated or scheduled tasks configured to run, and if both CCC and its user agent have exited, CCC's helper tool will exit automatically. Likewise, the user agent will remain open only if there are automated tasks configured, or if the user has CCC configured to display its icon in the menu bar. The CCC User Agent login item is now exposed in the Login Items section of the Users & Groups preference pane, and this can be removed by the user (as well as in CCC's Preferences window). The services that are affected by disabling CCC's user agent are clearly explained in CCC's preferences window.
- If the user declines saving a password for an encrypted volume in CCC's keychain, CCC will no longer ask the user for the password to that same volume in the future. The user will still have the opportunity to save that volume's password in CCC's keychain if, for example, the task fails to run because the encrypted volume was not unlocked, and CCC was unable to unlock it.
- When a custom filter item is modified, CCC will now properly indicate that the task needs to be saved.
- When dozens of volumes are present, CCC will now present these volumes in a scrollable list in the source and destination selectors.
- In addition to each of the days in a week, "Day of the Month" is now an option when configuring monthly tasks. This allows the user to schedule a task to run "On the first day of the month" or "On the last day of the month".
- SMTP accounts that are configured in Mail are now available in CCC's Email Settings preferences to simplify the setup of email settings.
- CCC's Documentation window now offers an option to find text in the current page.
- Fixed an edge-case issue in which sending an email could lead to a crash if the SMTP server stopped responding. Affected tasks would have completed successfully, but the email notification would not be delivered, and this also prevented a task history event from being recorded.

Carbon Copy Cloner 4.0.6

February 5, 2015

- The Import button is now correctly disabled if the Task Migration panel is presented with no tasks enabled for import.
- Addressed a race condition that could occasionally lead to a Recovery HD volume remaining mounted, which could lead to a dialog upon ejecting an external disk indicating that the disk contains multiple volumes. This was harmless, but could be confusing.
- Fixed a bug in which the notice that a task is suspended would be presented detached from the main window. When overlooked (which is easy to do because the panel is obscured by the main window), CCC would be unable to activate or delete suspended tasks.
- Fixed an issue in which excluding a file or folder that had a newline character in its name would cause a backup task to fail.

Carbon Copy Cloner 4.0.5

January 22, 2015

- This update addresses a minor bug introduced in 4.0.4 that would cause the "New disk image" option in the Destination selector to fail to produce the New disk image panel on Mountain Lion systems.

Carbon Copy Cloner 4.0.4

January 21, 2015

- CCC now makes a special accommodation for specifying a DiskWarrior Preview volume as the source to a backup task.
- CCC now handles cases where the user or an external utility (e.g. "CleanMyMac") deletes the folder where CCC stores task configuration files while CCC is running. Previously this caused CCC to report that it was unable to save tasks (which would be resolved after restarting), now CCC will recreate the folder immediately, then save the task.
- Fixed an issue that occurred when multiple tasks started simultaneously and attempted to retrieve an item from CCC's private keychain. Previously, only one of the tasks would succeed, the others would report that they were unable to retrieve the keychain item, or that they were unable to mount the destination volume (for example).
- Fixed a UI anomaly that would occur in the sidebar when resizing the window.
- Fixed an issue in which the main window's user interface elements would not load properly on some Mountain Lion systems.
- Fixed an issue in which custom filters associated with a task that had a remote Macintosh specified as the source would be lost after the initial import (e.g. from a CCC 3.5 task). Also fixed an issue in which this same task would constantly be marked "dirty" when the task was selected, despite making no changes to it.
- Made a minor adjustment to how a Recovery HD volume is created that should avoid a bug in Disk Utility when attempting to make future partition changes to that disk.
- CCC will now unlock the root destination folder if it is locked (rather than report an error that the destination cannot be written to).
- Addressed a compatibility issue with some OS X FUSE volumes (e.g. BoxCryptor).
- Fixed an issue in which CCC would report that a source Xsan volume was not available after that volume had been unmounted and remounted.
- Implemented a workaround to an OS X Yosemite bug in which the height of a Save or Open panel (e.g. the panel presented when you choose "Choose a Folder" or "Choose a disk image" or "New disk image") grows by 22 pixels every time it is opened. This growth, when unchecked, would eventually cause the panel to grow past the bottom of the screen, making some buttons inaccessible.
- Addressed an edge case in which the Recovery HD OS version was not collected for some Recovery HD volumes when opening CCC.
- If a task is missed because the source or destination is missing, and the task is configured to run when the missing volume reappears, the state information that indicates that a run time was missed due to a missing volume is now stored persistently. Previously this information was lost when CCC's helper tool was reloaded, e.g. after restarting, or after updating CCC, which would result in a task getting skipped.
- If a laptop's AC power is restored while the system is sleeping, this power state change is now detected more reliably on wake. Previously, CCC relied on the power state change notification to run tasks that were waiting for AC power to be restored. If that state change occurred during sleep, CCC would have missed the notification and errantly reported that a task was "waiting for AC power to be restored", even though AC power was available.

Carbon Copy Cloner 4.0.3

November 24, 2014

- In some cases, OS X Yosemite's Service Management daemon crashes while attempting to install CCC's helper tool. In other cases, the Service Management daemon fails to cope with a corrupted system folder, and this also leads to a failure installing CCC's helper tool. This update works around both of these OS X bugs.
- OS X Yosemite's Finder has a bug in which mounted disk image volumes will appear to remain mounted after CCC has successfully unmounted them. Finder will remove these



"ghost" icons if you double-click them, but this update works around this Finder bug by mounting disk images with a flag that prevents the disk image from being browsable in the Finder.

- There is a bug in OS X Yosemite's diskutil command-line utility in which it will unlock and attach a FileVault-protected volume, but not mount that volume. This contradicts past behavior as well as the documentation for this utility. This update offers a workaround to this OS X Yosemite bug.
- When OS X Yosemite is first started up, the console owner is sometimes an undefined user (and not the root user). This dubious ownership affected CCC's postflight power management options (restart and shutdown). This update now recognizes this dubious ownership and applies the power management action more effectively.
- Added a new option to the scheduling selector that allows finer-grained control over the handling of a task when the source or destination is missing. You can now suppress errors and still have the task run when the missing volume reappears.
- Added a troubleshooting option, "Don't preserve extended attributes". This new option can be leveraged when dealing with Synology DiskStation performance issues that occur when trying to retrieve extended attributes from files on the DiskStation.
- The notification that is sent to NotificationCenter when the source or destination volume is missing has been improved. If the user has not deselected the option to "Run as soon as the missing volume reappears," the notification will ask the user to attach the missing volume to proceed. This is only applicable to cases where the source or destination is a local volume. If the affected item is a folder or is a network volume, we assume that other errors occurred beyond "volume is not attached" so the notification will still indicate that an error occurred.
- Fixed an issue in which the path to the CCC private keychain was incorrectly imported in cases where a CCC 3.5 task had been created by a user account other than the currently-logged-in user.
- The "Use strict volume identification" control is no longer disabled for ad hoc tasks.
- The Task Plan now properly reflects the task "next run time" when a time zone shift has occurred.
- Warnings that the Recovery HD is out of date are no longer improperly presented to non-admin users.
- Fixed a condition in which the user agent would present a prompt to run a task before it had obtained the details of the task (such as task name) from CCC's helper tool.
- CCC now obtains a sleep assertion that will keep the system awake during Dark Wake. In particular, this will avoid tasks running while the system is in and out of sleep (which is harmless, though makes it look like the task is taking longer than it actually is), and will also avoid the error "The backup task was aborted because the destination volume is on transient storage, and the system went to sleep."
- Backup tasks configured to run on a monthly basis can now be configured to start on a date in the future.
- Fixed an issue in which a scheduled task would fail to run because the system woke (or was powered on) a bit earlier than expected.
- BitCasa volumes mounted via OSXFUSE do not advertise support for files larger than 4GB, so CCC was refusing to attempt to copy files larger than 4GB to these volumes. Apparently these volumes do actually support large files, so this update implements a workaround for this non-standard volume behavior.
- Fixed an issue in which CCC could hang on launch if 64 or more volumes were mounted.
- Fixed a bug in which CCC was errantly loading corrupted copies of task configuration files (e.g. that resulted from previous failed attempts to save the tasks).
- Fixed a bug in which CCC was referencing the wrong unique identifier when storing the passphrase for an encrypted disk image in some edge cases. This would lead to CCC failing to mount the disk image and prompting the user to re-enter the passphrase.
- The sanity checks that prevent a task from writing to a growable disk image on the startup disk are now avoided in cases where the disk usage of the source cannot be accurately determined.



- Several non-error concerns are now suppressed from being presented as errors in the Task History window.
- Fixed an issue in which CCC's Recovery HD archive was not getting updated when the source was updated to 10.10.
- System files are no longer excluded by default from remote Macintosh sources.
- Fixed an issue in which CCC would not prune the contents of the `_CCC SafetyNet` folder after it had been renamed from `"_CCC Archives"`. This is a one-time occurrence, but in some cases users encountered a "Destination is full" message on this initial backup.
- Some network filesystems have a rogue "hidden" flag on the root folder of the sharepoint. While Finder manages to ignore that flag, it is still preserved when copying files from that sharepoint with CCC. This would lead to the destination folder being invisible. This update strips any such rogue "hidden" flag from the destination root folder at the end of the backup task.
- Fixed an issue in which an error that should have been ignored will cause the menubar application to display an alert icon when the user agent application is reloaded.
- Fixed an issue in which CCC would occasionally crash if a slow network volume was present. This crash did not affect the operation of backup tasks, but was nevertheless annoying if the user was trying to modify a backup task.
- Command+Option+Q will now quit CCC as well as the privileged helper tool and user agent. The helper tool and user agent consume nearly no resources when idle, and they are required for the performance of scheduled tasks. This is a convenience for people that do not wish to configure CCC tasks to run automatically.
- The hidden NetBoot sharepoint hint files are now excluded by default. This avoids having the backup volume appear as an ad hoc NetBoot sharepoint when that volume is mounted, and also avoids the file sharing service preventing its unmount.
- Fixed the checkbox that controls whether CCC automatically checks for software updates.
- Fixed an edge case scenario in which CCC was unable to store SMTP credentials when logged in to a different user account than what was used to originally specify the credentials.
- The "AvidUnityISIS" filesystem does not advertise support for files larger than 4GB, so CCC was refusing to attempt to copy files larger than 4GB to these volumes. Apparently these volumes do actually support large files, so this update implements a workaround for this non-standard volume behavior.
- Fixed an issue in which CCC would not copy some items from a data-only volume to a network volume if those items had names that are the same as OS X system folders.
- Fixed an issue in which `##et_source_name##` was not getting replaced in email notifications when the source was a folder on a missing volume.
- Fixed an issue in which the task would appear to not be proceeding when copying files to some network volumes.

Carbon Copy Cloner 4.0.2

October 17, 2014

- Email account settings are now imported when importing a CCC 3.5 task that was configured to send emails.
- Tasks created by CCC 3.5 through 3.5.2 are now imported (previously they were not recognized as migrate-able tasks).
- Fixed an issue in which CCC would errantly report that an error occurred while trying to set a global default.
- Fixed an issue in which the CCC application window would be moved from a secondary display to the primary display when revealing the sidebar.
- The CCC window position is now restored correctly in cases where the sidebar is hidden by default.
- Errors that occur while establishing a secure connection to an SMTP server are now reported with better advice when sending a test email.

- Fixed an issue specific to the German localization in which the "day" option for checking for CCC application updates would not "stick".
- Fixed numerous UI behavior annoyances.
- Fixed an issue in which CCC would occasionally report that a Recovery HD volume was out of date or missing when it actually was not.
- There were a few places that the "Use strict volume identification" setting was not getting respected, and in those cases CCC would errantly report that the destination volume was unavailable. These should all be resolved now.
- When the "Don't delete anything" Advanced SafetyNet option is specified, older versions of modified items are not deleted, they are moved to the SafetyNet. SafetyNet pruning is now available for tasks configured with this option.
- Clicking on the "Find and replace corrupted files" button will now reveal a dialog informing the user of that option's performance implications.
- If the user is logged in as a non-admin, the Recovery HD is now properly presented as "<OS version unavailable>", rather than "No Recovery HD". Recovery HD volumes can only be mounted when the logged-in user is an administrator.
- CCC will more effectively keep the system awake when a task is running on a system that is running on battery power. Note that, by default, CCC tasks will not start if the system is running on battery power.
- CCC now attempts to repair the ownership of its private keychain. This should deal with some edge cases in which the keychain's ownership is set to the root user.
- Some ZFS volumes not only lack a UUID, but also have an underlying physical device with an identical volume name. This poses a problem for CCC when attempting to positively identify a ZFS destination volume. We have implemented a workaround in which the unmounted volume will be ignored, however this makes it impossible for CCC to pre-mount a ZFS volume that is attached, but not mounted. We're not happy with this workaround, and it can be avoided if the ZFS filesystem implementation is improved to add a volume UUID to each logical volume.
- Fixed an issue in which "##et_destination_name##" was appearing in task notification emails.
- Fixed an issue in which the Authentication Credentials Installer Package would fail to install, asking the user to report the issue to the Software manufacturer.
- Numerous improvements to the CCC command-line utility.
- Resolved some minor issues that led to crashes.

Carbon Copy Cloner 4.0

October 1, 2014

- Completely redesigned CCC's interface and architecture.
- The functionality of the main task configuration window and the scheduled tasks window have been consolidated. Tasks can be saved, scheduled, and edited, all in the same window.
- Configuring a backup task is far simpler -- complex settings are hidden by default, but accessible at the click of a button. The sidebar and toolbar can be hidden or revealed to control the number of options presented at once.
- Menubar application for quick access to information about CCC backup tasks
- Progress indication is no longer presented in a window that can't be minimized or managed like the rest of your windows. Instead, the menubar application icon changes to indicate that a task is running, and a simple progress indicator next to each task indicates how far along it is.
- Tasks can be chained together to form more complex backup routines
- New runtime conditions offer more control over when and how scheduled tasks run
- A Task History window will indicate details about when a task ran and whether it was successful. All history events are listed in one window, and can be sorted by task name, source/destination name, start time, and status.

- Configuring email account settings is now down in a centralized location. Test email notifications are now much more proactive about reporting configuration errors.
- Email notifications can be customized. A template is offered in CCC's preferences that can be customized to include runtime variables (e.g. task name, source/destination name, data copied, errors reported, etc.).
- The interface for specifying custom filters is greatly simplified. Filters are now explicitly retained per-task, and can easily be modified at a later time.
- Custom filters can be reordered.
- The "Disk Center" has been incorporated into the main window as well, offering details of locally mounted volumes such as disk usage, encryption status, presence of a recovery HD, and current read and write data rates.
- The Disk Center simplifies the presentation of read and write error statistics collected by OS X's IOKit Storage Driver.
- The Disk Center now lists tasks associated with each volume, along with relevant task state (e.g. last run date, last run status). Simply double-click a task to switch to the task view, or click the Clone button right in the Disk Center to run the associated task immediately.
- A command-line application is now included that allows you to start, stop, and watch the progress of your CCC backup tasks.
- A task migration assistant will help you migrate your CCC 3.5.x tasks to CCC 4.0
- Authentication is no longer required every time you want to run a task. CCC will require authentication once for an administrative user, and then that user will have one-click access to starting, stopping, and configuring tasks. Non-administrative users will be required to authenticate with administrator credentials to start, stop, or modify CCC backup tasks.

Carbon Copy Cloner 3.5.3

October 22, 2013

Carbon Copy Cloner 3.5

July 20, 2012

Carbon Copy Cloner 3.4

July 20, 2011

Carbon Copy Cloner 3.3

September 21, 2009

Carbon Copy Cloner 3.2

March 18, 2009

Carbon Copy Cloner 3.1

March 24, 2008

Carbon Copy Cloner 3.0

September 18, 2007

Carbon Copy Cloner 2.3

October 23, 2003

Carbon Copy Cloner 2.0

November 19, 2002

Carbon Copy Cloner 1.0

January 18, 2002

Credits

CCC includes, in source or binary form, the following open source projects.

vsdbutil

Carbon Copy Cloner contains portions of source code available under the Apple Public Source License. That code may be downloaded by clicking the links below.

- [vsdbutil_main.c](https://opensource.apple.com/source/diskdev_cmds/diskdev_cmds-332.11.5/vsdbutil.tproj/vsdbutil_main.c.auto.html) <https://opensource.apple.com/source/diskdev_cmds/diskdev_cmds-332.11.5/vsdbutil.tproj/vsdbutil_main.c.auto.html> (View my modifications: [vsdbutil.h](http://bombich.com//software/opensource/vsdbutil.h) <<http://bombich.com//software/opensource/vsdbutil.h>> and [vsdbutil.c](http://bombich.com//software/opensource/vsdbutil.c) <<http://bombich.com//software/opensource/vsdbutil.c>>)

View the APSL 2.0 license <<https://www.opensource.apple.com/apsl>>

rsync

Carbon Copy Cloner also includes, independently in binary form, rsync version 3.0.6. rsync is made available under the GNU General Public License. Per the license requirements, the source code and my modifications may be downloaded via the links provided below. This modified software is provided at no cost and with no warranty, also per the GNU GPL.

- Download the complete rsync 3.0.6 project <<https://rsync.samba.org/ftp/rsync/src/rsync-3.0.6.tar.gz>>
- Download the rsync 3.0.6 patches <<https://rsync.samba.org/ftp/rsync/src/rsync-patches-3.0.6.tar.gz>>
- Download the diff file (diff between 3.0.6 + [crtimes.diff, fileflags.diff, log-checksum.diff, and backup-dir-dels.diff] and my modifications) <http://bombich.com//software/opensource/rsync_3.0.6-bombich_20160603.diff>
- View the GNU GPL <<http://bombich.com//software/opensource/COPYING.txt>>

Carbon Copy Cloner is not a derivative work of rsync. Rsync is called in binary form only. You can access the build of rsync that is included with CCC via the application bundle: right-click on the CCC application icon, choose "Show Package Contents", then navigate to Contents > MacOS > rsync.

Sparkle

Carbon Copy Cloner leverages [Sparkle](http://sparkle-project.org) <<http://sparkle-project.org>> for handling software updates. Sparkle is Copyright (c) 2006 Andy Matuschak and licensed under the following terms:

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

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THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A

PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

[View the complete license for Sparkle, including external attributions](http://bombich.com/software/opensource/SparkleLicense.txt)
<<http://bombich.com/software/opensource/SparkleLicense.txt>>

skpsmtplib

The SimpleSMTP framework included with CCC is a derivative work of the [skpsmtplib](https://code.google.com/p/skpsmtplib/) <<https://code.google.com/p/skpsmtplib/>> project. skpsmtplib is licensed under the MIT license:

The MIT License (MIT)
Copyright (c) 2008 Skorpiostech, Inc. All rights reserved.

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CocoaFob

We leverage [CocoaFob](https://pixelespressoapps.com) <<https://pixelespressoapps.com>> for license generation and verification in Carbon Copy Cloner. CocoaFob is distributed under the [BSD License](http://www.opensource.org/licenses/bsd-license.php) <<http://www.opensource.org/licenses/bsd-license.php>>, Copyright © 2009-2015, PixelEspresso. All rights reserved. The following statement pertains to CocoaFob:

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System Requirements for Carbon Copy Cloner

System Requirements

- OS X 10.8 Mountain Lion
- OS X 10.9 Mavericks
- OS X 10.10 Yosemite
- OS X 10.11 El Capitan
- macOS 10.12 Sierra

An [older version of CCC](http://bombich.com//download) is still available for users running Snow Leopard and Lion. Note that this version is not actively being developed and support is provided on a case-by-case basis.

Supported configurations

- HFS+ formatted partition or hard drive is required for a bootable backup of macOS
- AFP and SMB network file systems
- Backup of user data is supported on some non-HFS+ filesystems
- CCC will not clone to or from an unformatted or unmounted device — the source and destination must have a filesystem recognized by macOS and visible in the Finder
- Hard drives in Firewire, eSATA, Thunderbolt and USB enclosures *
- CCC will not backup directly to optical media (e.g. CD-ROM or DVD-ROM)
- CCC is supported only on machines that officially support OS X 10.8 Mountain Lion (or higher)
- A minimum screen resolution of 1024x768 is required

* Not all hard drive enclosures are capable of booting macOS. Check with the manufacturer of your hard drive enclosure to verify that booting from the enclosure is explicitly supported. See the [Preparing a hard drive for use with Carbon Copy Cloner](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x) and [Help! My clone won't boot](http://bombich.com//kb/ccc4/help-my-clone-wont-boot) sections of the CCC documentation for more information on disk formatting, partitioning, and general bootability concerns. These restrictions apply to the ability of the device to boot a Mac, any of these devices are suitable for general backup.



Purchasing CCC



How does the free 30-day trial work?

You can try the complete feature set of CCC for 30 days before purchasing it (no features are disabled during the trial). We encourage you to use that time to explore CCC's automated, incremental backup functionality and make a bootable backup.

[Download the latest and greatest version of Carbon Copy Cloner <http://bombich.com//download>](http://bombich.com//download).

If you have any questions about the behavior or functionality of Carbon Copy Cloner either during the demo period or after purchase, you can select **Ask a question about CCC...** from Carbon Copy Cloner's **Help** menu.

How much does Carbon Copy Cloner cost and how can I purchase it?

A household license of Carbon Copy Cloner costs \$39.99 USD plus any applicable local taxes. In some countries, we offer a pre-set price in local currency in order to allow a greater number of payment types, such as bank transfers. In other countries, the price in local currency is calculated at the time of sale and depends upon the current exchange rate with USD.

Businesses and institutions can find out more in our Volume and Pro License Store.

Bombich Software products are available directly through our [online store <http://bombich.com//store>](http://bombich.com//store), hosted by [FastSpring <http://fastspring.com>](http://fastspring.com), our e-commerce partner and Seller of Record. Carbon Copy Cloner software delivery is electronic only. There will be no actual shipment of a physical product. You can download the software at any time from our [download page <http://bombich.com//download>](http://bombich.com//download) and request that the registration key will be sent to you by email from within CCC if you have misplaced it.

Redemption codes that can be redeemed for single user licenses are also available from select consultants and resellers. For a list of authorized resellers, please see our [license redemption page <https://ccoreseller.com/redeem>](https://ccoreseller.com/redeem).

If I pay for CCC now, will I have to pay for future updates?

When updates consist of minor improvements and fixes (e.g. bug fixes, going from version 4.0 to 4.1, etc.), they are always free to licensed users.

From time to time, there will be new versions that require us to rewrite all or parts of our applications. These upgrades are specified by a new version number (e.g. going from version 3 to 4) and will include new features and functionality, such as support for newer operating systems. This process requires significant research, design, development and testing time. These releases will be handled like most commercial software: current users will be offered an upgrade price but the previous version will continue to work on older OSes if you decline to purchase the update.

Volume license customers with current software maintenance agreements will receive any paid upgrades at no additional charge.

Please note that we do not support older versions of CCC indefinitely. To find out which versions of CCC are currently supported and anticipated support sunset dates, please see our [download page](http://bombich.com/download) <<http://bombich.com/download>>.



Can I use one license of CCC on multiple Macs in my household?

Yes, the [CCC License <http://bombich.com//software/CCC_EULA.rtf>](http://bombich.com//software/CCC_EULA.rtf) allows you to install and use Carbon Copy Cloner on any computer that you own or control for personal, noncommercial use. If you're using CCC commercially or institutionally, check out our Corporate or Education Licensing options.

A CCC 4 license will also be accepted by CCC 3.5.7. If you have multiple Macs in your household and some do not meet the requirements for CCC 4, you can use the same license on all of your Macs with CCC 3.5.7 and CCC 4.

To learn more about how to use the license on multiple Macs, please see [How do I use CCC on multiple Macs in my household? <http://bombich.com//kb/ccc4/how-do-i-use-one-license-ccc-on-multiple-macs-in-my-household>](http://bombich.com//kb/ccc4/how-do-i-use-one-license-ccc-on-multiple-macs-in-my-household)

Do you offer an academic discount?

We offer a 25% academic discount.

Who is eligible?

To qualify for Bombich Software education pricing, you MUST be an Eligible Educational End User:

- Faculty, staff or administrator, currently employed at an accredited K-12 school or higher education institution, with a valid academic email address.
- Students who are currently enrolled at an accredited higher education institution, with a valid academic email address.

What is eligible?

New purchases of CCC Household licenses, Workstation licenses, Pro licenses, and Volume licenses qualify for an academic discount. Upgrade purchases are discounted for current license holders and are not eligible for an additional educational discount.

How do I receive a discount for personal use?

1. Visit our [EDU discount verification page <http://bombich.com//edu>](http://bombich.com//edu) to have a coupon code emailed to your academic email address.
2. Purchase CCC using the "Personal purchase" link in the email you just received.

*We maintain a long list of academic email domains that are eligible for our automatic academic discount. If your domain is not on the list, you may still receive a discount but you will need to complete a manual verification process. If manual verification is necessary, we'll email you instructions.

How do I receive a discount for institutional use?

1. Visit our [EDU discount verification page <http://bombich.com//edu>](http://bombich.com//edu) to have a coupon code emailed to your academic email address.

2. Purchase CCC using the "Institutional purchase" link in the email you just received.

*We maintain a long list of academic email domains that are eligible for our automatic academic discount. If your domain is not on the list, you may still receive a discount but you will need to complete a manual verification process. If manual verification is necessary, we'll email you instructions.

*If you would like to purchase using a check or purchase order, please email sales@bombich.com <<mailto:sales@bombich.com>> to get the process started.

Is there anything else I should know?

Terms and Conditions

Personal Use: For personal use, each Eligible Education End User may purchase one CCC license per version and academic email address. Bombich Software reserves the right to request evidence of employment or student status before Carbon Copy Cloner has been sold with an academic discount. This may include proof of school accreditation, faculty or student ID, and/or email address verification.

Institutional Use: If CCC is purchased for institutional use, the one copy limit does not apply, although Bombich Software reserves the right to limit the number of purchases by a single institution. Bombich Software also reserves the right to request evidence of employment before Carbon Copy Cloner has been sold with an academic discount. This may include proof of school accreditation, faculty or student ID, and/or email address verification.

Prices do not include local taxes or local customs charges. Bombich Software reserves the right to change this offer at any time and to revoke discounts or cancel orders in their sole discretion.

What if I have questions?

Please email sales@bombich.com <<mailto:sales@bombich.com>> for assistance.



Can I give CCC as a gift?

Yes, using our [Online Gift Store <http://sites.fastspring.com/bombich/product/ccc?option=gift>](http://sites.fastspring.com/bombich/product/ccc?option=gift).

CCC registration is tied to the name and email address that is entered in the order and our [Online Gift Store <http://sites.fastspring.com/bombich/product/ccc?option=gift>](http://sites.fastspring.com/bombich/product/ccc?option=gift) allows you to specify a gift recipient. You will receive a receipt via email and the gift recipient will receive license information immediately via email.

Do you offer a volume licensing program?

Yes, you can save your organization money with volume licensing.

Bombich Software, Inc. offers attractive multi-user license pricing for Carbon Copy Cloner. Volume licensing is open to anyone purchasing 5 or more licenses of Carbon Copy Cloner. A volume license agreement includes:

- Discounts off standard prices
- A single license key for all of your Carbon Copy Cloner licenses for easy administration
- Optional Software Maintenance

To learn more about our volume license, please see our [Volume License and Maintenance Agreement](http://bombich.com/software/CCC_Volume_License_and_Maintenance_Agreement_2014.pdf). <http://bombich.com/software/CCC_Volume_License_and_Maintenance_Agreement_2014.pdf>

Product Delivery and Ordering

We offer Carbon Copy Cloner volume licenses via download delivery only; we do not ship physical, boxed copies of the software.

To place your order, or obtain a price quote for a new volume license, please shop our [Corporate Store](http://bombich.com/store/corporate) <<http://bombich.com/store/corporate>>. To learn about our education discounts or place a discounted education order, please read about our [Education Pricing](http://bombich.com/edu) <<http://bombich.com/edu>>. If you would like to add additional seats to an existing volume license, please [email our Sales department](mailto:sales@bombich.com?subject=Add%20Volume%20License%20Seats%20to%20CC%20License) <<mailto:sales@bombich.com?subject=Add%20Volume%20License%20Seats%20to%20CC%20License>> for a custom quote.

Software Maintenance

Volume licenses offer the option of including software maintenance, a service which provides all updates to Carbon Copy Cloner at no additional charge beyond the subscription fee. Maintenance subscriptions can be cancelled at any time via a link found in your Carbon Copy Cloner volume license delivery email. For additional details, please see the [Carbon Copy Cloner Maintenance Terms](http://bombich.com/software/maintenance_terms_2014.pdf) <http://bombich.com/software/maintenance_terms_2014.pdf>.

Sales Policies

For information on our sales policies, please refer to our [Sales Policies and Frequently Asked Questions](http://bombich.com/sales-terms-and-conditions) <<http://bombich.com/sales-terms-and-conditions>>.

If Carbon Copy Cloner is licensed at an education discount, then it may only be used by enrolled students, faculty, teachers and administrators at an accredited K-12 educational institution (or equivalent) or higher education institution organized and operated exclusively for the purpose of teaching its students. In addition, there are no portable or home use rights included with our volume licenses.

If you have any other questions, please [send us an email](mailto:sales@bombich.com). <<mailto:sales@bombich.com>>



Why isn't CCC on the Mac App Store?

We would love to add the Mac App Store as a distribution channel for CCC, but there are certain classes of applications that do not meet the policy requirements imposed by Apple. Unless Apple changes these policies, you will never see a utility that can make a bootable backup of OS X on the Mac App Store. You can [send Apple some feedback <https://www.apple.com/feedback/>](https://www.apple.com/feedback/) about this policy, but judging from the absence of the Mac App Store from Apple's Feedback page, and Apple's pertinacious position on this matter, we don't anticipate a change in this policy.



Do you offer telephone support?

We do not staff an incoming telephone support desk.

In providing support to our customers since 2002, we have determined that we can provide more efficient and higher quality support when that support interaction is started with an online submission process. When you submit a support request directly through Carbon Copy Cloner's Help menu, your logs are (with your consent) submitted alongside your request, allowing us to analyze your unique CCC configuration and any error messages you're encountering. Frequently we'll get requests with no more detail than "I'm having trouble getting this to work." That doesn't phase us. After a brief review of CCC's logs we can very quickly follow up with a list of steps to resolve the problem, along with annotated screenshots. If someone is still having trouble, we're happy to arrange a phone call or screen sharing support if that would help them get through a set of instructions.

Every support request is answered by a member of the Bombich Software support team and we do our best to respond to every request within one business day. We provide online support, in English, Monday through Friday between 9:00 AM and 5:00 PM, US Eastern Time.

Related Documentation

- [How do I get help? <http://bombich.com//kb/ccc4/how-do-i-get-help>](http://bombich.com//kb/ccc4/how-do-i-get-help)



Downloading, Installing and Registering CCC

How do I download and install Carbon Copy Cloner?

Watch a video of this tutorial on YouTube <<https://www.youtube.com/watch?v=jMVZqNHJLgI>>

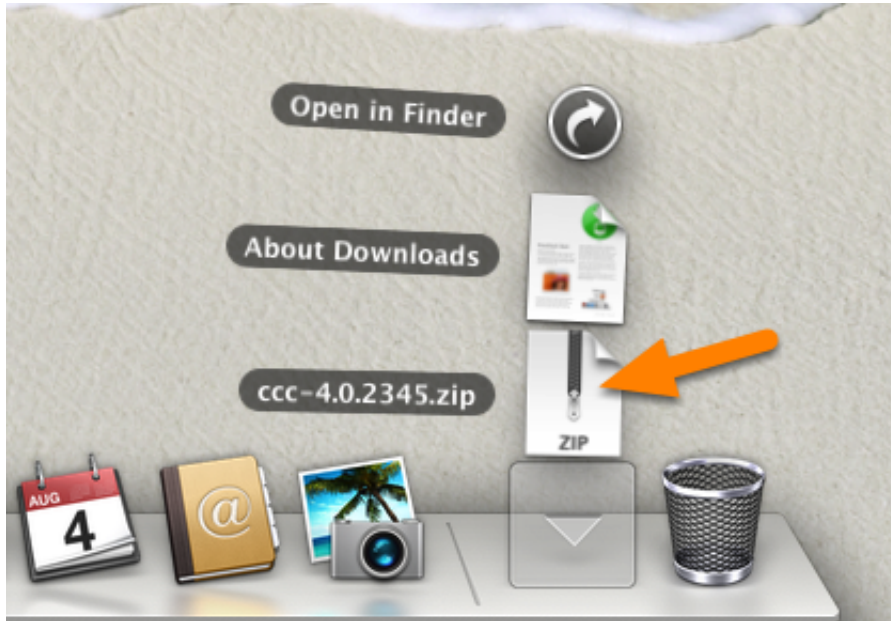
Visit **bombich.com**



The image shows a promotional banner for Carbon Copy Cloner. At the top, there is a navigation bar with links for 'FEATURES', 'ABOUT US', 'BLOG', 'HELP', and a 'BUY NOW' button. To the right of the navigation bar are search and social media icons. The main content area features the Carbon Copy Cloner logo and the text 'All-New Version 4.0' and 'Our biggest update ever. Ready for Yosemite.' Below this is a green button labeled 'View Product Features'. To the right, there is a laptop displaying the Carbon Copy Cloner software interface, which includes a 'Task Plan for "This Backup"' section and various settings options. Below the laptop is a blue banner with the text 'Ready to try Carbon Copy Cloner? Start your 30-day trial now!' and a green button labeled 'Download' with a download icon, which is highlighted with an orange border.

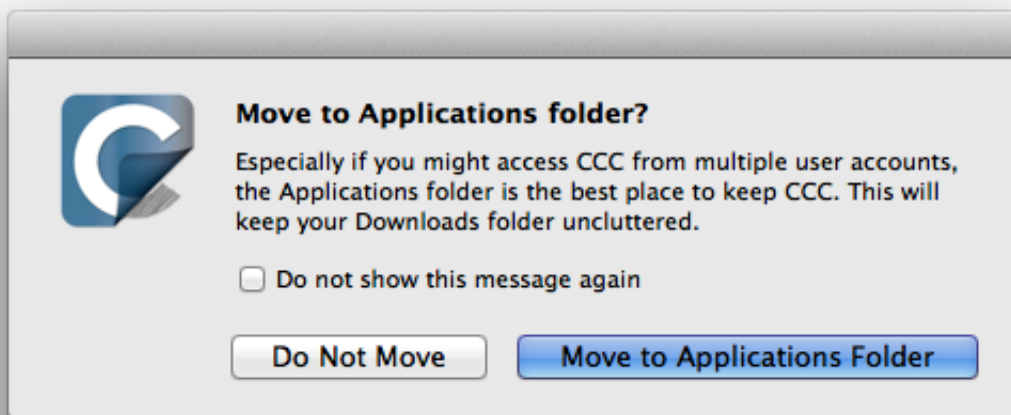
Go to <https://bombich.com> <<https://bombich.com>> and click on **Download**.

Allow download to complete and open the CCC Zip archive in your Downloads folder



Once the download is complete, open the CCC zip archive in your Downloads folder to unarchive CCC.

Open CCC and allow it to move itself to the Applications folder



Click **Move to Applications Folder**. From now on you'll find CCC in your Applications folder with the rest of your applications. Note: If you have an older version of CCC in your Applications folder already, CCC 4 will not overwrite that, and won't produce this prompt. That's OK, CCC will prompt to move itself after you have proceeded with migrating CCC 3 tasks and then uninstalled CCC 3.

(Optional) Add CCC to your Dock



To add CCC to your dock, drag and drop it from the Applications folder into your Dock.



Can I download the old versions of Carbon Copy Cloner?

Older versions of CCC can be downloaded at <https://bombich.com/download> <<http://bombich.com/download>>.

CCC 4 licenses can be used to register CCC 3.5 as well as CCC 4.

How to Register CCC in One Click

Install and Launch Carbon Copy Cloner



The image shows a promotional banner for Carbon Copy Cloner. At the top, there are navigation links: FEATURES, ABOUT US, BLOG, HELP, and a prominent BUY NOW button. Social media icons for search, Facebook, and Twitter are also present. The main content area features the Carbon Copy Cloner logo and the text 'All-New Version 4.0' and 'Our biggest update ever. Ready for Yosemite.' Below this is a green button labeled 'View Product Features'. To the right, a laptop displays the Carbon Copy Cloner software interface, showing various backup options like 'Macintosh HD' and 'CCC Backup'. A small external speaker is positioned in front of the laptop. At the bottom of the banner, a blue bar contains the text 'Ready to try Carbon Copy Cloner? Start your 30-day trial now!' and a green button with a download icon and the word 'Download'.

For one-click registration to work, you must first install and launch Carbon Copy Cloner. To download CCC, please visit <https://bombich.com> <<https://bombich.com>> and click on the download button.

Open Your Registration Email

Hello Friendly Customer,

Thank you for purchasing Carbon Copy Cloner! As a small business, we truly appreciate every purchase.

This email is important - please keep this email around! You should have already received a separate email with your receipt and a link to a printable invoice.

Your registration details are below, please don't hesitate to let us know if we can ever be of assistance!

Mike
Founder, Bombich Software

Carbon Copy Cloner

Registration name: Your Name
Registration email: Your Email Address
Registration code:

[\[REDACTED\]](#)

Number of licenses: [1]

Registering Carbon Copy Cloner

Please resist the temptation to type in that really long registration code. If you're reading this email on your Mac and you already have CCC installed*, just click on this great big button:



We suggest that you do this right now, while you're online. As long as you already have CCC installed on your Mac, clicking the magic button should instantly apply the registration settings to CCC. If you don't already have Carbon Copy Cloner installed, do this first:

1. [Download the latest version of CCC](#)
2. Double-click the disk image and drag the Carbon Copy Cloner icon onto the Applications icon.
3. Launch Carbon Copy Cloner, then go back to this email and click the registration button above to apply your registration settings

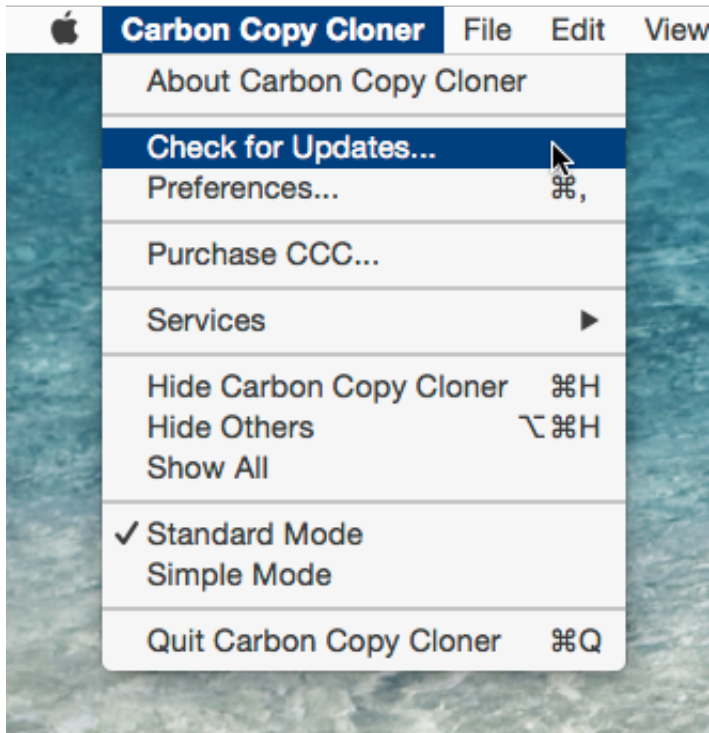
*** Not on your Mac right now?** If you want to apply this registration code to another Macintosh covered under the same license, drag the big registration button to your Desktop, then distribute the bookmark file to the other Macs and open it there.

Open your registration email and click on the **Click Here to Register CCC** button. That's it! You're all set!

Note: If you get a message similar to "Safari can't open com.bombich.ccc.lic://blah-blah-blah because OS X doesn't recognize Internet addresses starting with com.bombich.ccc.lic", double-check that you have downloaded CCC and opened it on the Mac where you're trying to apply the registration settings. If you have already opened CCC and you're still getting this message, try entering the registration values manually, or contact us for assistance.

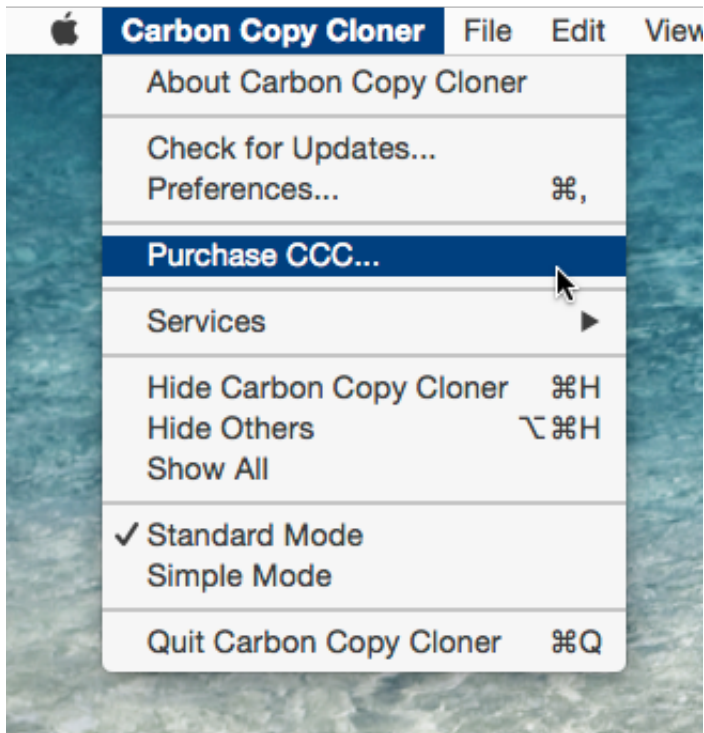
How to Manually Enter a CCC Registration Code

Launch CCC and Check for Updates



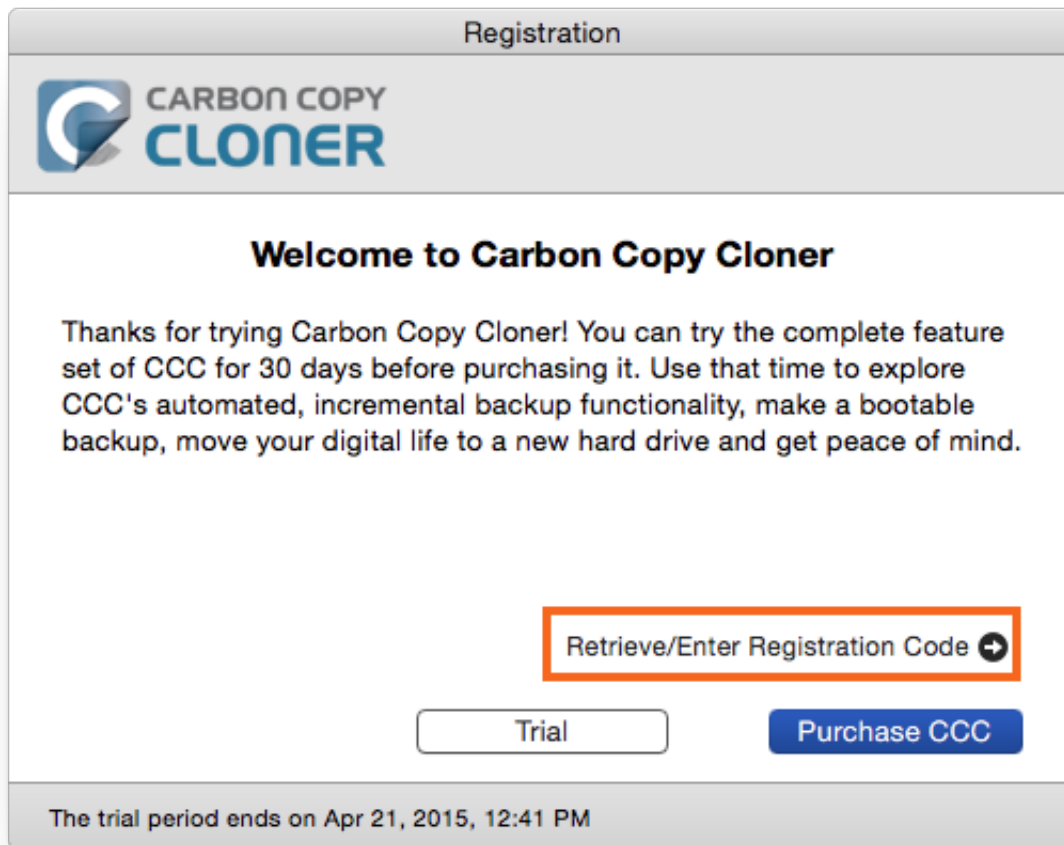
Launch CCC on the unregistered computer. Go to **Carbon Copy Cloner > Check for Updates...** to ensure that you are running the most recent version of CCC.

Check Registration Status



Once relaunched, go to **Carbon Copy Cloner > Show Registration...** to check the registration status of the computer.


Unregistered CCC



If CCC is unregistered, you will see the **Welcome to Carbon Copy Cloner** registration screen. If you have previously purchased CCC, click on **Retrieve/Enter Registration Code**.

Copy and Paste in Registration Codes

Registration

 CARBON COPY
CLONER

Carbon Copy Cloner Registration

Name

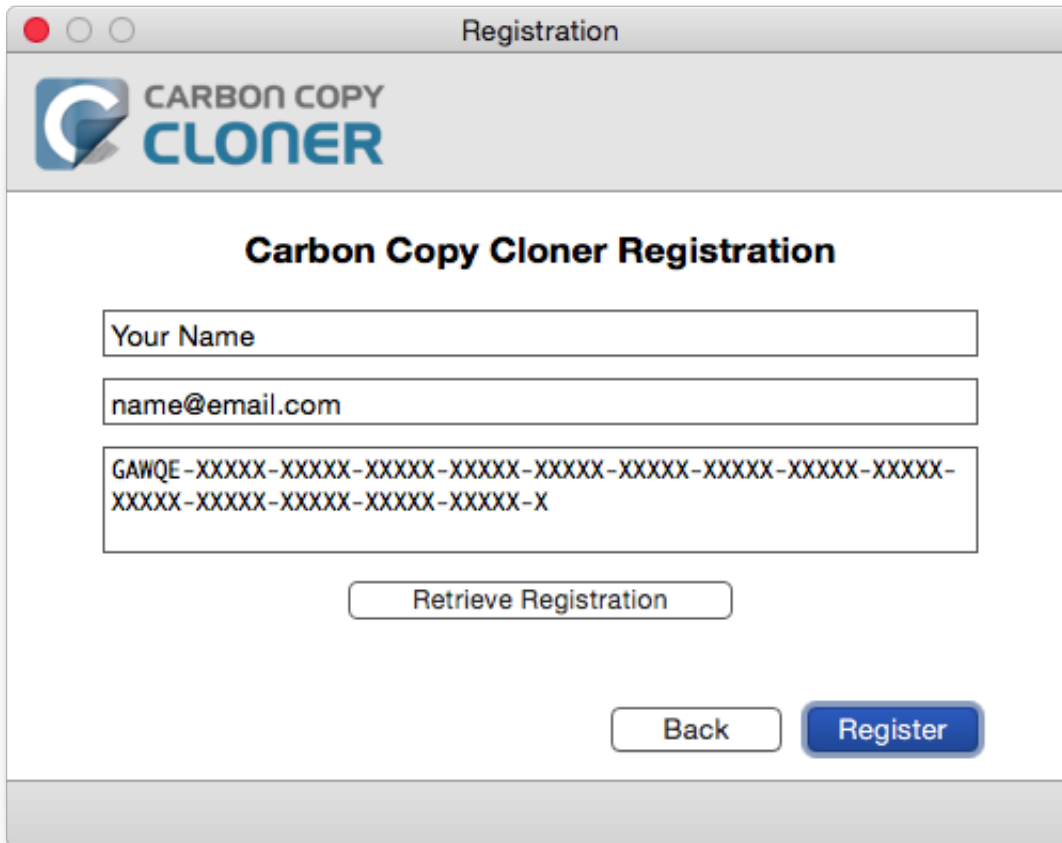
Email Address

License Key

The trial period ends on Apr 21, 2015, 12:41 PM

Copy and paste in the name, email address and license key exactly from your registration email. Note: If you try to use a different name or email address, the license key will show as invalid. Click **Register**.

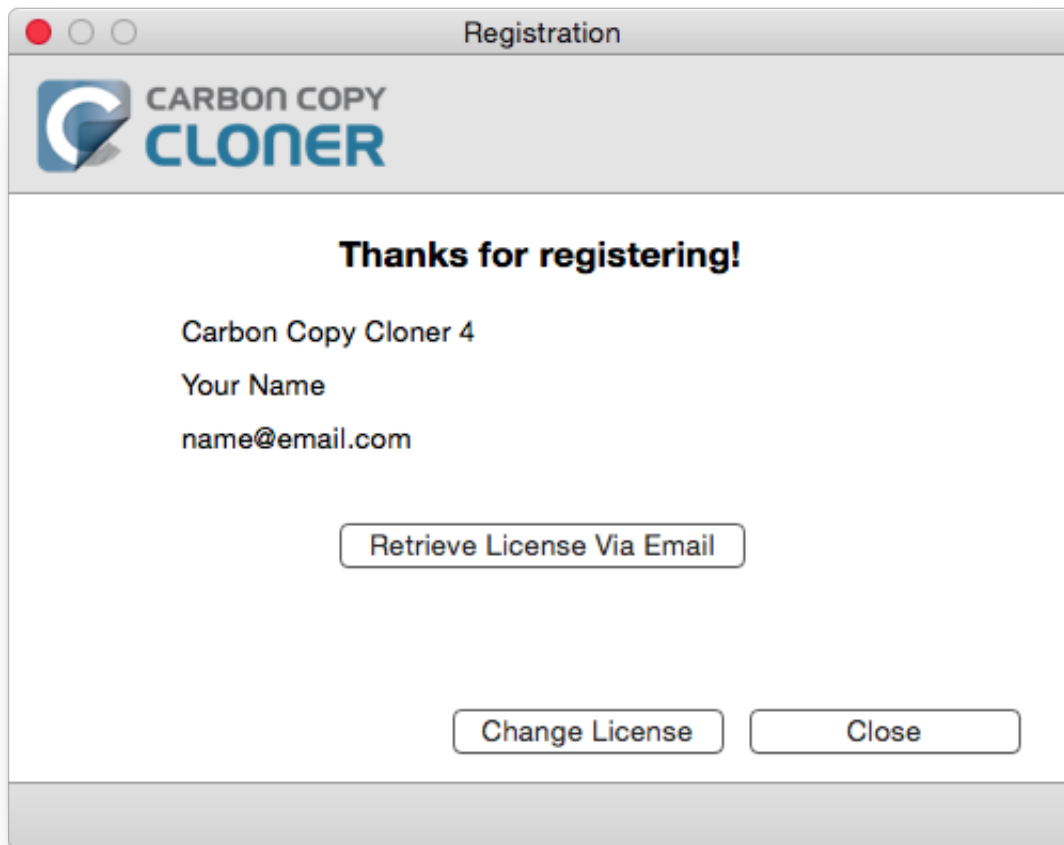
Properly Entered Code



The screenshot shows a window titled "Registration" with the Carbon Copy Cloner logo at the top left. The main heading is "Carbon Copy Cloner Registration". Below this are three input fields: "Your Name", "name@email.com", and a registration code field containing "GAWQE-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-X". Below the code field is a "Retrieve Registration" button. At the bottom right are "Back" and "Register" buttons.

For your reference, here is what a registration code should look like. Note that the registration code automatically broke between the two lines; I did not use the return key to do so.

Successfully Registered



Once your copy of CCC is successfully registered, you should see a "Thanks for registering!" screen.



Trouble Applying Your Registration Information?

Frequently Asked Questions

1. How do I retrieve my registration information? I paid for CCC in the past, but now I'm trying to use CCC under another user account. [<#retrieve>](#)
2. What if I can't retrieve my registration information? [<#retrieve_help>](#)
3. When I click on the button to apply my registration settings, my browser says that it can't open this weird-looking URL. [<#reglink>](#)
4. Why did Firefox report "Corrupted Content Error" when I clicked on the button to apply my registration settings? [<#firefox>](#)
5. How do I register CCC in one click? [<#oneclick>](#)
6. How do I manually enter a CCC registration code? [<#manualreg>](#)
7. I'm still having trouble. How do I get someone to help me? [<#more_help>](#)

How do I retrieve my registration information? I bought CCC, but it says that I'm unregistered.

If you see a prompt to purchase CCC and you have paid for CCC in the past, you can [retrieve your registration information at our website <http://bombich.com//forgot>](#). Simply provide the email address that you used when you paid for CCC, and we'll send your registration information via email. A button in the email will instantly register CCC (no copying/pasting of registration codes is required).

Your registration code is tied to the name and email provided when the license was purchased. If your email or name are entered incorrectly (capitalization matters!), the license will show as invalid.

To ensure that the license information is applied correctly, just open your license email and click on the "Click Here to Register CCC" button to automatically apply the settings (if prompted, select CCC as the application to use when opening the link).

What if I can't retrieve my registration information?

There are several reasons that this might happen, e.g. you don't have access to the email account you used when you originally paid for CCC or you don't remember which email you used. If you can't automatically retrieve your registration information, we need to verify your previous purchase.

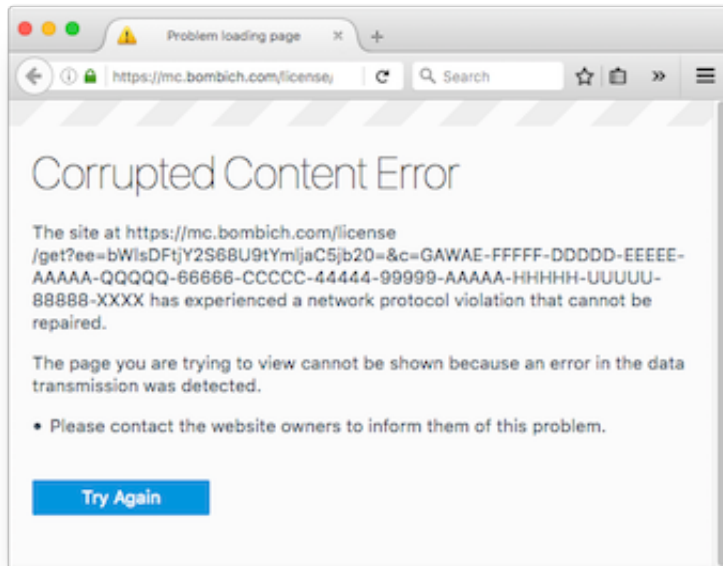
Please [submit a request for registration assistance <http://bombich.com//forgot?found=0>](#) and we'll work it out as quickly as possible.

When I click on the button to apply my registration settings, my browser says that it can't open this weird-looking URL.

If you click on the "Click Here to Register CCC" button in the email that you received from us and you get a message similar to "Safari can't open com.bombich.ccc.lic://blah-blah-blah because macOS doesn't recognize Internet addresses starting with com.bombich.ccc.lic", that means that CCC hasn't yet been registered as the application that handles those URLs. Typically CCC is registered as that URL handler when you launch CCC, so be sure that you have downloaded CCC and opened it on the Mac where you're trying to apply the registration settings. If you have already opened CCC (3.5 or later) and you're still getting this message, try [entering the registration values manually](#)

<<http://bombich.com//kb/ccc4/how-manually-enter-ccc-registration-code>>, or [contact us for assistance](#) <<http://bombich.com//forgot>>.

Why did Firefox report "Corrupted Content Error" when I clicked on the button to apply my registration settings?



There's definitely not a "network protocol violation" going on here. Rather, this is a Firefox bug that has surfaced periodically over the years. The URL works perfectly fine in any other browsers, and even different versions of Firefox. As of this writing, the bug (present in Firefox 49.0.1) should be resolved in Firefox version 50.0, slated for release in November 2016.

To work around the Firefox shortcoming, copy and paste that URL into Safari instead.

How do I register CCC in one click?

[View step-by-step one-click registration directions, complete with pictures.](#)
<<http://bombich.com//kb/ccc4/how-register-ccc-in-one-click>>

How do I manually enter a CCC registration code?

[View step-by-step manual registration directions, complete with pictures.](#)
<<http://bombich.com//kb/ccc4/how-manually-enter-ccc-registration-code>>

I'm still having trouble. How do I get someone to help me with my registration?

We're here to help. Just [contact us via this Registration Assistance form](#) <<http://bombich.com//forgot?found=0>>, and we will help you sort it out as quickly as possible.

How do I use one license of CCC on multiple Macs in my household?

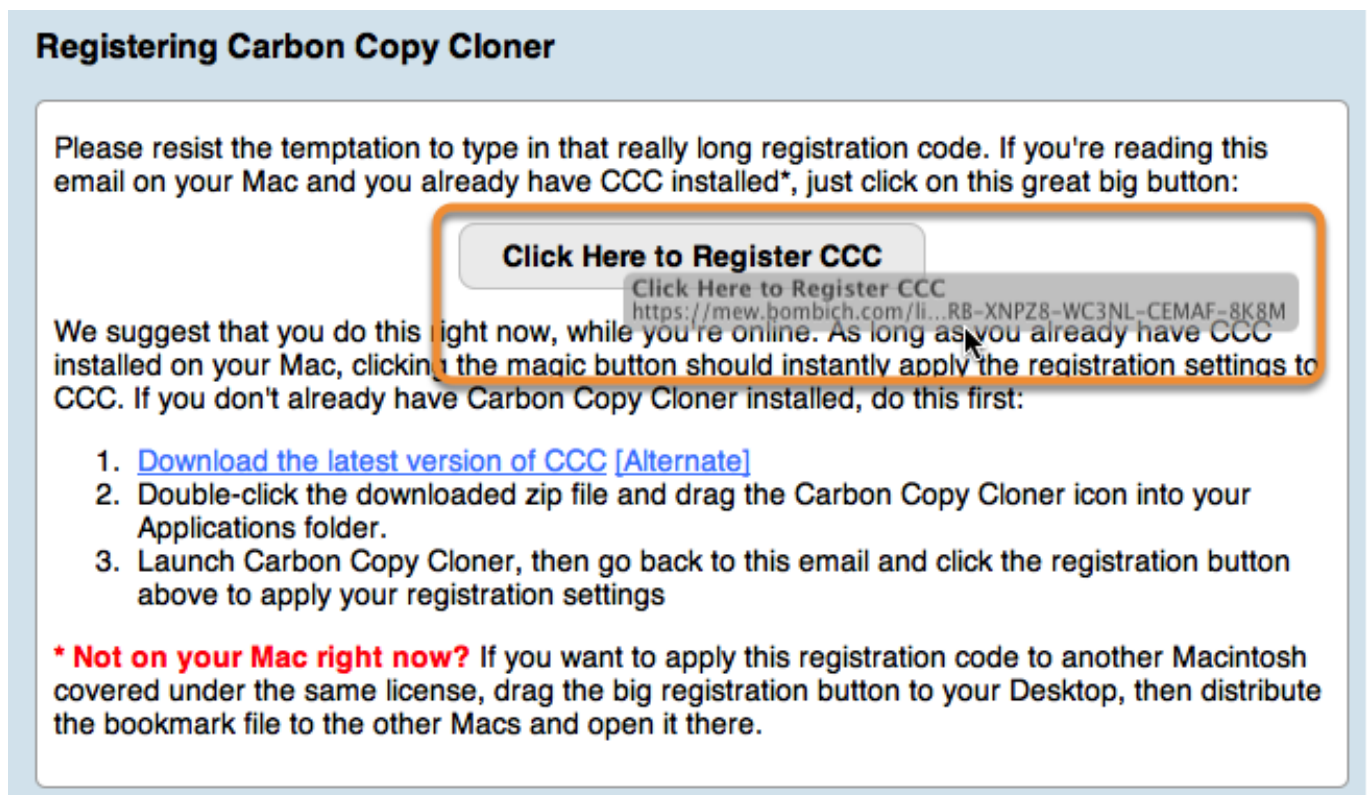
The CCC license allows you to install and use Carbon Copy Cloner on any computer that you own or control for personal, non-commercial use. If you're using CCC commercially or institutionally, the instructions in this article are also applicable, but be sure to check out our [Corporate and Education Licensing options](http://bombich.com/store/corporate) <<http://bombich.com/store/corporate>> so that your use is in compliance with the license.

Install and open CCC on the other Mac first

[Download CCC](http://bombich.com/software/download_ccc.php?v=latest) <http://bombich.com/software/download_ccc.php?v=latest> on the other Mac before attempting to apply the registration settings. Open CCC and allow CCC to move itself to your Applications folder when prompted. Full installation instructions are available here: [How do I download and install Carbon Copy Cloner?](http://bombich.com/kb/ccc4/how-do-i-download-and-install-carbon-copy-cloner) <<http://bombich.com/kb/ccc4/how-do-i-download-and-install-carbon-copy-cloner>>

Open your registration email

To apply the registration settings to another computer, drag the **Click Here to Register CCC** link to your Desktop, then open the bookmark file on another Mac.



Registering Carbon Copy Cloner

Please resist the temptation to type in that really long registration code. If you're reading this email on your Mac and you already have CCC installed*, just click on this great big button:

Click Here to Register CCC

Click Here to Register CCC
<https://mew.bombich.com/li...RB-XNPZ8-WC3NL-CEMAF-8K8M>

We suggest that you do this right now, while you're online. As long as you already have CCC installed on your Mac, clicking the magic button should instantly apply the registration settings to CCC. If you don't already have Carbon Copy Cloner installed, do this first:

1. [Download the latest version of CCC \[Alternate\]](#)
2. Double-click the downloaded zip file and drag the Carbon Copy Cloner icon into your Applications folder.
3. Launch Carbon Copy Cloner, then go back to this email and click the registration button above to apply your registration settings

*** Not on your Mac right now?** If you want to apply this registration code to another Macintosh covered under the same license, drag the big registration button to your Desktop, then distribute the bookmark file to the other Macs and open it there.

When you drag the link to your Desktop, a bookmark file will appear on the Desktop.

Drag registration link to your Desktop



To apply the registration settings to another Mac, drag the **Click Here to Register CCC** button or link from your purchase confirmation email to your Desktop.

Transfer and double-click



Transfer this file to your other Macs (via email, flash drive, file sharing, cloud storage, etc.) and double-click it to apply the CCC registration settings there.



I already purchased CCC but can't find my registration code. Can you send it to me?

If you're getting a message about a trial and you have already purchased CCC, or if you have any other questions or concerns about your registration, you can [retrieve your registration code here <http://bombich.com//forgot>](http://bombich.com//forgot).

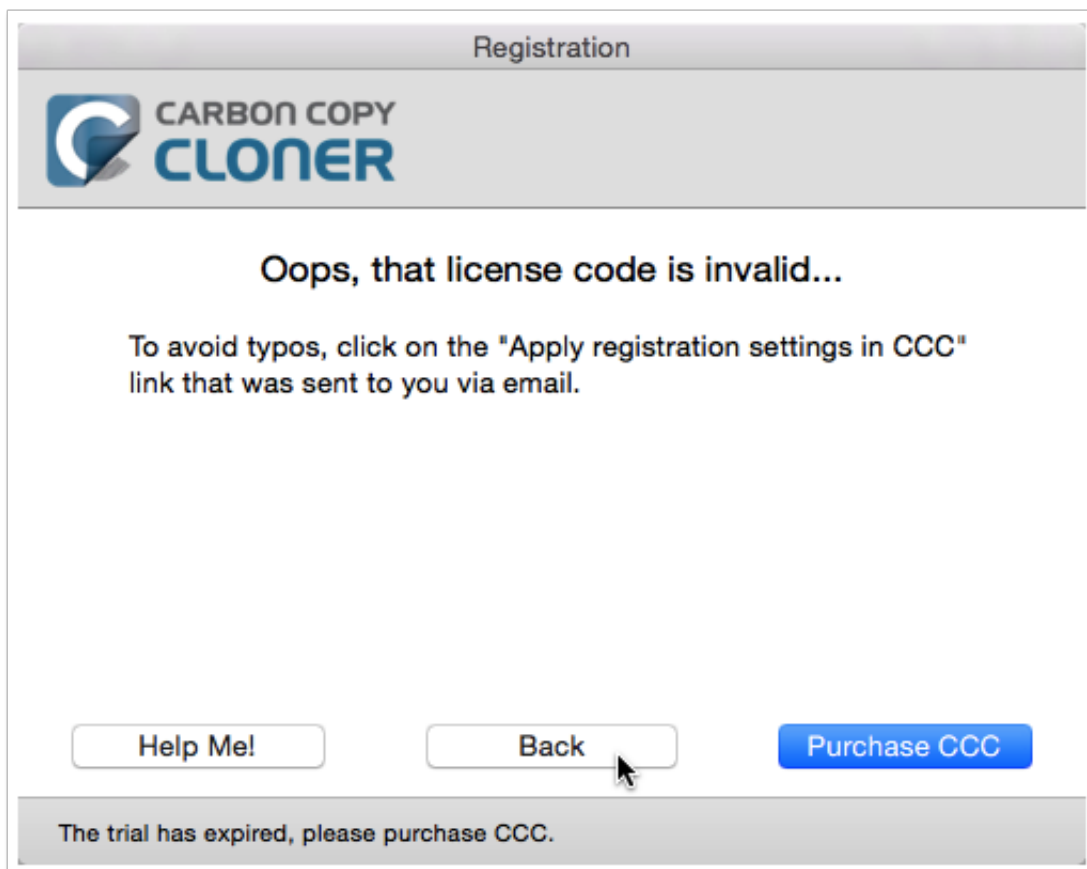
Oops, that license code is invalid...

If you see this window when trying to launch CCC

There are two common issues that cause this.

1. Your name, email address or registration code doesn't exactly match the information provided at the time of purchase.
2. The version of CCC that you are running is damaged and needs to be replaced with a new copy downloaded from <https://bombich.com/download> <<http://bombich.com/download>>.


To check on the info entered in CCC, click on **Back**.



Registration Details

Open your registration email and verify that the information you see exactly matches. Click on **Register** when you are done.

Registration



Carbon Copy Cloner Registration

The trial has expired, please purchase CCC.

One-Click Registration

Tired of trying to make sure it matches? Just click on **Apply Settings** in your registration email and the information will be automatically entered for you.

Carbon Copy Cloner 4

Purchase Date: October 30, 2014

Name: Sarah Bombich

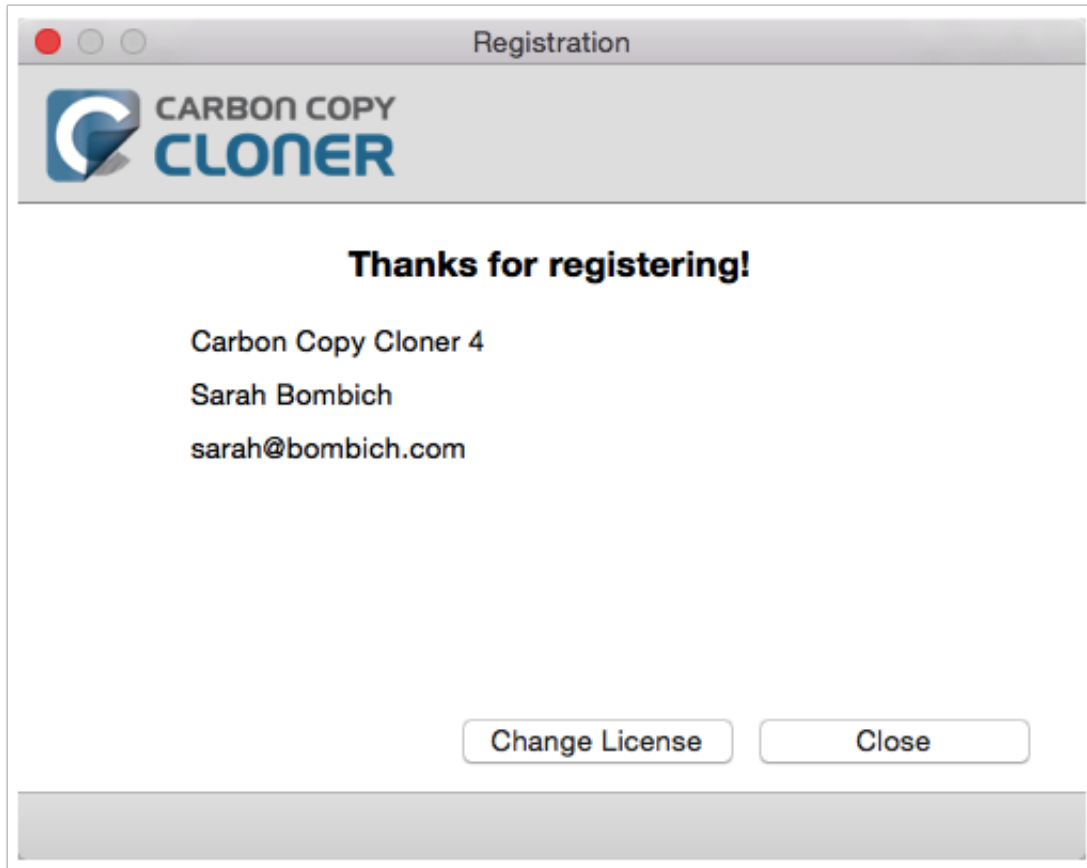
Email: sarah@bombich.com

Code: XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX-XXXXX

Automatically apply these registration settings in CCC:

Successful registration

Once you are successfully registered, you will see this window. Click **Close** and start backing up.



Migrating CCC tasks from one system to another

If you wish to migrate your tasks from CCC on one system to CCC on another system, follow these steps:

1. Quit CCC if it is running.
2. In the Finder, navigate to the root level of the volume you wish to move the tasks to (the "destination").
3. Starting at the **root of that volume**, navigate to /Library/Application Support/
4. Move the com.bombich.ccc item to the Trash (**note:** doing so will remove any saved tasks on that system).
5. Open a new Finder window.
6. Navigate to the root level of the volume that contains the tasks you wish to copy (the "source").
7. Starting at the **root of that volume**, navigate to /Library/Application Support/.
8. Copy com.bombich.ccc from the source to /Library/Application Support/ on the destination.
9. Restart your computer.
10. Open CCC — your tasks should now be restored.

Note that you may have to activate suspended tasks, and/or reselect the source or destination volumes in your tasks.

Also, please note that you must move the com.bombich.ccc application support folder that is located in the **root-level** Library folder (e.g. Macintosh HD > Library, NOT Macintosh HD > Users > USER_NAME > Library). **If you're looking in your home folder, you're in the wrong place.**

Getting Ready to Use CCC

Choosing a backup drive

Internal or external?

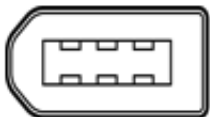


If you have a Mac with room for additional internal hard drives, you can use that space for your backup hard drive. We prefer external hard drive enclosures for portability reasons — You can easily swap a pair of external hard drives between office and home to have an inexpensive offsite backup solution. This also gives you the opportunity to easily leverage that hard drive to back up multiple Macs.

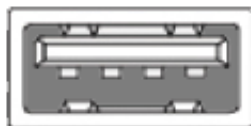
USB, Firewire, Thunderbolt, or eSATA?



Firewire



USB



Thunderbolt



Many hard drive enclosures have Firewire, USB, Thunderbolt or a combination of interfaces for connecting the hard drive to your computer. Any of these interfaces will work fine for backing up and safeguarding your data, though Firewire and Thunderbolt are the most reliable interfaces for booting a Mac. **We generally recommend purchasing an enclosure that offers multiple interface options (e.g. Firewire+USB or Thunderbolt+USB).** eSATA offers good performance, but often is not bootable. If your Mac does not offer native USB 3.0 support (e.g. it's older than 2012), a USB

device may boot your Mac, but performance will be considerably slower than your Mac's internal hard drive.

Specific hard drive recommendations

Most hard drive enclosures will work just fine for your backups, however, [some cannot function as a bootable device](http://bombich.com//kb/ccc4/help-my-clone-wont-boot#known_issues) <http://bombich.com//kb/ccc4/help-my-clone-wont-boot#known_issues>. It would be nearly impossible for us to curate an exhaustive list of every enclosure/Mac combination that does and does not work. However, we frequently get asked for a recommendation, so here's a list of some hard drive enclosures that we have tested with good results. Performance and price go hand-in-hand. If you opt for a USB-only device, your Mac will be slower when booting from that device, especially if your Mac was manufactured prior to 2012.

USB 3.0, Portable External Hard Drive

Toshiba 2TB, Canvio Connect II <<http://amzn.to/2cbRytx>>

WD 3TB, My Passport Ultra <<http://amzn.to/2clQEog>>

Samsung T3 Portable SSD - 1TB - USB 3.1 External SSD <<http://amzn.to/2cL9DRZ>>

USB 3.0, Desktop External Hard Drive

WD 4TB My Book for Mac <<http://amzn.to/2cfqMS1>>

Thunderbolt, Desktop External Hard Drive

WD 4TB My Book Thunderbolt Duo Desktop RAID <<http://amzn.to/2c3Vtdg>>

How big should the backup volume be?

The backup volume should be at least as large as the amount of data that you want to copy to it. If you're planning to make regular backups to this volume, a good rule of thumb is that the backup volume should be at least 50% larger than the amount of data that you're initially backing up to it. This allows for a modest amount of data growth and room for temporary archiving of modified and deleted files.

We strongly recommend that you find the means to dedicate a volume to the task of backing up your irreplaceable data.

If you have data on your backup volume that exists nowhere else, it is not backed up! Whenever you target a volume for use with Carbon Copy Cloner, there is a risk that some files will be removed for one legitimate reason or another. CCC offers options and warnings to protect your data from loss, but nothing can protect your data from a misuse of CCC or a misunderstanding of the functionality that it provides.

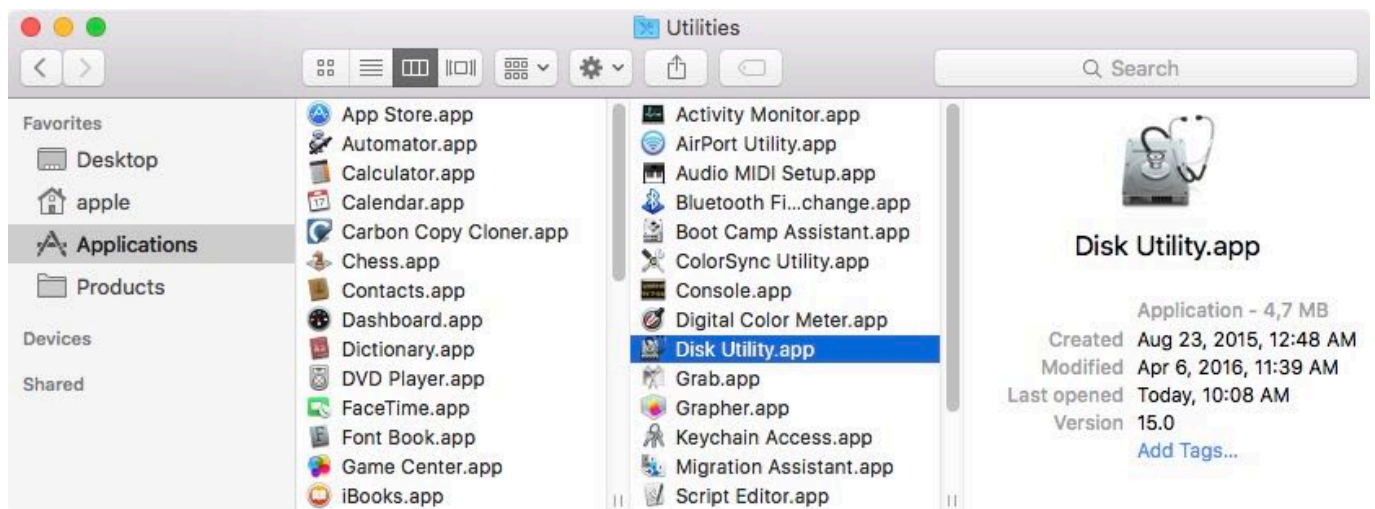
Preparing your backup disk for a backup of OS X

Watch a video of this tutorial on YouTube <<https://www.youtube.com/watch?v=3AUXkwaVVFQ>>

Note: This will erase all data on your backup disk!!!

Launch Disk Utility

Open a Finder window and navigate to **Applications > Utilities** and double click on **Disk Utility**.

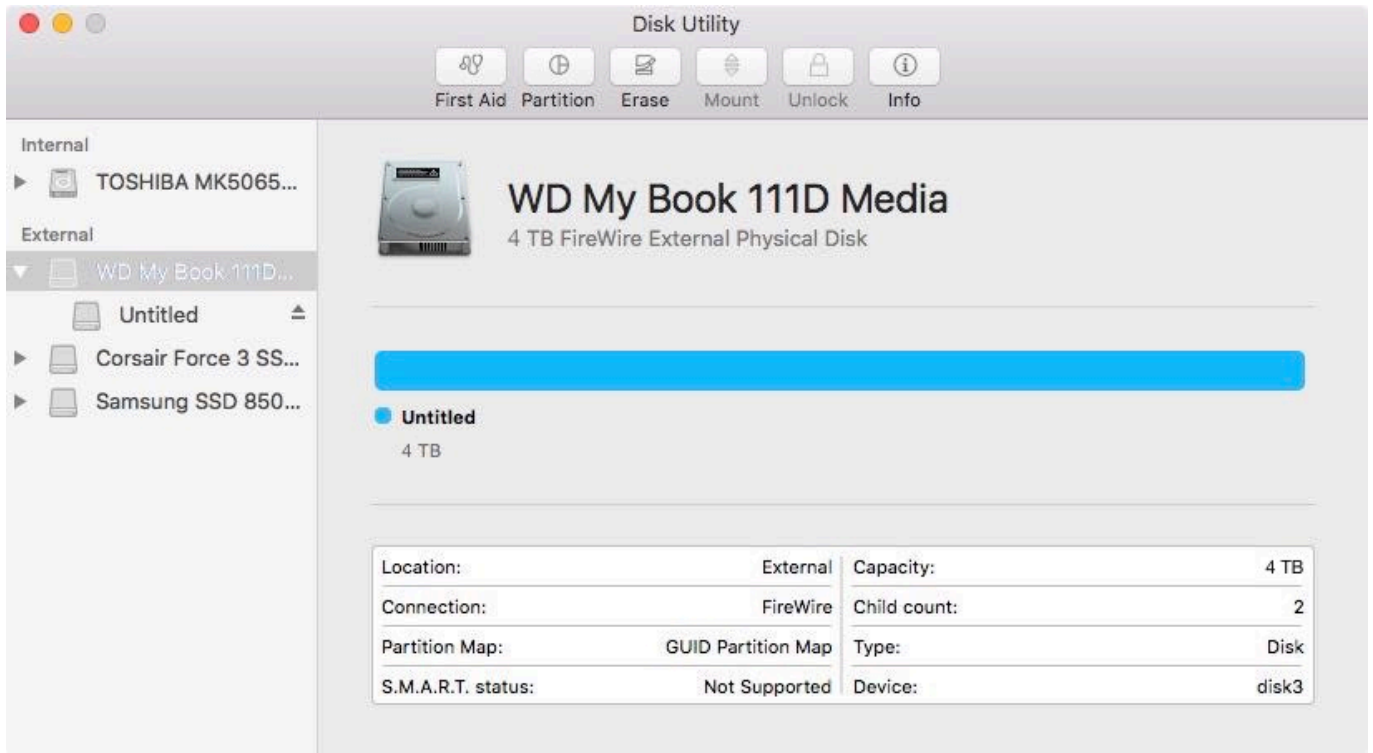


Disk Utility in OS X 10.11 El Capitan and macOS 10.12 Sierra is very different than on previous OSes. If you are using Mountain Lion, Mavericks, or Yosemite, [skip to here <#older_than_el_capitan>](#).

Select the backup disk

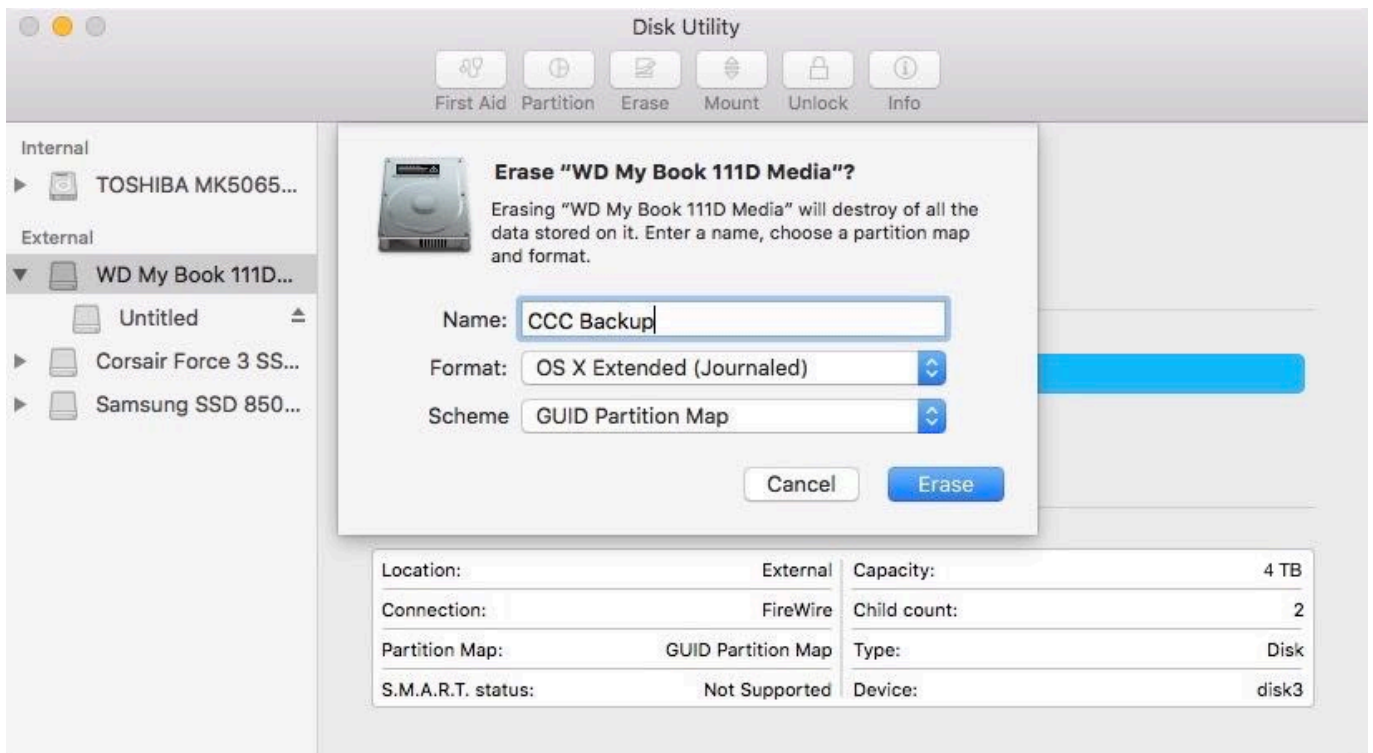
Click to select the disk that you would like to use for your backup. This disk should not be the same as your startup disk.

The name of a new disk will often include the manufacturer's name (e.g. WD My Book 111D Media...). A startup disk will often include the manufacturer's serial number in the title (e.g. TOSHIBA MK50...).



Erase the backup disk

Click on the **Erase** button in Disk Utility's toolbar, then configure the name, format, and partitioning scheme of your backup disk. You can set the name to whatever you like, but set the Format to **Mac OS Extended (Journaled)** and set the Scheme to **GUID Partition Map**, then click the **Erase** button.



Don't Use Time Machine

Click **Don't Use**. You may use the same backup disk for both Time Machine and CCC backups, but if you do so, you must use a dedicated partition for the Time Machine backup. Otherwise Time Machine will consume all available space on the backup volume and make it impossible for CCC to use the backup volume.



Your new hard drive is now ready to accept backups created by Carbon Copy Cloner!

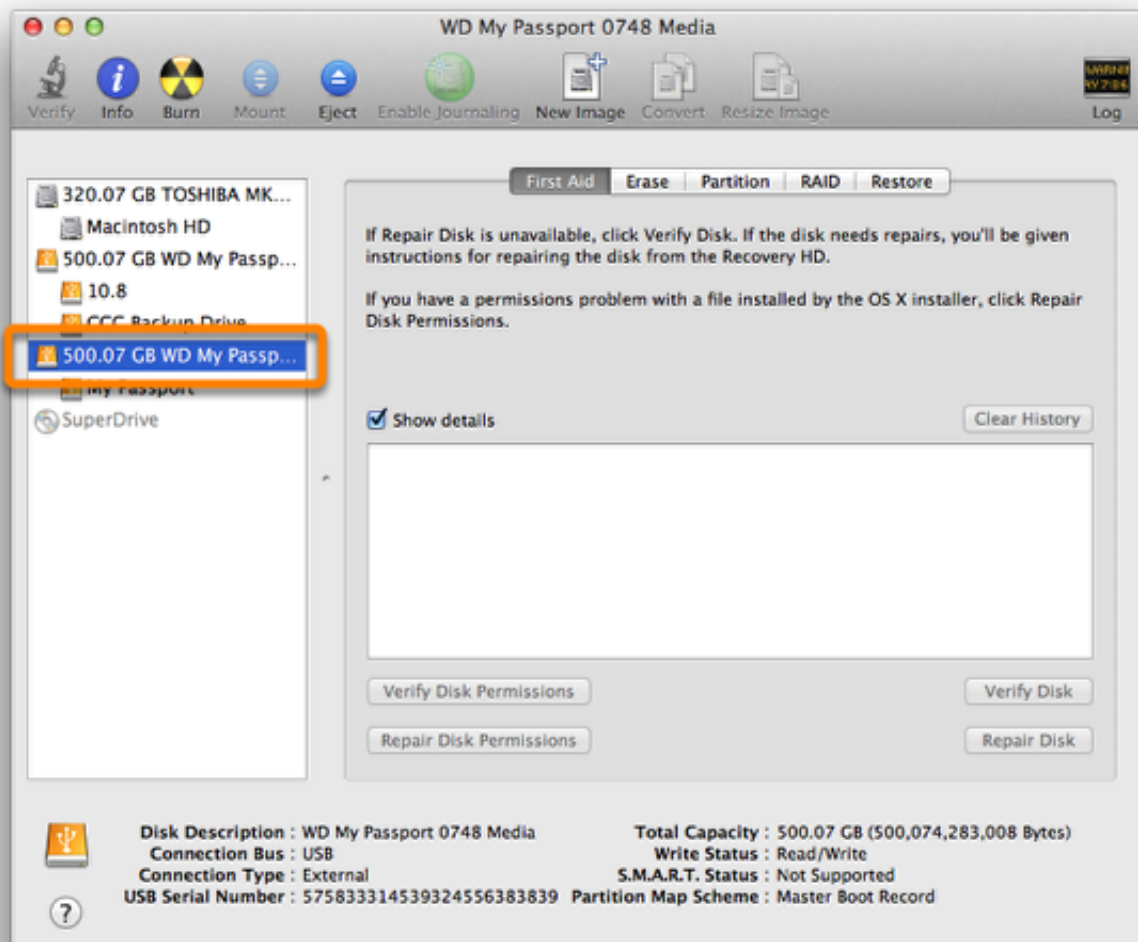
Instructions for Mountain Lion, Mavericks, or Yosemite

Watch a video of this tutorial on YouTube <<https://www.youtube.com/watch?v=WZ1sstRdWjk>>

Select the backup disk

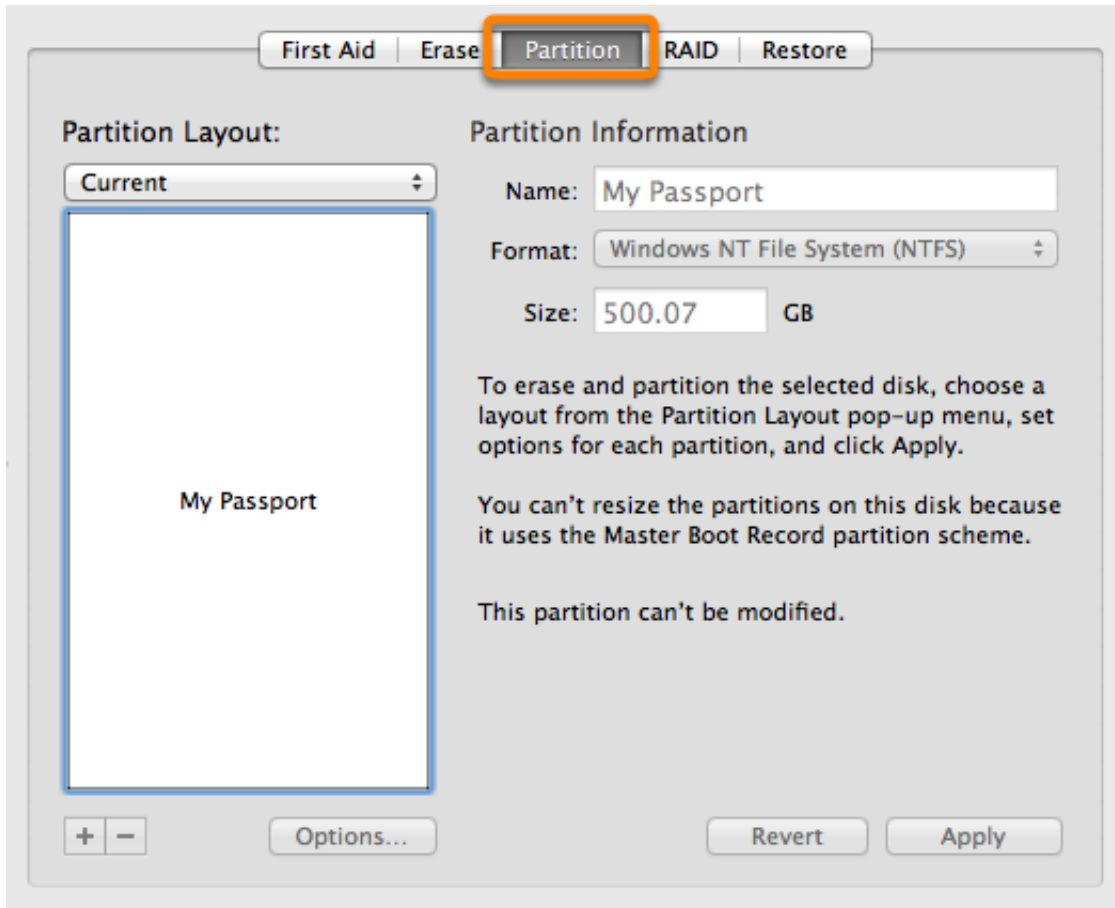
Click to select the disk that you would like to use for your backup. This disk should not be the same as your startup disk.

The name of a new disk will often include the storage capacity and manufacturer's name (e.g. 500.07 GB WD My Passp...). A startup disk will often include the manufacturer's serial number in the title (e.g. 320.07 GB TOSHIBA **MK3255GSXF** Media).

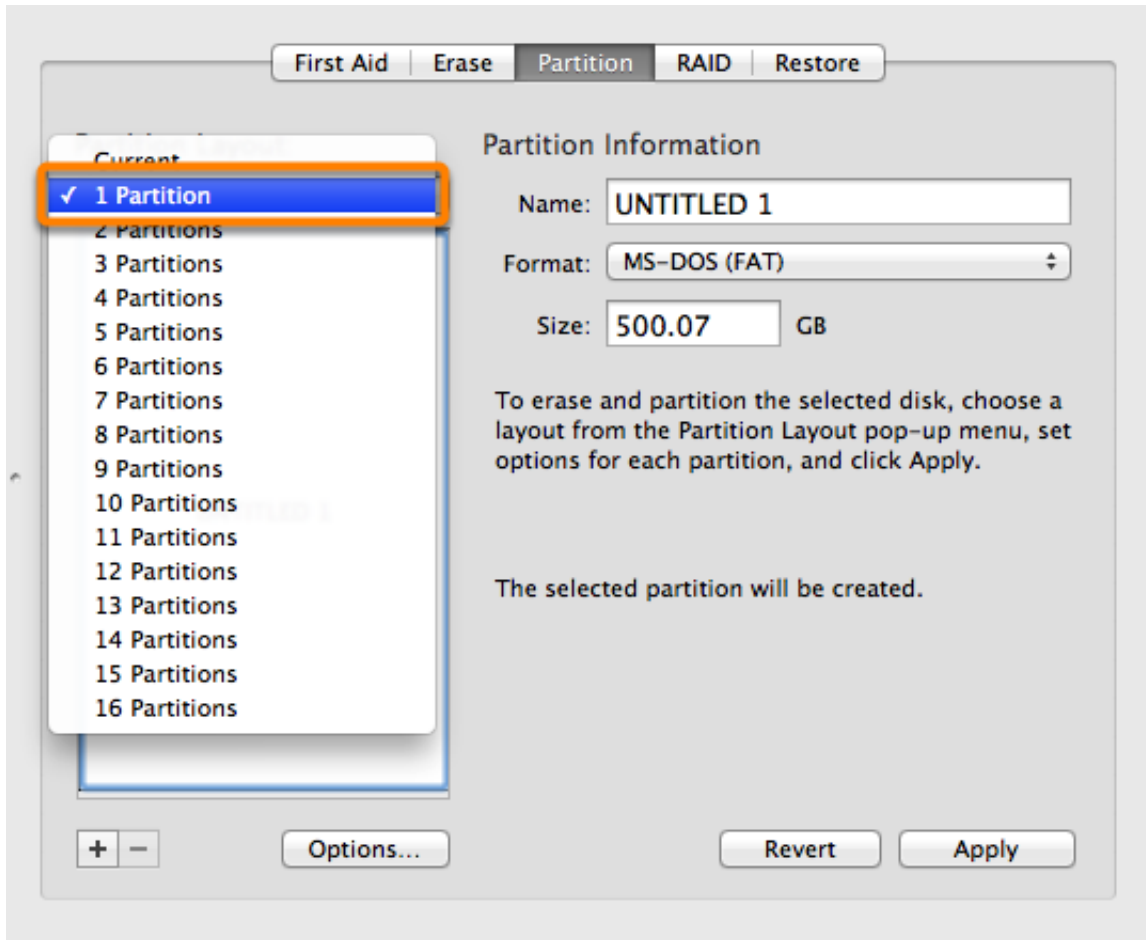


Partition the backup disk

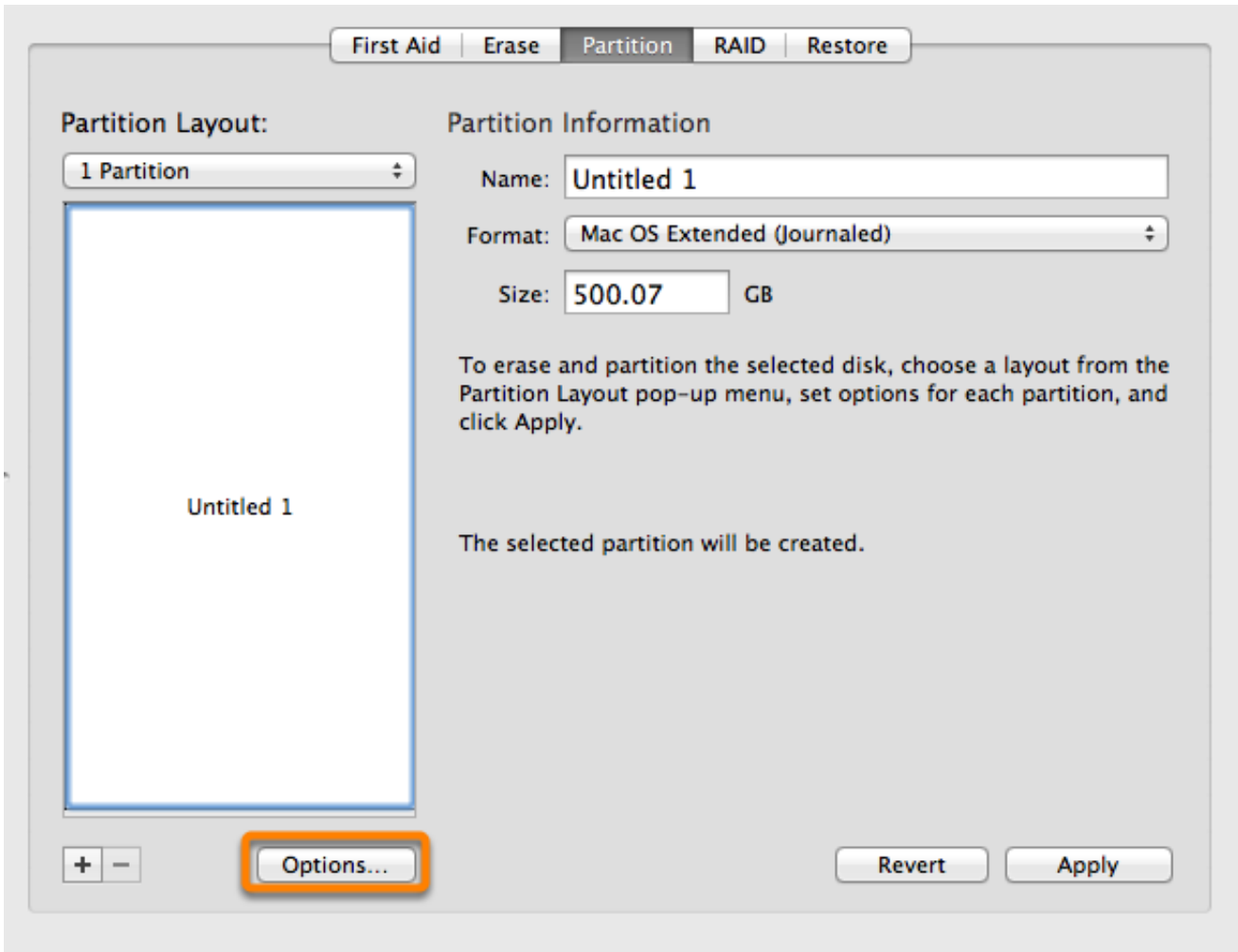
Click on the **Partition** tab.



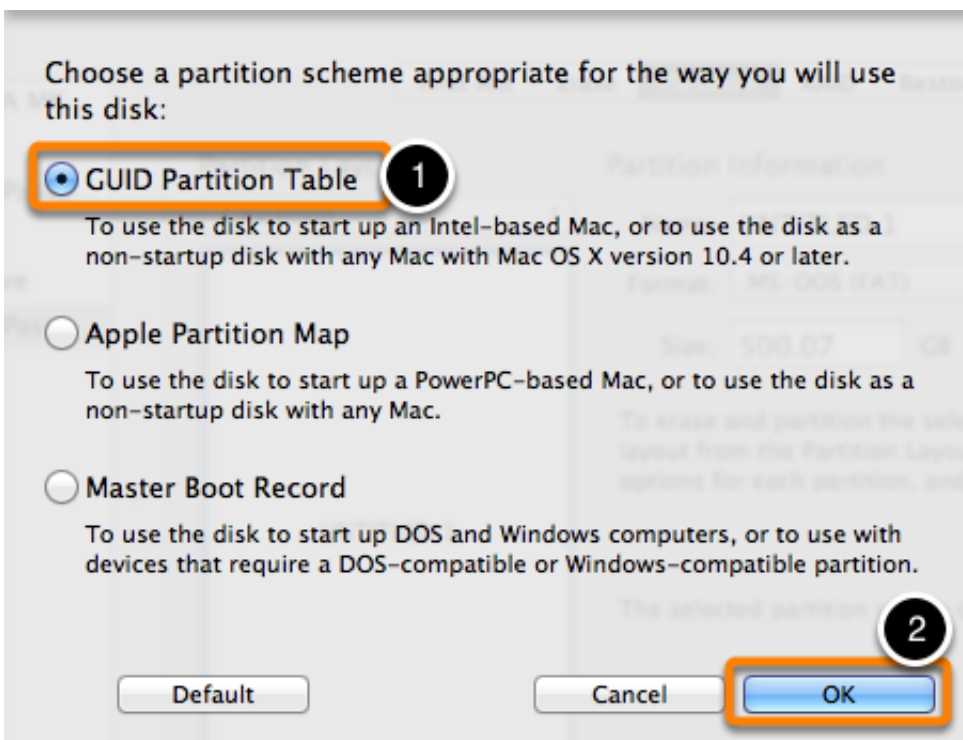
Choose **1 Partition** from the Partition Layout popup menu (or more if desired).



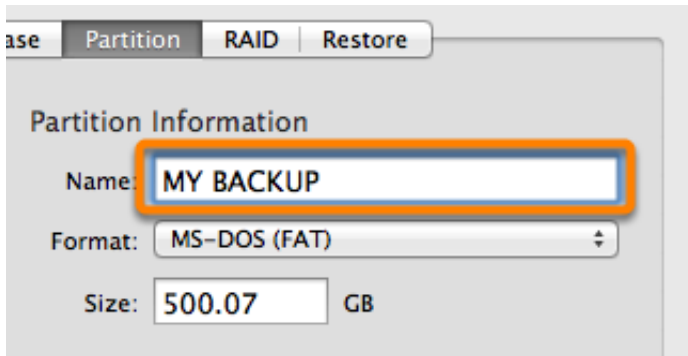
Click on **Options**.



Choose **GUID Partition Table**, then click the **OK**.

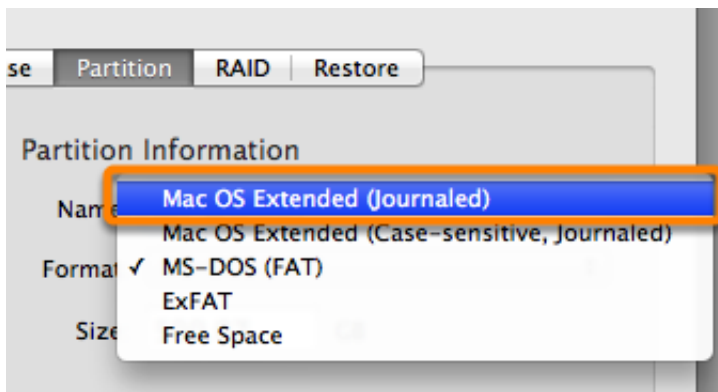


Name the Volume

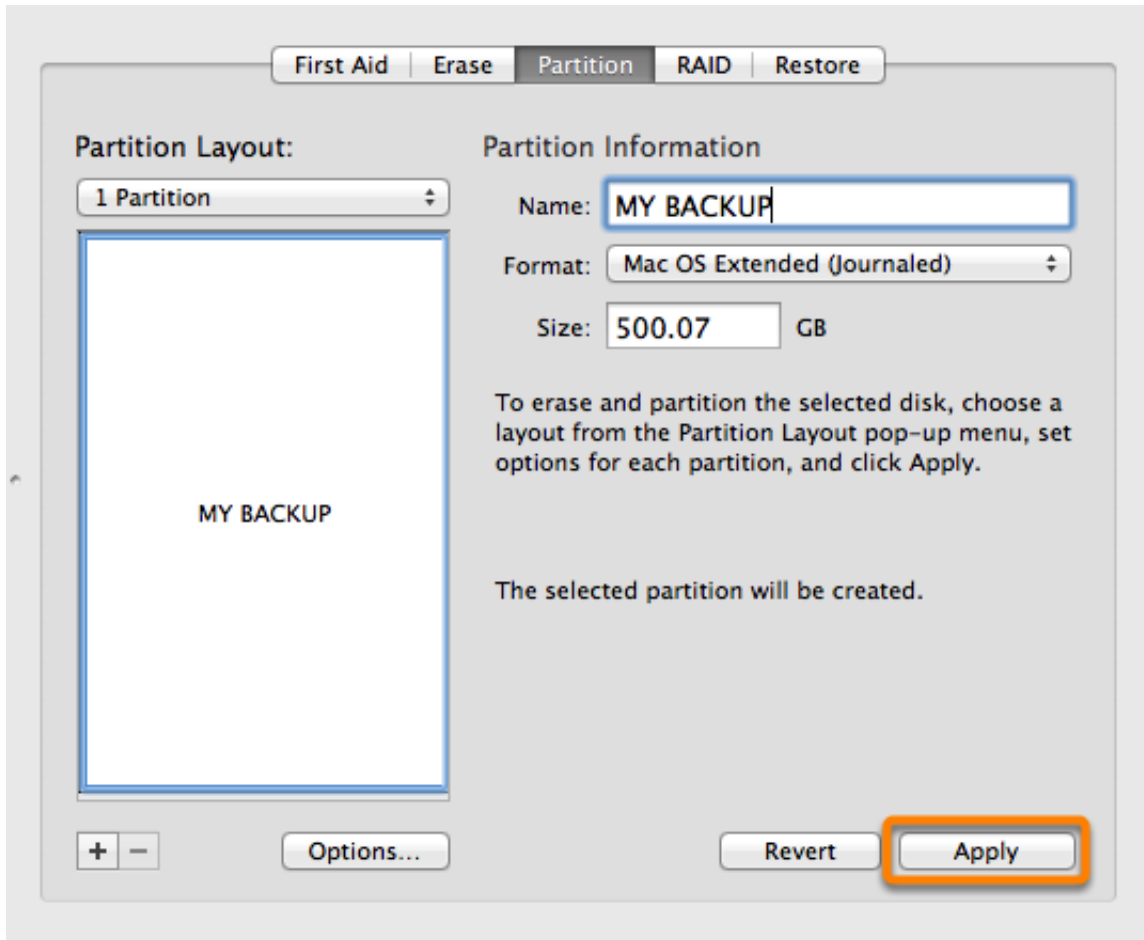


Format the Volume

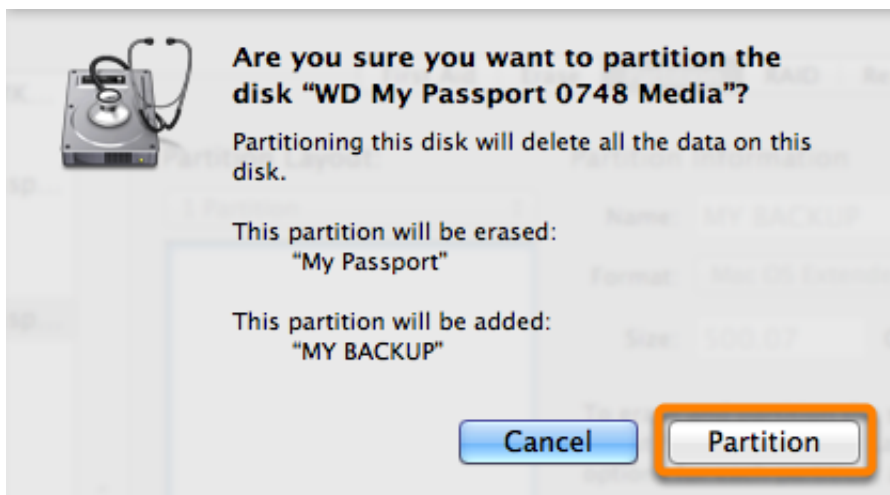
Select **Mac OS Extended (Journaled)** from the Partition Format popup menu.



Click **Apply**.



Ensure that you have selected the correct disk for your backup drive. This step will delete all data from the selected disk. Click **Partition**.



Now [skip ahead to the remainder of the instructions <#no_time_machine>](#) that are not OS-specific.

Related Documentation

"My disk is already formatted HFS+, why am I getting this warning?"
<<http://bombich.com/kb/ccc4/my-disk-already-formatted-hfs-why-am-i-getting-warning>>
Video: [Preparing a drive for a backup of the macOS in macOS 10.11 or higher](#)



<<https://www.youtube.com/watch?v=3AUXkwaVVFQ>>

Video: Creating a new/additional partition (OS X 10.10 and earlier)

<<https://www.youtube.com/watch?v=XQG6-Ojiv3s>>

Support for third party filesystems (e.g. NTFS, FAT32) <<http://bombich.com//kb/ccc4/backing-up-tofrom-network-volumes-and-other-non-hfs-volumes>>



Using CCC

How to set up your first backup

Watch a video of this tutorial on YouTube <<https://www.youtube.com/watch?v=SADf7xp97nE>>

Attach the backup disk to your computer

See the [Choosing a backup volume](http://bombich.com//kb/ccc4/choosing-backup-drive) <<http://bombich.com//kb/ccc4/choosing-backup-drive>> section for additional advice on this subject.

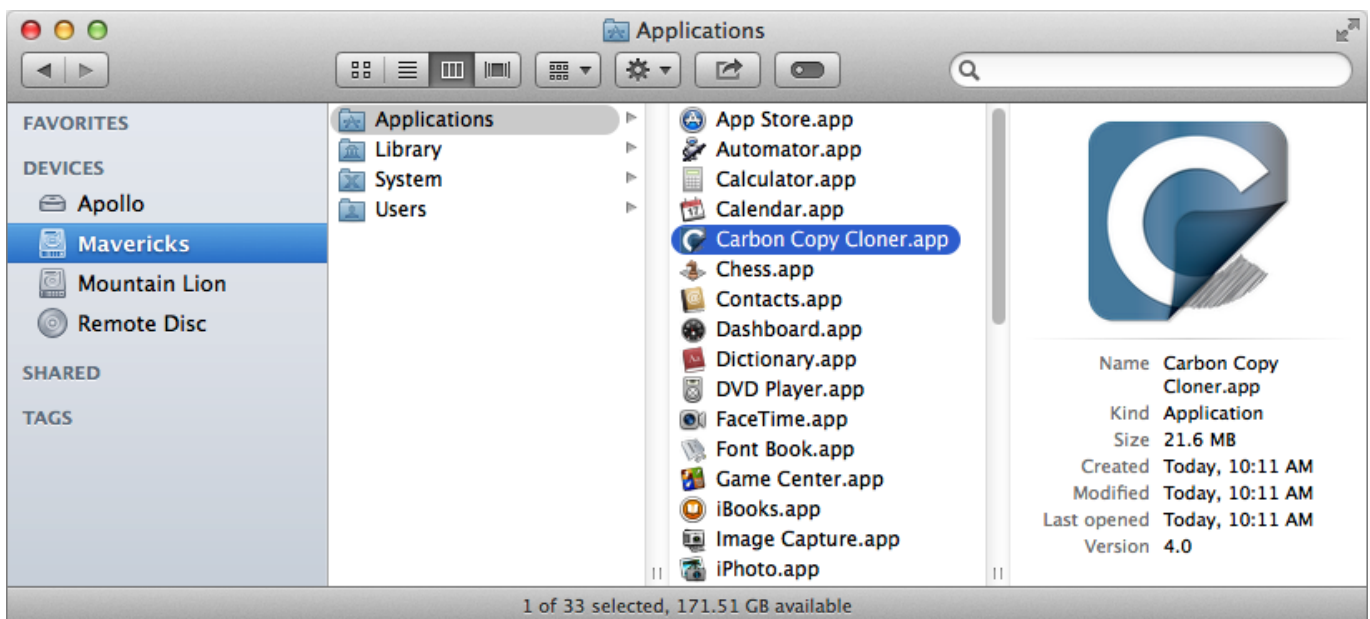
Format the disk

Before you can use a new disk for a backup of macOS, you must first initialize it with the correct format using the Disk Utility application.

See the [Preparing your backup disk for a backup of OS X](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x) <<http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>> section of the documentation for step-by-step instructions. You can also [watch a video of that tutorial on YouTube](https://www.youtube.com/watch?v=3AUXkwaVVFQ) <<https://www.youtube.com/watch?v=3AUXkwaVVFQ>>

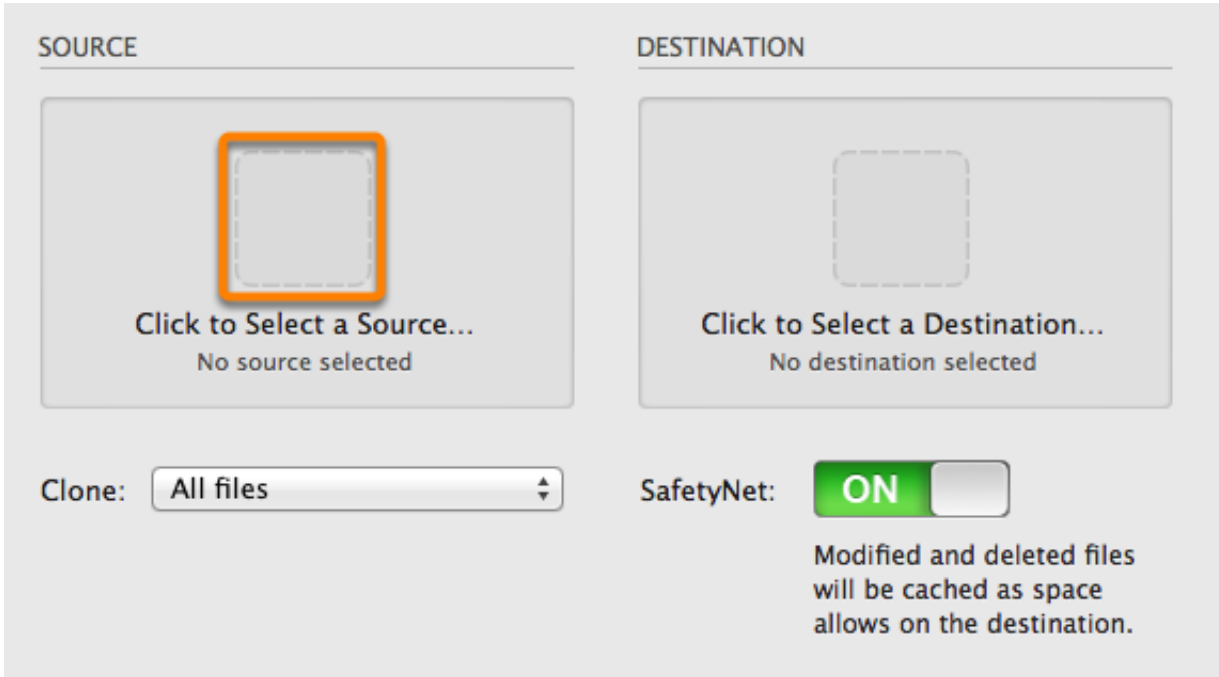
Launch Carbon Copy Cloner

Applications > Carbon Copy Cloner



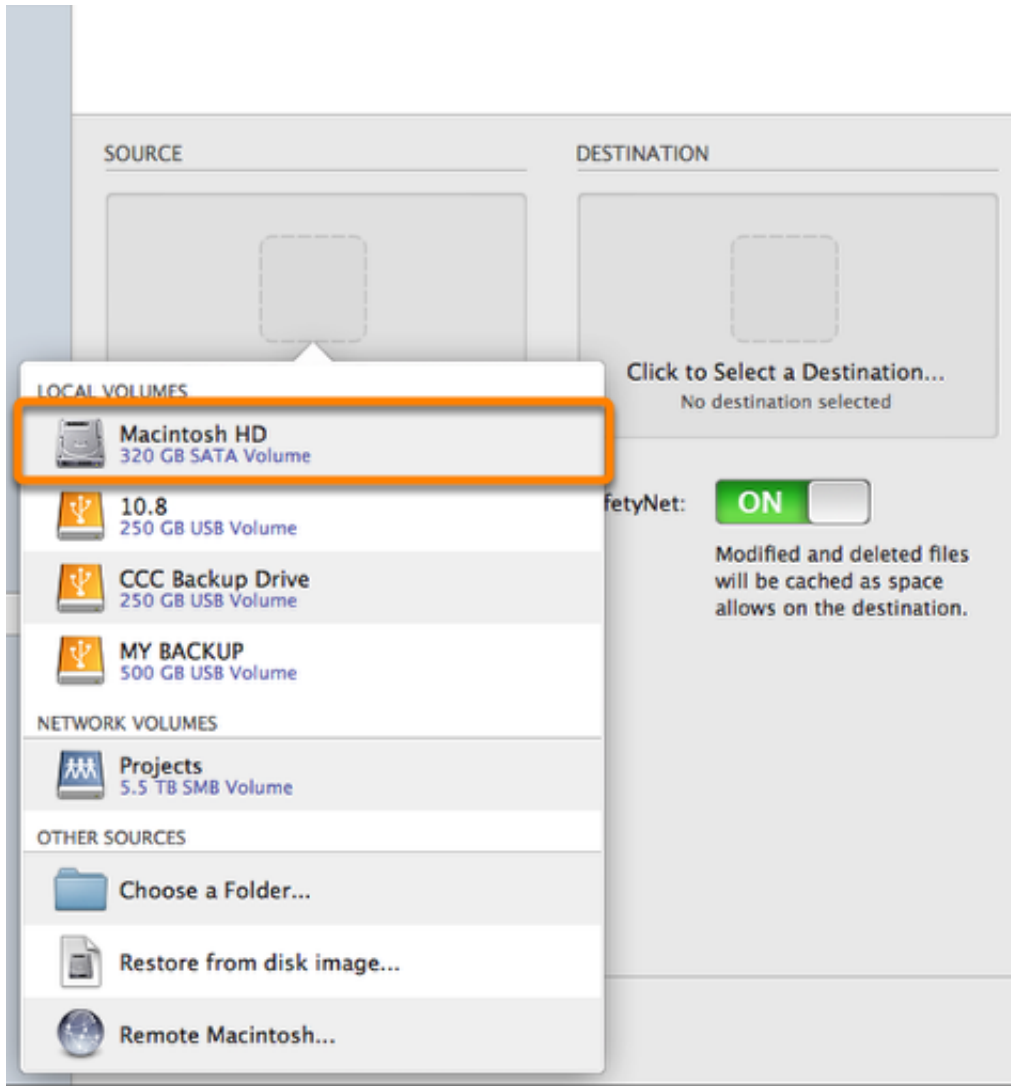
Select the Source

Click on the dotted box under the SOURCE heading to view available sources.



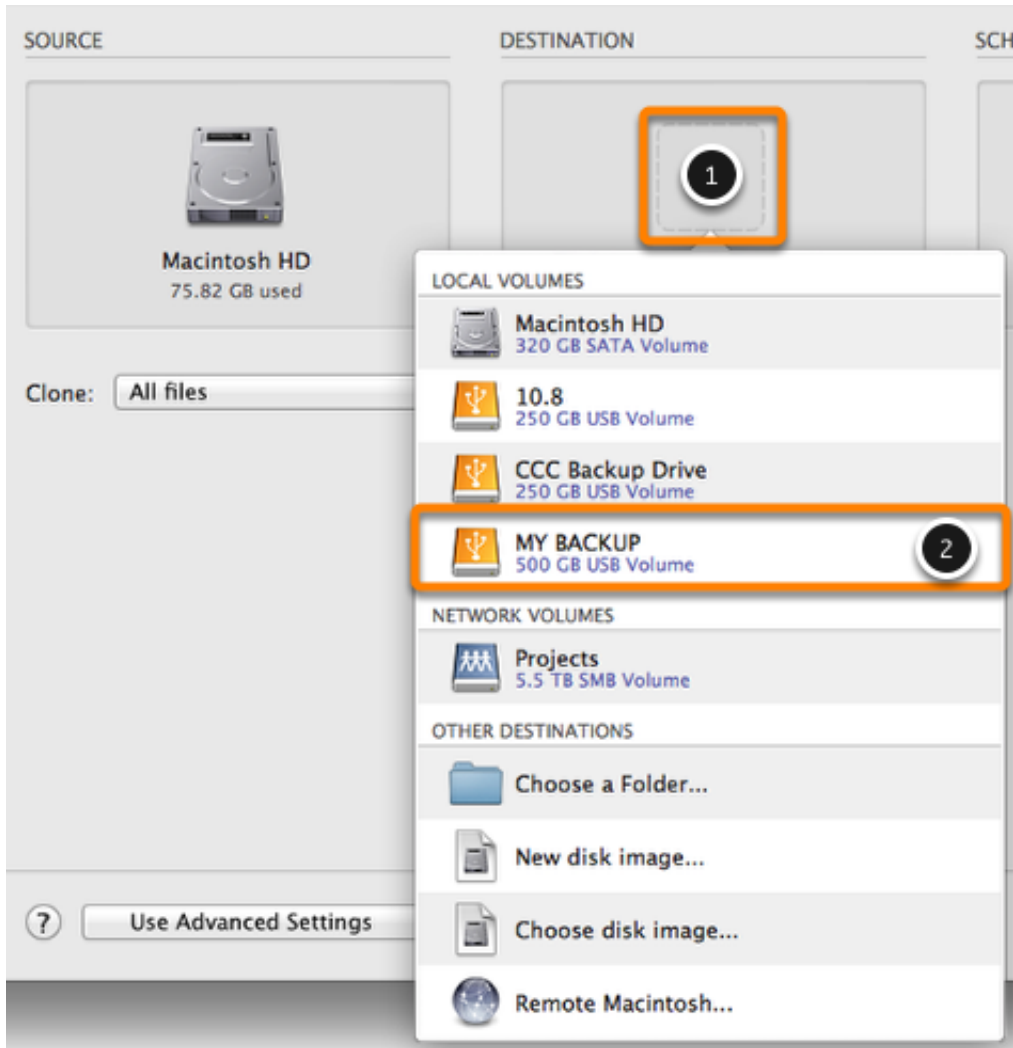
The screenshot shows the Carbon Copy Cloner (CCC) setup window. It is divided into two main sections: SOURCE and DESTINATION. The SOURCE section has a large dashed square button with an orange border, labeled "Click to Select a Source..." and "No source selected". The DESTINATION section has a similar dashed square button, labeled "Click to Select a Destination..." and "No destination selected". Below the SOURCE section, there is a "Clone:" label followed by a dropdown menu currently set to "All files". Below the DESTINATION section, there is a "SafetyNet:" label followed by a toggle switch that is currently turned "ON" (green). Below the toggle switch, there is a note: "Modified and deleted files will be cached as space allows on the destination."

Select your startup disk from the menu of available volumes for the source.



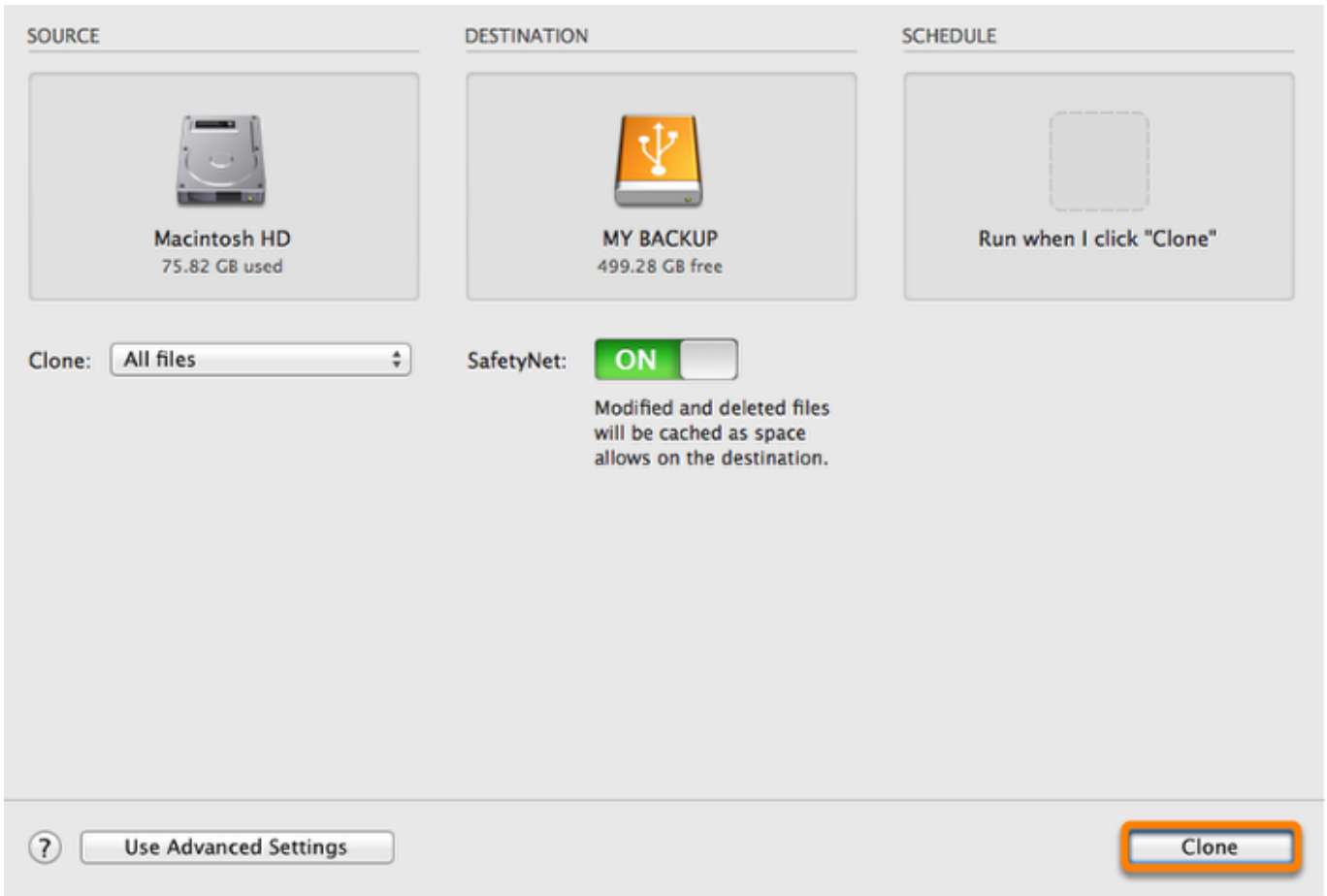
Select the Destination

Click on the dotted box under the DESTINATION heading to view available destinations, then select your new backup drive from the menu of available volumes for the destination.



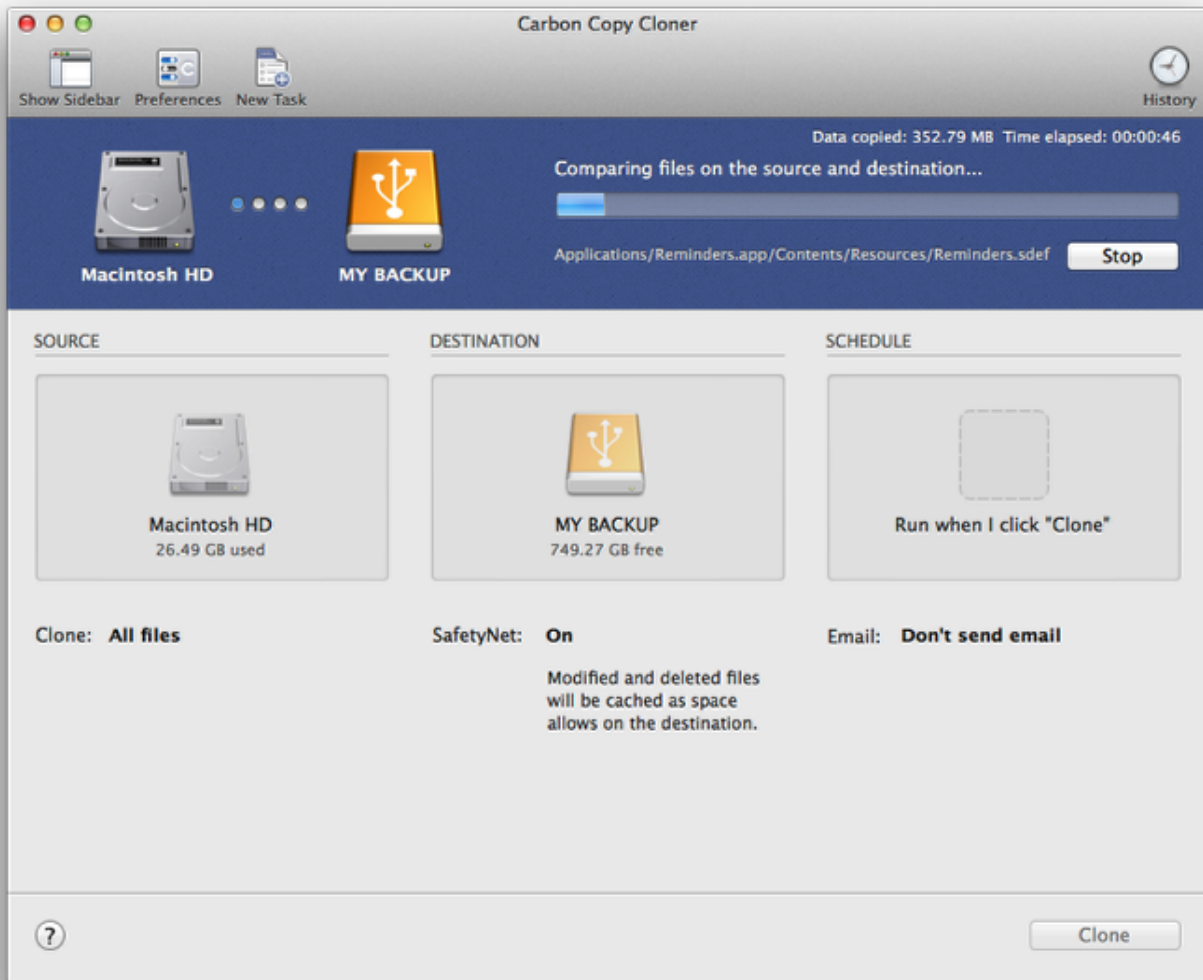
Begin the Clone

Click **Clone**.



The screenshot shows the Carbon Copy Cloner (CCC) interface with three main sections: SOURCE, DESTINATION, and SCHEDULE. The SOURCE section shows 'Macintosh HD' with 75.82 GB used. The DESTINATION section shows 'MY BACKUP' with 499.28 GB free. The SCHEDULE section shows 'Run when I click "Clone"'. Below these sections, there are settings for 'Clone' (set to 'All files') and 'SafetyNet' (set to 'ON'). A note under SafetyNet states: 'Modified and deleted files will be cached as space allows on the destination.' At the bottom, there is a 'Use Advanced Settings' button and a 'Clone' button highlighted with an orange border.

Congratulations - your first clone is in progress!



Smart Updates

If you run the same backup task again, CCC will copy only the items that have changed. There's no special setting to achieve this behavior, simply click the Clone button again or configure your backup task to [run automatically on a scheduled basis](http://bombich.com//kb/ccc4/how-set-up-scheduled-backup).

Related Documentation

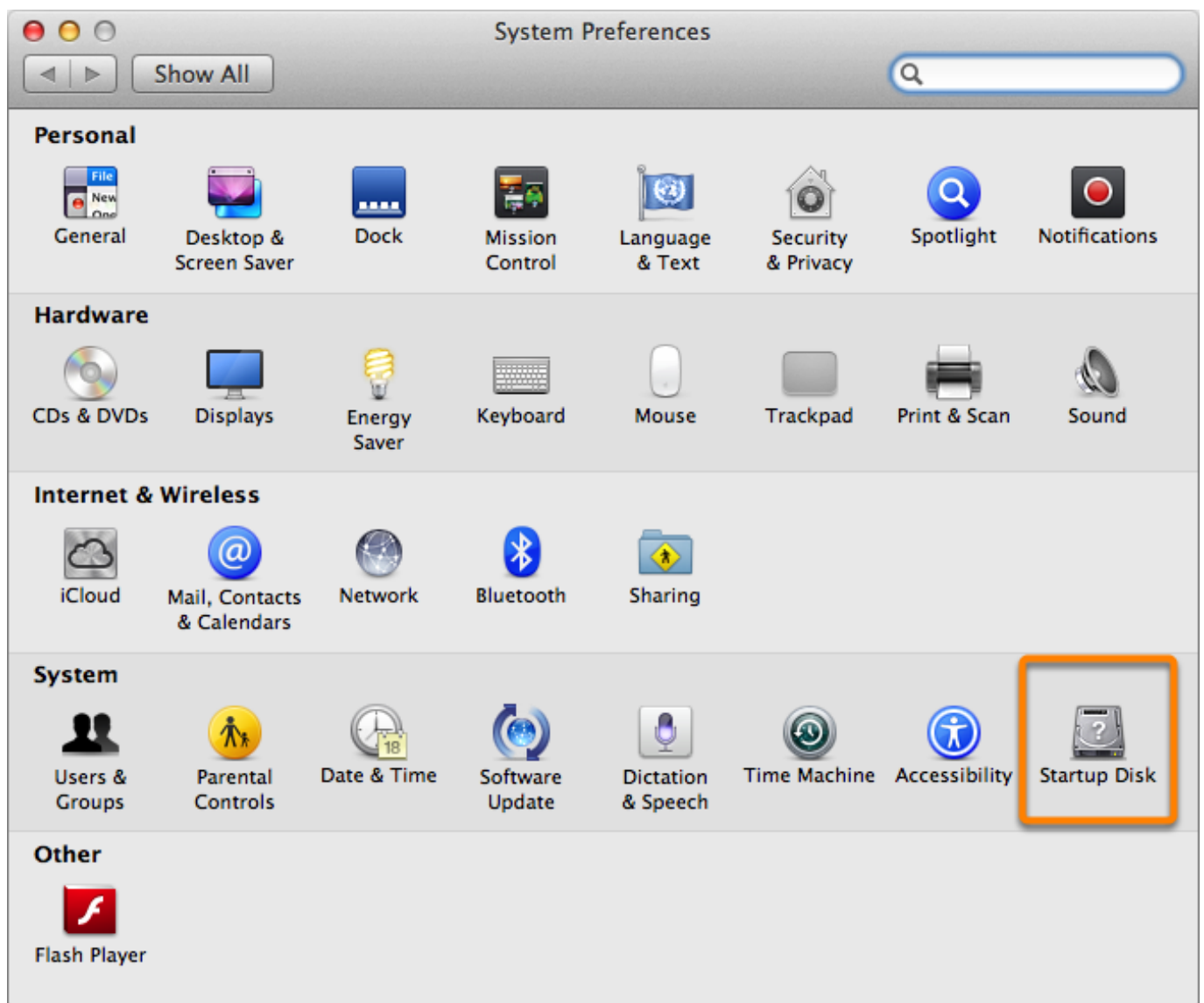
- [How to verify or test your backup](http://bombich.com//kb/ccc4/how-verify-or-test-your-backup)
- [Sample Usage Scenarios](http://bombich.com//kb/tags/sample-usage-scenarios)
- [How do I get help?](http://bombich.com//kb/ccc4/how-do-i-get-help)

How to verify or test your backup

Attach the backup volume to your computer

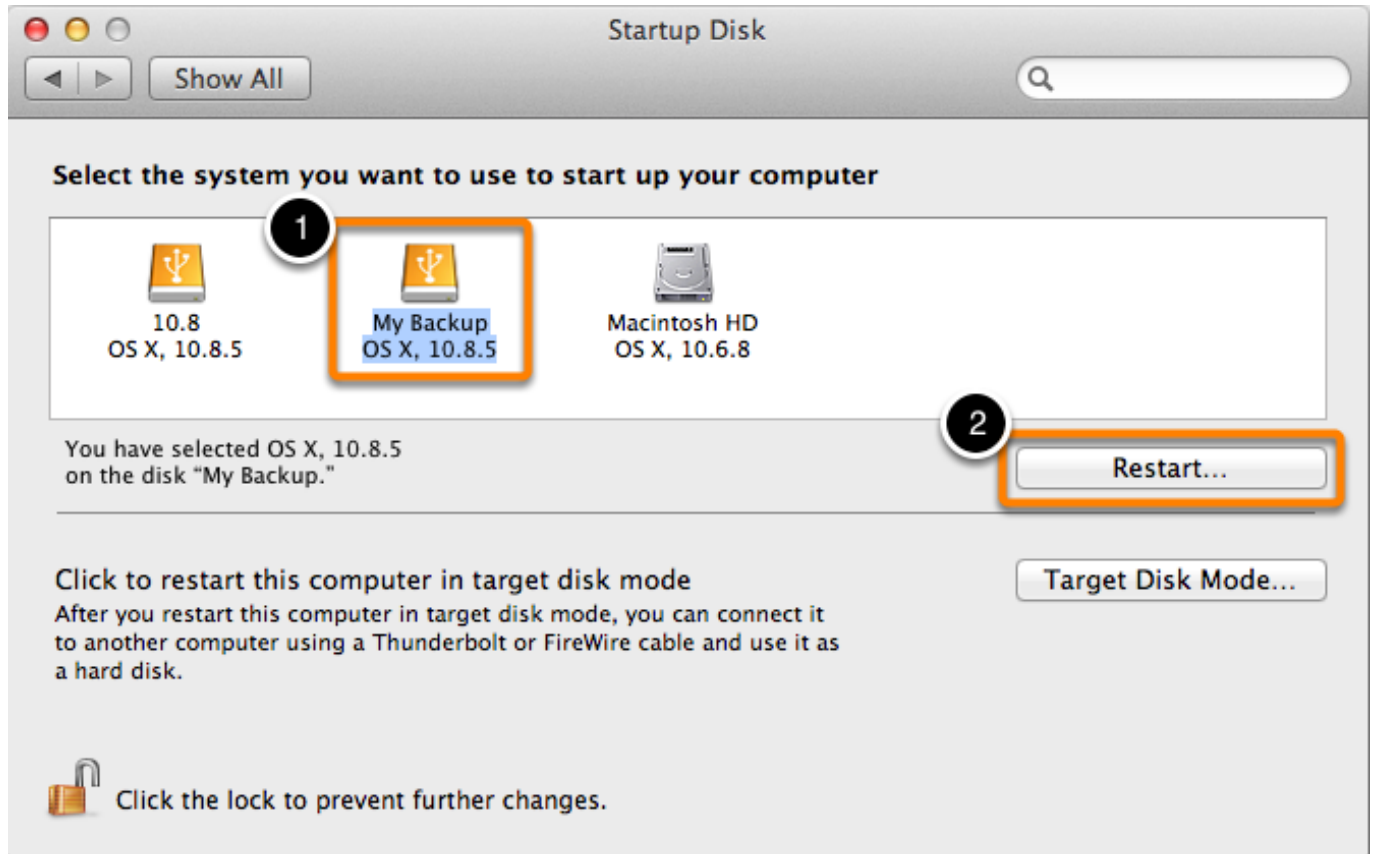
Open the Startup Disk Preferences

System Preferences > Startup Disk



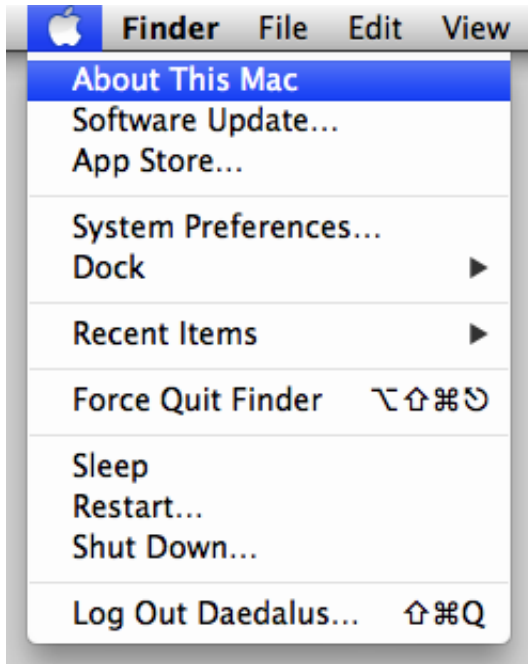
Select the backup volume

After clicking the lock in the lower lefthand corner, select the backup volume that you would like to verify. Click **Restart**.



Verify the startup disk

When your Mac has finished restarting, choose **About this Mac...** from the **Apple** menu.



Verify that you are booted from the backup volume.



Test the Backup

Launch a few applications and verify that your data is intact.

Reset the Startup Disk

Reset your startup disk in the Startup Disk preference pane (as described earlier) to your original startup disk, then restart your computer.

Related Documentation

For a more in-depth verification of the integrity of your backup, see the [Advanced Settings](#)



<<http://bombich.com//kb/ccc4/advanced-settings>> article to learn more about the **Find and replace corrupted files** option.

- Some applications behave differently or ask for the serial number on the cloned volume. Did CCC miss something? <<http://bombich.com//kb/ccc4/some-applications-behave-differently-or-ask-serial-number-on-cloned-volume.-did-ccc-miss>>
- "The disk usage on the destination doesn't match the source — did CCC miss some files?" <<http://bombich.com//kb/ccc4/disk-usage-on-destination-doesnt-match-source---did-ccc-miss-some-files>>
- Help! My clone won't boot! <<http://bombich.com//kb/ccc4/help-my-clone-wont-boot>>

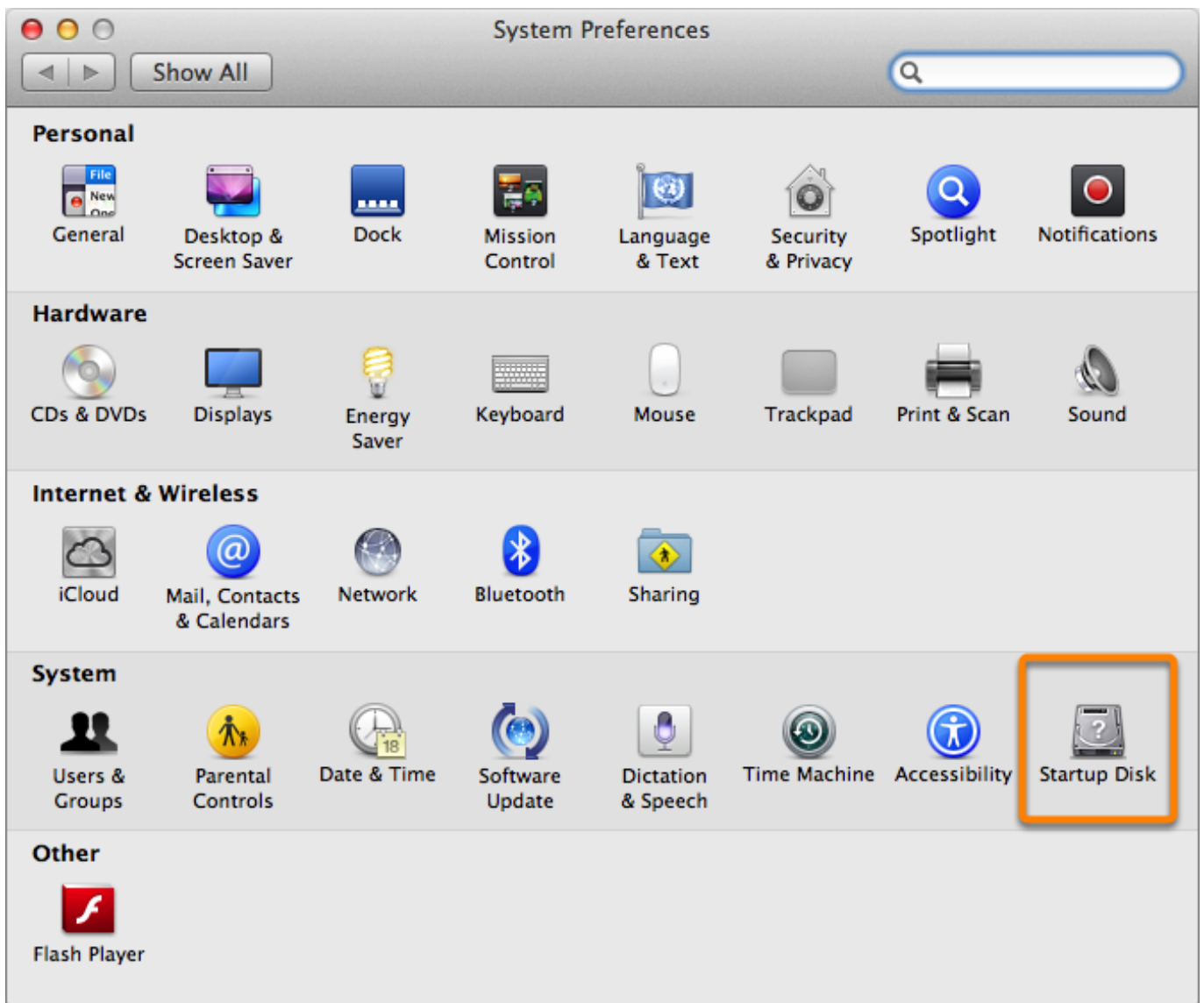
How to restore from your backup

Attach the Backup Volume to Your Macintosh

Attach the backup disk to your Mac using a USB, Firewire, or Thunderbolt cable.

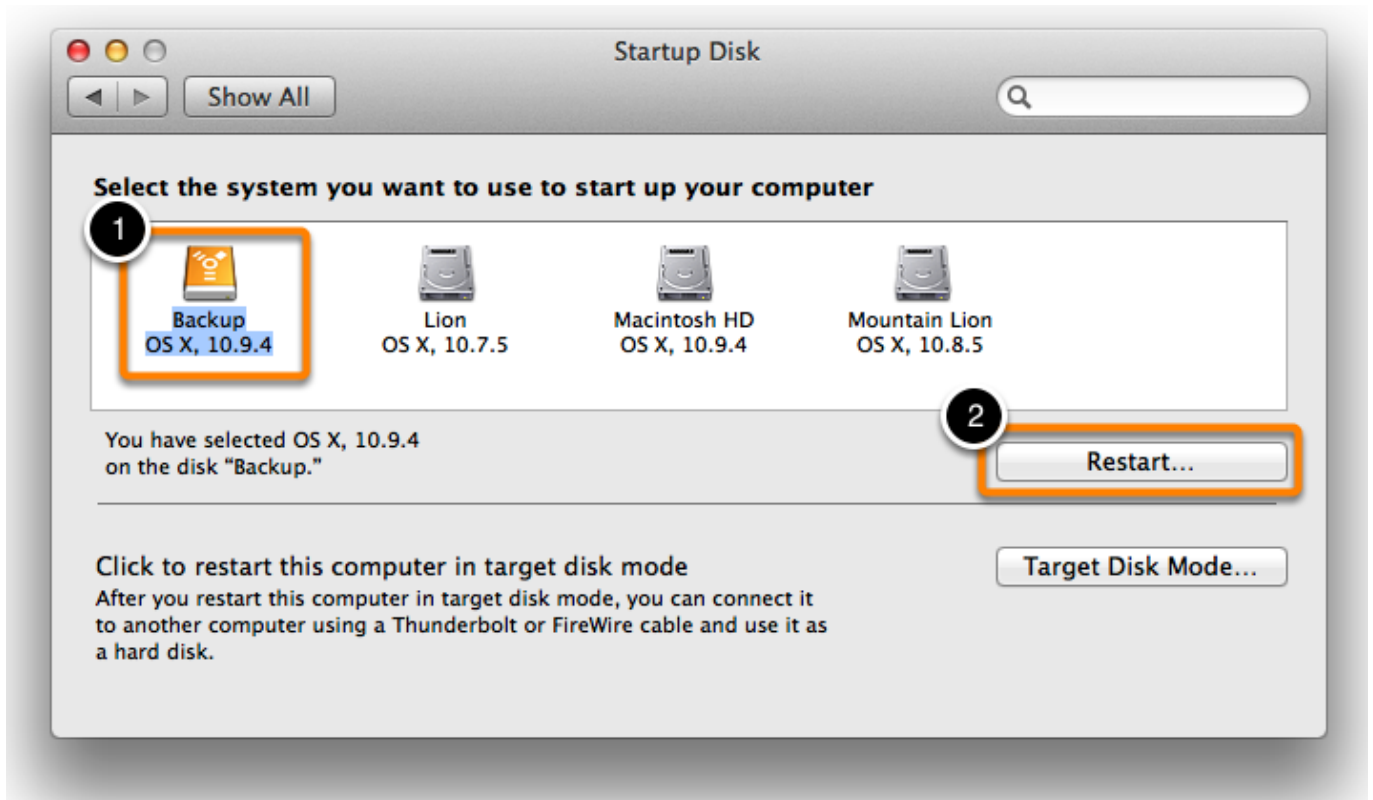
Launch Startup Disk

System Preferences > Startup Disk



Select the Backup Volume

Select the backup disk that you would like to use to restore. Click **Restart**. This will reboot the system from your backup and allow you to clone the backup onto your main hard drive.



If you are unable to boot from your original hard drive, hold down the Option key as you start up your Mac. Your backup disk should appear as a startup disk option in the startup disk selector screen.

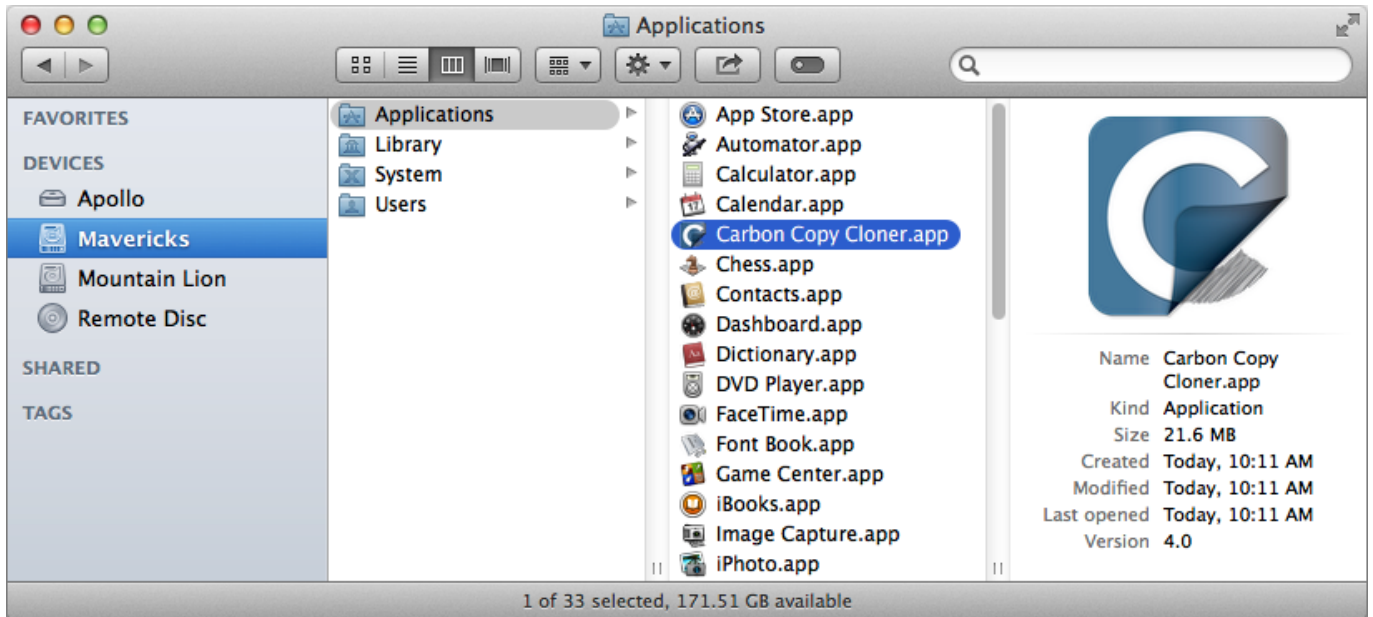
Prepare the disk that you're restoring to

Unless you're restoring just a handful of individual files, we recommend that you restore your backup to a freshly-formatted disk. See [Preparing your backup disk for a backup of OS X](http://bombich.com/kb/ccc4/preparing-your-backup-disk-backup-os-x) <<http://bombich.com/kb/ccc4/preparing-your-backup-disk-backup-os-x>> for complete instructions on how to format the destination.

Launch Carbon Copy Cloner

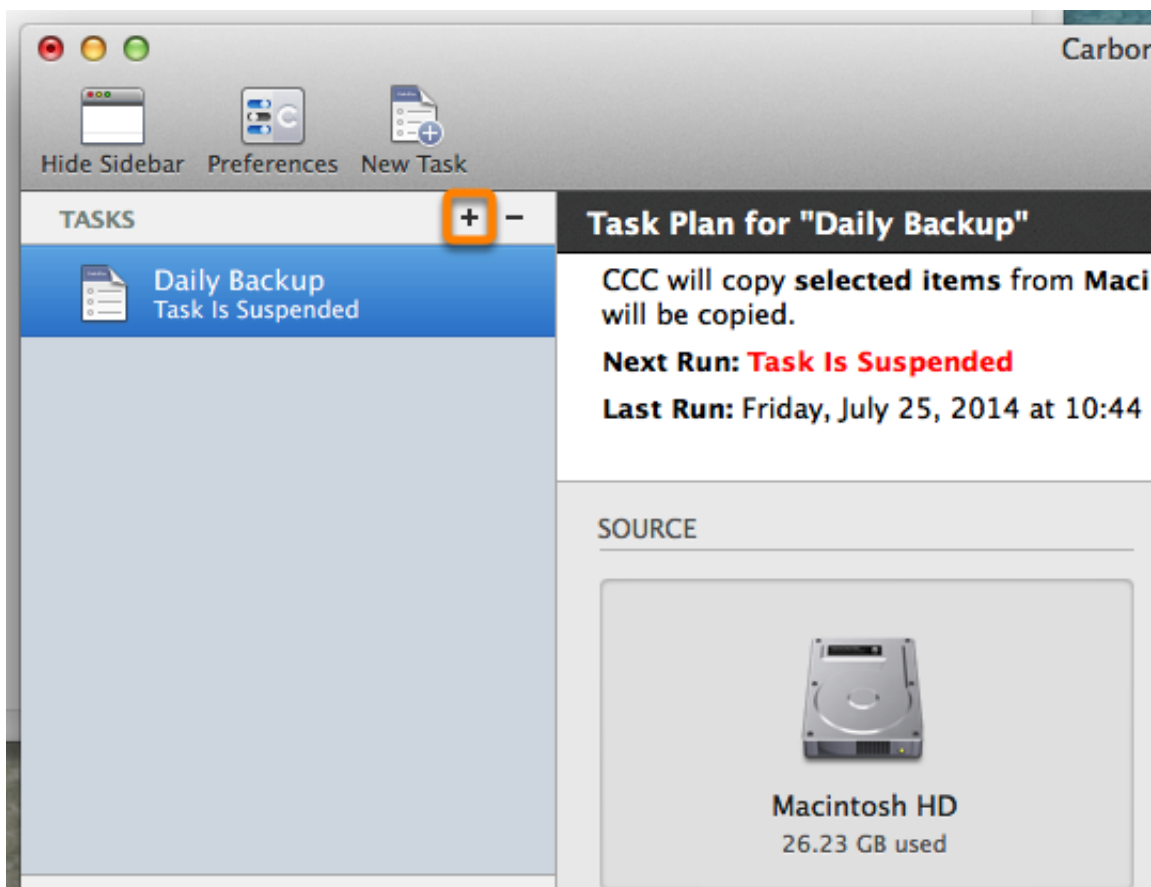
When your Mac has finished restarting launch Carbon Copy Cloner. **Applications > Carbon Copy Cloner**

Note: When you open CCC on your backup volume, CCC will indicate that your regularly-scheduled tasks are suspended. If prompted, choose the option to leave your tasks suspended. Likewise, choose "Revert changes" if prompted to save your tasks.

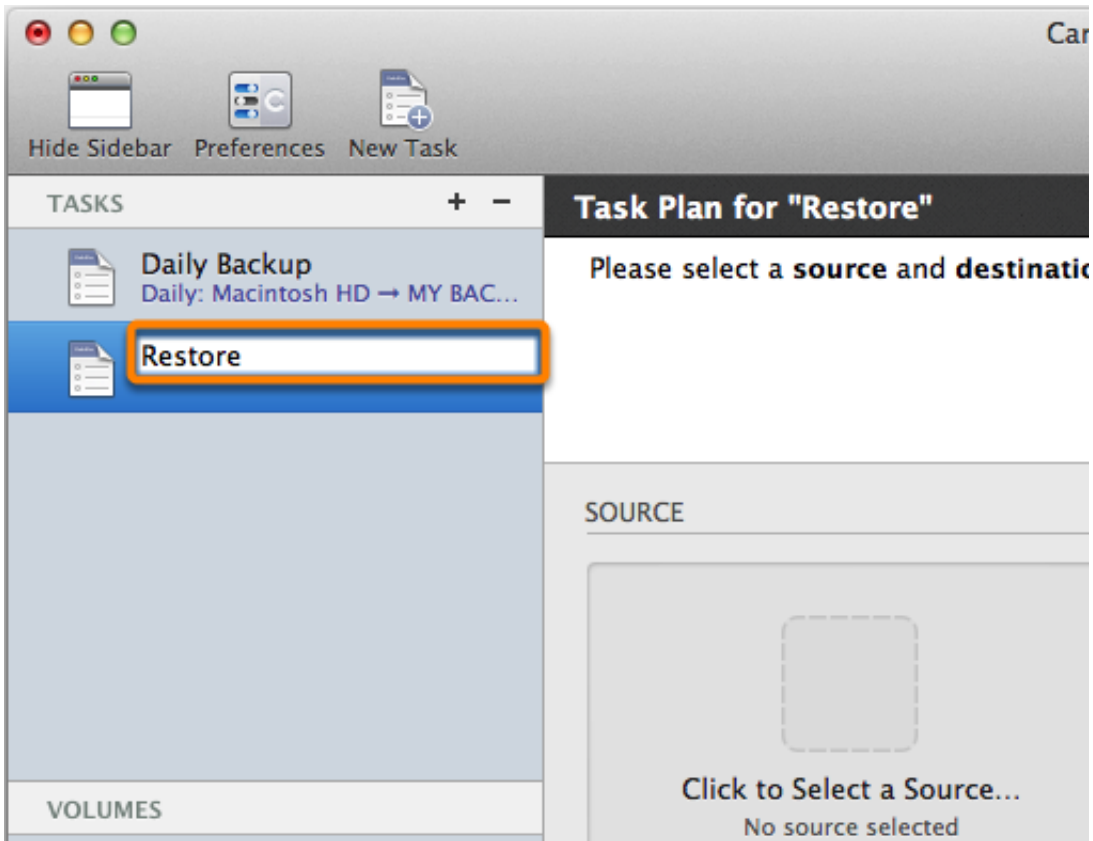


Create a New Task

Click + in the TASKS header. Click **Show Sidebar** if necessary.

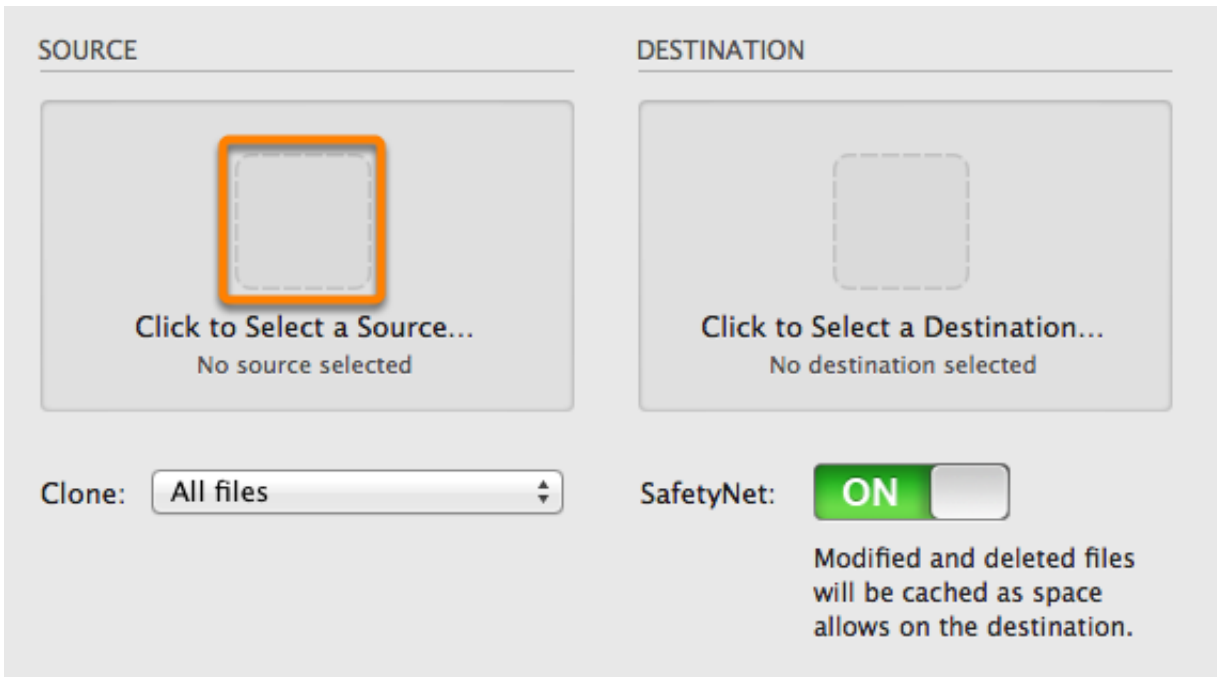


Name the new task.

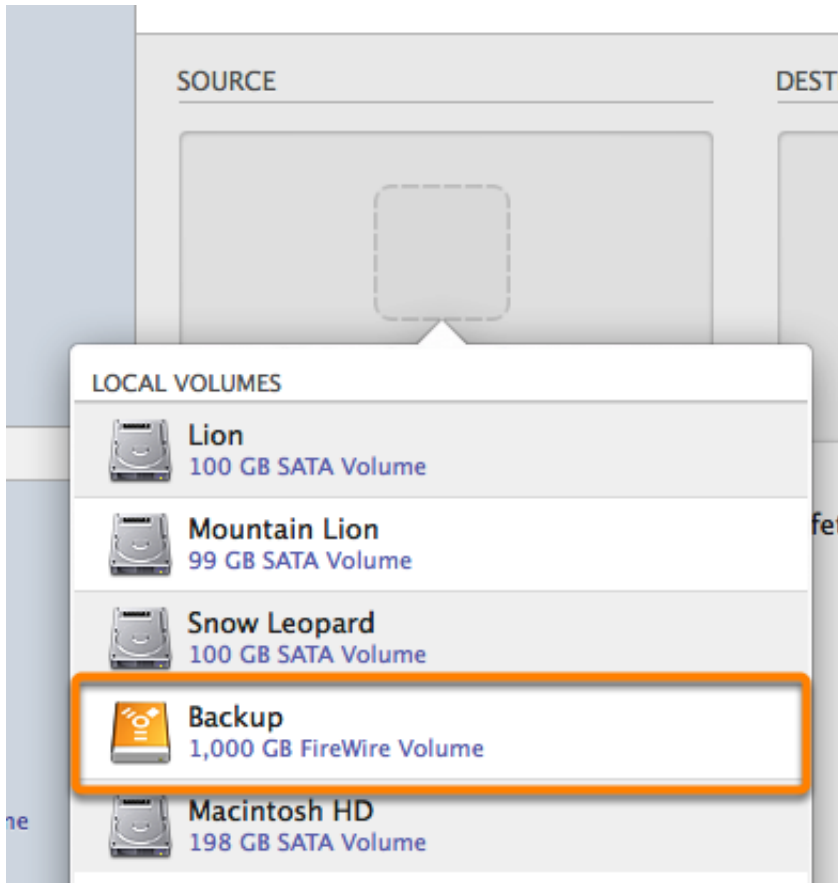


Select the Source

Click on the dotted box under the Source heading to view available drives.

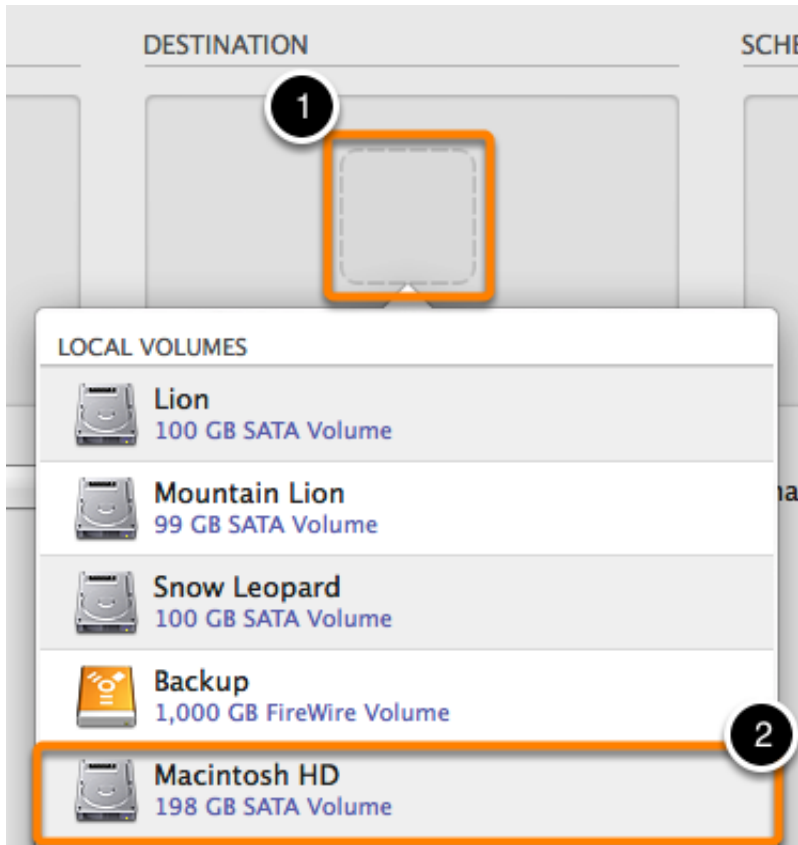


Click to select your backup **volume** as the Source.

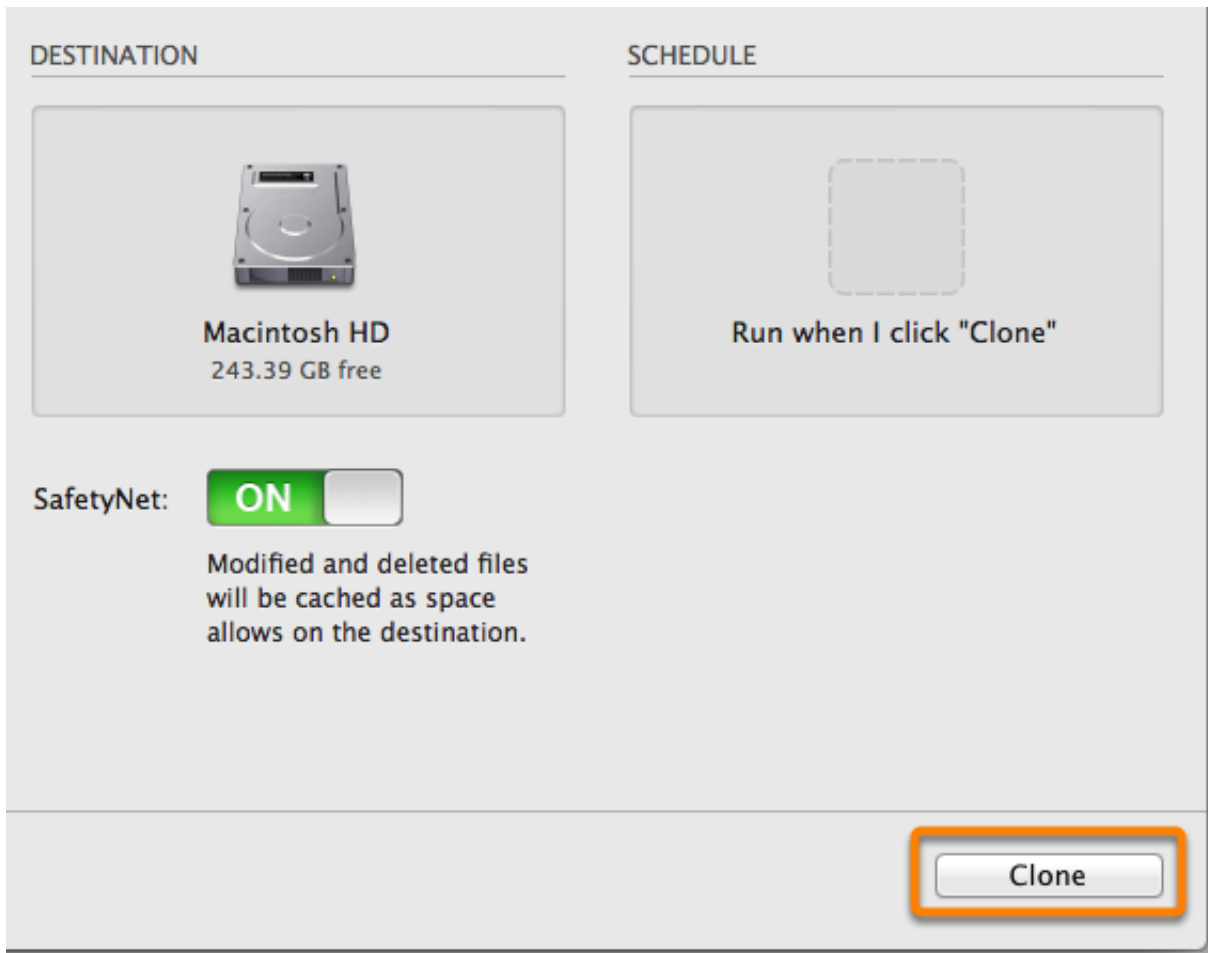


Select the Destination

Click on the **dotted box** under the Destination heading to view available drives. Click to select the **volume** that want to restore to.



Click Clone



Reset the Startup Disk

After the clone is finished reset your startup disk in the Startup Disk preference pane (as described earlier) to your original startup disk and restart your computer.

System Preferences > Startup Disk

Test the Restoration

Launch a few applications and verify that your data is intact.

Congratulations, you've just restored your data from a backup!

Related Documentation

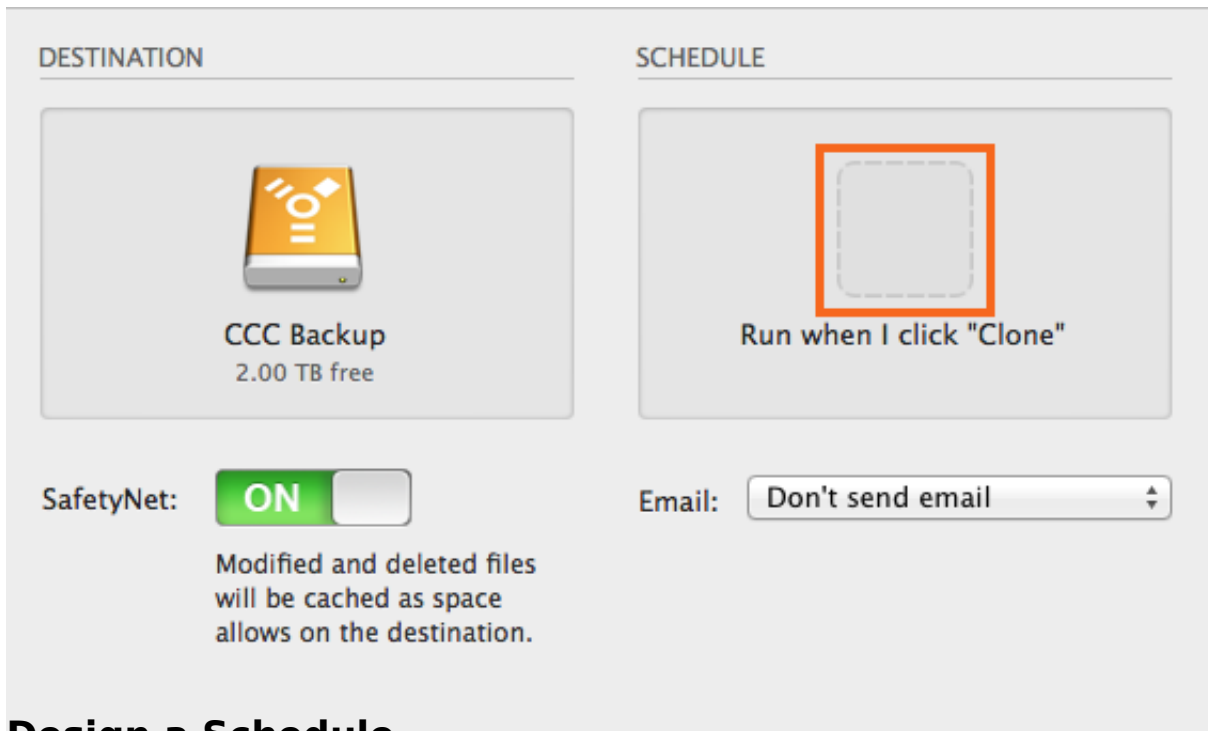
- Video: How to restore individual files and folders from your CCC backup <https://youtu.be/n_7JgLY_W0>
- Restoring non-system files <<http://bombich.com//kb/ccc4/restoring-non-system-files>>
- Restoring from a disk image <<http://bombich.com//kb/ccc4/restoring-from-disk-image>>
- "I have a full-volume backup in a folder or a disk image, but I don't have a bootable backup. How can I restore everything?" <<http://bombich.com//kb/ccc4/i-have-full-volume-backup-in-folder-or-disk-image-i-dont-have-bootable-backup.-how-can-i>>

How to set up a scheduled backup

Watch a video of this tutorial on YouTube <<https://www.youtube.com/watch?v=IHijjbbTiV4>>

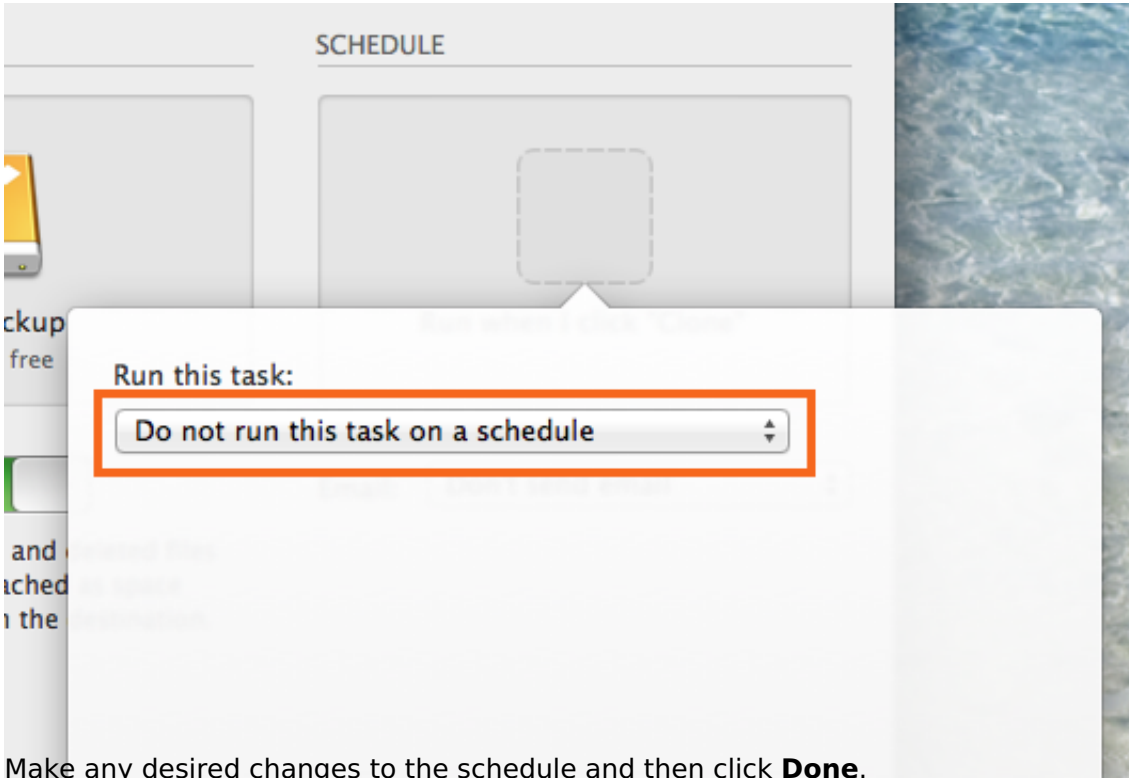
Configure the Task

Configure CCC as if you were going to run a backup task immediately, selecting your **Source** and **Destination**. Click the dotted box below the **Schedule** heading to view the scheduling options.

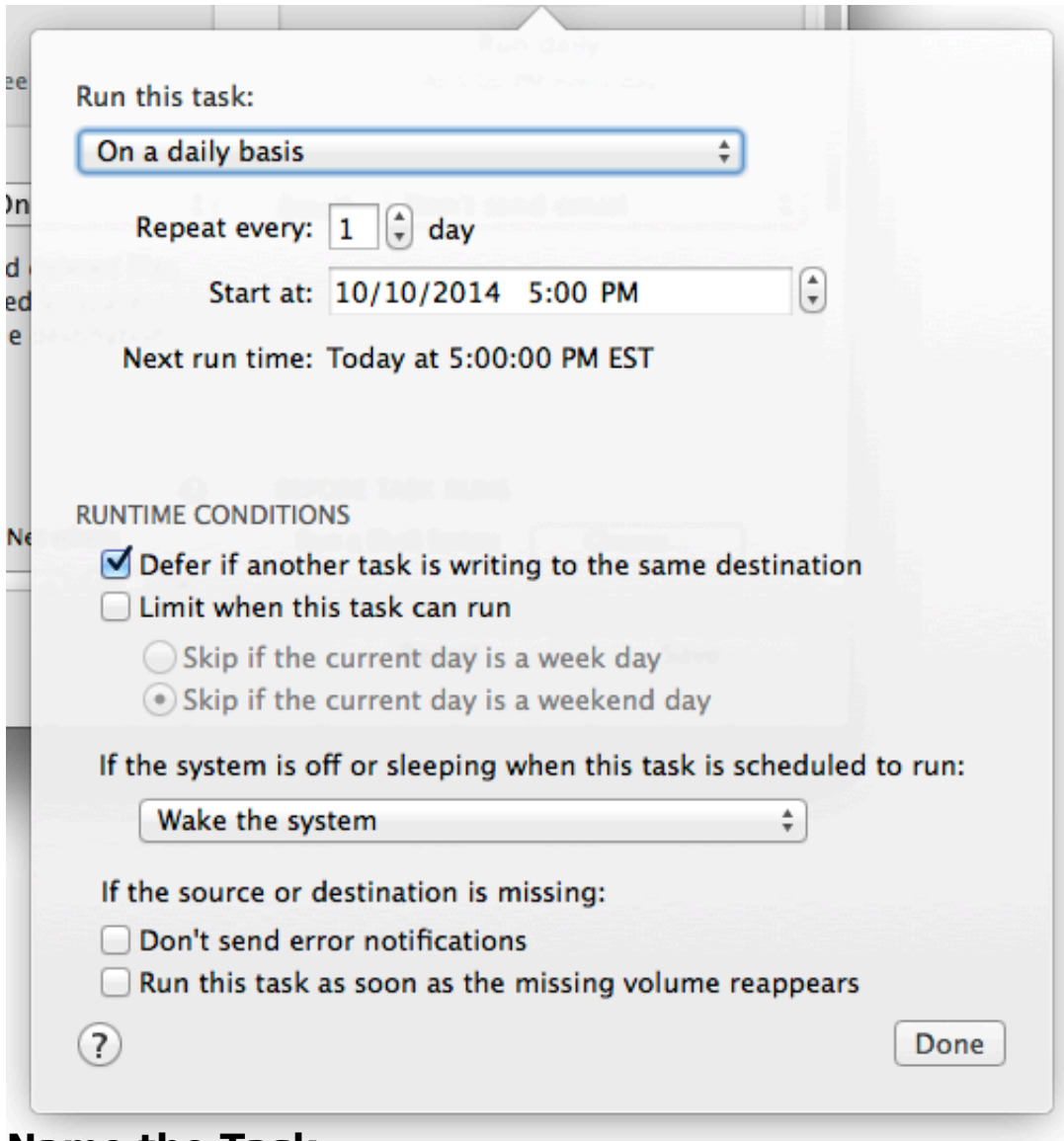


Design a Schedule

Select when you would like the task to run from the drop down menu. If you would like the task to run at a regular interval, choose to have the task run on an hourly, daily, weekly, or monthly basis. If you would like to have the task run when the source or destination volume is reconnected to your Mac, choose the **Run on disk appearance** option.

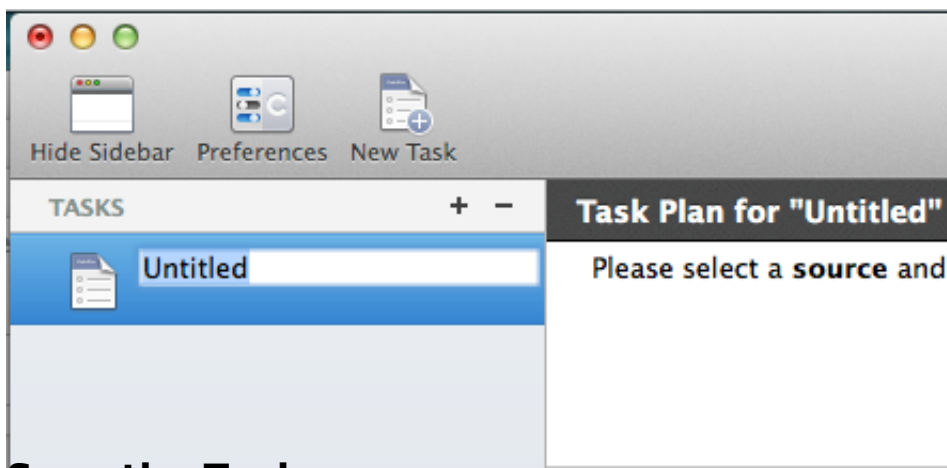


Make any desired changes to the schedule and then click **Done**.






Name the Task

Click on the task title **Untitled** and provide a name for the task.



Save the Task

Click **Save**.

SOURCE	DESTINATION	SCHEDULE
 Macintosh HD 21.31 GB used	 CCC Backup 2.00 TB free	 Run daily At 6:00 PM every day
Clone: <input type="text" value="All files"/>	SafetyNet: <input checked="" type="checkbox"/> ON Modified and deleted files will be cached as space allows on the destination.	Email: <input type="text" value="Don't send email"/>
<input type="button" value="Use Advanced Settings"/>		<input type="button" value="Save"/>

Your backup task will run at the times that you have scheduled!

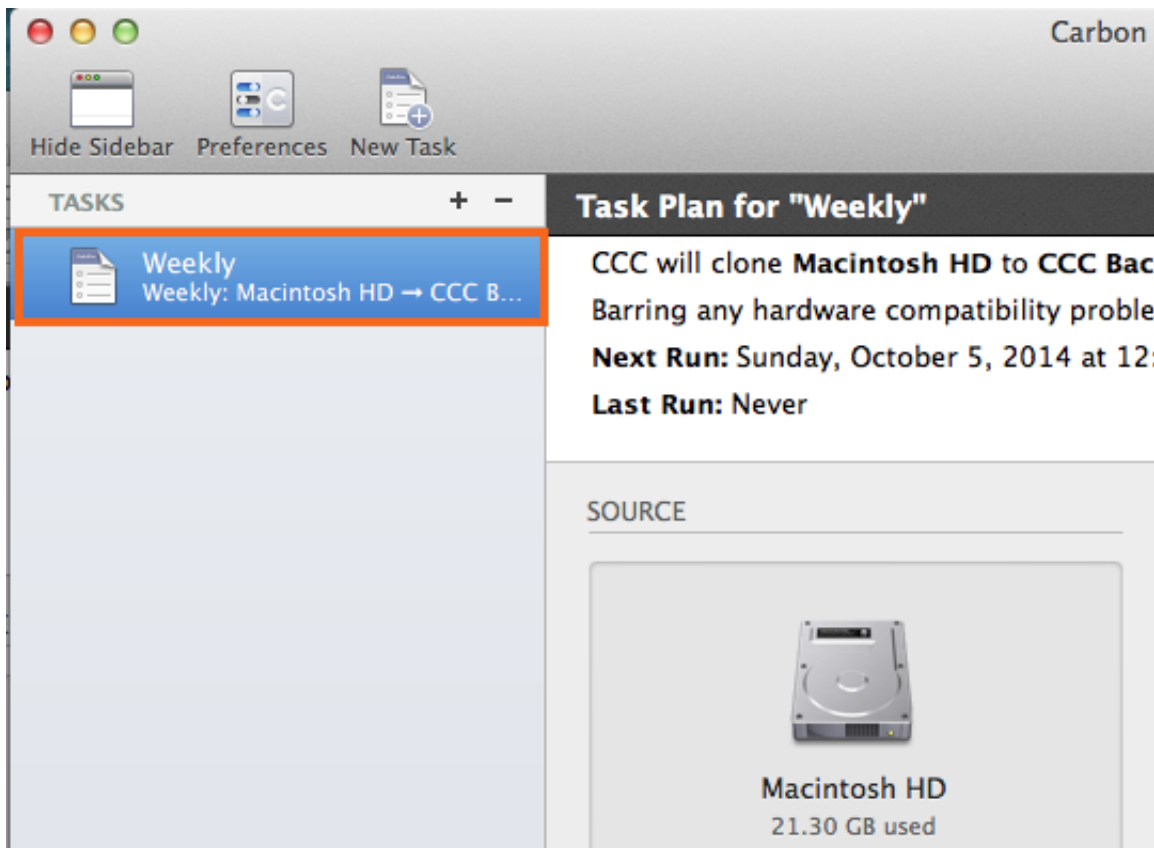
Related Documentation

- [How to modify a scheduled backup <http://bombich.com//kb/ccc4/how-modify-scheduled-backup>](http://bombich.com//kb/ccc4/how-modify-scheduled-backup)
- [Configuring Scheduled Task Runtime Conditions <http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions>](http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions)

How to modify a scheduled backup

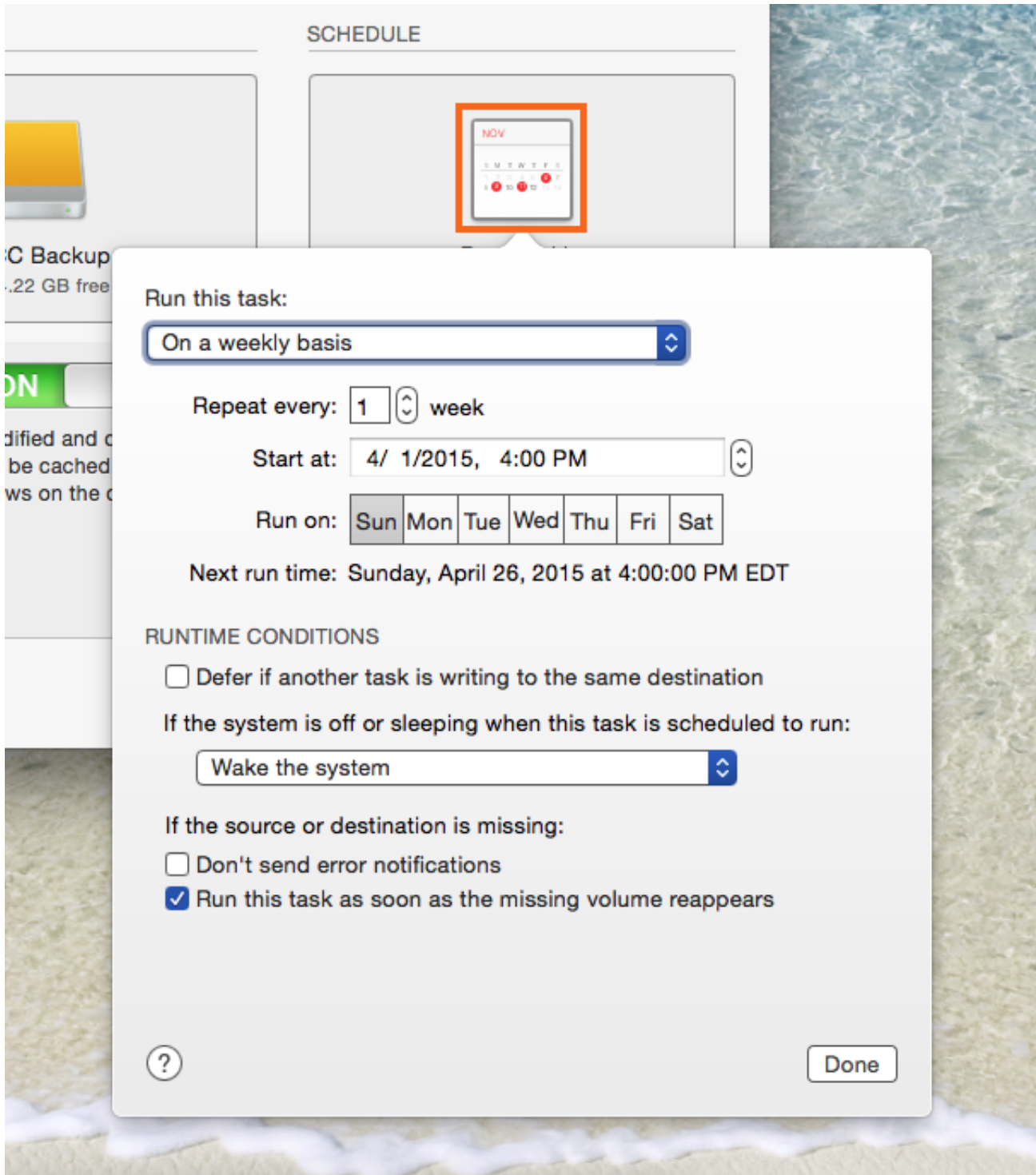
Select the Task

Select the **Task** to be modified. If necessary click **Show Sidebar** to reveal scheduled tasks.



Modify the Schedule

Click the **Schedule Icon**.



Modify the schedule. Click **Done**.

Run this task:

On a weekly basis

Repeat every: 2 weeks

Start at: 4/ 1/2015, 4:00 PM

Run on: Sun Mon Tue Wed Thu Fri Sat

Next run time: Today at 4:00:00 PM EDT

RUNTIME CONDITIONS

Defer if another task is writing to the same destination

If the system is off or sleeping when this task is scheduled to run:

Wake the system

If the source or destination is missing:

Don't send error notifications

Run this task as soon as the missing volume reappears



?

Done

Save the Schedule

Click **Save**.

Note: If you have changed your mind about any changes you have made to your task settings, you can click the **Revert** button to revert the task to its last-saved settings.

DESTINATION	SCHEDULE
 CCC Backup 2.00 TB free	 Run weekly On [Su, Tu, We] every 2 weeks
SafetyNet: <input checked="" type="checkbox"/> ON Modified and deleted files will be cached as space allows on the destination.	Email: <input type="text" value="Don't send email"/>
<input type="button" value="Revert"/> <input checked="" type="button" value="Save"/>	

Your backup will now run according to the new schedule!

Monitoring backup tasks with the CCC menubar application

The Carbon Copy Cloner menubar application

CCC's menubar application gives you quick access to your tasks so that you can quickly determine their status, see which tasks are running, and start, stop, or defer a particular task.



No tasks are running



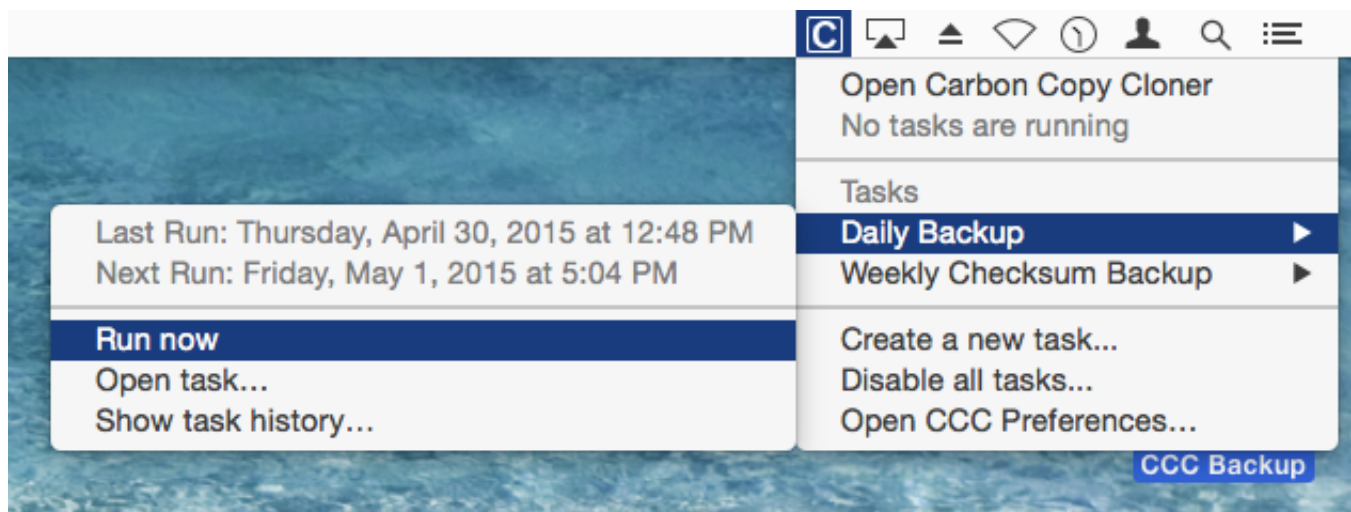
One or more tasks are running



A task requires your attention

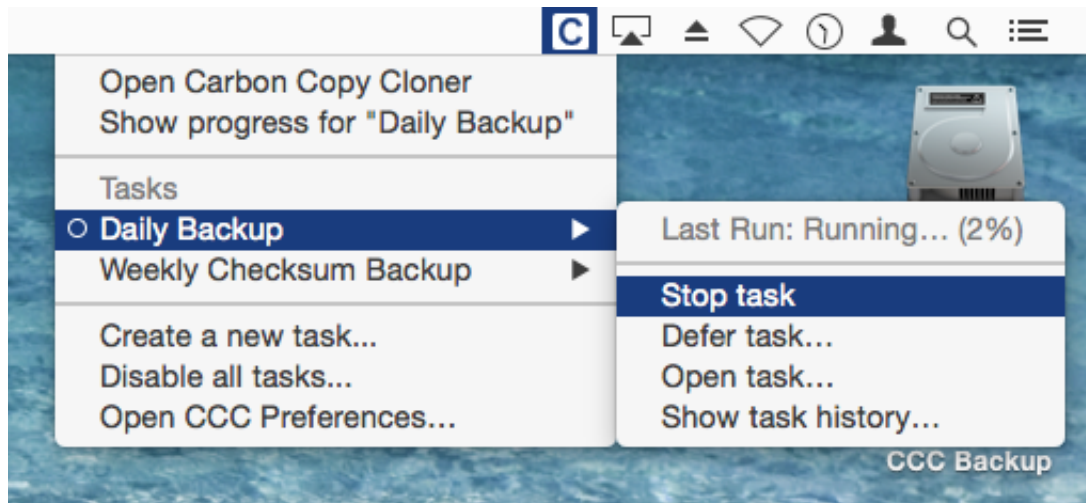
Starting a task

If you would like to run one of your tasks immediately, click on the Carbon Copy Cloner menubar application, then select **Run now** from that task's submenu.



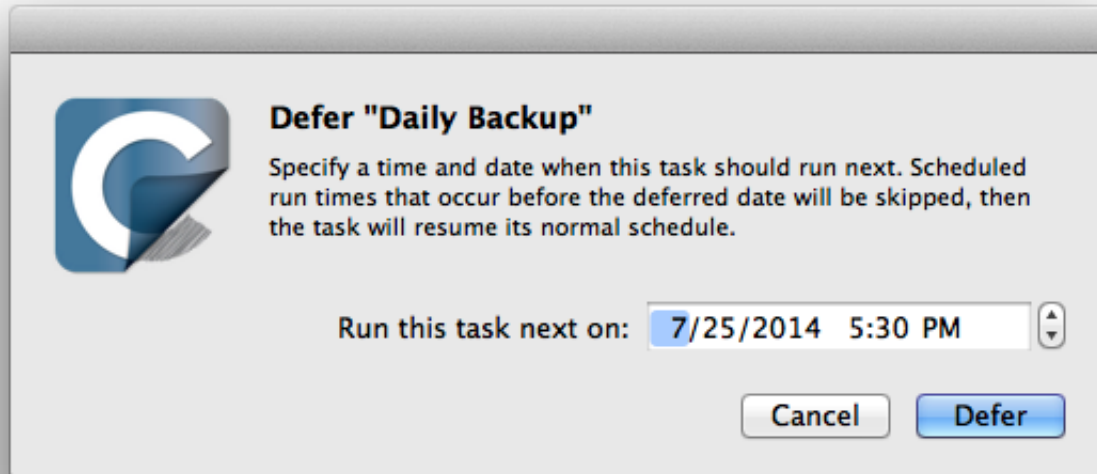
Stopping a task

Occasionally, you may find that one of your scheduled tasks is running at an inconvenient time. Working late? Getting ready to dash off to the airport? Click on the Carbon Copy Cloner menubar application, then select **Stop Task** from the task submenu to stop that task immediately.



Deferring a task

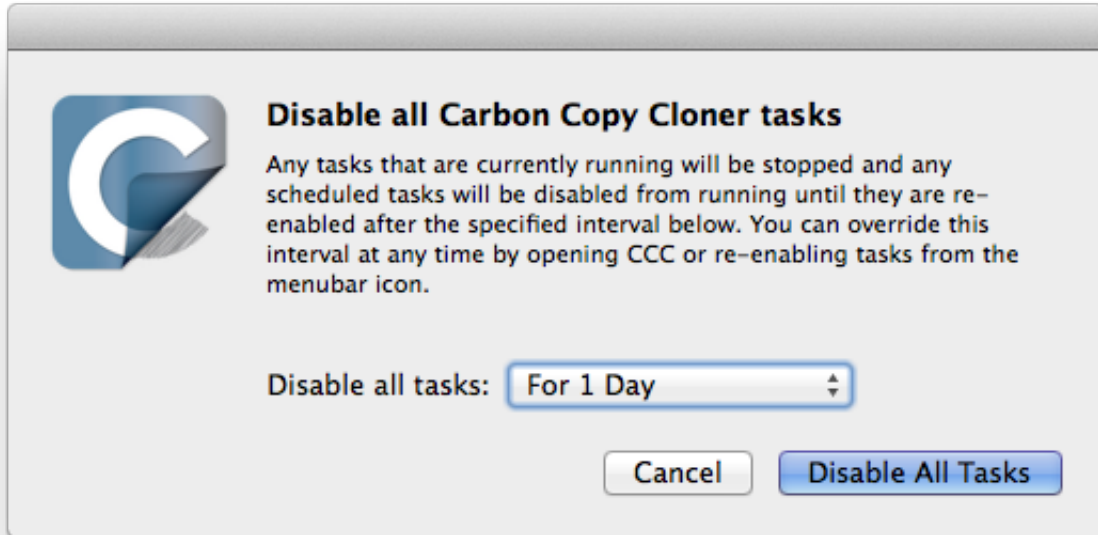
If you want to stop a regularly-scheduled task that is currently running, and also prevent it from running in the near future, you can choose "Defer task" from the Carbon Copy Cloner menubar application. For example, suppose you have taken your laptop with you on vacation, but decided it was safest to leave your backup disk at home. To avoid the daily or hourly indications that your backup volume is unavailable, defer the task until a time that you know your destination disk will be available.



Disabling tasks

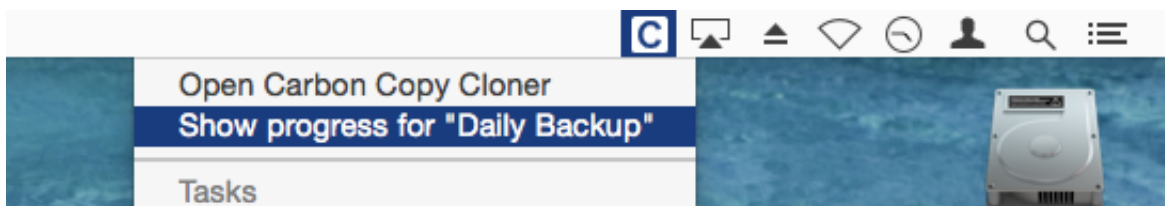
If you would like to disable, or suspend, all tasks, choose **Disable all tasks...** from the Carbon Copy Cloner menubar application menu. CCC will offer a list of choices ranging from one hour to one week, and also an option to disable tasks indefinitely. To re-enable tasks, choose **Re-enable all tasks** from the Carbon Copy Cloner menubar application, or simply open CCC and choose to re-enable tasks when prompted.

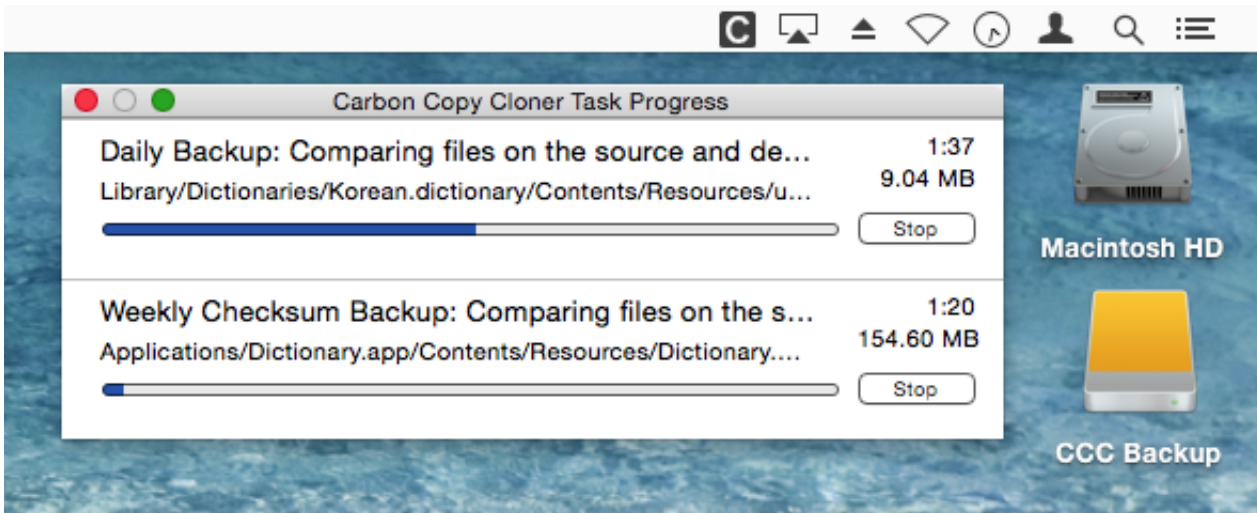
Note: If you would like to disable an individual task, choose **Open task...** from the task's submenu. In CCC, right-click on the task you would like to disable and choose the option to disable the task. Note that disabled tasks do not show up in the CCC menubar application list of tasks.



Viewing task progress indication

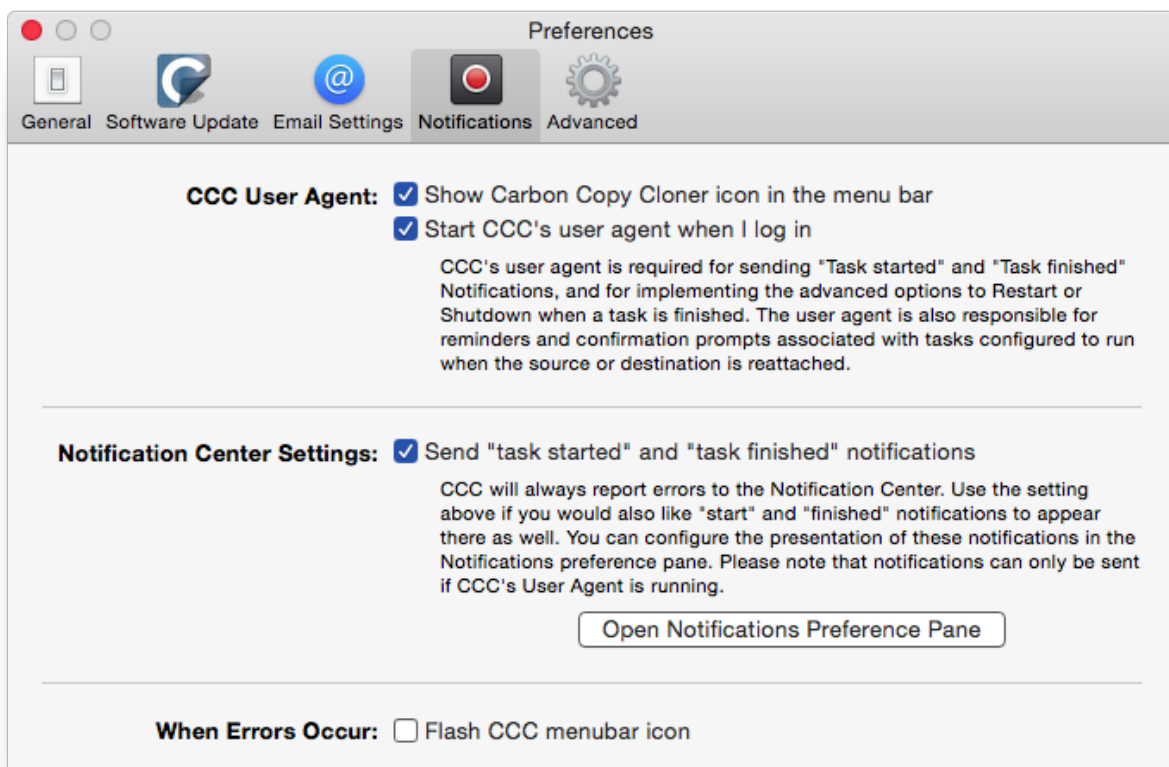
The CCC menubar application offers a miniature task progress window. This window will display detailed progress indication for every running task, and will automatically hide itself when no tasks are running. This window is not displayed by default, choose **Show progress for {task name}** to reveal the window. Note that this option is only available when a task is running, the window cannot be opened when there is no progress to show.





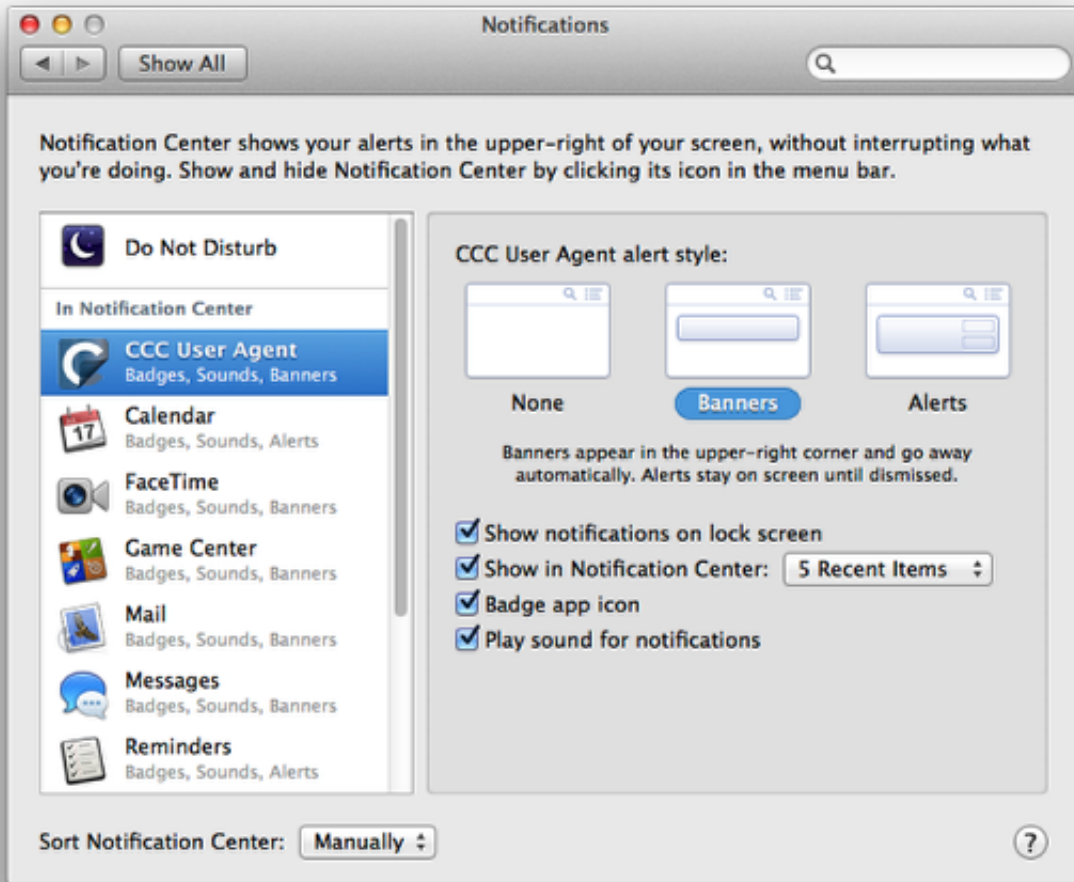
Notification Center

Carbon Copy Cloner sends notifications to OS X's Notification Center when a backup task starts and finishes, and when a task reports an error. These notifications will appear under an application named **CCC User Agent** in Notification Center. The Notifications panel of CCC's preferences windows offers an option to disable task started and task finished notifications, as well as an option to flash the CCC menubar icon when errors are encountered.



To configure how these notifications are managed and presented by macOS's Notification Center,

open the **Notifications** preference pane in the **System Preferences** application.



In older versions of CCC, a scheduled task would present a dialog box if the source or destination was missing, or if errors had occurred. Where can I find that setting in CCC 4?

CCC 4 sends these notifications to Notification Center, so they are subject to the display preferences specified in the Notification Center preference pane. By default, notifications are presented as banners, and these are automatically dismissed after a few seconds. You can configure the **CCC User Agent** notifications to be presented as Alerts instead if you want them to stay on screen until you dismiss them.

Purging CCC from the Notification Center

Applications should automatically be removed from the Notification Center at some point after you delete them from your system. Sometimes, however, Notification Center can be really slow about doing that. If you see multiple copies of CCC in your Notification Center Preference Pane, you can use this [Purge CCC From Notification Center](http://bombich.com/software/files/tools/purge_ccc_from_notification_center.zip)

[<http://bombich.com/software/files/tools/purge_ccc_from_notification_center.zip>](http://bombich.com/software/files/tools/purge_ccc_from_notification_center.zip) utility to immediately remove those items. Note that this will remove **all** instances of Carbon Copy Cloner and CCC User Agent from the Notification Center, including CCC 4. CCC 4's user agent will reappear in

the Notification Center automatically the next time one of your backup tasks sends a notification to it.

Some features of CCC will be disabled if the CCC User Agent is not configured to start on login

The CCC menubar application is named "CCC User Agent", and is bundled inside of the CCC application file. The user agent places the CCC icon in the menubar, but it also provides other proxy-like functionality for CCC's background helper tool. The following features are provided by the CCC user agent:

- **Task started** and **Task finished** Notifications
- The advanced options to **Restart or Shutdown when a task is finished**
- For tasks configured to run when the source or destination is reattached:
 - **Ask for confirmation before proceeding**
 - **Remind me if my task hasn't run in a while**

If you have not configured CCC's user agent to be opened on login, then the features listed above cannot be performed reliably. As a result, those features will be disabled until you configure the user agent as a login item. You can change the CCC user agent login item setting in the Notifications section of CCC's Preferences window at any time.

Related Documentation

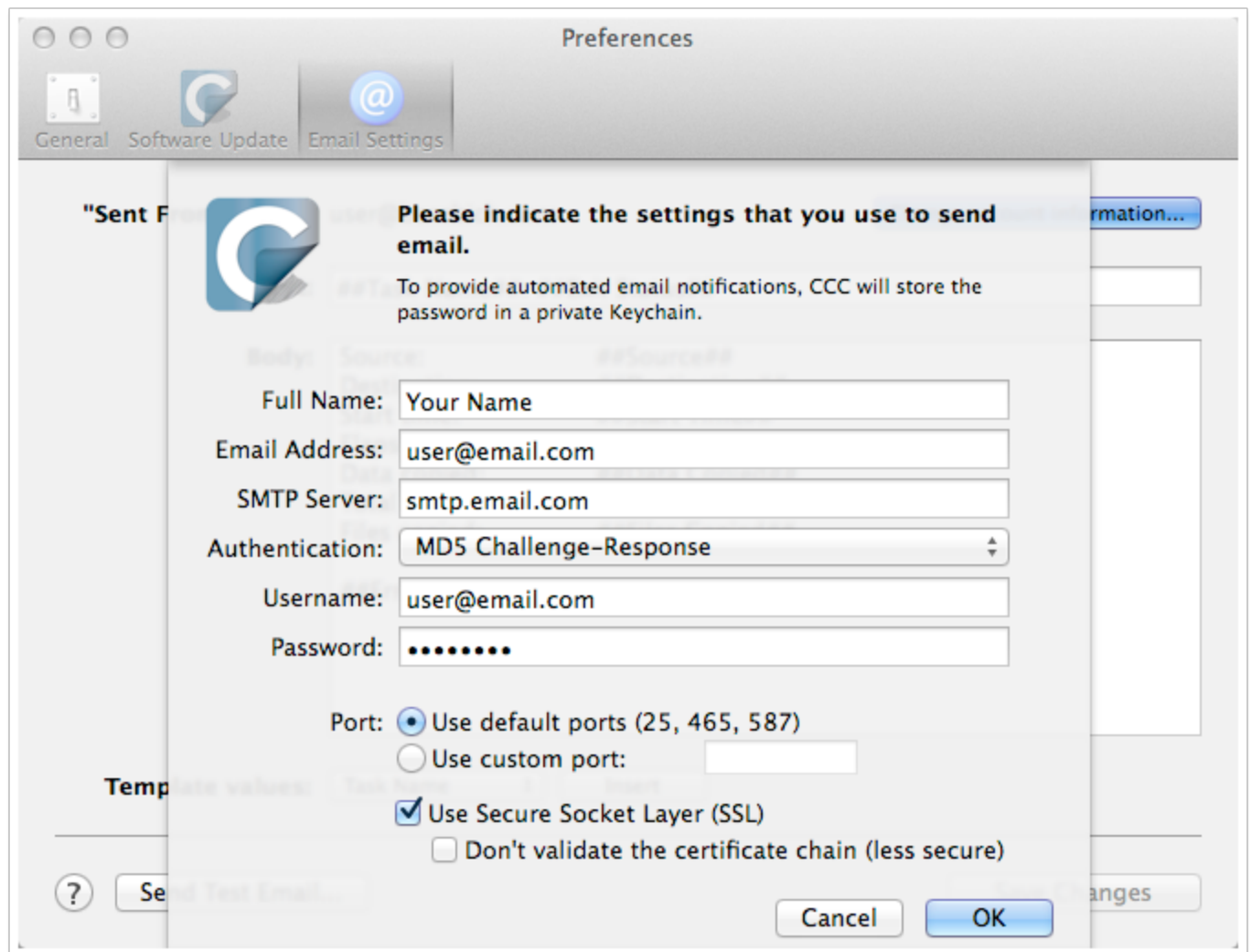
- [Configuring CCC's menubar application preferences <#notification_preferences>](#)
- [How to find out when a backup last ran: CCC Task History <http://bombich.com//kb/ccc4/how-find-out-when-backup-last-ran-ccc-task-history>](http://bombich.com//kb/ccc4/how-find-out-when-backup-last-ran-ccc-task-history)

Configuring Email Notifications

If you would like CCC to send your tasks' results via email, you must first configure a sending email account in CCC's Email Settings.

1. Choose **Preferences** from the Carbon Copy Cloner menu (or click the **Preferences** button in the toolbar).
2. Click the **Email Settings** button in the toolbar of the Preferences window.
3. Choose from one of the accounts imported from Mail in the **Sent From Email** popup menu, then verify the details and provide your account credentials in the form that is provided.
4. Click the **OK** button when you are finished entering your account details.

Note for advanced users: If your SMTP server requires SSL and uses a **self-signed** security certificate, check the **Don't validate the certificate chain** checkbox. Alternatively, you can add your server's security certificate to the **System** keychain in the Keychain Access application and explicitly trust that certificate.



[Optional] Modify the email subject and body template

The subject and body of the email that CCC sends upon task completion can be customized. For



example, if you want to know which of your Mac's a particular email is coming from, you could customize the subject of the message:

Jon's iMac: ##Task Name##: ##Exit Status##

When CCC sends an email notification, it will replace the template values (enclosed in double # characters) with the attributes of your task, e.g.:

Jon's iMac: Daily Backup: Backup Finished Successfully

Most of the available template values are already present in the default template. You can rearrange the template values and modify the text around them, but do not modify the text inside of the double # characters. If you would like to add a template value:

1. Place the cursor where you would like to place the template value, e.g. in the subject or body text field.
2. Select a template value from the **Template values** popup menu.
3. Click the **Insert** button.

When you are finished making changes to your subject and body templates, click on the **Save Changes** button. This template will be used for all email notifications sent by CCC.

If you have suggestions for additional template values, please [let us know](http://bombich.com//software/get_help) <http://bombich.com//software/get_help>!

Send a test email

Click on the **Send Test Email...** button at the bottom of the window. You will be prompted to provide an email address to send the test email to. When CCC indicates that the test email has been sent, check your email to confirm that you can receive it and that the template provides the information you wish to receive when your tasks complete.

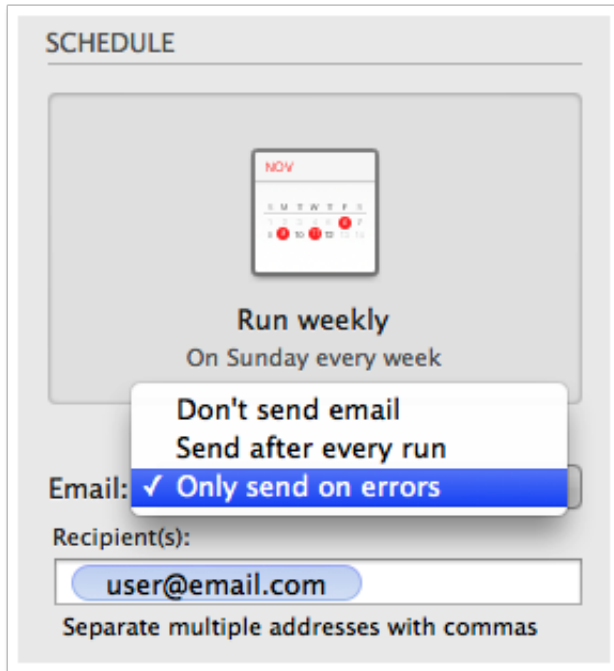
Select a notification level

Close the Preferences window, then select the task to which you would like to add email notifications. There are three notification levels:

- Don't send email: CCC will never send an email when this tasks finishes.
- Send after every run: CCC will send an email at the end of every task (i.e. successful tasks and those that report errors).
- Only send on errors: CCC will send an email only when errors occur for this task.

Select a notification level, then specify the email addresses that you would like CCC to notify when the task completes. If you would like to have emails sent to multiple addresses, separate those addresses with a comma, or simply press the return key after typing in each address. The recipient text field may only show one address at a time. Use the arrow keys to see each address.

Once you have configured a notification level and recipients, choose **Save** from CCC's File menu to save the changes.



Sending email with an SMTP account that requires two-step verification

If you have enabled two-step or two-factor verification on your iCloud or Gmail account, CCC will not be able to immediately send emails using that account. When attempting to send an email with that account, you will receive an error indicating that the username and password are invalid, or that authentication failed.

Solution: iCloud with two-factor or two-step authentication

Apple does not currently extend support to third-party developers for their two-step/two-factor authentication mechanism. If you have enabled two-step or two-factor authentication on your Apple ID, visit your Apple ID account page and create an application-specific password for CCC:

1. Sign in to your [Apple ID account page](https://appleid.apple.com/account/home) <<https://appleid.apple.com/account/home>>.
2. In the Security section, click the **Generate Password...** link under the **APP-SPECIFIC PASSWORDS** heading and follow the steps provided.
3. Paste the application-specific password into the Email Settings panel of CCC's Preferences window.

Apple's reference: [Using app-specific passwords](https://support.apple.com/kb/HT6186) <<https://support.apple.com/kb/HT6186>>

Solution: Yahoo with two-step verification

If you have enabled two-step verification on your Gmail account, visit your App Passwords page to generate an application-specific password for CCC:

1. Visit your [Account Security page](https://login.yahoo.com/account/personalinfo) <<https://login.yahoo.com/account/personalinfo>>.
2. Click on the **Generate app password** link at the bottom of the page.
3. Click **Select your app** and choose **Other App**. Type in CCC or Carbon Copy Cloner as the custom name.
4. Click the **Generate** button.
5. Copy and paste the application-specific password into the Email Settings panel of CCC's

Preferences window. Note: We recommend that you **copy and paste** the code. If you choose to transcribe it, take care not to insert spaces. The code is presented in four groups, but it does not actually contain spaces; it should be exactly 16 characters.

Solution: Gmail with two-step verification

If you have enabled two-step verification on your Gmail account, visit your App Passwords page to generate an application-specific password for CCC:

1. Visit your [App passwords page](https://security.google.com/settings/security/apppasswords) <<https://security.google.com/settings/security/apppasswords>>.
2. Click **Select app** and choose **Other (custom name)**. Type in CCC or Carbon Copy Cloner.
3. Click the **Generate** button.
4. Paste the application-specific password into the Email Settings panel of CCC's Preferences window. Note: We recommend that you **copy and paste** the code. If you choose to transcribe it, take care not to insert spaces. The code is presented in four groups, but it does not actually contain spaces; it should be exactly 16 characters.
5. Click the Done button.

Google's reference: [Sign in using App Passwords](https://support.google.com/accounts/answer/185833) <<https://support.google.com/accounts/answer/185833>>

"Your Gmail account will not permit CCC to send email notifications"

Google is very insistent that developers of third-party applications attain a Google Developer Account and subscribe to Google's proprietary APIs so they can use a special form of authentication with Gmail accounts (OAuth2). Developers that choose to use industry-standard authentication mechanisms instead are unjustly deemed as "less secure", and by default, Google will deny authentication requests from these applications. To add insult to injury, when an application attempts to authenticate to Gmail using the industry-standard authentication methods, Google sends you an email that suggests that the requesting application "doesn't meet modern security standards".

CCC absolutely uses modern security standards — TLS, in particular, to secure all traffic to the SMTP server. TLS has and continues to be the modern security standard for securing email communications. Rather than spend several days implementing support for Google's proprietary authentication mechanism, I have chosen to spend my precious development time improving other functionality within CCC; functionality that's core to protecting your data.

If you get a message that your Gmail account won't permit CCC to send email, we have two suggestions:

- [Enable two-step verification on your Google account](https://accounts.google.com/b/0/SmsAuthConfig) <<https://accounts.google.com/b/0/SmsAuthConfig>> and then [create an application password for CCC](#) <[#two_step_auth_google](#)> [this is our primary recommendation]

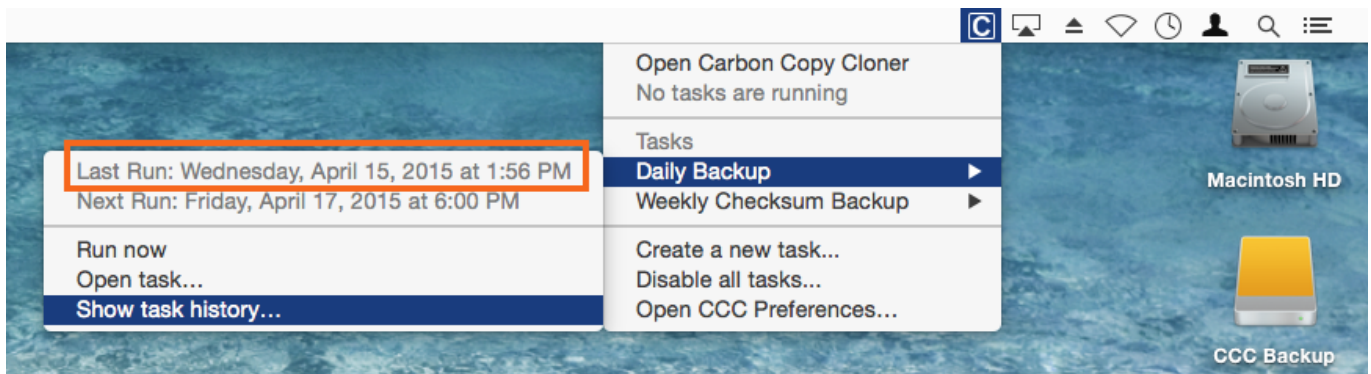
— Or —

- [Change the settings in your Gmail account](http://www.google.com/settings/security/lesssecureapps) <<http://www.google.com/settings/security/lesssecureapps>> that Google disabled

Alternatively, you could just specify a non-Google email account in the Email Settings section of CCC's Preferences window.

How to find out when a backup last ran: CCC Task History

To find out when a backup task last ran, click on the Carbon Copy Cloner icon in your menubar, then move the mouse over the submenu of the task you would like to inspect. The submenu for each task will indicate when the task last ran, the status of that last run, and when the task is scheduled to run next (if applicable). Select **Show task history...** to open CCC and view more detail about the previous times that that task has run.



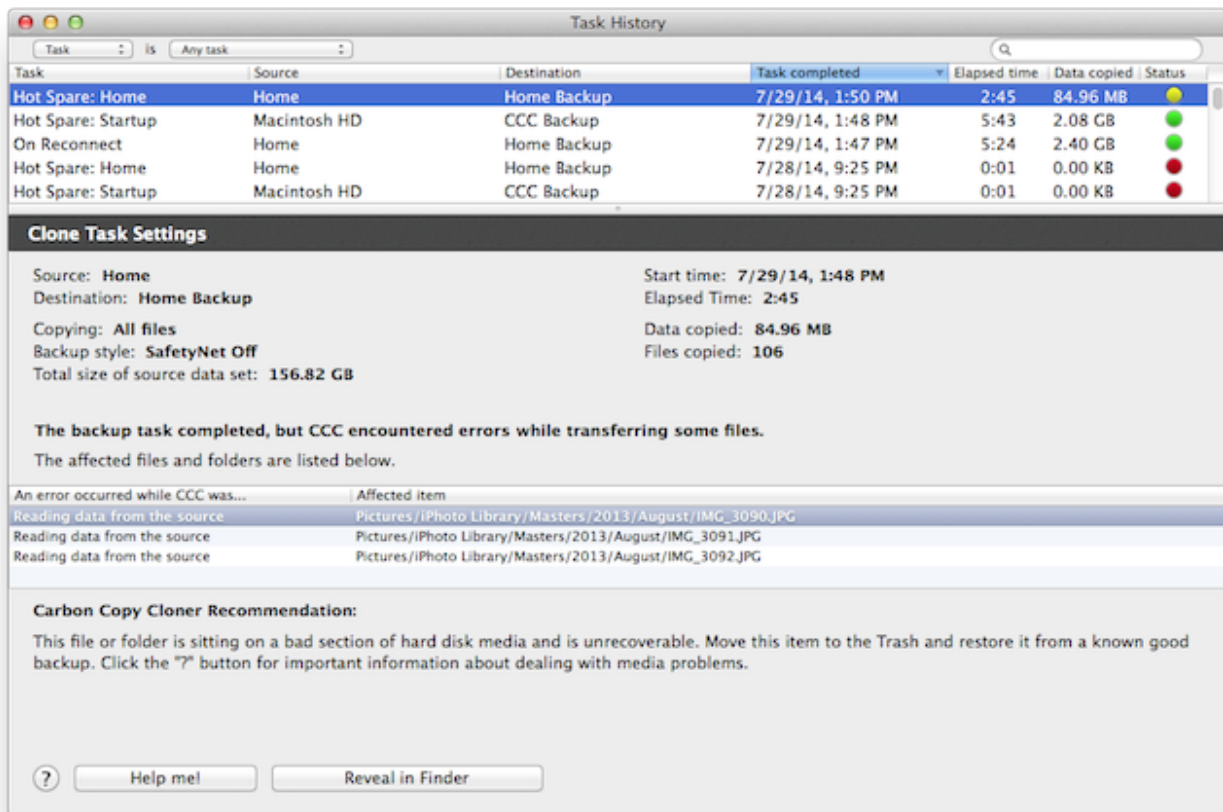
Each time CCC performs a backup task, the results and statistics of that task are recorded and displayed in CCC's Task History window. To view task history, click on the History button in the toolbar, or choose **History** from the Window menu. Within the Task History window, your task events can be filtered and sorted by task name, source, destination, or start time. CCC will show up to 1000 task history events. Each event will indicate when the task started and ended, how much data was copied, and the overall status of the task. The color of the status indicator is defined as follows:

- Green: Task completed successfully
- Yellow: The task completed, but errors occurred while transferring some files
- Red: An error occurred that prevented the task from completing
- Gray: The task was cancelled

If errors occurred, CCC will indicate a list of the affected files. CCC does not record a list of every file that is copied.

Error Reporting

There are many hardware and filesystem problems that could affect your Mac's hard drives. Filesystem and media corruption are commonplace, and CCC delivers expert advice to you when the errors occur. CCC's Task History window shows the results of all of your backup tasks, and details of any errors that occur. CCC enumerates these errors, analyzes them for common conditions, then explains the problem in simple terms with down-to-earth advice for fixing the problem.



You can resize the task history window to see more events at once. You can also drag the divider at the bottom of the events list to make more room for error messages.

Exporting a list of affected files

If you would like to save a list of the affected files in the errors table, select the affected items (or press Command+A to **Select All**), then choose **Copy** from CCC's File menu (or Command+C) to copy the list of items to the clipboard. Please note that every error may not be the same. When you export a list of files, the per-file contextual information is not retained. Return to CCC's Task History window for the contextual information and advice specific to each file.

Getting help for common errors

When errors occur, CCC will categorize the error and offer troubleshooting advice. For some errors, CCC will offer helpful buttons at the bottom of the task history window that will, for example, take you to Disk Utility or reveal a corrupted file in the Finder. Click on each error to see what CCC recommends to resolve the error. If you're stuck or overwhelmed, or if CCC's advice alone isn't helping you resolve the problem, click the "Help Me!" button to submit a summary of the problem to the Bombich Software Help Desk.

Related Documentation

- "Where can I find CCC's log file?" <<http://bombich.com//kb/cc4/where-can-i-find-cccs-log-file>>



Can I remove events from CCC's Task History window?

You cannot remove specific events from CCC's Task History at this time. You can, however, clear the entire Task History if you quit CCC, then remove the contents of this folder on your startup disk:

`/Library/Application Support/com.bombich.ccc/History`

Protecting data that is already on your destination volume: The Carbon Copy Cloner SafetyNet

In a typical backup scenario, you have a disk that is dedicated to the task of backing up your startup disk, and you expect the contents of the backup disk to match the contents of the source exactly. In many cases, though, people see lots of extra space on a big 3TB disk and can't resist using it for "overflow" items — large video files, archives of old stuff, maybe your iMovie Library. If you already have that big disk loaded with some overflow items and you're hoping to use it as a backup volume as well, you'll find that CCC's default settings are designed to give you that backup without completely destroying everything else on your backup disk in the blink of an eye.

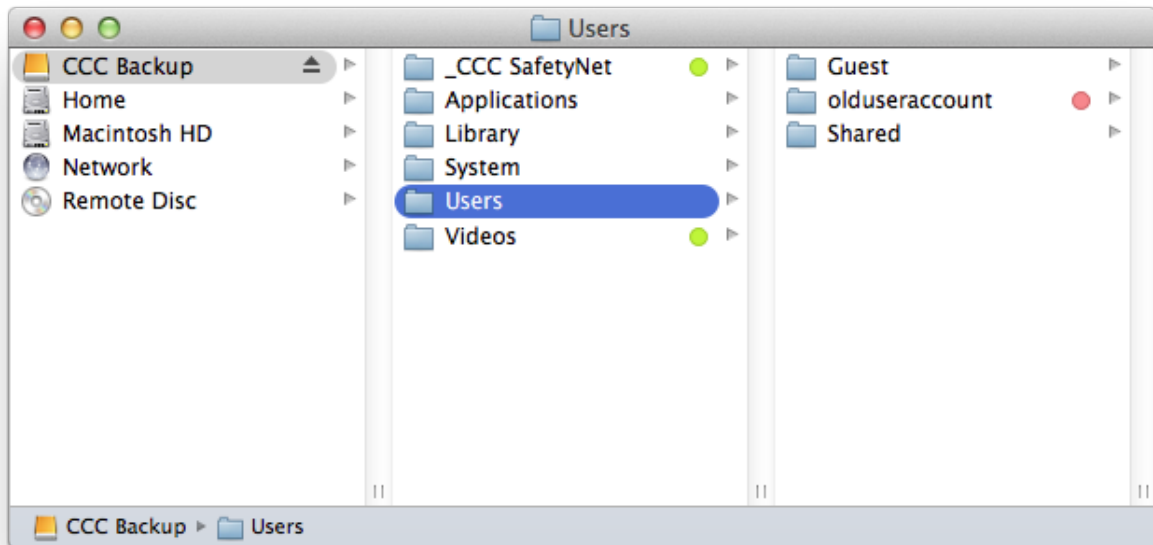
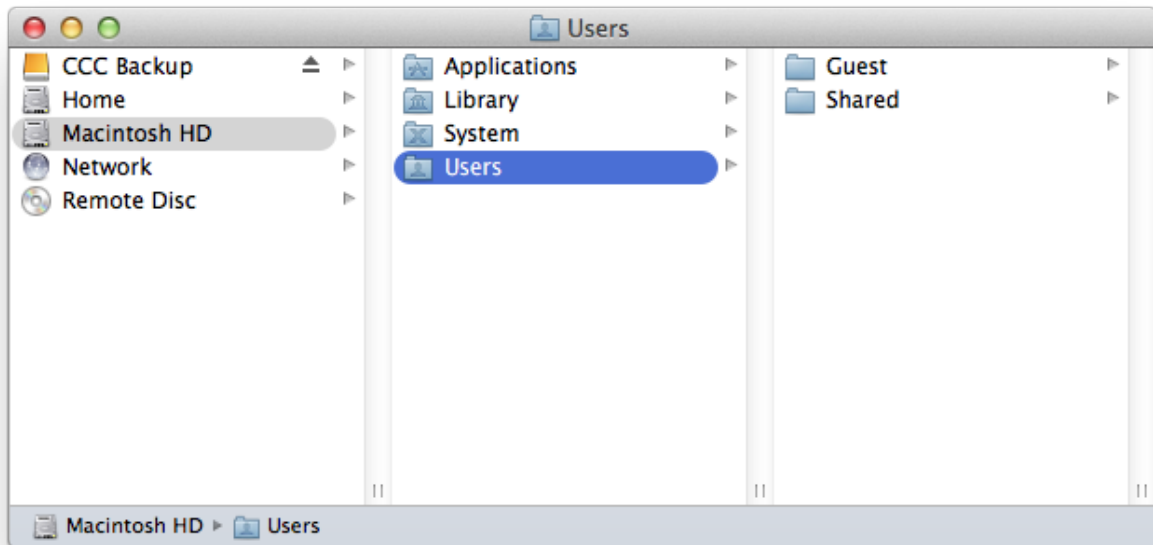
When CCC copies files to the destination, it has to do something with files that already exist on the destination — files that are within the scope of the backup task, and items that aren't on the source at all. By default, CCC uses a feature called the SafetyNet to protect files and folders that fall into three categories:

- Older versions of files that have been modified since a previous backup task
- Files that have been deleted from the source since a previous backup task
- Files and folders that are unique to the root level of the destination

SafetyNet On

When the SafetyNet is on, CCC places the older versions of modified files, and files that have been deleted from the source since a previous backup, into the `_CCC SafetyNet` folder at the root of the destination. We call this a "safety net" because the alternative would be to immediately delete those items. The SafetyNet prevents catastrophes — rather than immediately deleting items from the destination, CCC saves these items on the destination as long as space allows.

That third category of files and folders is left alone on the destination when the SafetyNet is enabled. Files and folders that are unique to the root level of the destination will be left completely alone. To get a better of idea of what that means, consider the following two Finder windows:



The first window shows the contents of the startup disk, with the usual Applications, Library, System, and Users folders. The second window shows the contents of the destination volume. The "root" of the destination volume is what you see in the second pane. There are two items that are unique to the root level of the destination volume, "_CCC SafetyNet" and "Videos". If CCC were to update this volume with the SafetyNet on, both of these folders, tagged as green in the screenshot, would be left alone by CCC. The Users folder, however, is not unique to the destination — that folder is present on both the source and destination. As a result, the "olduseraccount" folder that is inside the Users folder would **not** be left in place, rather it would be moved to the _CCC SafetyNet folder.

Limiting the growth of the SafetyNet folder

When the SafetyNet feature is enabled for a CCC backup task, CCC will automatically prune the contents of the SafetyNet folder, by default, when the free space on the destination drops below 25GB. You can modify this pruning behavior for each task by clicking the "Use Advanced Settings" button at the bottom of the CCC window. CCC offers pruning based on size of the SafetyNet folder, age of items within the SafetyNet folder, and amount of free space on the destination. If you find that your backup tasks frequently run out of space on the destination, you can modify CCC's SafetyNet pruning limit to make more space available at the beginning of each backup task.

SafetyNet Off

If you always want the destination to match the source, and you have no need for retaining older versions of modified files or files deleted from the destination since a previous backup task, you can disable CCC's SafetyNet with the large switch icon underneath the destination selector. When CCC's SafetyNet is disabled, older versions of modified files will be deleted once the updated replacement file has been successfully copied to the destination, and files that only exist on the destination will be deleted permanently. Files and folders that are unique to the destination will not be given special protection from deletion. **The only exception to this is the `_CCC SafetyNet` folder — CCC will not delete that folder.** If the `_CCC SafetyNet` folder was created in a previous task that had the SafetyNet enabled, you can simply drag the SafetyNet folder to the Trash to dispose of it.

Other ways to protect the data on your backup volume

If you would rather that CCC did not move or delete files that are unique to your backup volume (e.g. files that are not part of the source data set), there are a couple other ways to protect that data.

Add a new partition to the destination hard drive

You can use Disk Utility to resize existing volumes (those volumes must be formatted with a filesystem that supports resizing, such as HFS+) and to add new partitions. These actions can be done non-destructively, that is, without erasing the files and folders on any existing volumes.

[Watch a video that demonstrates how to add a partition to your backup disk](https://youtu.be/ezlr1dH63gs)
<<https://youtu.be/ezlr1dH63gs>>

Back up to a folder

You can use CCC to back up your data to a subfolder on the destination volume. When backing up to a subfolder on the destination volume, CCC's copying and deleting considerations are made entirely within the scope of that subfolder — content outside of that subfolder is not considered or affected by the backup task. To back up to a folder, select "Choose a folder..." from CCC's Destination selector.

General thoughts on keeping "other" data on your backup volume

We strongly recommend that you find the means to dedicate a volume to the task of backing up your irreplaceable data. If you have data on your backup volume that exists nowhere else, it is not backed up! Whenever you target a volume for use with Carbon Copy Cloner, there is a risk that some files will be removed for one legitimate reason or another. CCC offers options and



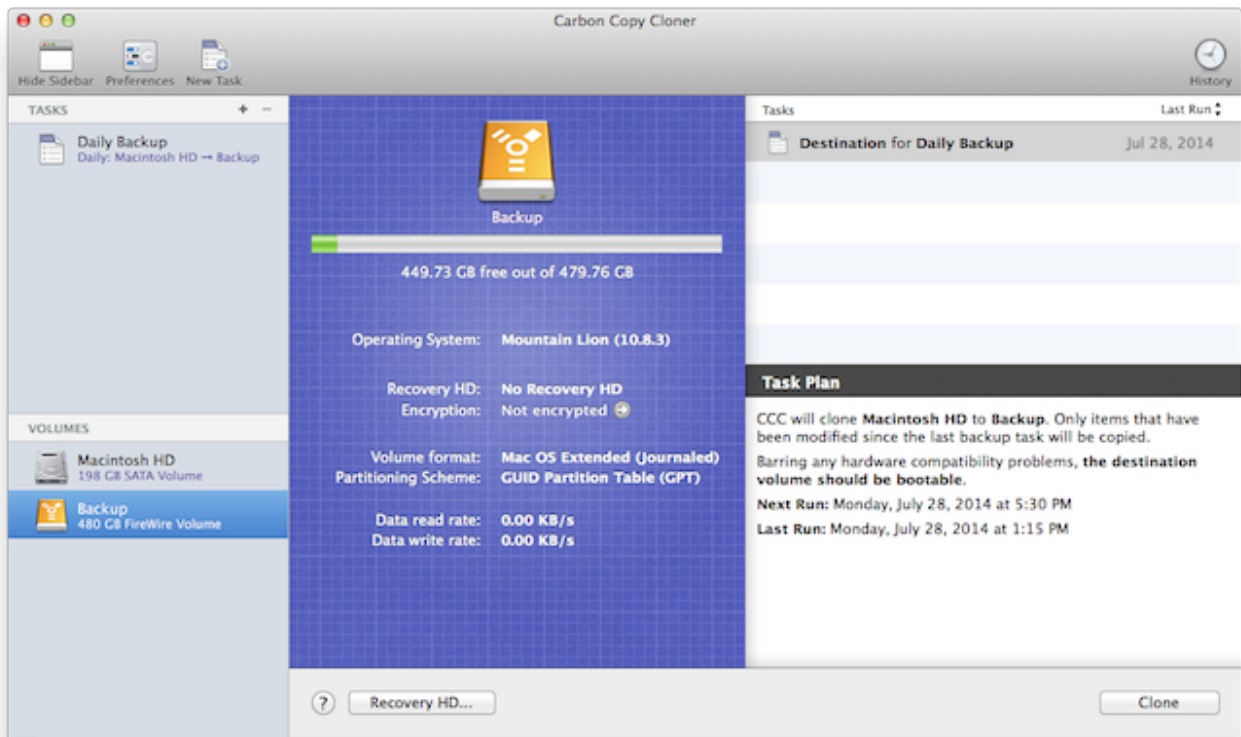
warnings to protect your data from loss, but nothing can protect your data from a misuse of CCC or a misunderstanding of the functionality that it provides.

Related Documentation

- [Frequently asked questions about the Carbon Copy Cloner SafetyNet <http://bombich.com//kb/cc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet>](http://bombich.com//kb/cc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet)

The Disk Center

CCC's Disk Center shows general volume information for each locally-attached volume mounted on your Mac, as well as read and write rate and error statistics for those volumes. Select a volume in CCC's sidebar (click "Show Sidebar" in the toolbar if it is hidden) to view that volume in the Disk Center. CCC also shows any backup tasks that are associated with the selected volume. Simply click the Clone button to run a selected task, or double-click the task to edit the task.



Basic volume information

The Disk Center table in the sidebar displays a list of locally-attached, mounted volumes. Click on one of these volumes to display information such as the volume name, filesystem, capacity, and disk usage. CCC displays a level indicator above the disk usage figure. When disk usage exceeds 70% of the volume capacity, the level indicator will turn yellow to indicate that you may want to consider "cleaning house". If the disk usage exceeds 90% of the volume capacity, the level indicator will turn red. Especially on a volume that contains an installation of macOS, we recommend that you try to maintain at least 10% of the volume as free space. When you start to consume that last 10%, fragmentation becomes a problem and general performance of macOS begins to decline.

Drive Statistics

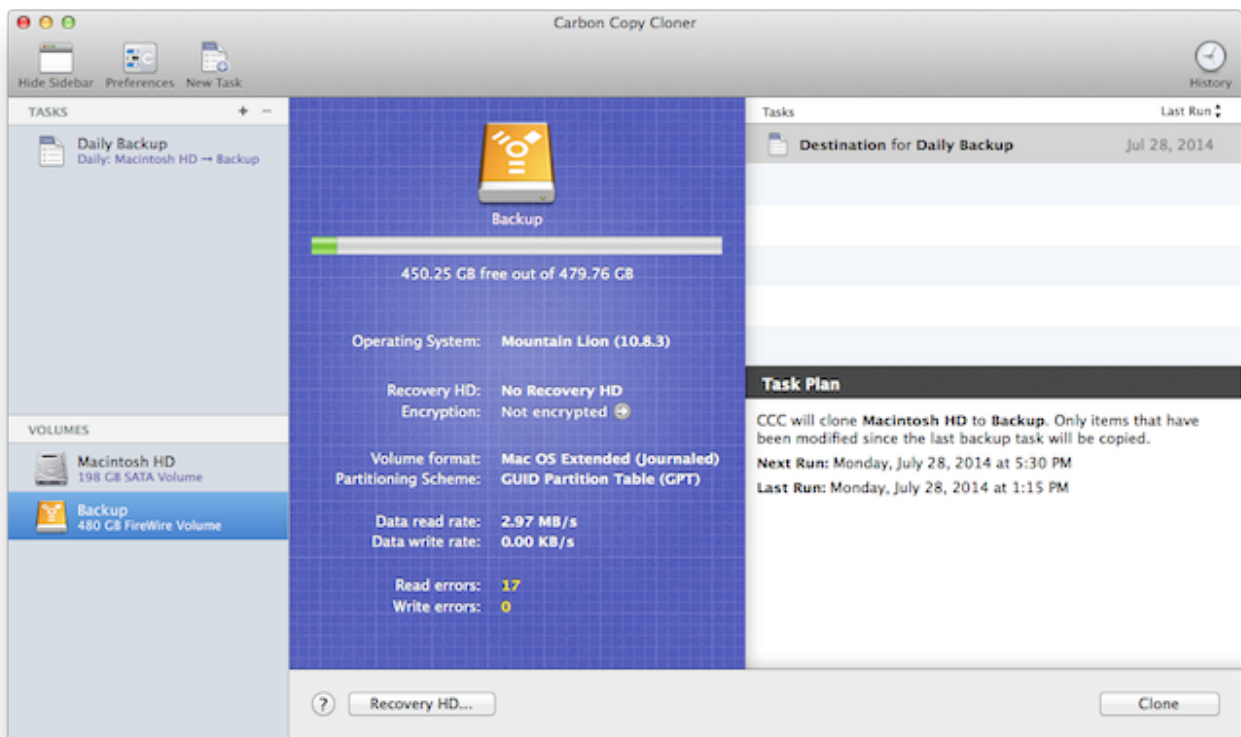
The Disk Center will update disk activity statistics on a one-second interval. Disk activity is collected by macOS at the hardware interface, so data for multiple volumes residing on the same disk will be identical. The data read and write rate can give you a good indication of how fast macOS is able to read and write data from and to your disk. You will likely notice that these values fluctuate wildly

over the course of a backup task. This is quite normal, write performance will generally be lower when copying lots of small files and higher while copying a larger file. When lots of small files are being copied, there is a lot of seek activity occurring on your source and destination volumes. This seeking greatly reduces the overall throughput compared to the theoretical throughput of your disks.

If your backup task seems particularly slow, stop the task and see what the baseline disk activity is. If there is a considerable amount of activity, use the Activity Monitor application to determine which applications are using excessive Disk resources.

Disk error statistics

CCC will report read and write error statistics when they are present:



Read and write errors indicate the number of read or write attempts that have failed since the disk was attached to your Mac (since startup for internal disks). Read errors often occur when files that are residing on damaged sectors cannot be automatically moved by the disk's firmware. Such files would also be unreadable by CCC, and CCC will report the failure to read these files at the end of the backup task. Read errors are not necessarily indicative of a failing hard drive. This number will rise steadily if multiple attempts are made to read the same corrupted file, for example. Read errors are, however, generally associated with physical hardware problems that will reduce the performance of a backup task. In some cases, macOS does not handle read failures well, and attempts to access the disk can lead to system-wide stalls.

Write errors are more serious. If you have a disk that is reporting write failures, there is either a hardware configuration problem with the device (e.g. bad cable, port, or enclosure), or the disk is failing.

Disk Utility and [other third-party utility] doesn't report any problems with



this disk, why does CCC?

Read and write errors statistics are stored by the lower-level storage drivers, they are not specific to a volume. Usually when a read error occurs, the hard drive firmware attempts to move data on the affected sector to another sector of the disk, then spare out the damaged sector. When that is successful, it's possible for the storage driver statistics to be stale. **These statistics will be reset when the affected disk is physically detached from your Mac, or upon reboot.**

Related Documentation

- [Identifying and Troubleshooting Hardware-Related Problems](http://bombich.com//kb/ccc4/identifying-and-troubleshooting-hardware-related-problems) <<http://bombich.com//kb/ccc4/identifying-and-troubleshooting-hardware-related-problems>>
- [Troubleshooting "Media errors"](http://bombich.com//kb/ccc4/identifying-and-troubleshooting-hardware-related-problems#io_errors) <http://bombich.com//kb/ccc4/identifying-and-troubleshooting-hardware-related-problems#io_errors>
- [Cloning Apple's Recovery HD partition](http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition) <<http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition>>
- [Working with FileVault Encryption](http://bombich.com//kb/ccc4/working-filevault-encryption) <<http://bombich.com//kb/ccc4/working-filevault-encryption>>

Cloning Apple's Recovery HD partition

Watch a video of this tutorial on YouTube <https://www.youtube.com/watch?v=6q9xeU_jtx8>

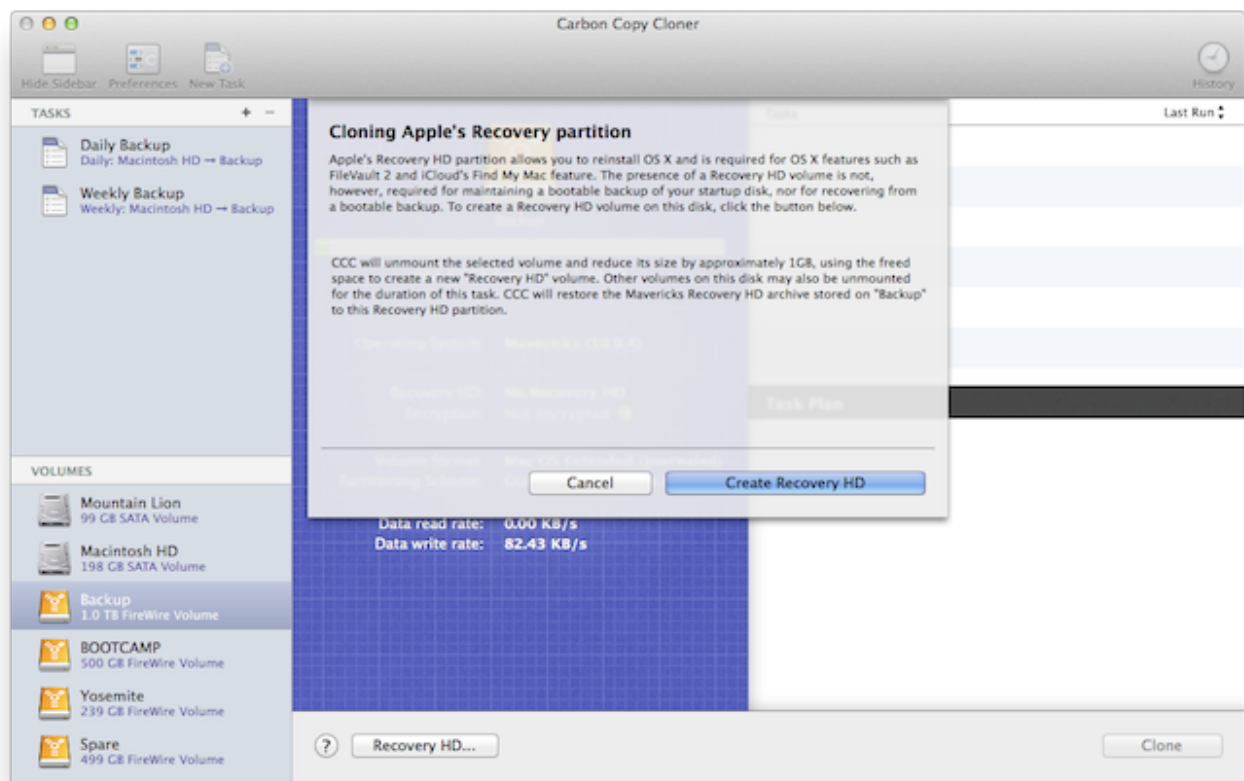
Starting with Mac OS X Lion, the macOS Installer creates a new, hidden volume on your startup disk named "Recovery HD". The primary purpose of the Recovery HD volume is to offer a method to reinstall macOS (Apple no longer distributes the macOS Installer on a DVD). When performing a backup of a macOS volume, Carbon Copy Cloner automatically archives the Recovery HD volume that is associated with the source volume to a disk image. This archive can later be restored to another Recovery HD volume. CCC's Disk Center also offers the ability to create a new Recovery HD volume on your destination disk.

Note: macOS restricts access to Recovery volumes. You must log in as an admin user to create or modify a recovery volume in CCC.

How do I create a Recovery HD volume on my backup disk?

With these simple steps:

1. Use CCC to clone your startup disk (or other source volume that contains an installation of macOS) to your backup volume
2. Select your backup volume in the **Volumes** section of CCC's sidebar (click the **Show Sidebar** button in CCC's toolbar if you do not see CCC's sidebar)
3. Click the **Recovery HD...** button at the bottom of the window
4. Click the **Create Recovery HD** button



Creating a new Recovery HD volume

Drobo devices do not support dynamic volume resizing (reference <https://www.drobo.com/support/updates/firmware/Release_Notes_Firmware_B800i_Elite_2.0.4.pdf>), and therefore cannot accept a Recovery HD volume. Do NOT attempt to create a Recovery HD volume on a Drobo device.

The Recovery HD volume is approximately 650MB, so to create a new Recovery HD volume, you must choose a volume on your disk that has at least 1GB of free space available. This documentation will refer to the chosen disk as the "donor" disk. No data will be harmed on the donor disk, it will simply be resized so some space can be allocated for the new Recovery HD volume. When you click the button to create a new Recovery HD volume, CCC will do the following:

1. Unmount the donor disk
2. Perform the equivalent of Disk Utility's "Verify disk" tool
3. Resize the donor volume to (size of the donor volume) - 1GB
4. Create a new volume named Recovery HD using the 1GB of borrowed space
5. Clone a suitable Recovery HD volume from an archive of the Recovery HD volume or another disk (such as the startup disk) onto the newly-created Recovery HD volume
6. Remount the donor volume

When the task has completed, the Recovery HD volume will not be mounted on your Desktop, nor will it appear in Disk Utility (it's a very special, very hidden volume!). You can verify the functionality of this Recovery HD volume by holding down the Option key on startup, then selecting the Recovery HD volume as the startup disk.

Note: When performing Recovery HD cloning tasks on a laptop, be sure to keep the Mac plugged into

an AC power supply for the duration of the task.

Recloning an existing Recovery HD volume

If you choose a volume that already has an associated Recovery HD volume, CCC will indicate that you may "Restore Recovery HD". Recloning the Recovery HD volume may be helpful if the Recovery HD volume is invalid, or its partition type is invalid (and it appears on your Desktop).

Removing an existing Recovery HD volume

In some cases you may have reason to remove a Recovery volume from your backup disk. To remove the Recovery HD volume:

1. Select your backup volume in the **Volumes** section of CCC's sidebar (click the **Show Sidebar** button in CCC's toolbar if you do not see CCC's sidebar)
2. Click the **Recovery HD...** button at the bottom of the window
3. Hold down the Option key (⌘) and click the **Remove Recovery HD** button [VoiceOver users: Use QuickNav to locate the **Remove Recovery HD...** button to the left of the Cancel button]

CCC will remove the Recovery HD volume and give the space back to the donor volume. While this is a non-destructive task for the donor volume, we recommend that you back up any data on this volume before making partitioning changes to it.

"I updated my Mac to {newer OS}. Why is CCC putting an {older OS} Recovery HD on my backup volume?"

In contrast to CCC 3, CCC 4 makes every effort to apply a Recovery HD OS that matches the associated volume. If you have not yet updated your backup disk (e.g. by running a backup task on El Capitan), and you attempt to update the Recovery HD on your backup disk **first**, CCC will see that the backup disk has the older OS (e.g. Mavericks or Yosemite) and apply the older OS to the Recovery HD.

Run your backup task to update your destination volume to the newer OS first, then return to CCC's Disk Center to update the Recovery HD. In most cases, CCC will automatically prompt you to update the Recovery HD associated with your backup volume once you've done your first backup on the new OS.

"Why is the option to restore (or remove) a Recovery HD grayed out?"

If you are booted from the volume that you have selected in CCC's sidebar, the option to Restore or Remove the Recovery HD associated with that volume will be disabled. This is commonly encountered when you have booted from your backup volume. To make changes to the Recovery HD associated with your startup disk, first boot your Mac from some other startup volume.

This option will also be disabled if the selected volume is a Fusion or FileVault-protected volume (i.e. a "CoreStorage" volume). CCC cannot create a Recovery HD volume on a Fusion or FileVault-protected volume, therefore CCC will never allow you to remove the Recovery HD volume that is associated with a Fusion or FileVault-protected volume.

"CCC says there is a Recovery volume associated with my

startup disk. Why can't I see this Recovery HD volume in the Option key startup manager?"

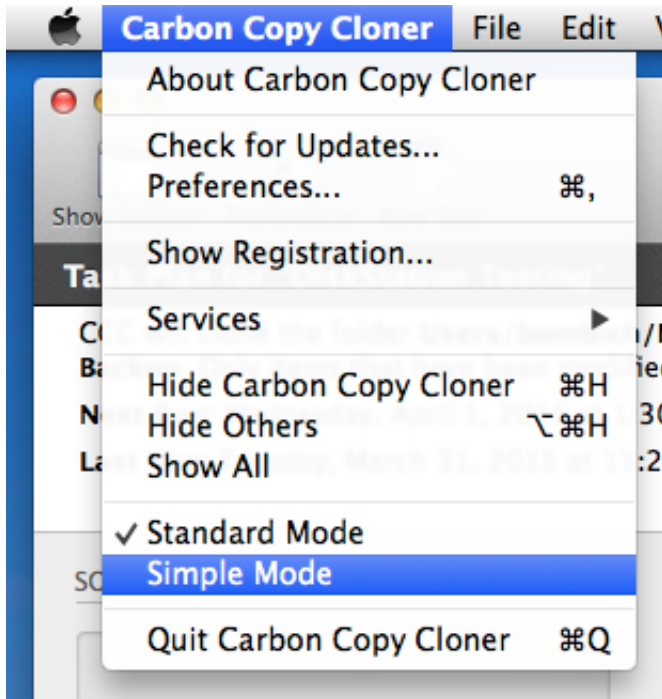
Also starting in Lion, Apple introduced an abstract volume type, the CoreStorage volume. Because these volumes are abstract, your Mac's firmware cannot boot directly from them; a small piece of macOS needs to assemble the abstract volume first. To accommodate this limitation, Apple associates a "helper" partition with CoreStorage volumes. In many cases, the Recovery HD volume plays that role. When you hold down the Option key on startup, your Mac's firmware can't detect the abstract CoreStorage volumes, but it can detect these helper partitions. To avoid confusion, the label given to these Recovery volumes is the label of the associated volume. So if you have a startup disk named "Macintosh HD" and an associated helper partition named "Recovery HD", you will only see one volume in the startup manager — the Recovery volume, but with the Macintosh HD label. If you want to boot from the Recovery volume, click on the Macintosh HD-labeled volume while holding down Command+R.

Related Documentation

- [Frequently Asked Questions about cloning Apple's "Recovery HD" partition <http://bombich.com/kb/ccc4/frequently-asked-questions-about-cloning-apples-recovery-hd-partition>](http://bombich.com/kb/ccc4/frequently-asked-questions-about-cloning-apples-recovery-hd-partition)
- [The Disk Center <http://bombich.com/kb/ccc4/disk-center>](http://bombich.com/kb/ccc4/disk-center)
- [Working with FileVault Encryption <http://bombich.com/kb/ccc4/working-filevault-encryption>](http://bombich.com/kb/ccc4/working-filevault-encryption)

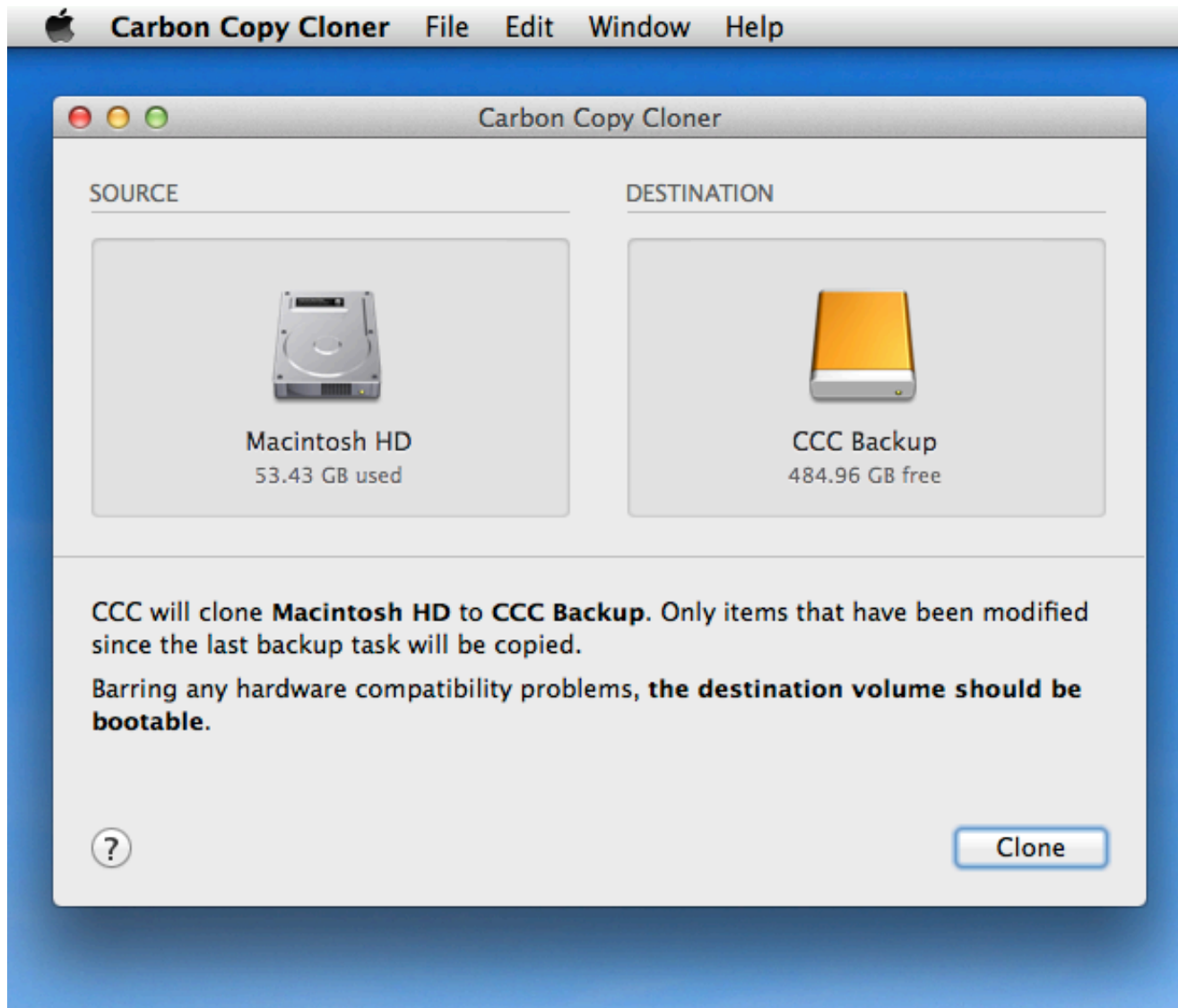
Simple Mode

Simple Mode significantly reduces the number of user interface elements — the sidebar, toolbar, scheduling selector, and advanced settings are all suppressed, leaving the user with only three primary controls: Source, Destination, Clone button. For users that desire a basic ad hoc clone from one volume to another and do not want to maintain scheduled tasks, this simplified interface is the perfect solution. To use Simple Mode, choose **Simple Mode** from the Carbon Copy Cloner menu.



Configuring a backup task in Simple Mode

1. Choose a source
2. Choose a destination
3. Click the Clone button



Related Documentation

- [Preparing your backup disk for a backup of OS X <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x)

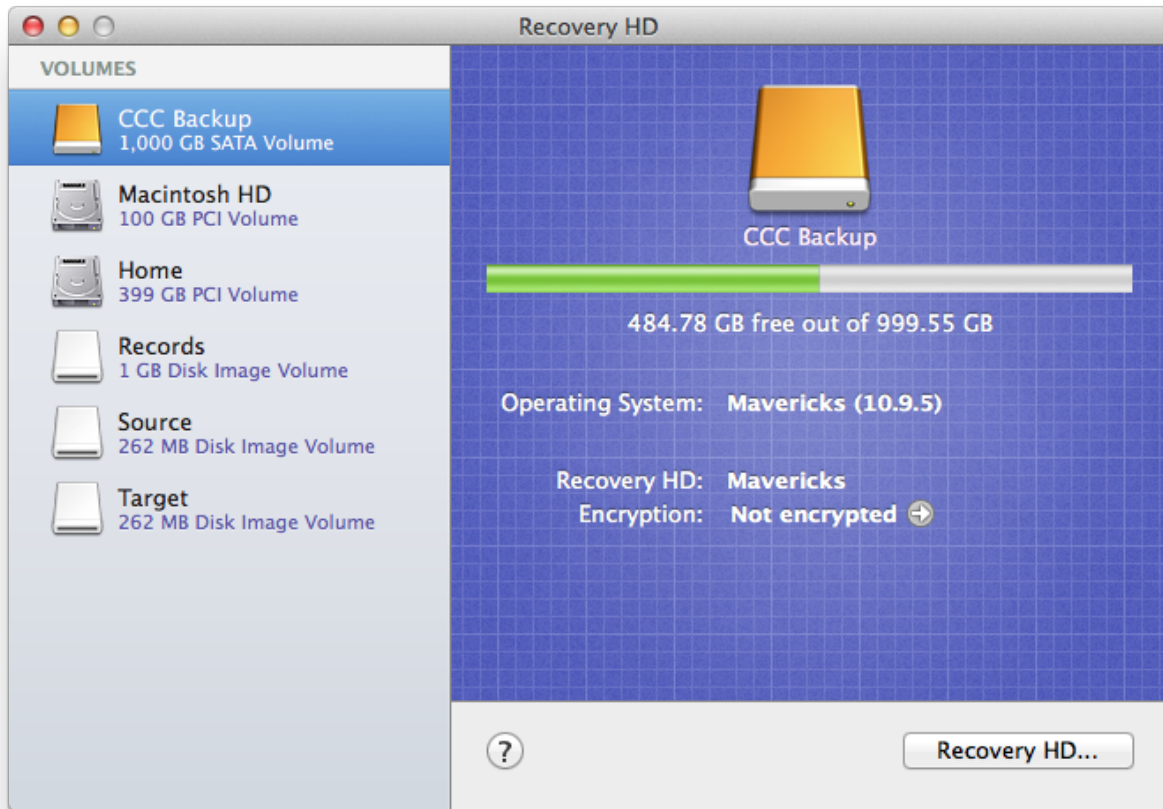
Can I choose a network volume? How do I schedule this backup? Can I exclude items from the backup task?

Simple mode aims to simplify **basic** cloning tasks. For additional options, choose **Standard Mode** from the Carbon Copy Cloner menu to switch back to standard mode.

For the curious, Simple Mode tasks run with the same default settings as tasks created in Standard Mode: SafetyNet is enabled, and the contents of the SafetyNet folder will be pruned when free space on the destination drops below 25GB. When in Simple Mode, your source and destination choices will not be saved between launches of CCC. Every time you open CCC, the source and destination will be empty. Additionally, CCC must remain open while a task is running — if you quit CCC, a running task will be stopped (after a confirmation prompt).

Cloning Apple's Recovery HD volume

While the background of this procedure tends to be the opposite of simple, we felt that this functionality should be made available in Simple Mode. After you have cloned an OS to your backup volume, you can choose **Recovery HD** from CCC's Window menu to reveal a separate window listing locally-attached volumes.



To create a Recovery HD on your backup volume, click on the backup volume in the table on the left, then click on the **Recovery HD...** button at the bottom of the window.

- [Cloning Apple's Recovery HD partition <http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition>](http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition)
- [Frequently Asked Questions about cloning Apple's "Recovery HD" partition <http://bombich.com//kb/ccc4/frequently-asked-questions-about-cloning-apples-recovery-hd-partition>](http://bombich.com//kb/ccc4/frequently-asked-questions-about-cloning-apples-recovery-hd-partition)

Notes for VoiceOver users

CCC's main window is divided into three main sections. At the top is a toolbar, and beneath that there is a split pane divided vertically. The view on the left is called the sidebar, the view on the right holds the task configuration view. When you open CCC for the first time, the sidebar is hidden. The sidebar is automatically revealed when you add a new task.

The sidebar is split horizontally. The top half contains a table of backup tasks, the bottom half lists locally-attached volumes on your Mac. When you select a task in the task list, the details of that task are presented in the right pane of the window. Likewise, if you select a volume from the list in the bottom of the sidebar, the details of that volume are presented in the right pane. CCC requires that you save any changes you have made to a task before selecting another task or a volume, so if you switch away from a task that is currently being edited, you will be prompted to save unsaved changes, revert the task to its on-disk state, or cancel the event that would have changed the task selection.

Navigation challenges and solutions

The "Automatically interact when using tab key" setting in VoiceOver Utility > Navigation can make navigation to CCC's task configuration view quite challenging. If you prefer to leave this setting enabled, we recommend that you hide CCC's sidebar to avoid navigation challenges. You can use CCC's View menu to select tasks and volumes (in other words, the contents of the View menu completely replaces the need for the sidebar).

Quick Nav

The Tab key will effectively move your cursor to each control in CCC. With Quick Nav enabled (to enable it, simultaneously press the left and right arrow keys), you can also navigate through non-control user interface elements, such as labels, scroll views and split view dividers. Largely this is quite intuitive, however there is one place where the order of elements as interpreted by the window is not very intuitive. This is only applicable when the sidebar is revealed -- if the sidebar is hidden, focus goes to the source selector, and the following is irrelevant.

Upon launch, CCC places focus on the tasks table. The task configuration view lies to the right of the tasks table, so you would think that you could use the right arrow key to move focus to the task configuration view. However, the tasks configuration view is ordered in front of the tasks table, so you must use the **left** arrow key to get from the tasks table to the task configuration view. Alternatively, use the Tab key.

Simple Mode

CCC 4.1 includes a new, simplified user interface called "Simple Mode." Simple Mode significantly reduces the number of user interface elements -- the sidebar, toolbar, scheduling selector, and advanced settings are all suppressed, leaving the user three primary controls: Source, Destination, Clone button. For users that desire a basic ad hoc clone from one volume to another, this simplified interface is the perfect solution.

Editing the name of a task

1. If Cursor Tracking is disabled, press Control+Option+Shift+F3 to enable Cursor Tracking.
2. Use the tab key to move VoiceOver focus to the CCC Backup Tasks table in the sidebar.
3. Press Control+Option+Shift+Down Arrow to start interacting with the Task Table.



4. Press Control+Option+Shift+Down Arrow again to start interacting with the selected task.
5. Press Control+Option+Shift+Space to simulate a mouse click event on the task name field. The text will now be editable and you can use standard VoiceOver text editing commands to position the cursor and edit the text. If you want to reposition the insertion point, you may have to disable QuickNav by pressing Left Arrow+Right Arrow.
6. Press the Return key when finished editing the task name.

Sample Usage Scenarios

I want to clone my entire hard drive to a new hard drive or a new machine

There are many different reasons to make an exact clone of your hard drive. Suppose your laptop is damaged and you must send it in for repair. In the meantime, you not only have to borrow another computer for the duration of the repair, you also don't have your data, applications and work environment exactly as they were on your machine. This lack of organization can be very frustrating and inhibit your productivity. When you get your machine back from repair, you have to deal with locating any modified documents on your loaner computer and copying them to your original computer. Also, Apple recommends that you backup your data before sending in a machine for repairs because they are not responsible for lost data.

In this situation, it would be ideal to simply copy off the entire contents of your hard drive to an external hard drive — to create a "bootable clone" of your production machine. You can then boot a loaner machine from this bootable clone and work from it as if working from your original machine (see the related documentation below for common questions related to running another Mac from your backup).

When you need a complete, simple backup of your entire hard drive:

1. Open Carbon Copy Cloner
2. Choose the volume that you want to clone from the Source selector
3. Choose a [properly-formatted volume <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x) from the Destination menu
4. Click the Clone button

If you want to update your cloned volume in the future, simply run the same task (or schedule it so it runs automatically) and CCC will update the backup volume with only the items that have changed since your last backup.

Use Setup Assistant or Migration Assistant to move data from an older Mac to a new Mac

Another scenario in which it would be desirable to do a full-volume clone is when you have purchased a new Mac and you would like to move everything from your old Mac to your new Mac. When you get a new computer from Apple, though, it has a specific version of macOS installed on it, and further, a hardware-specific "build". Your new Macintosh cannot boot from the older version and build of macOS that is installed on your older Mac, so simply cloning your old Mac onto your new Mac won't work. Due to this limitation, we recommend that you use the Setup Assistant application (runs on your Mac's very first boot) or the Migration Assistant application to migrate content from your old Mac to a new Macintosh. You can migrate either directly from the hard drive installed in your old Mac or from a backup of your old Mac (e.g. if your old Mac's hard drive had died). Once you have migrated your user accounts and applications using Setup Assistant or Migration Assistant, you can continue to use Carbon Copy Cloner to back up your Mac to the same backup volume that you were using for the old Mac.

[Apple Kbase #HT2186: Don't install older versions of Mac OS than what comes with your computer <https://support.apple.com/kb/HT2186>](https://support.apple.com/kb/HT2186)



Apple Kbase #HT2681: What's a "computer-specific OS X release"?

<<https://support.apple.com/kb/HT2681>>

Apple Kbase #HT204350: Move your content to a new Mac [Mavericks and later]

<<https://support.apple.com/en-us/HT204350>>

Apple Kbase #HT3322: How to use Migration Assistant to transfer files from another Mac [Lion and Mountain Lion] <<https://support.apple.com/kb/ht3322>>

Apple Kbase #HT1159: OS X versions (builds) included with Intel-based Macs

<<https://support.apple.com/kb/HT1159>>

Related Documentation

- Can I back up one computer and use the clone to restore another computer? <<http://bombich.com/kb/ccc4/can-i-back-up-one-computer-and-use-clone-restore-another-computer>>

I want to back up my whole Mac to a Time Capsule, NAS, or other network volume

Time Capsule and other network storage appliances are becoming very popular for providing shared "personal cloud" storage. Naturally, this storage looks very appealing as a backup destination. The thought of backing up all of your stuff without having to plug in a cable is very alluring. Indeed, this storage is well suited for the sharing of media files, but there are some logistical and practical hurdles to backing up large amounts of data, as well as backing up macOS system data to these devices. There are also some logistical hurdles to restoring a full system backup from a network volume. Below we explain how to back up macOS system files to a network volume, then we describe some of the limitations and performance expectations of this solution.

Note on bootability: You cannot boot your Macintosh from a backup kept on a network volume. If you require a bootable backup **or if you ever need to restore system files**, you must use an [external hard drive enclosure](http://bombich.com//kb/ccc4/choosing-backup-drive) <<http://bombich.com//kb/ccc4/choosing-backup-drive>> attached directly to your Mac to create a bootable backup.

Backing up macOS to a network volume

As described in [this section of the documentation](http://bombich.com//kb/ccc4/backing-up-tofrom-network-volumes-and-other-non-hfs-volumes#system_requires_hfs) <http://bombich.com//kb/ccc4/backing-up-tofrom-network-volumes-and-other-non-hfs-volumes#system_requires_hfs>, CCC will only back up system files to or from locally-attached HFS+ filesystems. To meet this requirement, you can ask CCC to create a disk image on your destination network volume. A disk image is a single file that contains the contents of another hard drive. When you double-click on a disk image file, the disk image's volume is mounted locally, as if it were an external drive attached directly to your Mac. To back up to a disk image with CCC:

1. Choose your source volume from the Source selector.
2. Select **New disk image...** from the Destination selector.
3. Unless you're making an archival backup of your data, choose the option to create a read/write **sparse bundle disk image** file. If that option is unavailable, choose the option to create a sparseimage file instead.
4. Specify the location where you want to save the disk image file. You will find your network volume in the sidebar of the **New disk image** save dialog*.
5. When you click the Clone button, CCC will create a disk image on the backup volume, back up the specified data, then unmount the disk image when the task is complete.

* Instructions for gaining access to network volumes is available in the macOS Help Center. If your network volume does not appear in CCC's Source or Destination menu, consult the documentation that came with the storage device you are trying to access, or choose "Help Center" from the Finder's Help menu ("Mac Help" on Yosemite and above) and search for "connecting to servers".

Performance expectations when backing up to a network volume

"Convenient" and "fast" often go hand-in-hand, but not when it comes to backing up to a network volume. There are several factors that can greatly reduce the performance of your backup, and this backup strategy involves several of them.

Backing up data over a wireless connection will be considerably slower than backing up over an ethernet connection. 802.11n networks support approximately 300 Mb/s of rated (theoretical) bandwidth under the best conditions, but they usually operate at much lower speeds (130 Mbps and below, which is comparable to 16 MB/s). Bandwidth drops considerably as you get further from the base station (a wooden door between your Mac and the router will cut the signal in half), and the file sharing protocol overhead will reduce your achievable bandwidth yet more. So practically speaking, you're lucky to get 8 MB/s over a wireless connection while sitting right next to the base station. If you're running Yosemite or later, that performance could be cut in half due to Apple Wireless Direct Link (AWDL), which causes the Airport card's interface bandwidth to be shared between your ordinary WiFi network and an ad hoc network hosted by your Mac.

We performed a simple bandwidth test to a fourth generation Airport Extreme Base Station (802.11n) to demonstrate the performance decline. We copied a 100MB file to an external hard drive attached to the base station via USB in three scenarios: 1. An ethernet connection to the base station, 2. Sitting a few feet from the base station, and 3. Sitting across the house from the base station (~35 feet, no line of sight to the base station). The results were 6.5s (15.5 MB/s), 18.7s (5.3 MB/s), and 256s (0.39 MB/s) for the three scenarios, respectively. So, before you try to back up over a wireless network, consider running a simple test in the Finder to see just how fast your connection is. If it takes more than a minute to copy a 100MB file, your connection is too slow to be practical for backup purposes.

Backing up to a disk image on a network volume is often faster than backing up to a folder on the network volume. We explain this performance difference in [Slow performance of network appliances can be mitigated by backing up to a disk image](http://bombich.com//kb/ccc4/slow-performance-network-appliances-can-be-mitigated-backing-up-disk-image) <<http://bombich.com//kb/ccc4/slow-performance-network-appliances-can-be-mitigated-backing-up-disk-image>> section of the documentation. The instructions provided above explain how to back up to a disk image, so as long as you follow those directions, you'll get the best performance possible.

The performance of the initial backup can be improved by attaching the storage directly to your Mac. If you're planning to attach an external disk to your wireless network router (e.g. base station, Time Capsule, etc.), consider attaching that storage directly to your Mac for the initial backup. Be sure to back up to a disk image on this storage (as described in the instructions above). After the initial backup has finished, you can then attach the external hard drive to your base station and specify the disk image as your destination in CCC by choosing **Choose disk image...** from CCC's Destination menu.

Some NAS devices cannot accommodate macOS disk images. NAS volumes mounted via SMB cannot accommodate macOS sparsebundle disk image files, those types of disk images cannot be mounted safely on SMB volumes (this limitation is not applicable on Sierra+ systems). Most NAS volumes can host a sparseimage file, however that format of disk image is a monolithic file, and some NAS devices may impose a 4GB file size limitation, which will limit the amount of data that you can back up to a disk image. If your NAS device does not support the AFP protocol, and if it also does not support files larger than 4GB, you will not be able to back up system files to a disk image on your NAS device. Please consult your NAS device documentation for more information on its support for macOS backups.

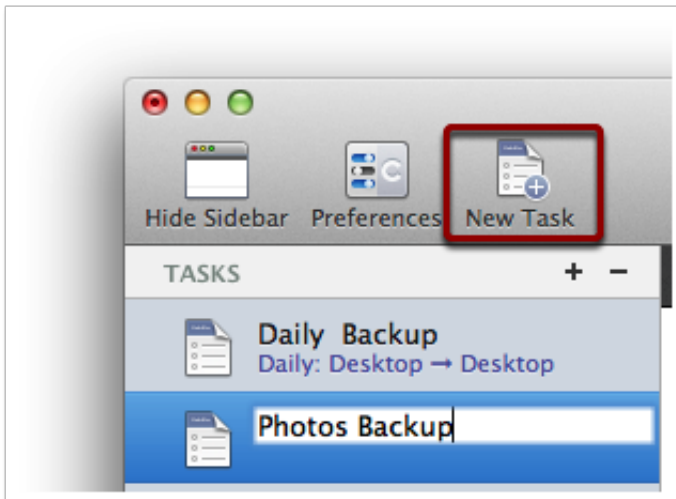
Restoring a full system from a disk image backup

There are some logistical challenges to restoring a full system from a disk image backup. In particular, you must have some other installation of macOS that you can boot from in order to perform the restore — you can NOT boot from your disk image backup on the Time Capsule or other network device. Before you have to rely on your backup in a catastrophe, prepare yourself for this logistical challenge. Learn more about this in the [Restoring from a disk image](http://bombich.com//kb/ccc4/restoring-from-disk-image#dmg_restore_startup_disk) <http://bombich.com//kb/ccc4/restoring-from-disk-image#dmg_restore_startup_disk> section of the documentation.

Cloning one external hard drive to another external hard drive

Create a new task

Click on the **New Task** button in the toolbar to create a new task, then type in a name for the new task.



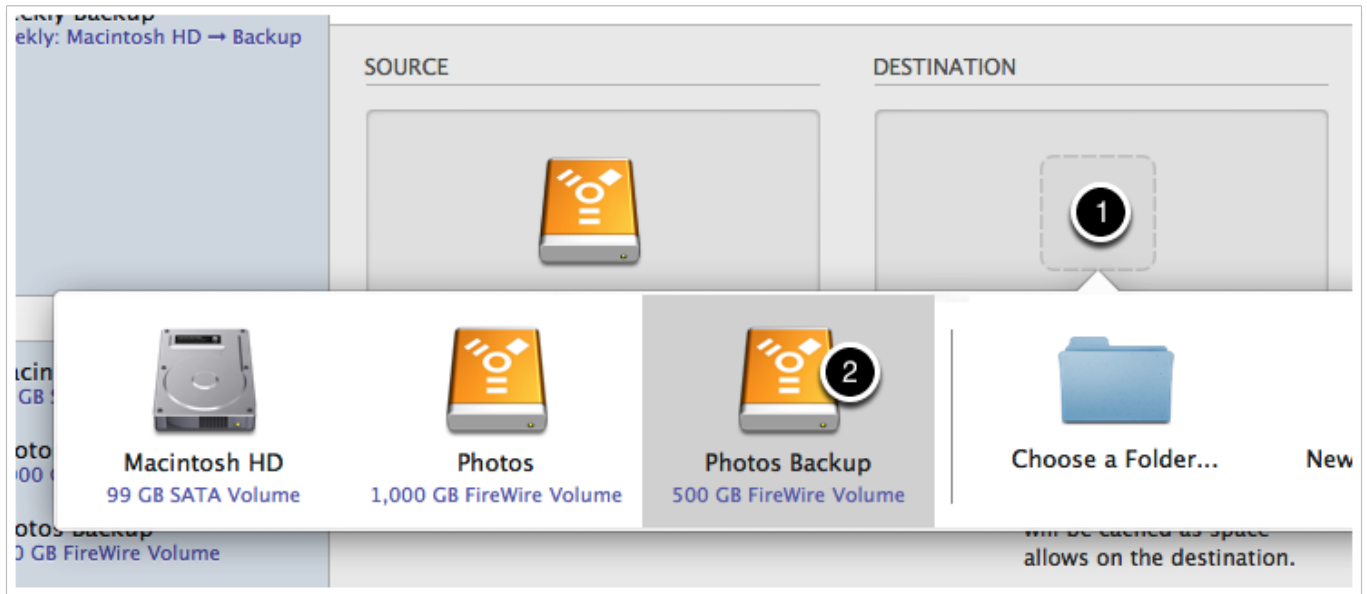
Select a source volume

Click on the Source selector button, then choose the volume that you want to copy files from.



Select a destination volume

Click on the Destination selector button, then choose the volume that you want to copy files to.



Click the Clone button

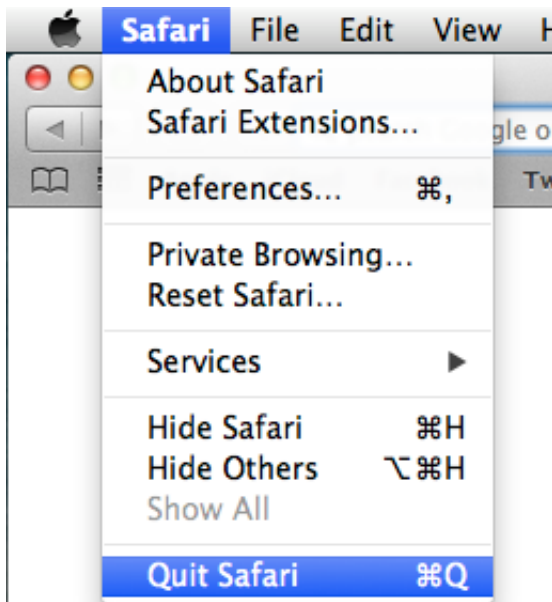
Click the Clone button to copy files right away, or click the Scheduler selector to configure the task to run on a regular basis.

Restoring an item from a hidden folder

Usually it's easiest to restore a single item from your backup by simply dragging it from the backup volume to your original source volume. Sometimes, though, it's not that easy. Suppose, for example, that you have inadvertently deleted all of your Safari bookmarks. The Safari Bookmarks file is stored in a hidden folder within your home directory, and the fact that this folder, and the folder on the backup volume are both hidden makes accessing that file in the Finder quite difficult. The steps below demonstrate how to restore this item from your Carbon Copy Cloner backup volume.

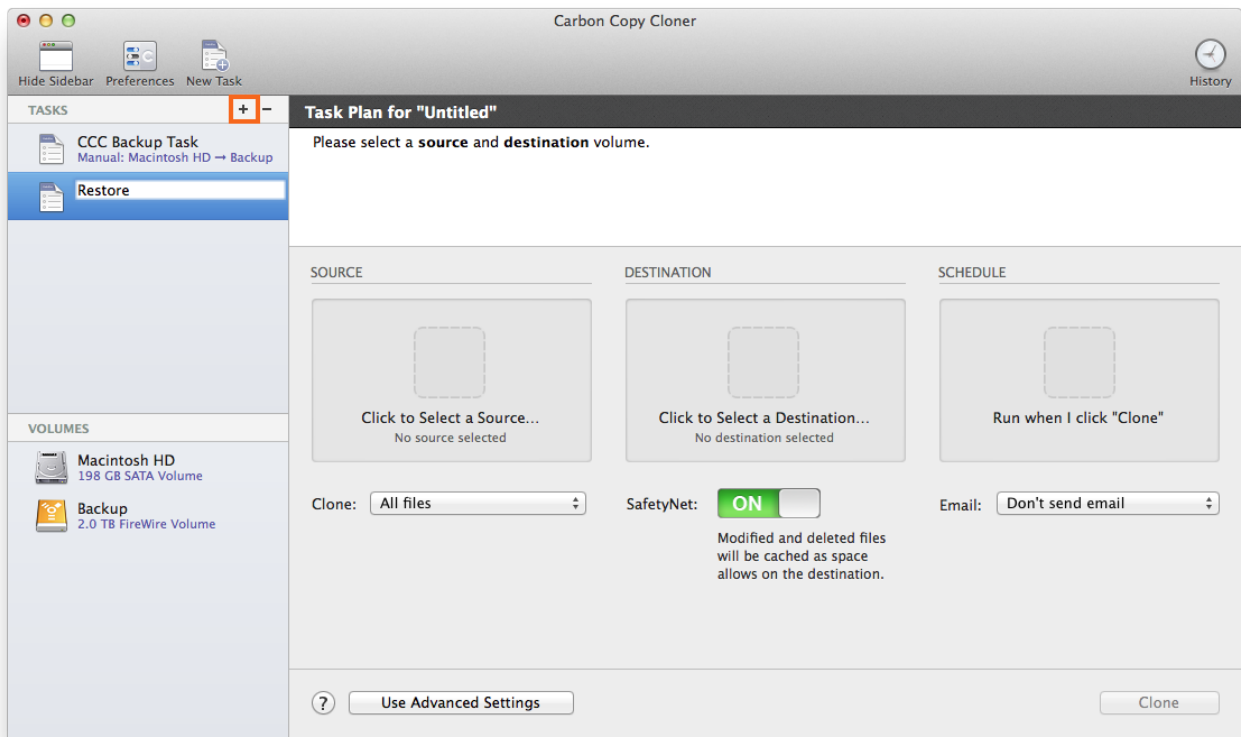
Quit Safari

Before you restore any files that are referenced by a particular application, you should quit that application first.



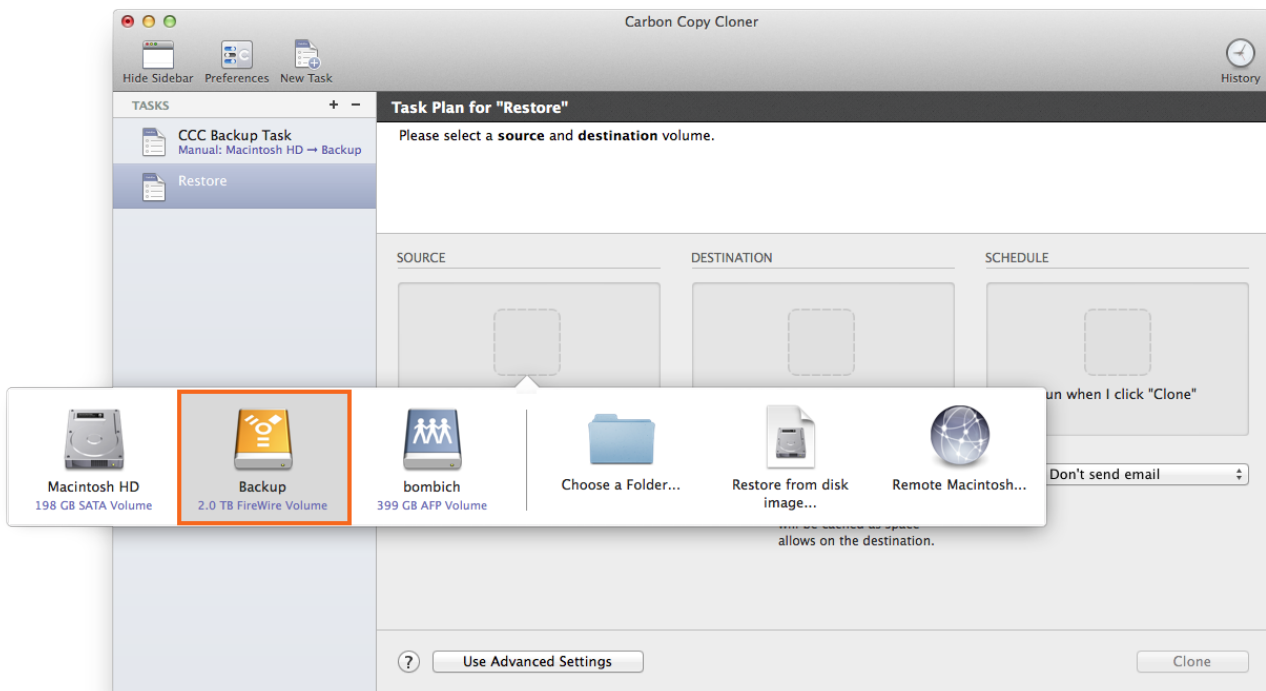
Open CCC and create a new task

Rather than making changes to your usual backup task, click the "+" button to create a new task. You can delete the task when you're done.



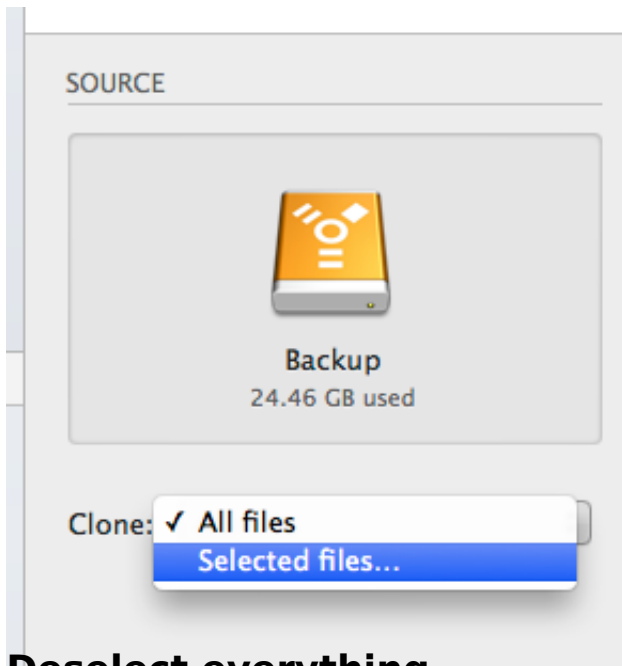
Select your backup volume as the source

Click on the Source selector and choose your backup volume as the source.



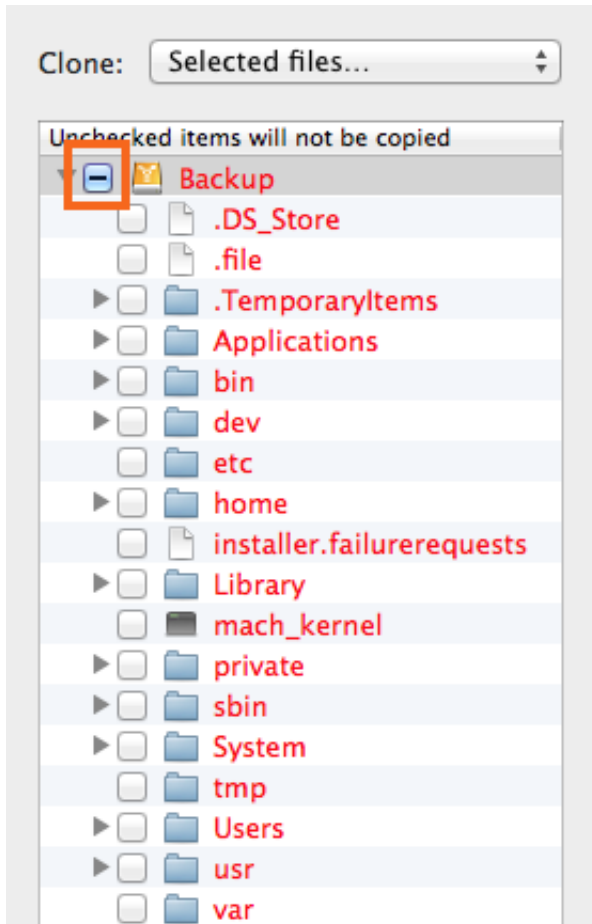
Choose "Selected Files..." from the Clone popup menu

We don't want to restore everything, so choose the "Selected Files..." option in the Clone popup menu.



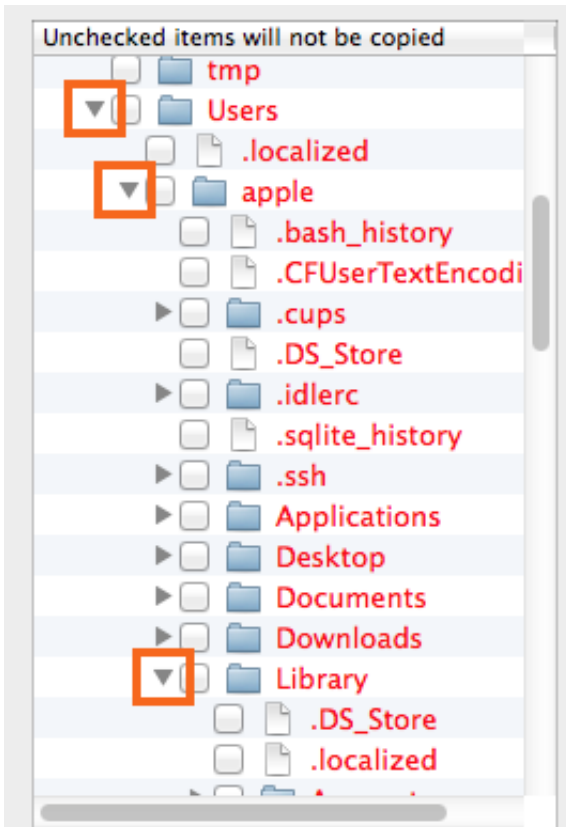
Deselect everything

By default, everything in the file list will have a checkmark next to it indicating that it should be copied. Click the box next to the top-most item ("Backup" in the screenshot below) to deselect everything.



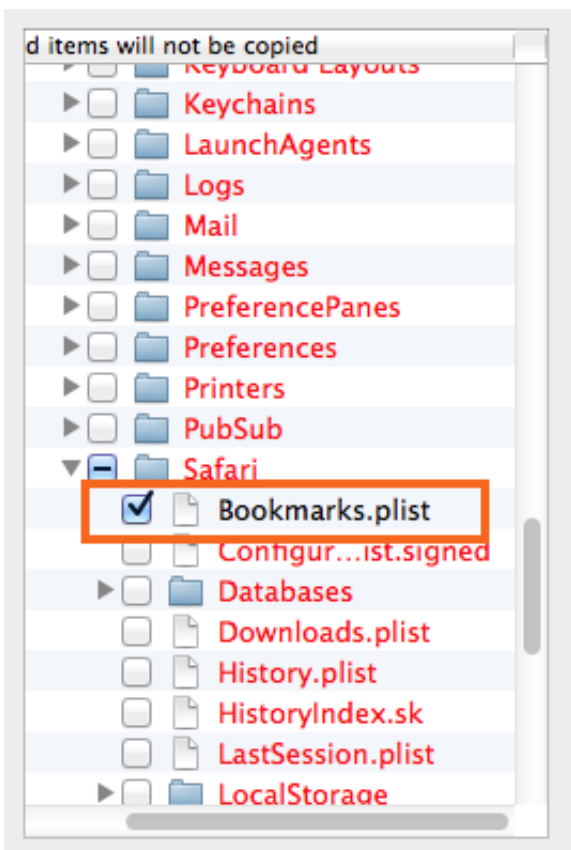
Navigate to the desired folder

Start opening disclosure triangles next to the folders that you would like to descend into until you reach the item you want to restore. In this case, the path is Users > apple > Library > Safari. The "Library" folder is hidden in the Finder, but CCC makes it visible here so you can restore items from it.



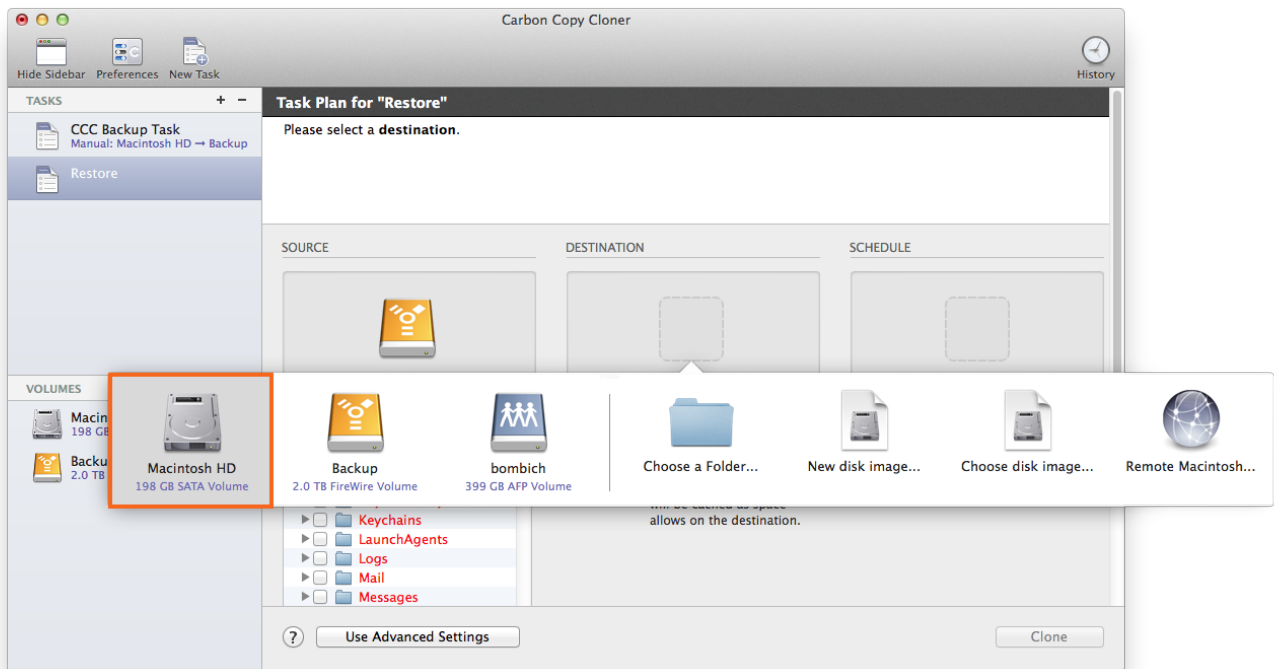
Select the item you would like to restore

Check the box next to the item you want to restore. "Bookmarks.plist" is the file we're trying to restore in this case.



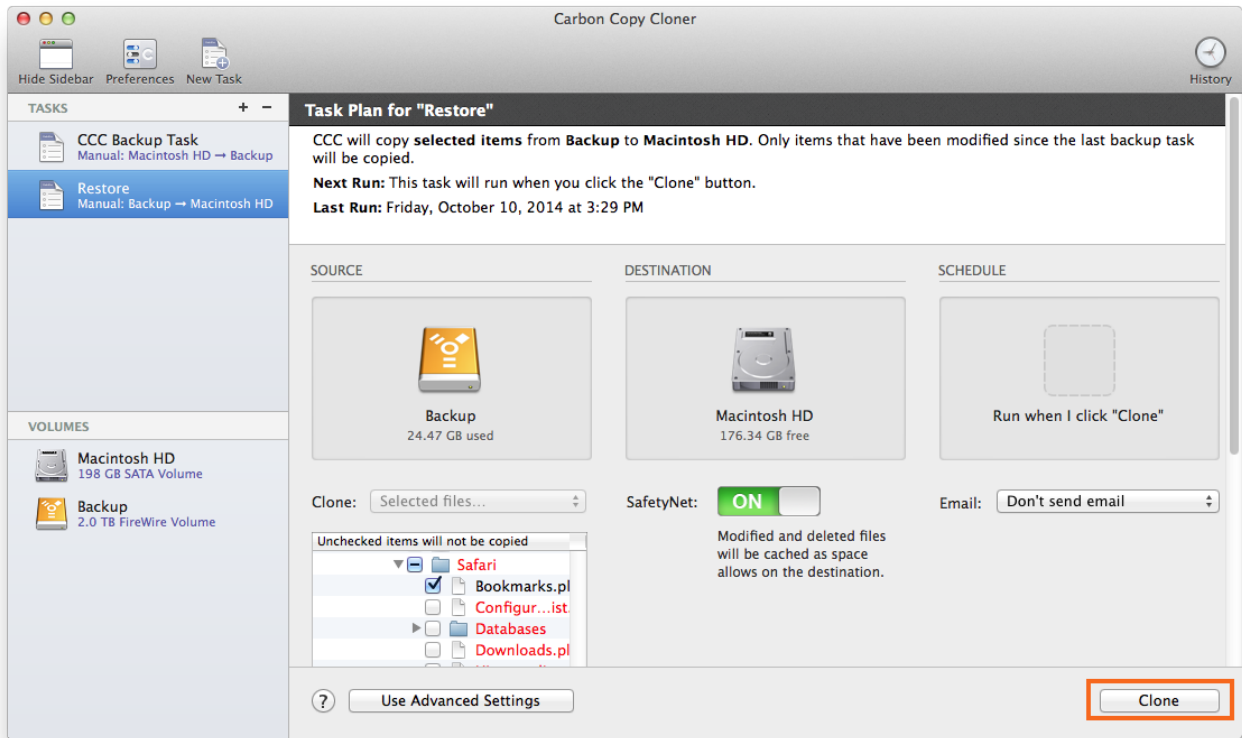
Select the volume to restore to as the destination

In this case, we want to restore the item back to the startup disk, so choose "Macintosh HD" from the destination selector. When you select your startup disk as the destination, CCC will produce a stern warning about restoring files to the startup disk. To prevent accidentally restoring system files to an active startup disk, CCC will explicitly exclude system files from this restore task. In this case, we can ignore the dialog because we already excluded everything except for the single file.



Click the Clone button

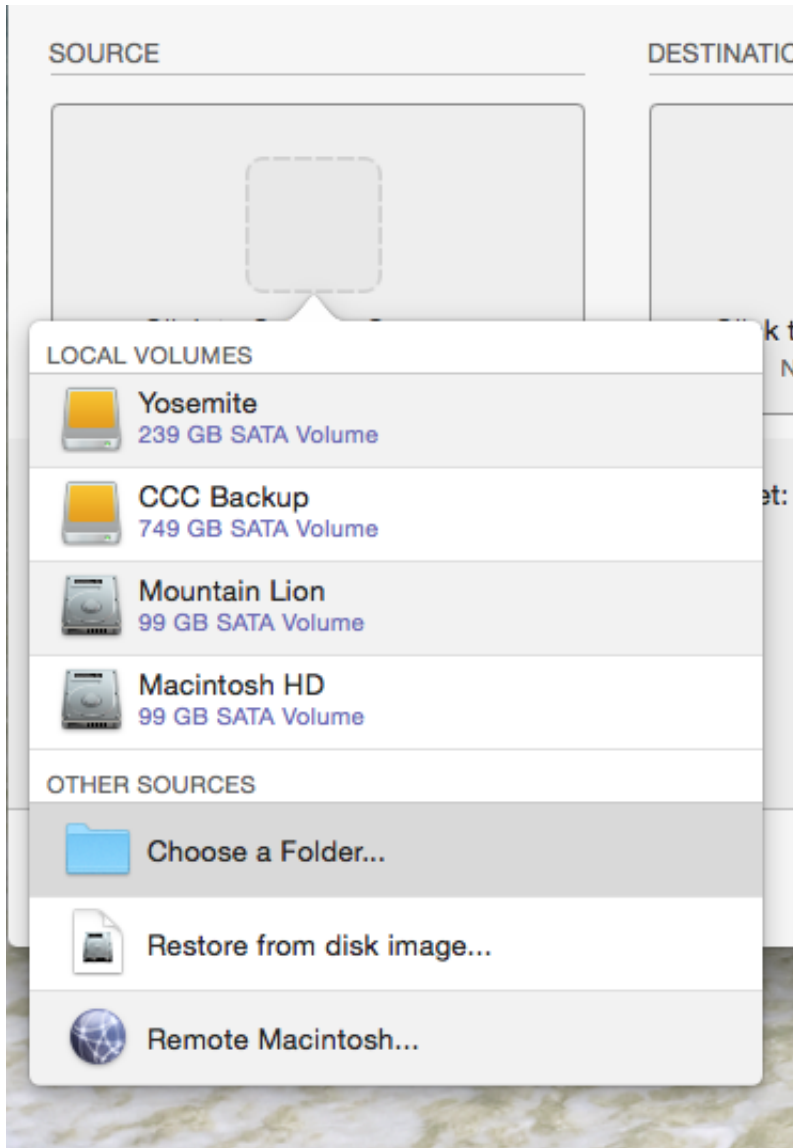
This restore task will go really quickly, and when it's done you can open Safari to verify that your bookmarks have been restored.



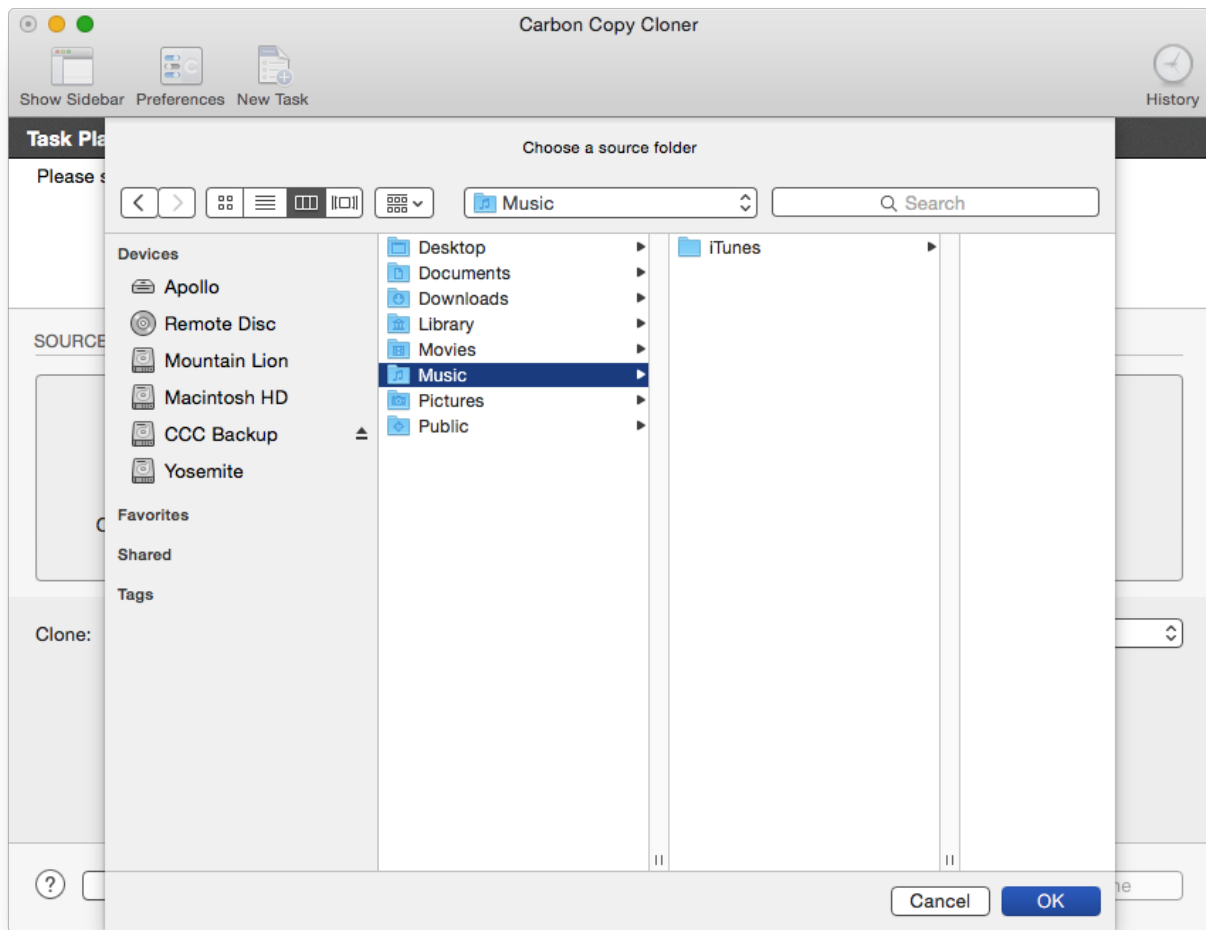
Folder-to-Folder Backups

Choose your source

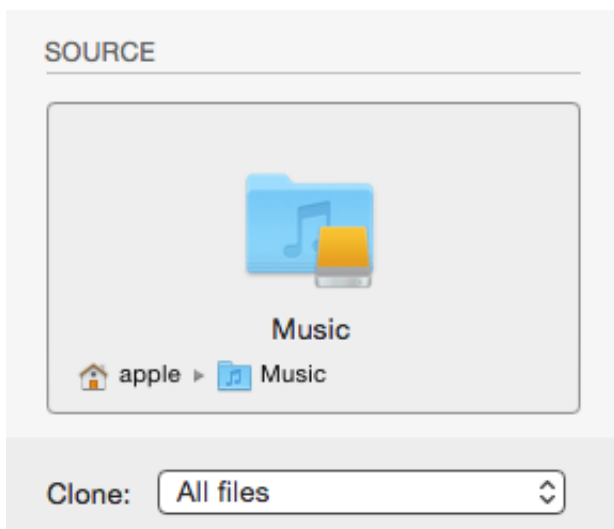
From the Source selector, select **Choose a Folder...**



Select your source folder and click **OK**.

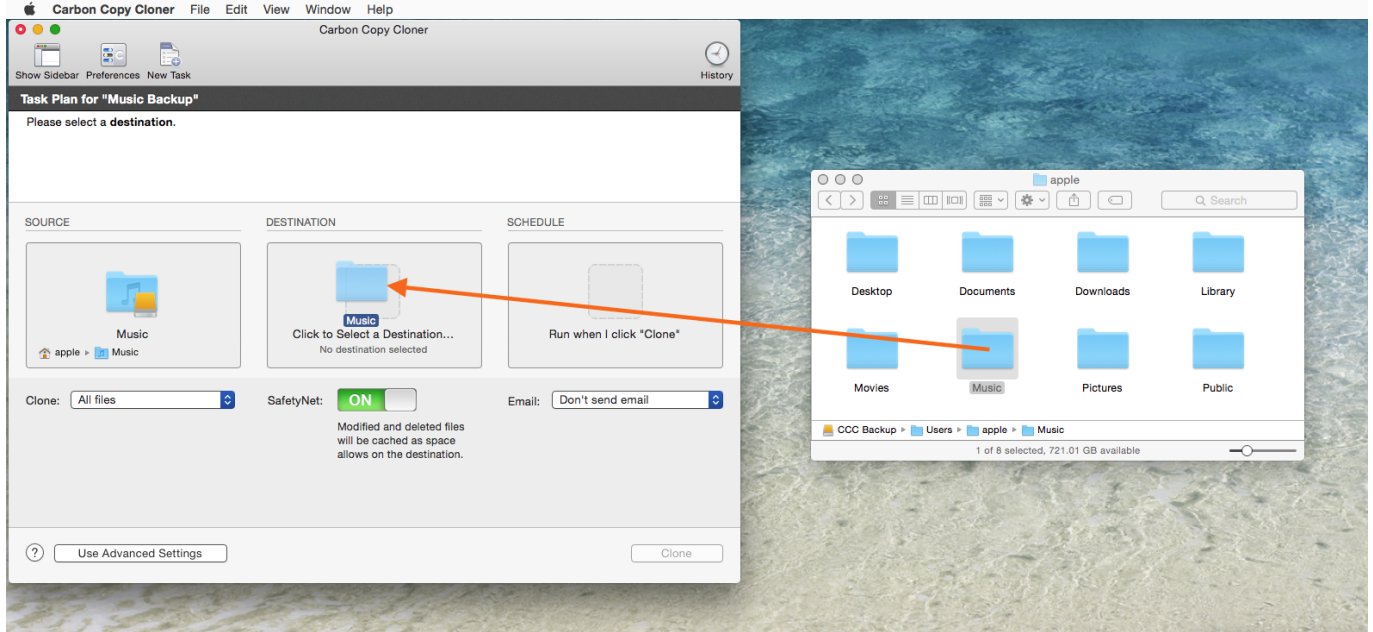


When correctly selected, the Source selector should display a folder icon and a path to the folder beneath it. Note that this path may be truncated but if you mouse over it, individual items will be expanded. You may choose to clone All files, the default, or choose to exclude selected files by using the Clone menu.

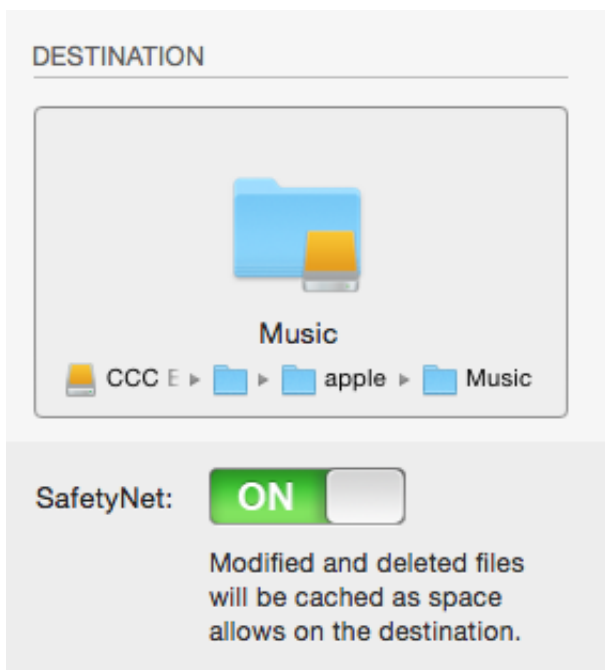


Choose your destination

The steps used to select the source need to be repeated for the destination. CCC also supports drag and drop selection, so we'll demonstrate that here. Find your destination folder in the Finder, then drag it onto CCC's Destination selector.

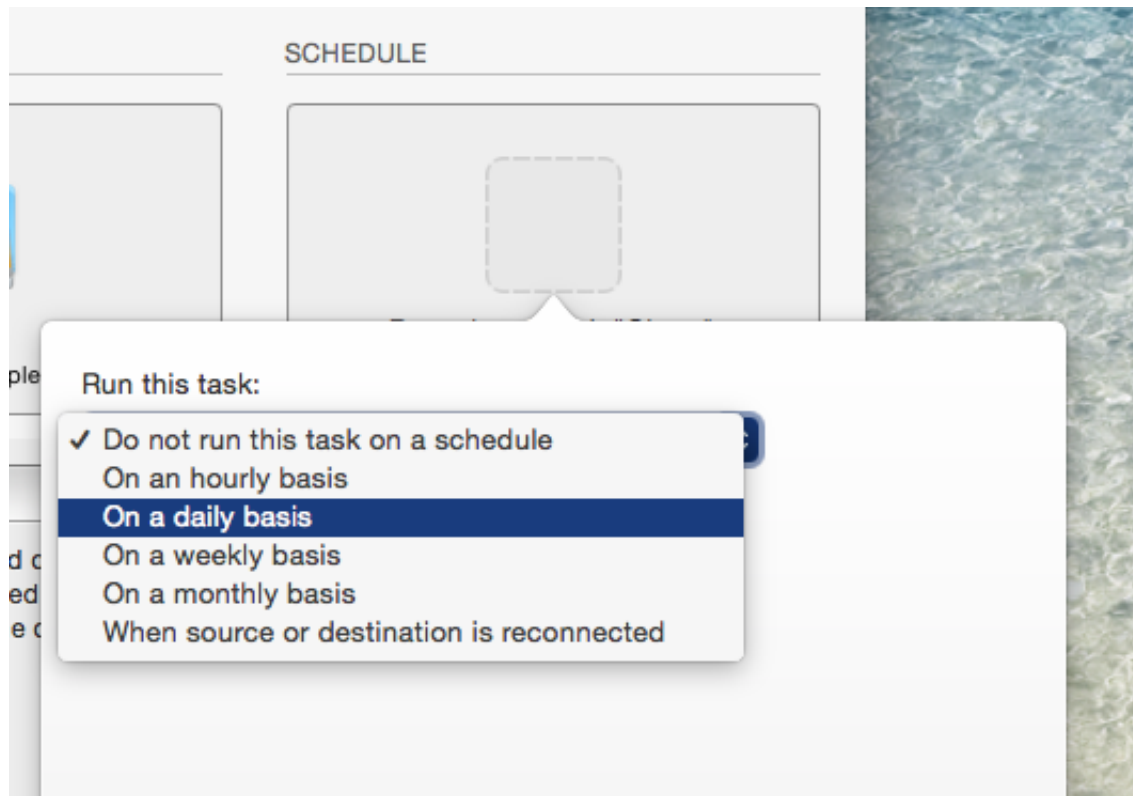


Once you have selected the destination folder, the Destination box should have a folder icon in it with the path displayed beneath it. You may choose to leave SafetyNet on or turn it off. To learn more about SafetyNet, please see [Protecting data that is already on your destination volume: The Carbon Copy Cloner SafetyNet <http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet>](http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet).



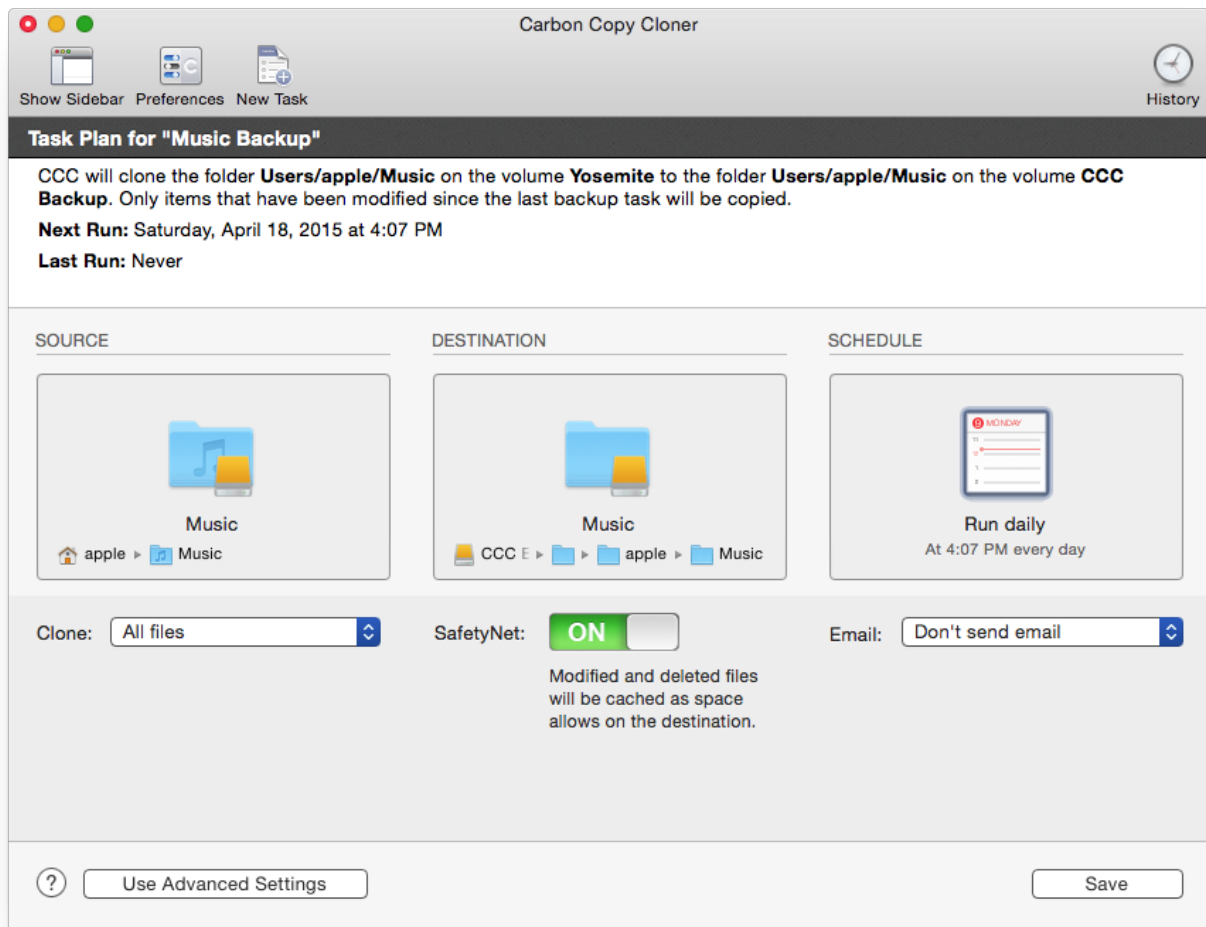
Schedule the backup

Click in the Schedule box and design a backup schedule that meets your needs. Click **Done** when you have finished.



Save and clone

Once you have your source, destination and schedule complete, click on Save in the bottom right-hand corner. This will save the task and you can find it in the tasks area on the left sidebar. If you don't see the sidebar, click on **Show Sidebar** in the CCC window header. You may click the **Clone** button to run the backup manually, or let it run on a schedule.





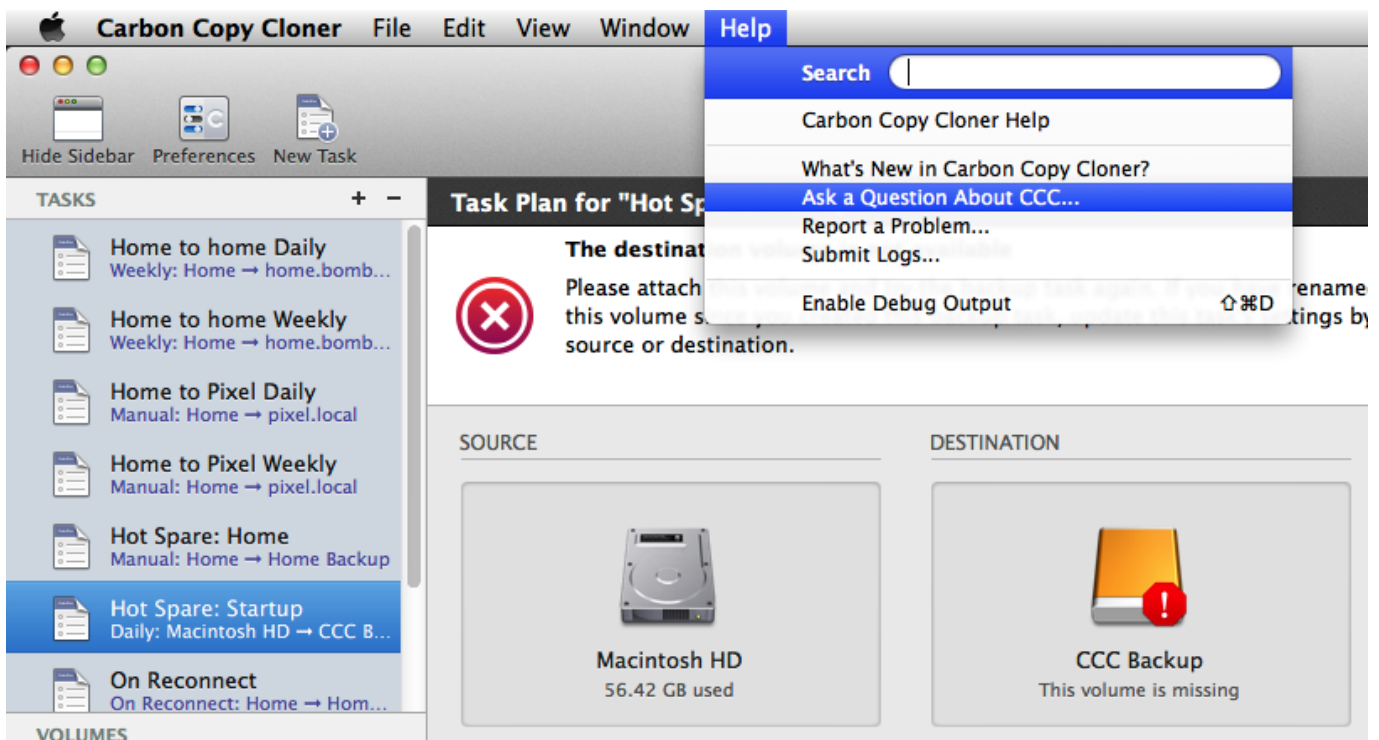
Troubleshooting

How do I get help?

The best way to receive help is by requesting it from within the Carbon Copy Cloner application. Please note that we provide support in English only and we try to respond within one business day.

Open Help

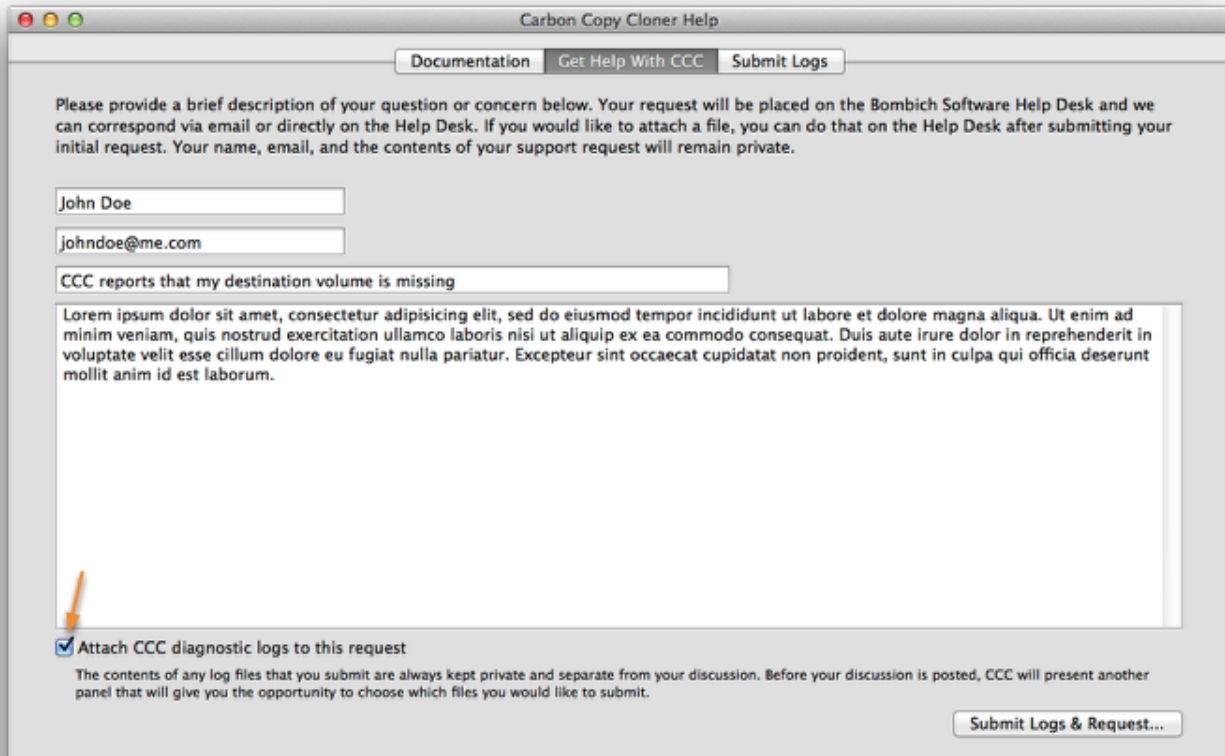
If you have a question about CCC or you need help solving a problem, we're here to help you. Choose Ask a **Question About CCC...** from Carbon Copy Cloner's **Help** menu.



Describe your question

Provide your name, email address, a brief subject, and let us know how we can help you. For the

fastest assistance, please include your logs with your help request. We usually get back to folks within one business day from their support request - and often much faster than that.



The screenshot shows a window titled "Carbon Copy Cloner Help" with three tabs: "Documentation", "Get Help With CCC", and "Submit Logs". The "Get Help With CCC" tab is active. The window contains a form for submitting a support request. At the top, there is a paragraph of text: "Please provide a brief description of your question or concern below. Your request will be placed on the Bombich Software Help Desk and we can correspond via email or directly on the Help Desk. If you would like to attach a file, you can do that on the Help Desk after submitting your initial request. Your name, email, and the contents of your support request will remain private." Below this text are three input fields: a name field containing "John Doe", an email field containing "johndoe@me.com", and a text area containing "CCC reports that my destination volume is missing". Below the text area is a large text box containing placeholder text: "Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum." Below the text box is a checkbox labeled "Attach CCC diagnostic logs to this request" which is checked. Below the checkbox is a paragraph of text: "The contents of any log files that you submit are always kept private and separate from your discussion. Before your discussion is posted, CCC will present another panel that will give you the opportunity to choose which files you would like to submit." At the bottom right of the window is a button labeled "Submit Logs & Request...".

Carbon Copy Cloner Help

Documentation Get Help With CCC Submit Logs

Please provide a brief description of your question or concern below. Your request will be placed on the Bombich Software Help Desk and we can correspond via email or directly on the Help Desk. If you would like to attach a file, you can do that on the Help Desk after submitting your initial request. Your name, email, and the contents of your support request will remain private.

John Doe

johndoe@me.com

CCC reports that my destination volume is missing

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Attach CCC diagnostic logs to this request

The contents of any log files that you submit are always kept private and separate from your discussion. Before your discussion is posted, CCC will present another panel that will give you the opportunity to choose which files you would like to submit.

Submit Logs & Request...

Help! My clone won't boot!

We're happy to [help you troubleshoot <http://bombich.com//software/get_help>](http://bombich.com//software/get_help) your bootability problems. Before you ask for help, please try the troubleshooting steps below. If you're having trouble with the steps or have run out of options, please let us know how far you got, or how far your Mac gets into the boot process.

Troubleshooting firmware discovery problems

When you boot your Mac while holding down the Option key, your Mac's firmware will display a list of available startup devices. Using only device drivers that are stored on your Mac's firmware chip, the firmware will scan all of your SATA, PCI, USB, Firewire, and Thunderbolt busses for hard drive devices, then read those hard drive volume headers to determine if a macOS system is available on each volume. Ordinarily, a CCC bootable backup volume will appear in this list, but occasionally your Mac's firmware may have difficulty discovering the hardware that hosts your backup.

If CCC's Task Plan didn't report any configuration concerns for your backup volume and you are having trouble booting from it, try the following troubleshooting steps (in order).

Rule out generally incompatible configurations and filesystem anomalies

If you are using an external hard drive enclosure, see whether your enclosure is listed at the bottom of this page as an enclosure that we've seen problems with in the past. Also, for good measure, use Disk Utility's "First Aid" utility to verify and repair any filesystem problems that may be present on the destination volume.

Troubleshoot discoverability issues in the Mac's Startup Manager

1. Reboot your Mac while holding down the Option key.
2. Wait about 30 seconds to see if the backup volume appears. **If your backup volume appears at this step and the boot process proceeds past the Apple logo, skip to the next section below <#stalled_boot>.**
3. Detach, then reattach the backup volume's Firewire, USB or Thunderbolt cable from/to your Mac and wait up to another 30 seconds. If your backup volume appears, select it and proceed with the startup process.
4. If the backup volume still does not appear as an option, shut down your Mac completely. Then start it up holding down the Option key, waiting another 30 seconds for the volume to appear.
5. Repeat the steps above, but using another interface (e.g. USB if you tried Firewire, Firewire if you already tried USB) and see if the volume appears.
6. If the hard drive enclosure is bus powered, try plugging in its DC power supply before starting up your Mac. Bus powered enclosures often take a bit longer to spin up or simply don't make themselves available that early in the boot process.

Additional USB device troubleshooting

Macs' support for booting from USB volumes has always been second class to Apple-invented interfaces such as Firewire and Thunderbolt. We strongly recommend using Firewire or Thunderbolt for your bootable backup; those interfaces are consistently more reliable when it comes to bootability. If you have a USB-only device in hand, though, here are a couple additional steps you can perform to try to get your Mac to "see" it early in the startup process.

1. Reboot your Mac while holding down the Option key.
2. If your Mac has multiple USB ports, try attaching your destination disk to each port (and be sure to use the ports on your Mac directly — not a hub, keyboard, or display)
3. If you are using a USB 3.0 enclosure, try using a USB 2.0 cable (yes, it **will** work!). USB 3.0 devices are backwards compatible to USB 2.0, but they don't always play well with the older USB device drivers that are embedded within your Mac's firmware. Using a USB 2.0 cable elicits different behavior from the enclosure that often works around compatibility problems that are only exposed when using the Mac's firmware USB drivers. Here are some pictures that show what the ends of USB 2.0 and USB 3.0 cables look like:

USB 2 Micro B**USB 3 Micro B**

Reset the Mac's Parameter RAM

Lastly, try resetting your Mac's parameter RAM. PRAM maintains settings related to starting up your Mac, and it's possible that invalid settings are interfering with your Mac's discovery of the external enclosure. To reset your PRAM:

1. Hold down Command+Option+P+R on startup
2. Hold down those keys until you hear the second startup chime.
3. Release all but the Option key after you hear the second startup chime.

Definitively rule out an incompatible enclosure

If the volume still won't boot, it may be impossible for your firmware to detect your enclosure (despite that macOS, once booted and having access to far more device drivers, can see the enclosure just fine). The Golden Litmus Test for bootability would be to install macOS directly onto the volume. If that fails to make the disk bootable, then it definitely isn't going to happen. **Please report these enclosures to us <http://bombich.com/software/get_help> so we can assemble a list of troublesome enclosures.**

The backup volume starts to boot the Mac, but is slow or never gets to the Finder

There are several visual hints that can indicate how far your backup volume is getting in the startup process:

1. Apple logo: The "booter" file was found and executed.
2. Spinning progress indicator: The OS "kernel" was executed and now has control over the startup process. The kernel will load kernel extension caches, mount the startup disk, then execute "launchd" which kicks off all of the other system processes.
3. Blue screen: The WindowServer has loaded, so the system is ready to start loading regular applications or the loginwindow.
4. Loginwindow or your Desktop: The system has finished loading, and is ready for user

interaction

If your backup volume showed up in the Option key startup disk selection screen, but doesn't display the Apple logo when you choose to start from it, then your Mac is having trouble finding the "booter" file on this volume. This can occur due to hard drive enclosure interference, due to filesystem corruption on the backup volume, or due to the volume being improperly "blessed" (blessing a volume stores certain information about the startup files in the volume's header, and your Mac uses that information to start the boot process).

1. Repartition the backup disk in Disk Utility, then reclone your startup disk to the destination.
2. Try booting from the backup volume again.

If you see the universal "No access" symbol after selecting your startup disk

This indicates that the kernel cannot load the kernel extension cache, or that it cannot mount the startup disk. This could be due to trying to run an incompatible operating system on your Mac, or due to an extension conflict with the enclosure you are trying to boot from.



We see this quite frequently when trying to boot from a USB 3.0 enclosure, especially on Macs that do not have native support for USB 3.0. We also see this more frequently on Yosemite when a critical kernel extension's code signature is invalid. This can happen, for example, when using something like [TRIM Enabler <https://www.cindori.org/trim-enabler-and-yosemite/>](https://www.cindori.org/trim-enabler-and-yosemite/) to modify macOS Storage drivers.

- If you are booting a different Mac than what the backup volume was cloned from, try installing macOS directly onto the cloned volume while booted from the Apple Recovery volume.
- If you're booting the same Mac from which you created the backup, try booting into Safe Boot mode (hold down the Shift key as you start your Mac, after selecting the backup volume as the startup disk).
- If you used a third-party utility to modify macOS software (e.g. TRIM Enabler), undo that modification, then run the backup task again.

If your Mac never progresses past the spinning progress indicator (below the Apple logo) or stalls at the blue screen while booting from the backup volume, there is probably a problem with some of the system files that are called early in the startup process. The system log on the backup volume can be very useful in troubleshooting these problems. To view the system log:

1. Boot your Mac from its usual startup disk while holding down the Shift key. This will start your Mac in Safe Boot mode, and will cause macOS to rebuild the kernel cache on the startup disk.
2. Run your backup task again, then try again to boot from the backup volume. If the same problem occurs, reboot from your regular startup disk and proceed to the next step.
3. Choose "Go to folder" from the Finder's Go menu.
4. Type `"/Volumes/Backup volume name/var/log"` (no quotes, and substitute the actual name of



the volume) and click the Go button.

5. Double-click on the system.log item in this folder.

Look for any error messages, indications of crashes, etc., or simply attach the system.log file to a [support request on the Bombich Software Help Desk <http://bombich.com//software/get_help>](http://bombich.com//software/get_help).

"unapproved caller. security agent may only be invoked by apple software" message appears on startup

This message generally appears when the volume you are trying to boot from is full or nearly full. You can remove items from the _CCC SafetyNet folder (or the entire folder itself), then empty the Trash to free up some space before trying to boot from that volume again. macOS should be given at least 2GB, preferably 5-10GB of free space to accommodate the creation of cache and virtual memory files on startup.

Configurations with which we have seen some problems

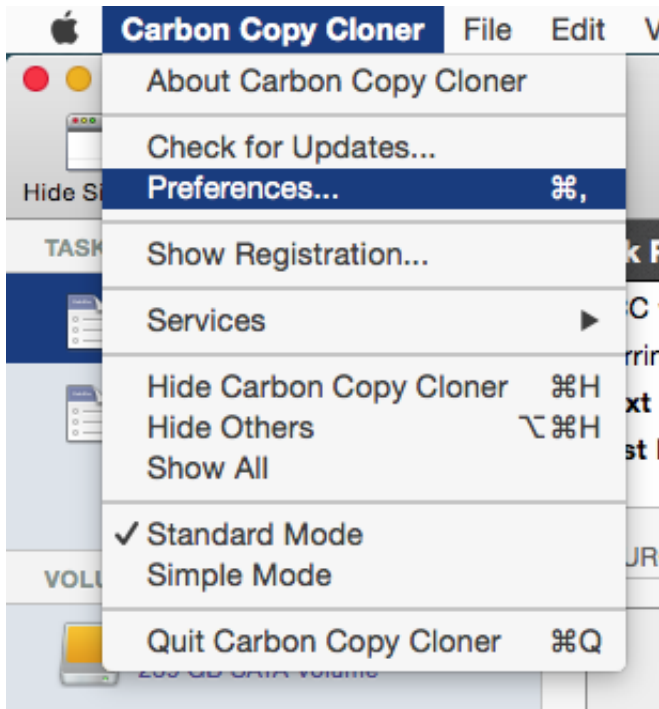
- [Some Western Digital enclosures cannot boot Macs <http://support.wdc.com/knowledgebase/answer.aspx?ID=1787>](http://support.wdc.com/knowledgebase/answer.aspx?ID=1787)
- [Hands Off! and possibly Little Snitch may prevent a cloned volume from booting <http://bombich.com//kb/discussions/no-boot-from-firewire800-disc>](http://bombich.com//kb/discussions/no-boot-from-firewire800-disc)
- [Some Macs have trouble booting from USB 3.0 enclosures <http://bombich.com//kb/discussions/imac-doesnt-boot-from-back-up>](http://bombich.com//kb/discussions/imac-doesnt-boot-from-back-up)
- [Some MacBook Pros can boot from a disk in an enclosure, but not when it is installed internally <http://bombich.com//kb/discussions/clone-boots-fine-externally...-everything-works-great...-wont-boot-internally>](http://bombich.com//kb/discussions/clone-boots-fine-externally...-everything-works-great...-wont-boot-internally)
- [Some MacBook Pros can boot from a disk in an enclosure, but not when it is installed internally \(asks to be reinitialized\) <http://bombich.com//kb/discussions/unable-boot-from-cloned-hitachi-hd-internally>](http://bombich.com//kb/discussions/unable-boot-from-cloned-hitachi-hd-internally)
- [Cannot boot from a hard drive installed in some optical bay replacement kits <http://bombich.com//kb/discussions/cant-boot-from-startup-disk-on-back-up-due-bless-tool-unable-...>](http://bombich.com//kb/discussions/cant-boot-from-startup-disk-on-back-up-due-bless-tool-unable-...)
- [Reports indicate that <https://discussions.apple.com/thread/4243814>](https://discussions.apple.com/thread/4243814), contrary to its published documentation, the [NewerTech Voyager Dock <http://www.newertech.com/products/voyagerq.php>](http://www.newertech.com/products/voyagerq.php) enclosure is **not** bootable via Firewire.
- We have received a report that the [Nexstar 6G <http://www.vantecusa.com/en/product/view_detail/584>](http://www.vantecusa.com/en/product/view_detail/584) USB 3.0 hard drive enclosure is not bootable due to a discoverability issue. The Nexstar TX from Vantec was bootable (using the same internal hard drive).
- We have received a report that the [CineRAID Home CR-H212 USB 3.0 Bus Powered Dual Drive RAID/JBOD Portable Enclosure <http://www.cineraid.com/products/home_h212.htm>](http://www.cineraid.com/products/home_h212.htm) may provide inconsistent bootability results. In at least one case, only one of the hard drives in the enclosure was discoverable by Mac firmware, and it appeared to be position-dependent within the enclosure.
- We have received a report that the Orico 3588US3 USB3 enclosure is not bootable due to a discoverability issue.

Related Documentation

- [A closer look at how CCC determines the "bootability" of a destination volume <http://bombich.com//kb/ccc4/closer-look-how-ccc-determines-bootability-destination-volume>](http://bombich.com//kb/ccc4/closer-look-how-ccc-determines-bootability-destination-volume)
- [Apple Kbase: About the screens you see when your Mac starts up <https://support.apple.com/en-us/HT204156>](https://support.apple.com/en-us/HT204156)

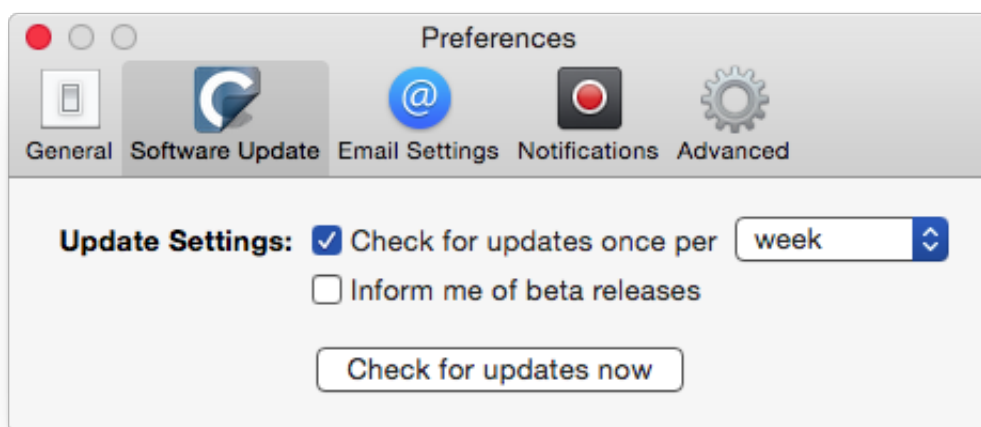
Keeping CCC up to date

Open Preferences



Select **Preferences** from the **Carbon Copy Cloner** menu

Select Software Update



You can immediately check for updates by clicking on **Check for updates now**.

By default, CCC will automatically check for updates once per **week**. You can change this preference to **day** or **month**. To disable automatic update checking, uncheck the box next to **Check for updates once per...**

By default, CCC will not inform you of beta releases. Occasionally, beta updates are provided to confirm that software changes have resolved a particular problem. In general, beta updates are only issued when a user has discovered a problem that the software developer can reproduce. Therefore, you should only apply beta updates when instructed to do so by Bombich Software.

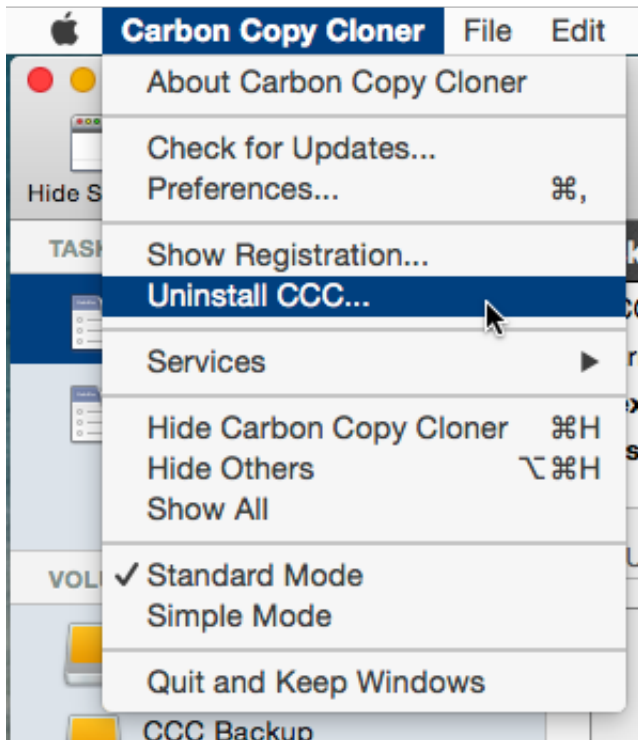
Do not use third-party update mechanisms

We have received numerous reports of poor update experiences when users use third-party update services, such as MacUpdate Desktop or CNET's Installer. In some cases, the third-party update services install **other promotional software** alongside the update, or completely mangle the update such that CCC is unusable. Please do not use these services to apply updates to CCC; use CCC's built-in software update mechanism.

Uninstalling CCC

Uninstalling from within Carbon Copy Cloner

To Uninstall Carbon Copy Cloner, hold down the Option key and choose **Uninstall CCC...** from the Carbon Copy Cloner menu. When you uninstall CCC, CCC's privileged helper tool and all saved tasks will be immediately deleted. The Carbon Copy Cloner application file and CCC's preferences will then be moved to the Trash.



Manually removing files associated with Carbon Copy Cloner

If you deleted the Carbon Copy Cloner application before leveraging the Uninstall feature, you can manually remove the following files and folders associated with CCC:

- /Library/Application Support/com.bombich.ccc
- /Library/LaunchDaemons/com.bombich.ccchelper.plist
- /Library/PrivilegedHelperTools/com.bombich.ccchelper
- /Users/yourname/Library/Application Support/com.bombich.ccc

To get to that last folder, hold down the Option key and choose **Library** from the Finder's **Go** menu. When finished moving items to the Trash, restart your computer, then empty the Trash.

Manually disabling the CCC User Agent and the com.bombich.ccchelper privileged helper tool

When you install and use Carbon Copy Cloner, two background utilities are installed to support CCC tasks. The helper application runs and coordinates tasks, it is required for all task-related activity. The helper tool will automatically exit if you do not have any scheduled tasks configured, and if you



do not have CCC configured to display CCC's icon in the menubar. The helper tool will launch automatically when you open CCC, and whenever the CCC User Agent is running.

The CCC User Agent relays notifications from the helper tool to Notification Center, and also presents prompts and reminders to the user, and delivers a subset of error conditions to the user. The User Agent will automatically exit if you do not have CCC configured to display CCC's icon in the menubar, you do not have any scheduled tasks configured, no tasks are currently running, and if CCC is not running.

If you have a specific reason to disable these applications, for example, if you use CCC infrequently, you can do the following when you are done using CCC:

1. Configure CCC to not show its icon in the menubar (Carbon Copy Cloner menu > Preferences > Notifications)
2. While holding down Command+Option (⌘ ⌥), click on the Carbon Copy Cloner menu
3. Choose **Disable All Tasks & Quit** (the keyboard shortcut is Command+Option+Q)

Please note that any scheduled tasks will not run as long as CCC's privileged helper tool is disabled.

Antivirus software may interfere with a backup

Some antivirus applications may prevent Carbon Copy Cloner from reading certain files, mounting or unmounting disk image files, or, in general, degrade the performance of your backup. In some cases, antivirus applications can even affect the modification date of files that CCC has copied, which will cause CCC to recopy those files every time as if they have substantively changed. In another case, we have seen such software create massive cache files on the startup disk during a backup, so much so that the startup disk became full. We recommend that you temporarily disable security software installed on your Mac (e.g. for the duration of your backup task) if problems such as these arise.

If CCC reports that antivirus software may be interfering with your backup task, here are some troubleshooting steps that you can take to resolve the problem:

1. Determine whether the files in question are being quarantined by your antivirus software. Perform a system scan with your antivirus software and address any issues that are reported. Please refer to the Help documentation associated with your antivirus product for more information.
2. If the problem persists, try running your backup task with the antivirus software temporarily disabled.

If the antivirus software's behavior cannot be resolved, you may be able to work around the problem with an advanced setting. Select your task in CCC's main application window, then:

1. Click the "Use Advanced Settings" button.
2. Open the "Troubleshooting Options" disclosure triangle.
3. Check the "Don't update newer files on the destination" box.
4. Save your task.

If these steps do not address the issue, or if you do not have antivirus software installed, please [open a support request <http://bombich.com//software/get_help>](http://bombich.com//software/get_help) and we'll do our best to help you resolve the problem.

Problem reports related to antivirus software

- [Sync problems and ACL issues <http://bombich.com//kb/discussions/sync-problems-and-acl-issues>](http://bombich.com//kb/discussions/sync-problems-and-acl-issues)
- [Subsequent backups are slow <http://bombich.com//kb/discussions/subsequent-backups-both-full-and-incremental-slow.>](http://bombich.com//kb/discussions/subsequent-backups-both-full-and-incremental-slow.)
- [Source Disk becomes full when cloning <http://bombich.com//kb/discussions/source-disk-becomes-full-when-cloning>](http://bombich.com//kb/discussions/source-disk-becomes-full-when-cloning)
- [System hangs during scheduled backup task <http://bombich.com//kb/discussions/having-finished-backup-task-launches-if-connecting-specific-firewire-disk-waking-up>](http://bombich.com//kb/discussions/having-finished-backup-task-launches-if-connecting-specific-firewire-disk-waking-up) (Sophos)
- [Problem with CCC and F-Secure 2011 virus scanner <http://bombich.com//kb/discussions/problem-ccc-and-f-secure-2011-virus-scanner>](http://bombich.com//kb/discussions/problem-ccc-and-f-secure-2011-virus-scanner)
- [McAfee changes modification date of files on the destination <http://bombich.com//kb/discussions/unchanged-files-being-archived>](http://bombich.com//kb/discussions/unchanged-files-being-archived)
- [Backup task is slower than it should be <http://bombich.com//kb/discussions/change-in-time-backup>](http://bombich.com//kb/discussions/change-in-time-backup) (VirusBarrier)
- [Slow performance during backup <http://bombich.com//kb/discussions/slow-incremental-clone>](http://bombich.com//kb/discussions/slow-incremental-clone) (F-Secure)



- Symantec Internet Security may cause kernel panics during a backup task
<<http://bombich.com//kb/discussions/ccc-causes-my-os-x-lion-10.7.4-panic>>
- BitDefender may generate excessive read activity on the destination volume during a backup task, and may cause the destination device to spontaneously eject. Add the destination volume to BitDefender's exclusion list to avoid the problem.

Why is CCC recopying every file during each backup?

CCC will copy only items that are different between your source and destination. So if you complete a backup task, then run it again the next day, CCC will copy only the items that were created or modified since that last backup task. CCC determines that a file is different using its size and modification date. If a file's size or modification date is at all different on the source and destination, CCC will copy that file to the destination.

Before concluding that CCC is recopying **every** file, open your most recent completed task in CCC's Task History window and compare the "Total size of source data set" and "Data copied" values. It is not uncommon for as much as 2-5GB of files to be updated between daily backups, for example, even when it seems that you have made no changes to the source volume. macOS is constantly updating various cache and log files, and these can really add up over the course of a day. If the amount of data copied is just a fraction of the total data set, then the amount of data being copied is probably normal.

Organizational changes will lead to large amounts of data being "recopied"

If you have made large organizational changes on your source volume, e.g. renamed or moved a folder that had a lot of data in it, that will result in many items being recopied to the destination because the path to those items has changed. You can avoid this recopying behavior by applying the same organizational changes to the destination prior to running your backup task.

Some antivirus applications may actually change file modification dates

After CCC has copied a file to the destination, the very last thing that it does is to set the file's modification date to the modification date of the source file. This filesystem activity prompts the AV software to scan the file, which is generally OK (albeit with a performance hit to the backup task). Reading a file is not sufficient to change the file's modification date, so well-written AV applications should cause no harm by scanning the files that CCC copies. When an AV application "touches" the file, however, or otherwise makes changes to the file, the modification date will be updated to the current date.

If the modification date of the files on your destination are getting set to the date and time of the backup tasks, there's a good chance that AV software or some other background service is making changes to the files after CCC has copied them. If you cannot resolve the modification date tampering of your AV software (or other software), you can configure CCC to avoid updating files that are newer on the destination. To apply this setting, select your backup task in CCC's main application window, then:

1. Click the **Use Advanced Settings** button.
2. Open the **Troubleshooting Options** disclosure triangle.
3. Check the **Don't update newer files on the destination** box.
4. Save your task.

Related Documentation

- Antivirus software may interfere with a backup <<http://bombich.com//kb/ccc4/antivirus-software-may-interfere-backup>>
- Advanced Settings <<http://bombich.com//kb/ccc4/advanced-settings>>

A time zone shift can affect modification dates on some filesystems

HFS+, NTFS, and other modern filesystems store the modification date of files based on the Coordinated Universal Time (UTC — comparable to GMT). FAT filesystems, on the other hand, store file modification dates based on the local time zone setting of your computer. Generally this difference isn't a problem, but there is a drawback if you copy files between FAT volumes and NTFS or HFS+ volumes. During time zone shifts and the Daylight Saving Time/Summer Time shift, the modification dates of files on FAT32 volumes will appear to have shifted. As a result, CCC will see these files as out of date and will recopy each file. Unfortunately CCC cannot remediate this shortcoming of the FAT filesystem, so if you have to copy files to or from a FAT volume, we recommend that the corresponding source or destination volume is also FAT formatted.

We have also received sporadic reports of this same problem when copying files to some network filesystems (NAS devices). If you encounter this problem, try the suggestion above to use the **Don't update newer files on the destination** advanced setting.

Microsoft MSDN Library: File Times <[https://msdn.microsoft.com/en-us/library/ms724290\(VS.85\).aspx](https://msdn.microsoft.com/en-us/library/ms724290(VS.85).aspx)>

"CCC found multiple volumes with the same Universally Unique Identifier"

Occasionally a circumstance arises in which CCC presents the following error message before creating or running a backup task:

CCC found multiple volumes with the same Universally Unique Identifier that was associated with the volume you designated as the source/destination for this task.

CCC cannot proceed with confidence in having correctly identified the volume you originally chose when you configured this backup task. Unmount one of the conflicting volumes and try the task again, or please choose "Ask a question" from CCC's Help menu to get help resolving the issue.

Most modern operating systems apply a universally unique identifier to a new volume when you format that volume (e.g. in Disk Utility). Volumes should never have the same identifier, these identifiers are called "universally unique" because they're supposed to be unique, universally! [Wikipedia <https://en.wikipedia.org/wiki/Universally_unique_identifier#Random_UUID_probability_of_duplicates>](https://en.wikipedia.org/wiki/Universally_unique_identifier#Random_UUID_probability_of_duplicates) notes that, for 122 bit UUIDs, there is a 50/50 chance of having a single duplicate UUID if 600 million UUIDs were allocated to every person on Earth. The chances of two volumes having the same UUID should, then, be slim enough that the UUID can be reliably used to positively identify the source and destination volumes.

Given these odds, it is statistically more likely that CCC's discovery of a duplicate UUID is due to a hardware or software problem rather than to two volumes randomly having the same UUID. Therefore, CCC makes the conservative decision to not back up to either volume if another volume with the same UUID is detected.

Unfortunately, it has come to our attention that many Iomega and Western Digital drives that are pre-formatted for macOS are stamped with the same UUID at the factory. As a result, this situation can arise if you own and attach two "factory fresh" Iomega hard drives to your computer.

Solution

Reformatting one of the affected volumes will resolve the problem, however there is a non-destructive solution:

1. Quit CCC if it is open
2. Download this [Reset Volume UUID utility <http://bombich.com//software/files/tools/reset_volume_uuid.zip>](http://bombich.com//software/files/tools/reset_volume_uuid.zip)
3. Unarchive the **Reset Volume UUID utility** and open it
4. When prompted, select one of the volumes that was identified as having a non-unique unique identifier
5. Open CCC and try configuring your backup task again

Sierra and Western Digital Hard Drive Enclosures

We have been tracking an emerging Sierra-specific issue that can lead to CCC producing this alert in

cases where a duplicate device is not physically present. Occasionally when you unmount and physically detach a Western Digital enclosure from a Mac running macOS Sierra, the macOS IOKit service errantly retains the virtual device object. When you subsequently reattach the device, it is assigned a new device identifier and virtual device object. At that point, any application that asks the macOS IOKit service for a list of disks will get duplicate values for the WD device. Most applications wouldn't care about the duplicate devices, but CCC tracks these devices and uses them to mount the source and destination at the beginning of the task, if necessary. Please note that CCC isn't causing this condition, it's just complaining about it.

CCC 4.1.11 works around the underlying macOS bug. If you're running into this error, and your Mac is running macOS Sierra, and your affected volume is on a Western Digital hard drive enclosure, you can download the latest version of CCC to get the workaround. Choose **Check for Updates...** from the **Carbon Copy Cloner** menu to get the latest version of CCC.

Also, we urge you to report this problem to us via the **Report a Problem** menu item in CCC's Help menu so we can add your OS and device details to our open problem report with Apple (rdar://28972958). In the meantime, the underlying problem should be harmless. But, if you ever see two **mounted** instances of your Western Digital device in the Finder, you should immediately unmount the device, detach it from your Mac, and then restart your computer. In most of the cases we've seen, the duplicate instances of the device are unmounted and therefore harmless. In one case, however, macOS mounted two instances of the volume and the volume wound up corrupted.

Finder or App Store finds other versions of applications on the backup volume

Occasionally we receive reports of odd system behavior, such as:

- When opening a document, the application on the backup volume is opened rather than the version from your startup disk
- When trying to update an application in App Store, the update appears to fail — the older version is always present
- The destination volume cannot be (gracefully) unmounted because various applications or files are in use
- When choosing "Open With..." from a Finder contextual menu, duplicates of your applications appear in the list

These problems consistently go away if the destination volume is ejected.

These problems are ultimately caused by problems with the LaunchServices database, which is an issue outside of the scope of the backup process. There are two things that you can do to address the problem:

Disable Spotlight on the destination volume

Disabling Spotlight indexing on the destination volume should prevent new additions being made to the LaunchServices database that reference the destination. Open the Spotlight preference pane, click on the Privacy tab, then drag your destination volume into the privacy tab. Check whether applications still open by default from the destination volume, because this step may be enough to address the issue.

Configure CCC to eject the destination volume at the end of the backup task

With an advanced setting, you can [configure CCC to unmount the destination](http://bombich.com/kb/ccc4/performing-actions-before-and-after-backup-task#dest_postactions) when CCC has finished copying files to it. By keeping the destination volume unmounted, Finder and App Store will be unable to find applications on that volume. You'll save wear and tear on that hard drive by keeping it spun down as well.

Reset the LaunchServices database

If applications still open from the destination volume, you can use this [Reset LaunchServices Register](http://bombich.com/software/files/tools/Reset_LaunchServices_Register.app.zip) application to reset the LaunchServices database, then restart your Mac.

"The task was aborted because a subtask did not complete in a reasonable amount of time"

Occasionally a backup task can stall if the source or destination stops responding. To avoid waiting indefinitely for a filesystem to start responding again, Carbon Copy Cloner has a "watchdog" mechanism that it uses to determine if its file copying utility has encountered such a stall. By default, CCC imposes a ten minute timeout on this utility. If ten minutes pass without hearing from the file copying utility, CCC will collect some diagnostics information, then stop the backup task. Our support team can analyze this diagnostic information to determine what led to the stall.

Common factors that lead to stalls

Hardware problems are the most common cause of a stall. There are a few other factors that can lead to a stall, though, depending on how the backup task is configured:

- Filesystem corruption or media problems on the source or destination can prevent that filesystem from providing a file or folder's filesystem entry
- A firmware problem in an external hard drive enclosure can cause that device to stop responding
- File sharing service errors can lead a network volume to become unresponsive
- Access to a network volume via a wireless connection may become slow enough that the volume stops responding
- Excessive bandwidth competition from other software can cause a volume to appear unresponsive, though it may just be responding very slowly

Troubleshooting suggestions

The first thing you should do if a task ends with this result is to reboot your Mac and run the task again. In many cases, an unresponsive filesystem is a transient problem, and the simple act of restarting will get the volume remounted in a better state. If the problem recurs, please choose **Report a problem** from CCC's Help menu and our support team can offer more specific troubleshooting suggestions. Below is a list of some of the troubleshooting suggestions we may offer depending on how your task is configured.

- Use Disk Utility's "Verify disk" tool to check for any filesystem problems on the source volume. If any are discovered and the source is your startup disk, reboot while holding down Command+R to boot from the Recovery volume, then use Disk Utility to repair the problems. Please note: A report of "No problems found" from Disk Utility does not mean that there are no problems with that volume. There are no hardware diagnostic utilities on the market that will inform you of a problem with a cable, port, or enclosure, or report a bug in the firmware of a hard drive or SSD.
- Exclude a file or folder from the backup task. Select **Selected files...** from the Clone popup menu (underneath the Source selector), then uncheck the box next to the item that the source filesystem is unable to read.
- Remove a corrupted item from the destination volume.
- Erase the destination volume (we make this recommendation sparingly, and only when the stall can be definitively identified as a filesystem problem on the destination).
- Disable Spotlight on the destination volume to reduce bandwidth competition. To disable



Spotlight, open the Spotlight preference pane, click on the Privacy tab, then drag the backup volume into the Privacy table. This only affects the destination volume, and it's reversible, you can remove it from that list should you decide that you want to re-enable indexing.

- If the stalling volume is a network volume, connect your Mac and the host of the network volume to the network via a wired connection (i.e. rather than via a wireless connection, if applicable).
- If the stalling volume is a network volume, eject that volume in the Finder, then [remount the volume using a different file sharing protocol <http://bombich.com//kb/cc4/backing-up-tofrom-network-volumes-and-other-non-hfs-volumes#nas_EINVAL>](http://bombich.com//kb/cc4/backing-up-tofrom-network-volumes-and-other-non-hfs-volumes#nas_EINVAL).

Troubleshooting slow performance when copying files to or from a network volume

Several Network Attached Storage (NAS) devices offer poor performance for reading extended attributes from files on the NAS volume (e.g. when copying those files from the NAS, or when reading existing files on the NAS to determine if they are up to date). This performance problem is independent of CCC, other non-CCC users have reported this on [Apple Support](#), for example. We have identified a couple workarounds that can avoid the performance problem.

Eject the network volume in the Finder

Our first recommendation is to **eject your network shares in the Finder**, then run your task again. We have run several tests and positively identified an issue in which the Finder will make repeated and ceaseless access attempts to the items of a folder on your network share if you simply open the network volume in the Finder. This persists even after closing the window. This is a Finder bug, and it exists in both Mavericks, Yosemite, and El Capitan. If you eject the network volume(s), then run your CCC backup tasks, CCC will mount the network volume privately such that it is not browseable in the Finder.

Disable support for extended attributes

If the stall persists despite trying the first workaround, you can try dropping the extended attributes from the source. While it is our preference to preserve extended attributes, Apple considers extended attributes to be "disposable" because some filesystems cannot support them.

1. Open CCC and select your backup task
2. Click the "Use advanced settings" button at the bottom of the window
3. Scroll down in the window and click the disclosure triangle next to "Troubleshooting"
4. Check the box next to "Don't preserve extended attributes"
5. Save and run the task

If a performance problem persists after that, please report the problem via CCC's Help menu.

Where can I find CCC's log file?

Older versions of Carbon Copy Cloner frequently steered users towards the log file to find more information about task activity, errors, etc. Our goal with CCC 4 was to have the Task History window provide any information that the user might have tried to retrieve from the CCC log file. For debugging purposes, however, CCC 4 does still log its activity in the following files:

- Task Activity: /Library/Application Support/com.bombich.ccc/pht_debug.log
- Task Editing: ~/Library/Application Support/com.bombich.ccc/ccc_debug.log
- CCC User Agent: ~/Library/Application Support/com.bombich.ccc/ua_debug.log

Tip: Hold down Command+Option and choose **Open Debug Logs** from the Carbon Copy Cloner menu to open these three files in the Console application.

If there's something specific that you're retrieving from the log that is not presented in the Task History window, [please let us know <http://bombich.com//software/get_help>](http://bombich.com//software/get_help). We'd prefer to consider exposing that information in the Task History window so you don't have to dig through the log. Also, note that basic details of task history are exposed in CCC's command-line utility, so that may be an easier way to get the information.

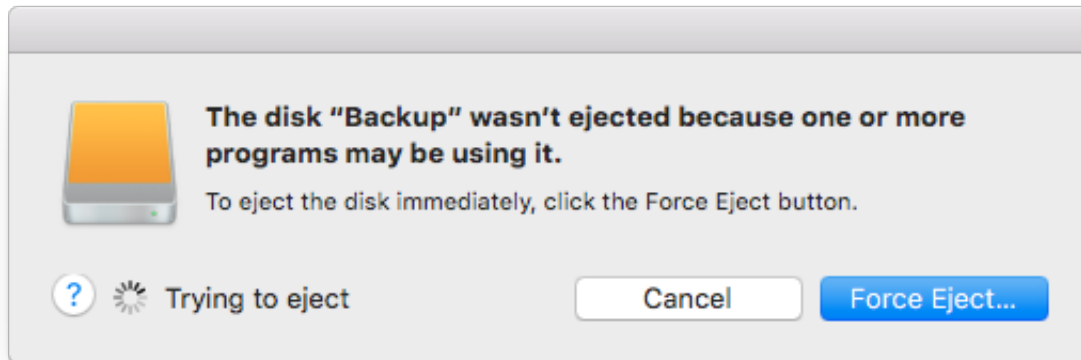
Where can I find a list of every file that CCC has copied?

CCC does not retain that information for each backup task. If you're concerned that CCC is copying too many or too few files, please [contact us for assistance <http://bombich.com//software/get_help>](http://bombich.com//software/get_help).

Related documentation

- [Using the ccc Command Line Tool to Start, Stop, and Monitor CCC Backup Tasks <http://bombich.com//kb/ccc4/using-ccc-command-line-tool-start-stop-and-monitor-ccc-backup-tasks>](http://bombich.com//kb/ccc4/using-ccc-command-line-tool-start-stop-and-monitor-ccc-backup-tasks)
- [Why is CCC recopying every file during each backup? <http://bombich.com//kb/ccc4/why-ccc-recopying-every-file-during-each-backup>](http://bombich.com//kb/ccc4/why-ccc-recopying-every-file-during-each-backup)
- [How do I get help? <http://bombich.com//kb/ccc4/how-do-i-get-help>](http://bombich.com//kb/ccc4/how-do-i-get-help)

Why can't I eject the destination volume after the backup task has completed?



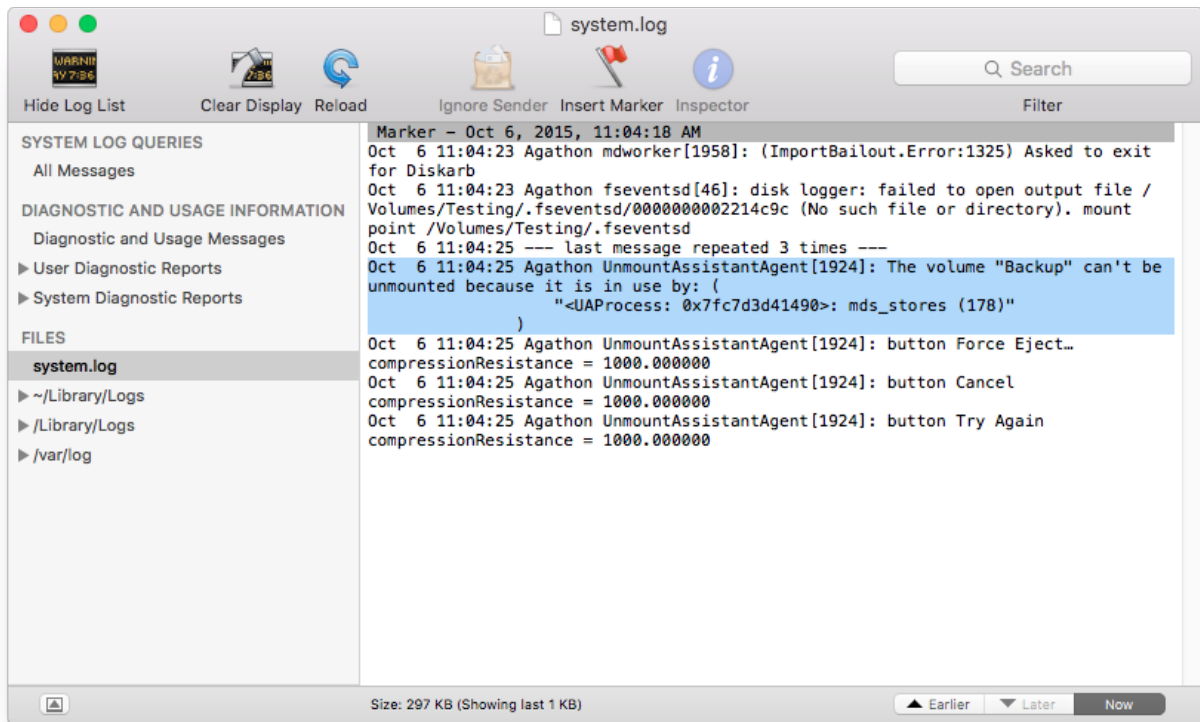
Occasionally this annoying message comes up when you're trying to eject your destination volume. If CCC is currently using that volume as a source or destination, then CCC will effectively prevent it from being unmounted gracefully. If your backup task isn't running, though, CCC isn't preventing the volume from being unmounted. But what application is?

If this occurs within a minute or so after the backup task completes, it's probably caused by macOS's "kextcache" utility — that utility rebuilds a cache file on the destination that is required for startup. That usually finishes after a minute or two, and usually the destination can be ejected after that. If this turns out to be the case, you can ask CCC to unmount the destination after the backup task completes. CCC will wait for kextcache to finish, resulting in a more reliable (and automated!) ejection of the destination at the end of the backup task:

1. Open CCC and select your backup task
2. Click the **Use Advanced Settings** button at the bottom of the window
3. Choose the option to [unmount the destination volume <http://bombich.com//kb/coc4/performing-actions-before-and-after-backup-task#dest_postactions>](http://bombich.com//kb/coc4/performing-actions-before-and-after-backup-task#dest_postactions) after the backup task completes
4. Save and run your backup task

If the disk cannot be unmounted several minutes after the backup task has completed, or if CCC is also unable to eject the destination, use the Console application to track down the culprit.

1. Open the Console application (in /Applications/Utilities)
2. Click on **system.log** in the sidebar
3. Go to the **Edit Menu > Find > Find...** (or press Command+F) to search for messages from the **UnmountAssistantAgent** application. Avoid using the Search field in the toolbar for this search, because that will hide important context.



In the example above, we can see that an application named **mds_stores** is preventing the Backup volume from being ejected. **mds_stores** and **mdworker** are Spotlight helper applications, so the issue here is that Spotlight is preventing the destination from being ejected. We have received numerous reports showing the same culprit since El Capitan was introduced. To resolve the conflict caused by Spotlight, you can disable Spotlight on the destination volume:

1. Open the Spotlight preference pane
2. Click on the Privacy tab
3. Drag the backup volume into the Privacy table

Disabling Spotlight in this manner only affects the destination volume, and it's reversible — you can remove your destination volume from that list should you decide that you want to re-enable indexing.

Remove any duplicate keychain entries in the Keychain Access application

Sometimes references to the keychain files on your backup volume can show up in the Keychain Access application. As a result, any application that leverages Keychain Services (e.g. Safari) will maintain a open file handle on the keychains on your backup disk, thus preventing that disk from unmounting. To resolve this, open the Keychain Access application (in `/Applications/Utilities`) and look for any duplicate keychain references in the sidebar. If you see duplicates, hover your mouse over those item until a tooltip appears revealing the path to the keychain file. If the keychain file is located on your backup disk, click on the keychain, then press the Delete key. When prompted, remove the references to the keychain file, not the file.



Identifying and Troubleshooting Hardware-Related Problems

Sometimes hardware components die slow and annoyingly inconsistent deaths. At one moment, it appears that you can copy data to the disk and use it ordinarily. In the next moment, you're getting seemingly random errors, hangs, crashes, the destination volume "disappearing" in the middle of a backup task, Finder lockups and other unruly behavior.

When hardware fails in this way, it's nearly impossible for the OS or CCC to pop up a dialog that says "Hey, it's time to replace XYZ!" Instead, you have to dig a little deeper, rule out components, try replacements, etc. to isolate the faulty component.

Many times that hardware problems occur, CCC will get meaningful errors from the macOS kernel that plainly indicate some sort of hardware problem, and CCC will report these at the end of the backup task. In some cases, however, macOS or CCC will detect a hung filesystem and you will see one of the following messages from CCC:

"The backup task was aborted because the [source or destination] volume's mountpoint changed."

If you see this message, macOS's kernel recognized that the affected filesystem was not responding and terminated it. While this is obviously an abrupt end to your backup task, it beats the alternative macOS behavior described next.

"The backup task was aborted because the [source or destination] filesystem is not responding."

CCC will present this message when the source or destination volume hasn't accepted read or write activity in at least ten minutes, and a deliberate followup test verifies that a simple read or write request fails. In these cases, macOS's kernel has failed to take action on the misbehaving filesystem and you can expect to see hangs in any application that attempts to read from or write to the affected volume. To break the hang, the affected disk must be forcibly detached from your Mac or you must reboot by holding down the power button if the disk is internal.

Troubleshooting steps

When CCC suggests that you might have a hardware problem, here are the steps that we recommend you take to isolate the problem. Repeat the backup task between each step, and stop if something has resolved the problem:

1. If the affected volume resides on an external hard drive, detach that disk from your Mac, then reattach it. Otherwise, restart your Mac before proceeding. Note that this generally only resolves the acute problem of a filesystem hanging. While the disk may appear to function fine once it is reattached, it's not unlikely for problems to recur.
2. Run Disk Utility's "Repair disk" tool on the source and destination volumes. Filesystem problems are commonplace, and easy to rule out. If you discover filesystem problems on your startup disk, boot from your CCC backup volume or Apple's Recovery volume to run Disk Utility so you can repair the problems.
3. If you have any other hardware devices attached to your Mac (e.g. Firewire or USB webcams, printers, iPhones — anything other than a display, keyboard, mouse, and the



source/destination disks), detach them. If your source or destination volume is plugged into a USB hub, keyboard, or display, reconnect it to one of your Mac's built-in ports.

4. Replace the cable that you're using to connect the external hard drive enclosure to your Mac (if applicable).
5. Try connecting the external hard drive enclosure to your Mac via a different interface (if applicable)
6. Try the same hard drive in a different external hard drive enclosure.
7. Reformat the hard drive in Disk Utility. If the affected disk is not an SSD, click the "Security Options" button in the Erase tab and drag the slider to the right to specify the option to write a single pass of zeroes. Writing zeroes to every sector will effectively detect and "spare out" any additional failing sectors that have yet to be discovered.
8. If none of the previous steps has resolved the problem, then the hard drive is failing or defective. Replace the hard drive.

"Why does CCC eject the destination?" or "Why is CCC making my whole computer hang?"

We hear this one a lot, and we generally reply, "don't shoot the messenger." In most cases, CCC is either the only application copying files to the affected volume, or it is at least the application doing most of the access, so it only seems like the problem is specific to CCC. A typical backup task will make millions of filesystem requests, so it comes as no surprise to us when CCC uncovers hardware problems in a disk. CCC is merely copying files from one disk to another, and this is not the kind of task that should cause a system-wide hang. Whenever multiple applications are hanging while trying to access a volume, the fault lies entirely within the macOS kernel, which is mishandling hardware that is either failing or defective. If you're uncertain of this assessment, please send us a report from CCC's Help window. When CCC detects a hang or stalled filesystem, it collects diagnostic information to determine where the hang is occurring. We're happy to review the diagnostics and confirm or deny the presence of a hardware problem.

"But Disk Utility says that there is nothing wrong with the disk..."

Disk Utility is competent at detecting structural problems with the filesystem, but it can't necessarily detect hardware failures that can cause a filesystem to stop responding to read and write requests. Additionally, even if your disk is SMART capable and "Verified", the attributes that SMART status reports on are weighted, and may not yet indicate that the hardware is in a pre-fail condition. Don't take a "Verified" status to indicate that your disk has no hardware problems whatsoever.

"But Disk Warrior/Tech Tool/[other third-party utility] says the hardware is fine, I'm sure the hardware is fine!"

There are no hardware diagnostic utilities on the market that will inform you of a problem with a cable, port, or enclosure, or report a bug in the firmware of a hard drive or SSD. The tools currently available on the Mac platform will inform you of software-based filesystem problems, media failure, and the results of SMART diagnostics which are specific to the hard drive device inside of an enclosure. While these tools are great at identifying the problems within that scope, the inability to detect problems with a cable, port, or enclosure, or a firmware bug on a hard drive, leaves a gaping hole that can only be filled with old-fashioned troubleshooting — isolate components, rule out variables, run multiple tests.

Other factors that can lead to hangs

Hardware is often the culprit when a backup task hangs, but sometimes other software can interfere with a backup task and even cause the whole system to hang. If you are using an external hard drive enclosure that came with custom software, try disabling or uninstalling that software before trying

your next backup task. If a firmware update is available for your enclosure, try applying that as well to see if a problem with the enclosure has been resolved recently through a software update.

Related discussions:

[Uninstalling Seagate diagnostic utilities alleviates hangs <http://bombich.com//kb/discussions/cant-restore-image>](http://bombich.com//kb/discussions/cant-restore-image)

Additionally, some hard drive enclosures respond poorly to sleep/wake events. If the problems that you are encountering tend to occur only after your system has slept and woken, you should try a different hard drive enclosure or interface to rule out enclosure-specific sleep problems.

Troubleshooting "Media errors"

Read errors are typically a result of media damage — some of the "sectors" on the hard drive have failed and macOS can no longer read data from them. Read errors can occur on the source or destination volume, and they can affect old disks as well as brand-new disks. **When read errors occur, the file or files that are using the bad sector must be deleted.** Bad sectors are "spared out" — permanently marked as unusable — only when the files on those sectors are deleted. The steps below indicate how to resolve media errors.

1. Click on the affected item in the Task History window, then click on the "Reveal in Finder" button.
2. Move the affected files and/or folders to the Trash.
3. Empty the Trash.
4. If you had to delete items from your source volume, locate those items on your backup volume and copy them back to the source (if desired).
5. If CCC reported problems with more than a few files or folders, we strongly recommend that you reformat the affected disk in Disk Utility. If the affected disk is not an SSD, click the "Security Options" button in the Erase tab and drag the slider to the right to specify the option to write a single pass of zeroes. Writing zeroes to every sector will effectively detect and "spare out" any additional failing sectors that have yet to be discovered. If the affected disk is your startup disk, boot from your CCC bootable backup volume to perform this procedure (after you have allowed CCC to complete a backup).

Once you have deleted the affected files, you should be able to re-run your backup task with success.

Note: If you do not have a backup of the affected files, please scroll to the top of this document and exhaust the hardware-based troubleshooting techniques first. As indicated above, read errors are *typically* a result of media damage. In some rare cases, though, media errors can be errantly reported when a hardware-based problem exists (e.g. a bad port, cable, or enclosure). If deleting your only copy of a file is the suggested resolution, then it's prudent to rule out everything else as the cause of an issue before deleting that file.

"But Disk Utility says that there is nothing wrong with the disk"

While it is generally a good practice to run Disk Utility's "Repair volume" utility when you run into problems with your disk, note that **Disk Utility does not scan for bad sectors, it only checks the health of the filesystem.** Additionally, the SMART status that is reported in Disk Utility will report "Verified" unless the drive is in a pre-fail condition — i.e. failure is imminent. **Bad sectors will not be reported by Disk Utility.**

Individual sector failures are not uncommon, and not necessarily indicative of imminent drive failure. A full-volume backup of your hard drive is a great method for detecting media problems with sectors

that are in use because it requires reading data from each of those sectors. If you only see a handful of affected files, delete those files as described above and continue to use the disk. If you see dozens or hundreds of these errors, however, there could be a more significant problem at play, and it may be time to replace the disk.

Errors on read write that are caused by physical drive malfunction

If your source or destination hard drive is experiencing a significant physical malfunction (errors that go beyond "input/output" read errors described above), you may have a narrow window of opportunity to back up the data from that disk to another hard drive. Time is precious; components could fail at any moment rendering the drive completely unmountable. Read activity is stressful on a dying volume, especially a full-volume backup. We recommend that you immediately back up the files that are most important to you. When you have backed up the most important data, next try to do a full-volume backup. When you have recovered as much data as possible, we recommend that you replace the affected hard drive.

What if the dying drive's volume won't mount?

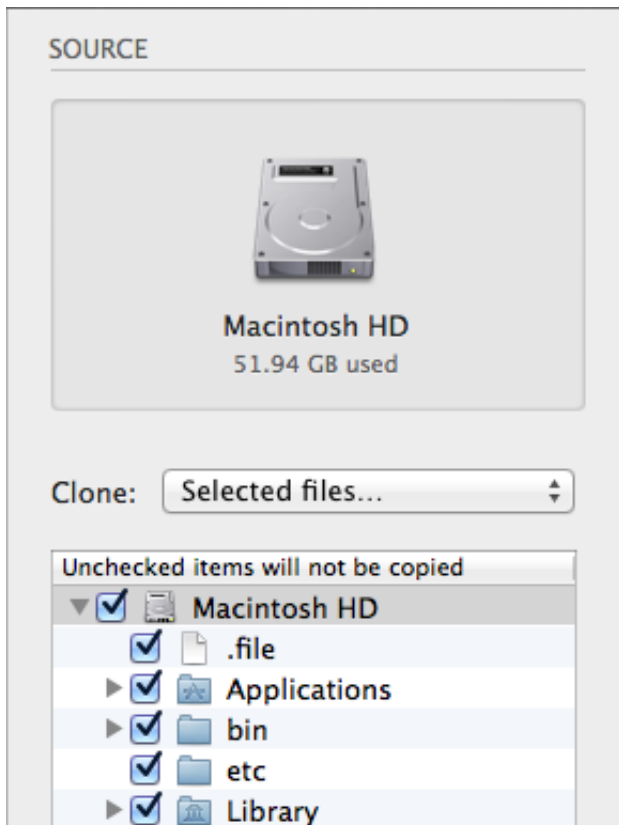
More often than not, you're completely out of luck. You may be able to revive a hard drive for small amounts of time by letting the drive cool down (somewhere cool and dry, not cold) and then powering it up attached to a service workstation (i.e. don't attempt to boot from it, you may not have enough time).



Advanced Topics

Excluding files and folders from a backup task

By default, CCC will copy everything from the volume or folder that you specify as the source. If you do not want to copy every item from the source, you can choose "Selected files" from the Clone popup menu underneath the Source selector, then specify items that should be excluded from the backup task.



Next to each item in the list of files on the source, there is a checkbox that, when unchecked, indicates that an item should not be copied to your destination volume (unchecked items will also turn red to indicate that they are excluded). Each folder in this table has a disclosure triangle, just like in the Finder. Click on the disclosure triangle to reveal the contents of a folder, then you can continue deselecting items to be copied, if desired. CCC will not allow you to navigate beyond the folders for which you have permission to view. Additionally, if you deselect an item that is required for macOS to boot, CCC will note this as a "Configuration concern" when you click the Clone button. Your destination volume will be bootable as long as it meets the requirements for macOS and you select to copy all required system files.

Excluded files are not deleted from the destination

When you uncheck an item in the **Unchecked items will not be copied** table, this tells CCC to **exclude** that item from the backup task. That does not, however, indicate that CCC should **delete** that item from the destination, e.g. if it had been copied there by a previous backup task. In fact,

excluding an item from the backup task implicitly protects that item on the destination. If you have items on the destination that are now excluded from a backup task that you no longer want, you can simply remove them from the destination by dragging them to the Trash. If you would like to change CCC's behavior instead, you can use the Advanced setting to [Remove excluded files](http://bombich.com/kb/ccc4/advanced-settings#delete_excluded) <http://bombich.com/kb/ccc4/advanced-settings#delete_excluded>.

Advanced filter options

If the files you want to exclude are scattered across your filesystem, it may be tedious to manually exclude each of them. To address this, CCC offers advanced filter options when using Advanced Settings. To access the advanced filter options, click the "Use Advanced Settings" button at the bottom of the CCC window, choose "Custom..." from the Clone menu, then click the Inspector button next to the Clone popup menu.

File type filters allow you to specify a file extension (e.g. "dmg", "doc", "mp3", etc.) of a file type that you would like to exclude. Suppose you want to exclude disk images from being backed up, for example, simply add "dmg" to the File types filter table and any file with that extension will be excluded.

In the Custom Filter window, click the "+" button to add a new custom filter rule. These custom rules follow the syntax defined in the "INCLUDE/EXCLUDE PATTERN RULES" section of the [rsync man page](https://rsync.samba.org/ftp/rsync/rsync.html) <<https://rsync.samba.org/ftp/rsync/rsync.html>>. The "Insert file type filter" button will insert a template rule that excludes files based on file extension. Suppose you want to exclude mp3 files from being backed up, for example, simply edit the template file type rule to read "- *.mp3" and any file with that extension will be excluded.

The following list demonstrates rules that would exclude log and cache folders:

- Library/Caches
- /private/var/log
- /Library/Logs

These rules will exclude any item that contains "Library/Caches" *anywhere* in the path (for example, ~/Library/Caches in every users home directory as well as in /Library/Caches). Items in the /private/var/log folder at the root of the volume will be excluded as well as items in /Library/Logs (but not, for example, in /Users/john/Library/Logs). Note that in the case of /private/var/log, you must indicate the real path of the folder to be excluded. Indicating the /var/log symbolic link, for example, would not be sufficient to exclude the contents of this folder.

You can learn more about custom rules by reading the "EXCLUDE PATTERNS" section of the [rsync man page](https://rsync.samba.org/ftp/rsync/rsync.html) <<https://rsync.samba.org/ftp/rsync/rsync.html>>.

Note: Filters specified in the "Custom Filter" window will not be reflected in the "Unchecked items will not be copied" table in the main window.

Items automatically ignored

Carbon Copy Cloner excludes some items from the backup task by default. A complete list of exclusions along with an explanation for the exclusion is available in [this section of the documentation](http://bombich.com/kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task) <<http://bombich.com/kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task>>.

The CCC SafetyNet folder, "_CCC SafetyNet" is excluded by a global filter. See the [Frequently asked questions about the Carbon Copy Cloner SafetyNet](http://bombich.com/kb/ccc4/frequently-asked-questions-about-the-carbon-copy-cloner-safenet) <[http://bombich.com/kb/ccc4/frequently-asked-](http://bombich.com/kb/ccc4/frequently-asked-questions-about-the-carbon-copy-cloner-safenet)

[questions-about-carbon-copy-cloner-safetynet#restore_archives](#)> section of the documentation to learn how to restore items from that folder.

Additionally, CCC will exclude and protect system folders if you select the startup disk as the destination (these items will be grayed out in the "Unchecked items will not be copied" table). If you would like to restore a specific item, such as the contents of /Library/Application Support, this protection can be avoided by choosing a specific folder at the source and destination via the "Choose a folder" options in the Source and Destination selectors. With great power comes great responsibility — take care to avoid overwriting your system files.

CCC includes everything by default, items must be explicitly excluded

When you deselect an item from the list of items to be copied, CCC adds this item to a list of excluded items. By default, though, everything on your source volume or folder will be included in the backup task. This is intentional. We decided that we couldn't reliably predict what the end user might want to do with new files and folders added since a backup task was created, so we took the conservative approach of assuming that anything new should be backed up. Consider the following scenario to understand the implications of this design choice:

You instruct CCC to back up the contents of your **Documents** folder to a **Documents** folder on the destination volume on a regular basis using a [Folder-to-Folder configuration](#) <<http://bombich.com//kb/ccc4/folder-folder-backups>>. When you create the backup task, the source folder contains a few subfolders:

- Parallels
- Recreation
- WIP

Suppose you only want business-critical items to be backed up, though, so you initially exclude Recreation from the backup task. After running the first backup task, there are two items in the **Documents** folder on the destination: Parallels and WIP.

At some time in the future, you add Notes, Misc, and Stamps to the **Documents** folder on the source volume. Because these items are not explicitly excluded, and because CCC only excludes items from the backup task that are explicitly excluded, these new items will appear in the **Documents** folder on your destination volume the next time your backup task runs.

Forcing CCC to exclude everything by default and include specific items

Using custom filter rules as documented above, you can configure CCC to back up only specific items within a folder and to exclude anything else by default. The following rules would configure CCC to back up only the Parallels and WIP folders and exclude everything else by default; new items added to the source folder would also be excluded:

```
+ /Parallels/**
+ /WIP/**
- *
```

The last rule explicitly excludes everything, so only the items explicitly included will be backed up. Note that specifying custom rules will be far simpler if you limit your backup task to a specific parent folder that contains every item that should be backed up. Choose "Choose a folder" from the Source selector to limit the scope of what CCC should consider for the backup task. In the example above, the rules are relative to the Documents folder -- the Documents folder was selected as the Source

via the **Choose a folder** item in the Source selector.

Finally, note that you must include every parent folder up to the selected folder to include those items. Suppose, for example, that you wanted to copy only one folder within the Parallels folder, and the WIP folder. You must explicitly include the parent folder, otherwise the - * filter will apply to exclude that Parallels folder. For example:

```
+ /Parallels/  
+ /Parallels/Windows/**  
+ /WIP/**  
- *
```

With these rules, CCC would copy just the Parallels/Windows folder and the WIP folder. If there was a Parallels/Linux folder, that item would be excluded.

Note: The effects of custom rules are not reflected in the "Unchecked items will not be copied" table. When applying rules like this, it is best to not make changes to the "Unchecked items will not be copied" table to avoid confusion about what will and will not be excluded from the backup task. Both sets of exclusions will apply, though custom rules (includes and excludes) take precedence over exclusions defined in the list of items to be copied.

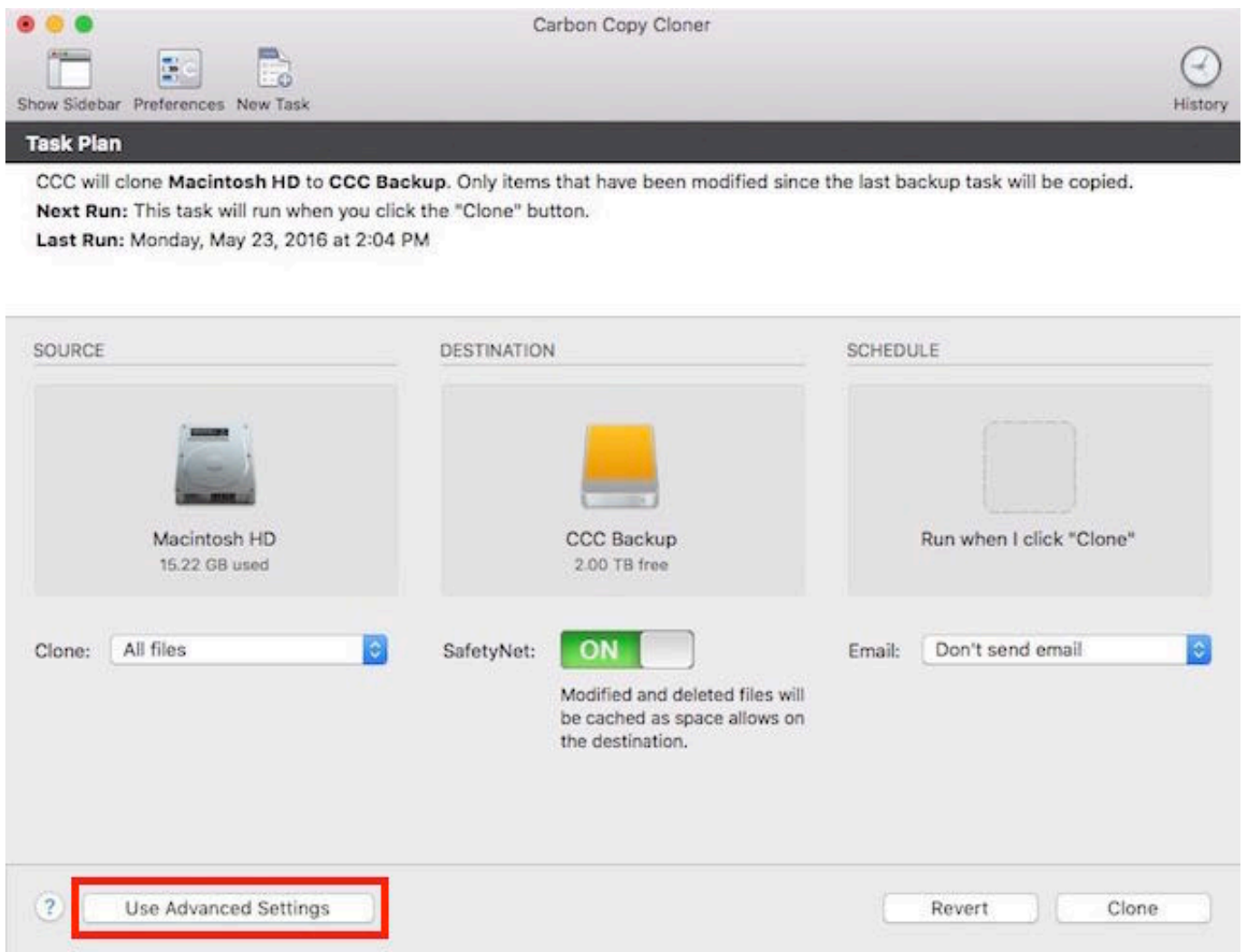
Related Documentation

- [Some files and folders are automatically excluded from a backup task <http://bombich.com//kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task>](http://bombich.com//kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task)

Advanced Settings

CCC's Advanced Settings are helpful in specific situations, but are not generally required for routine use. Some of these settings involve more risk, so please use them with caution, and don't hesitate to ask questions via the **Ask a question about CCC...** menu item in CCC's Help menu if the explanations below are insufficient for your particular scenario.

To access the advanced settings, simply click on the **Use Advanced Settings** button at the bottom of the CCC application window. To revert all advanced settings to default values and go back to using simple settings, click the **Use Simple Settings** button at the bottom of the CCC application window.



Destination Options

Use strict volume identification

By default, CCC uses the name and Universally Unique Identifier ([UUID](https://en.wikipedia.org/wiki/Uuid)) of your source and destination to positively identify those volumes. By verifying both of these identifiers, there is less risk in, for example, backing up to a volume that has the same name as your usual destination but is not actually the destination.

While beneficial, this behavior can sometimes have the wrong result. For example, if you rotate between a pair of external hard drives, CCC will not backup to both of them even though they have the same name (e.g. **Offsite Backup**). CCC will instead claim that the UUID of one of the volumes does not match that of the originally chosen destination.

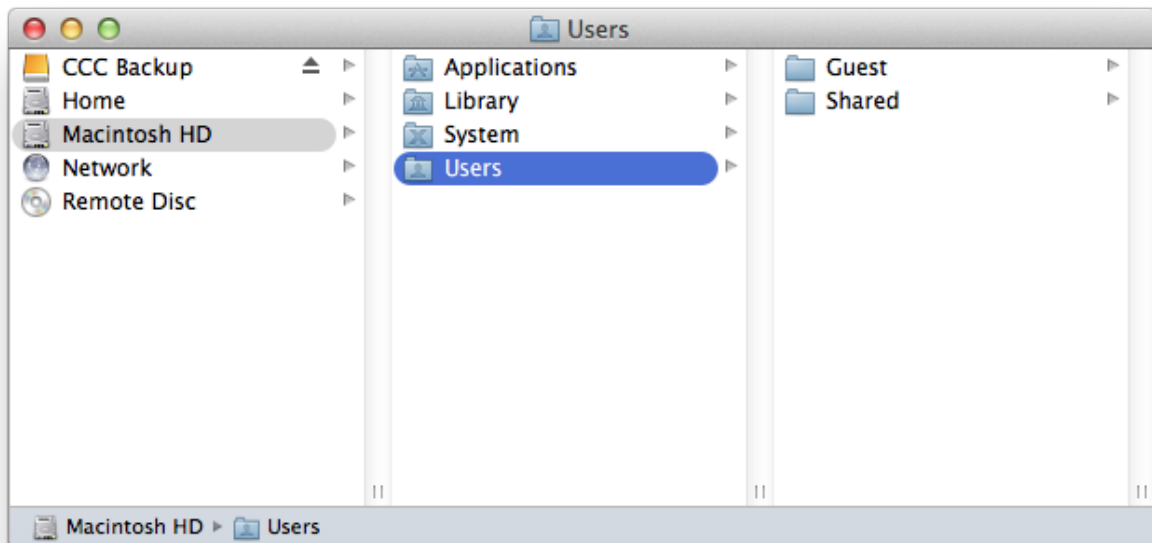
To accommodate a "rotating pair of backup volumes" solution, you can uncheck this option to indicate that CCC should only use the volume name to identify the destination volume. When deselecting this option, be vigilant that you do not rename your destination volume and that you never attach another non-backup volume to your Mac that is named the same as your destination volume.

This option is automatically disabled when the destination volume does not have a UUID. Network volumes and some third-party filesystems, for example, do not have volume UUIDs.

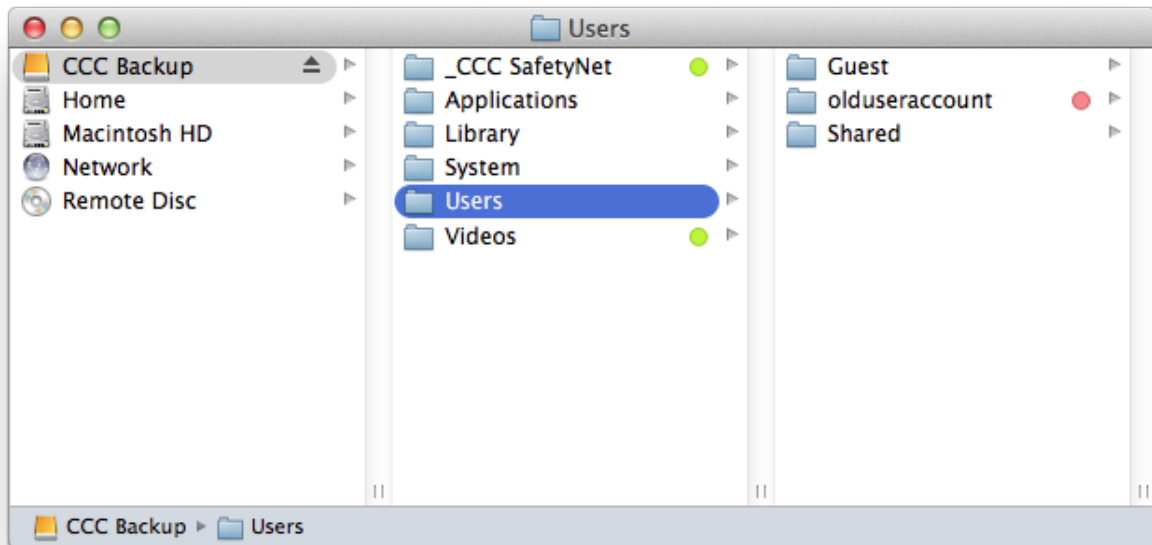
Note: This setting is only applicable to the **destination** volume. CCC **always** uses the name and UUID to positively identify the source volume.

Protect root-level items

If you have files and folders on your destination volume that you would like to be left alone, yet you want to keep your backup "clean", use the **Protect root-level items** option. This option is enabled by default when CCC's SafetyNet option is enabled. To understand how this feature works, suppose you have these items on your source volume:



And you have these items on the destination volume:



With the **Protect root-level items** option, the **Videos** folder will **not** be moved to the `_CCC SafetyNet` folder because it is unique to the root level of the destination. The `Users` folder is **not** unique to the root of the destination, though, so its contents will be updated to match the source. As a result, the `olduseraccount` folder will be moved to the `_CCC SafetyNet` folder (or deleted if you have disabled the SafetyNet).

Find and replace corrupted files

CCC normally uses file size and modification date to determine whether a file should be copied. With this option, CCC will calculate an MD5 checksum of every file on the source and every corresponding file on the destination. CCC then uses these MD5 checksums to determine if a file should be copied. This option will increase your backup time, but it will expose any corrupted files within your backup set on the source and destination. This is a reliable method of verifying that the files that have been copied to your destination volume actually match the contents of the files on the source volume.

Media failures occur on nearly every hard drive at some point in the hard drive's life. These errors affect your data randomly, and go undetected until an attempt is made to read data from the failed sector of media. If a file has not been modified since a previous (successful) backup, CCC will not ordinarily attempt to read every byte of that file's content. As a result, it is possible for a corrupted file to go unnoticed on your source or destination volume. Obviously this is a concern if the file is important, and one day you actually need to recover the contents of that file.

Frequent use of the checksum calculation option may be a burden upon your productivity. We do recommend, though, that you add this option to a weekly or monthly backup regimen to verify the integrity of your backup.

Note: CCC will never replace a valid file on your destination with an unreadable, corrupt file from the source. If CCC cannot read a file on your source volume, any existing backup of that file will remain intact on your backup volume and CCC will report an error, advising you to replace the source file with the intact backup version.



What is a "corrupted" or "unreadable" file?

CCC's **Find and replace corrupted files** option specifically refers to files that cannot be **physically** read from the disk. It does not refer to files that have been mistakenly or maliciously altered such that they cannot be opened by the application that created them.

Using the "Find and replace corrupted files" option to verify your backup

CCC's checksum option verifies the integrity of the files on your destination volume **before** files are copied, it is not a verification of files that have just been written. In general, the checksum of a file immediately after it is written to disk is of questionable value. Most disks have a write cache, and file data goes to the cache before it is written to actual media. If you write a file and then immediately ask to read it back, as much as x amount of data (where x = the size of the cache) is going to come from the volatile cache. If *any* of the file's data comes from the write cache, then the checksum doesn't reflect the status of the data on the permanent media, and that really defeats the purpose of checksumming the file in the first place.

If you want to verify the integrity of the files on your destination, a subsequent backup with CCC's **Find and replace corrupted files** option is the best way to do that. You can even automate this process by creating a second task that uses this option, then select the second task in the "Run another backup task" popup menu in the **After task runs** section of advanced settings.

Troubleshooting Options

Run a deletion pass first

When the CCC SafetyNet option is disabled, CCC typically deletes unique items from the destination as it encounters them. CCC iterates through the folders on your source alphabetically, so some files are often copied to the destination before all of the files that will be deleted have been deleted from the destination. If your destination volume has very little free space, CCC may not be able to complete a backup to that volume. This option will cause CCC to run a deletion pass through the entire destination before copying files. Use of this option will make your backup task take longer.

This option will only be enabled when the SafetyNet option is disabled.

Remove excluded files

When you exclude an item from your backup task, CCC will not only avoid that item on your source, but it will also exclude that item from consideration for deletion and archiving on the destination. Suppose, for example, that you have a full backup of your "Media" volume. One day, though, you decide that you really don't need a backup of the "Oldies" folder on this volume, so you exclude Music > Oldies folder from the backup task and disable CCC's SafetyNet option. After running the backup task, you wonder, "Why is Oldies still on the destination?" Oldies isn't **unique** to the destination, it also exists on the source volume — this is why CCC did not delete that item from the destination. If you were expecting CCC to delete items that you have explicitly excluded from the backup task, this option will provide that functionality.

This option is not applicable if you have selected **Don't delete anything** SafetyNet setting. This setting also will not override explicit protections placed on the `_CCC` SafetyNet folder, so when this option is used in conjunction with CCC's "SafetyNet On" setting, items will be moved to the SafetyNet folder rather than deleted immediately.

Also note that this option and the **Protect root-level items** option work on mutually exclusive sets of files and folders — this option will only affect the items that you have deselected in the



Unchecked items will not be copied table (visible when you choose to clone Selected files rather than All files), or excluded via a custom filter, it does not affect items that are unique to the root of the destination. Finally, note that this option is disabled if your destination volume is the startup disk. Use this option with care.

Don't update newer files on the destination

Files on the source are generally considered to be the authoritative master, and CCC will recopy a file if the modification date is at all different — newer or older — on the source and destination. Occasionally there are circumstances where the modification date of files on the destination is altered after a backup task runs (e.g. by anti virus applications), and this alteration causes CCC to copy these files every time. This option can work around these circumstances when the root cause of the modification date alteration cannot be addressed.

Don't preserve permissions

This setting will avoid the errors generated by network volumes that disallow the modification of permissions and ownership on some files. It will also prevent CCC from enabling ownership on the destination volume. Use of this option while backing up applications or macOS system files will prevent those items from working correctly on the destination.

Don't preserve extended attributes

This setting will disable support for reading and writing extended attributes, such as Finder Info, resource forks, and other application-proprietary attributes. Extended attributes store data about the file. Apple explicitly recommends that developers do not store irreplaceable user data in extended attributes when saving a file, because extended attributes are not supported by every filesystem, and could be silently dropped (e.g. by the Finder) when copying a file.

This option is helpful in cases where the source or destination filesystem offers exceptionally poor performance for reading and writing extended attributes, or offers very limited support for macOS native extended attributes such that many errors are reported when trying to copy these metadata.

Related Documentation

- [CCC reported that the destination is full. What can I do to avoid this?](http://bombich.com//kb/cccl4/cccl-reported-destination-full.-what-can-i-do-avoid)
- [Troubleshooting slow performance when copying files to or from a network volume](http://bombich.com//kb/cccl4/troubleshooting-slow-performance-when-copying-files-or-from-network-volume)



Performance Suggestions

There are several factors that affect the performance of your backup tasks. Here we describe the most common conditions that affect backup performance, and offer some suggestions for mitigating the effects of those conditions.

Reduce the number of files considered for backup

CCC analyzes all of the files that are included in your backup set for consideration to be copied. If you have a particularly high number of files on your source volume, you may want to put some thought into how your files are organized. For example, if you have a large number of files that never change (perhaps some old, completed projects), you can collect these into a folder named "Archives", back it up once, then exclude it from future backups. CCC will not delete excluded items from your destination (unless you ask it to using Advanced Settings), so as long as you keep the original on your source volume, you will always have two copies of your archived content. Because these items are excluded from your daily backups, CCC will not spend time or RAM enumerating through those files for changes.

Hard drive performance and interface bandwidth

Performance will be worse for smaller hard drives (e.g. physically smaller, like those in laptops), for older hard drives, and for hard drives that are nearly full and thus more likely to be fragmented. You will also get longer copy times when you have lots of small files vs. a volume filled with just a few very large files. Finally, you will see better performance with faster/more efficient interfaces — Thunderbolt is faster than Firewire, Firewire 800 is faster than USB 2.0, etc.

When you consider purchasing an external hard drive for backup, we recommend enclosures that have multiple interfaces (e.g. Firewire and USB, or Thunderbolt and USB). Depending on how you use the Firewire or USB interfaces on your Mac, you may find that you get better performance or reliability when trying a different interface on your external backup disk. Additionally, if your source volume is nearly full, we recommend that you replace it with a larger hard drive to avoid the performance implications of filesystem fragmentation.

Spotlight Indexing

Anything that causes CCC to compete for bandwidth to your source or destination volume will increase the amount of time that it takes to back up your data. Spotlight indexing is one such process that CCC typically must compete with for disk bandwidth. As you copy new data to your destination volume, for example, Spotlight wants to read those "new" files so it can index their contents. Having a Spotlight index of your backup volume may be unnecessary as you probably want to search for files only on your source volume. To disable Spotlight indexing on a volume that is dedicated to backup, drag the icon of the destination volume into the "Privacy" tab of Spotlight Preference Pane in the System Preferences application. If you do want the backup volume indexed, drag its icon out of the "Privacy" tab after the cloning and indexing will start immediately.

Find and replace corrupted files

CCC offers an advanced option to ["Find and replace corrupted files"](http://bombich.com/kb/cccl4/advanced-settings#checksum) [<http://bombich.com/kb/cccl4/advanced-settings#checksum>](http://bombich.com/kb/cccl4/advanced-settings#checksum). When using this option, CCC will re-read every file on the source and every file on the destination, calculating a checksum of each file. CCC then compares these checksums to see if a file should be recopied. While this is an excellent



method for finding unreadable files on the source or destination, it will dramatically increase the amount of time that your backup task takes, and it will also increase CPU and hard drive bandwidth consumption on your Mac. We recommend limiting the use of this option to weekly or monthly tasks, and scheduling such tasks to run when you are not typically using your Mac.

Other applications and conditions that can lead to performance problems

Over the years we have received numerous queries about poorer performance than what is expected. Careful analysis of the system log and Activity Monitor will usually reveal the culprit. Here are some things that we usually look for:

- Other backup software copying simultaneously to the same volume, a different volume on the same disk, or across the same interface as CCC's destination.
- Utilities that watch filesystem activity and do things when file changes are detected. [Antivirus software <http://bombich.com//kb/ccc4/antivirus-software-may-interfere-backup>](http://bombich.com//kb/ccc4/antivirus-software-may-interfere-backup) is a common culprit, but we have also seen problems caused by other watcher applications, such as memedod and Western Digital's SmartWare.
- Slow interfaces — USB hubs (including the ports on a USB keyboard or display) and even some USB cables can reduce the bandwidth to your disk dramatically. If you're using USB, be sure that your device is plugged directly into one of the USB ports on your Mac.
- Daisy chaining Firewire devices is usually OK, though some enclosures can stall the entire Firewire bus when given too much bandwidth. If you see this behavior, try switching the order of devices in the chain, or attach your backup disk directly to a Firewire port on your Mac.
- Using a wireless network connection to connect to a network volume. If you're seeing poor performance with a wireless connection, compare the performance when using a wired (ethernet) connection. You will also see dramatically better results if you back up to a disk image on a network volume rather than backing up directly to that network volume.

Use the Console application to view the contents of the system log. If you're still having trouble identifying a performance problem, [we're here to help <http://bombich.com//software/get_help>](http://bombich.com//software/get_help).

Related Documentation

- [Slow performance of network appliances can be mitigated by backing up to a disk image <http://bombich.com//kb/ccc4/slow-performance-network-appliances-can-be-mitigated-backing-up-disk-image>](http://bombich.com//kb/ccc4/slow-performance-network-appliances-can-be-mitigated-backing-up-disk-image)
- [Troubleshooting slow performance when copying files to or from a network volume <http://bombich.com//kb/ccc4/troubleshooting-slow-performance-when-copying-files-or-from-network-volume>](http://bombich.com//kb/ccc4/troubleshooting-slow-performance-when-copying-files-or-from-network-volume)



Working with FileVault Encryption

CCC is fully qualified for use with FileVault-protected volumes. CCC offers some advice around enabling encryption in the Disk Center.

Enabling encryption on a volume that contains (or will contain) an installation of macOS

If your goal is to create a bootable, encrypted backup, use the following procedure:

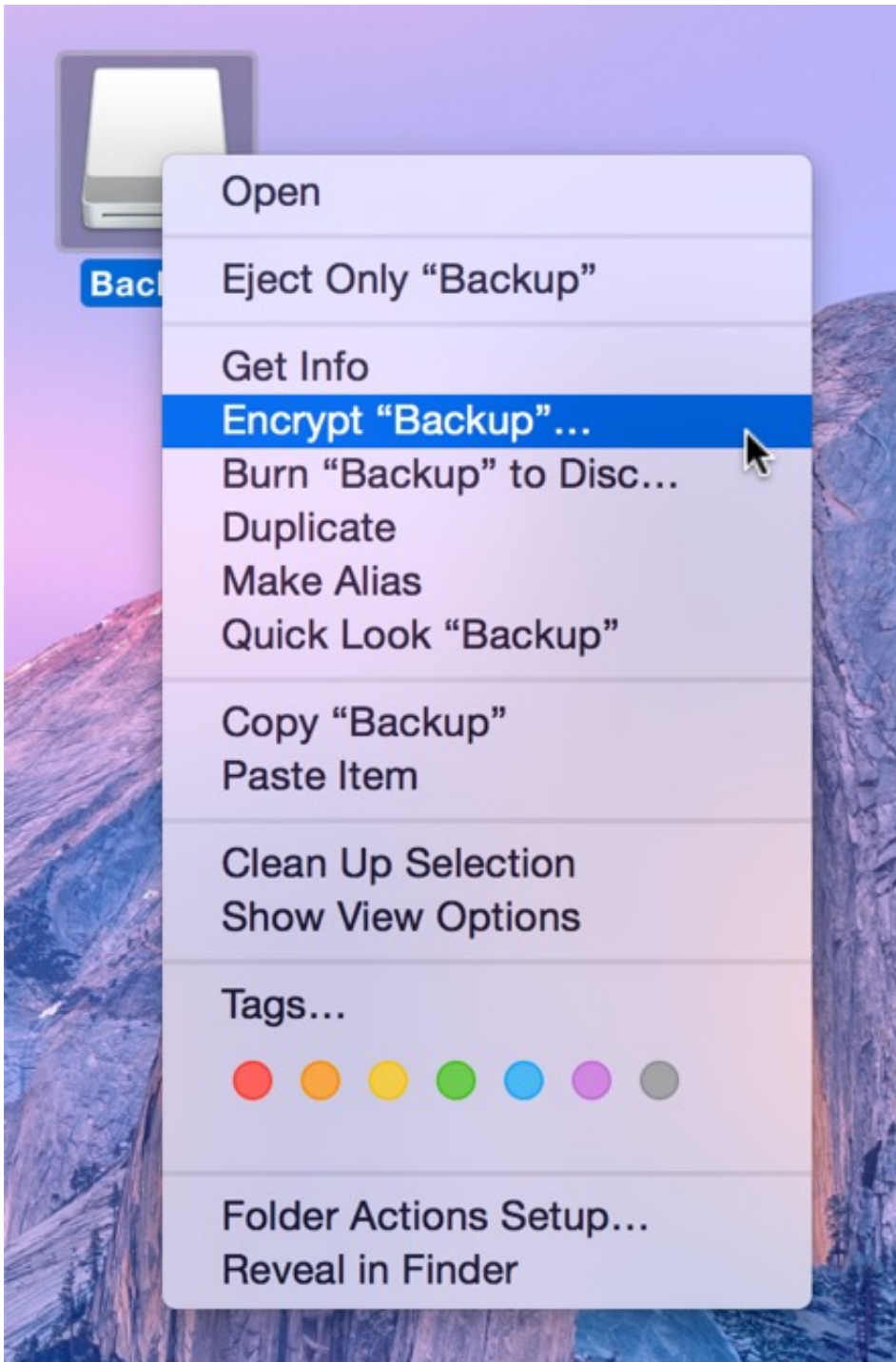
1. Follow CCC's documentation to [properly format the destination volume](http://bombich.com/kb/ccc4/preparing-your-backup-disk-backup-os-x) [<http://bombich.com/kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com/kb/ccc4/preparing-your-backup-disk-backup-os-x). Do **not** format the volume as encrypted.
2. Use CCC to [back up your startup disk](http://bombich.com/kb/ccc4/how-set-up-your-first-backup) [<http://bombich.com/kb/ccc4/how-set-up-your-first-backup>](http://bombich.com/kb/ccc4/how-set-up-your-first-backup) to the unencrypted destination volume.
3. Click on the destination volume in CCC's Disk Center, then click the **Recovery HD** button to [create a Recovery HD](http://bombich.com/kb/ccc4/cloning-apples-recovery-hd-partition) [<http://bombich.com/kb/ccc4/cloning-apples-recovery-hd-partition>](http://bombich.com/kb/ccc4/cloning-apples-recovery-hd-partition) volume. Note: You must be logged in to an administrator account to perform this step.
4. Open the **Startup Disk** preference pane and restart your Mac from backup volume.
5. Enable FileVault encryption in the **Security & Privacy** preference pane of the System Preferences application.
6. Reboot your Mac (it will reboot from the backup volume).
7. Open the **Startup Disk** preference pane and restart your Mac from your production startup volume.
8. [Configure CCC for regular backups](http://bombich.com/kb/ccc4/how-set-up-scheduled-backup) [<http://bombich.com/kb/ccc4/how-set-up-scheduled-backup>](http://bombich.com/kb/ccc4/how-set-up-scheduled-backup) to your encrypted backup volume.

Note: Mac firmware cannot "see" FileVault-protected volumes larger than 2.2TB when the disk is attached via USB. If attaching the disk to your Mac via Firewire or Thunderbolt is not an option, [create a 2TB partition](https://youtu.be/ezlr1dH63gs) [<https://youtu.be/ezlr1dH63gs>](https://youtu.be/ezlr1dH63gs) at the beginning of the external disk to work around this limitation.

Note: **You do not have to wait for the conversion process to complete before using the backup disk.** Additionally, you do not have to remain booted from the backup disk for the conversion process to complete. You can simply enable FileVault encryption, then immediately reboot from your primary startup disk and the conversion process will carry on in the background. Encryption will continue as long as the backup disk is attached. macOS doesn't offer a convenient method to see conversion progress, but you can type `diskutil cs list` in the Terminal application to see conversion progress.

Enabling encryption on a volume that will not contain an installation of macOS

If your backup volume won't be a bootable backup of macOS, simply right-click on that volume in the Finder and choose the option to encrypt the volume.



Related Documentation

- Frequently Asked Questions about encrypting the backup volume <<http://bombich.com/kb/c4/frequently-asked-questions-about-encrypting-backup-volume>>
- The Disk Center <<http://bombich.com/kb/c4/disk-center>>
- [Apple Kbase] Learn more about FileVault <<https://support.apple.com/kb/HT4790>>

Some files and folders are automatically excluded from a backup task

Carbon Copy Cloner maintains a list of certain files and folders that are automatically excluded from a backup task. The contents of this list were determined based on Apple recommendations and years of experience. The following is a list of the items that are excluded along with an explanation of why they are excluded.

Legend:

Items prefixed with a "/" indicate that they will only be ignored if located at the root of the volume. Items postfixed with a "/*" indicate that only the contents of those folders are ignored, the folders themselves will be copied.

Items postfixed with a "*" indicate that the filename will be matched up to the asterisk.

Filesystem implementation details

- .HFS+ Private Directory Data*
- /.journal
- /.journal_info_block
- .AppleDouble
- .AppleDB
- /lost+found
- Network Trash Folder

These items only show up if you're running an older OS than what was used to format the source volume, and on some third-party implementations of AFP and SMB network filesystems. These items should never, ever be manipulated by third-party programs.

Volume-specific preferences

- .metadata_never_index
- .metadata_never_index_unless_rootfs
- /.com.apple.timemachine.donotpresent
- .Volumelcon.icns
- /System/Library/CoreServices/.disk_label*
- /TheVolumeSettingsFolder

These items record volume-specific preferences, e.g. for Spotlight, Time Machine, and a custom icon for the volume. [Feedback on the exclusion of these items is welcome <http://bombich.com/software/get_help>](http://bombich.com/software/get_help). Because they are volume-specific preferences, the exclusion of these items from a day-to-day backup seems most appropriate.

Apple-proprietary data stores

- .DocumentRevisions-V100*
- .Spotlight-V100
- /.fseventsd
- /.hotfiles.btree

- /private/var/db/systemstats

These items are Apple-proprietary data stores that get regenerated when absent. Attempting to copy these data stores without unmounting the source and destination is not only futile, it will likely corrupt them (and their respective apps will reject them and recreate them).

The DocumentRevisions data store is used by the Versions feature in macOS. The Versions database stored in this folder contains references to the inode of each file that is under version control. File inodes are volume-specific, so this dataset will have no relevance on a cloned volume.

Volume-specific cache files

- /private/var/db/dyld/dyld_*
- /System/Library/Caches/com.apple.bootstamps/*
- /System/Library/Caches/com.apple.corestorage/*
- /System/Library/Caches/com.apple.kext.caches/*

Copying these caches to a new volume will render that volume unbootable. The caches must be regenerated on the new volume as the on-disk location of system files and applications will have changed. macOS automatically regenerates the contents of these folders when CCC is finished updating the backup volume.

NetBoot local data store

- /.com.apple.NetBootX

In the unlikely event that your Macintosh is booted from a Network device, macOS will store local modifications to the filesystem in this folder. These local modifications are not stored in a restorable format, therefore should not be backed up. In general, you should not attempt to back up a NetBooted Mac.

Dynamically-generated devices

- /Volumes/*
- /dev/*
- /automount
- /Network
- /.vol/*
- /net

These items represent special types of folders on macOS. These should not be backed up, they are dynamically created every time you start the machine.

Quota real-time data files

- /.quota.user
- /.quota.group

When these files are copied to a destination volume using an atomic file copying procedure, the macOS kernel will prevent the destination from being gracefully unmounted. The contents of these files is never accurate for the destination volume, so given the kernel's unruly behavior with copies of these files, CCC excludes them. According to the quotacheck man page, these files **should** be regenerated every time a quota-enabled volume is mounted (e.g. on startup). We have not found

that to be consistently true. If you're using quotas, run `sudo quotacheck /` after restarting from your backup volume or a restored replacement disk to regenerate these files.

Large datastores that are erased on startup

- `/private/var/folders/zz/*`
- `/private/var/vm/*`
- `/private/tmp/*`
- `/cores`

macOS stores virtual memory files and your hibernation image (i.e. the contents of RAM are written to disk prior to sleeping) and temporary items in these folders. Depending on how you use macOS and your hardware configuration, this could be more than 50GB of data, and all of it changes from one hour to the next. Having this data for a full-disk restore does you absolutely no good — it makes the backup and restore processes take longer and the files get deleted the next time you boot macOS.

Trash

- `.Trash`
- `.Trashes`

Moving an item to the trash is typically considered to be an indication that you are no longer interested in retaining that item. If you don't want CCC to exclude the contents of the Trash, you can modify CCC's global filter:

1. Hold down the Option key and choose **Show experimental settings** from CCC's Help menu
2. Click on the **Global Filters** tab
3. Find the two filters for **.Trash** and **.Trashes** and delete them
4. Click the Apply button

Time Machine backups

These folders store Time Machine backups. Time Machine uses proprietary filesystem devices that Apple explicitly discourages third-party developers from using. Additionally, Apple does not support using a cloned Time Machine volume and recommends instead that you start a new Time Machine backup on the new disk.

- `/Backups.backupdb`
- `/.MobileBackups`
- `/.MobileBackups.trash`
- `/.MobileBackups.trash`

Corrupted iCloud Local Storage

iCloud leverages folders in your home directory for local, offline storage. When corruption occurs within these local data stores, macOS moves/renames the corrupted items into the folders indicated below. macOS doesn't report these corrupted items to you, nor does it attempt to remove them. CCC can't copy the corrupted items, because they're corrupted. To avoid the errors that would occur when trying to copy these corrupted items, CCC excludes the following items from every backup task:

- `Library/Mobile Documents.*`

- .webtmp

Special files

Files included in this section are application-specific files that have demonstrated unique behavior. The kacta and kactd files, for example, are created by antivirus software and placed into a special type of sandbox that makes them unreadable by any application other than the antivirus software.

The last two items can be found in each user home folder. Excluding these items prevents the applications that were open during the backup task from opening when you boot from the backup volume. This seems appropriate considering that Apple intends the feature to be used to open the applications that were in use when you log out, restart or shutdown, not at an arbitrary point during the backup task.

- /private/tmp/kacta.txt
- /private/tmp/kactd.txt
- /Library/Caches/CrashPlan
- /PGPWDE01
- /PGPWDE02
- /.bzvol
- /Library/Application Support/Comodo/AntiVirus/Quarantine
- /private/var/spool/qmaster
- \$Recycle.Bin
- Saved Application State
- Library/Preferences/ByHost/com.apple.loginwindow*

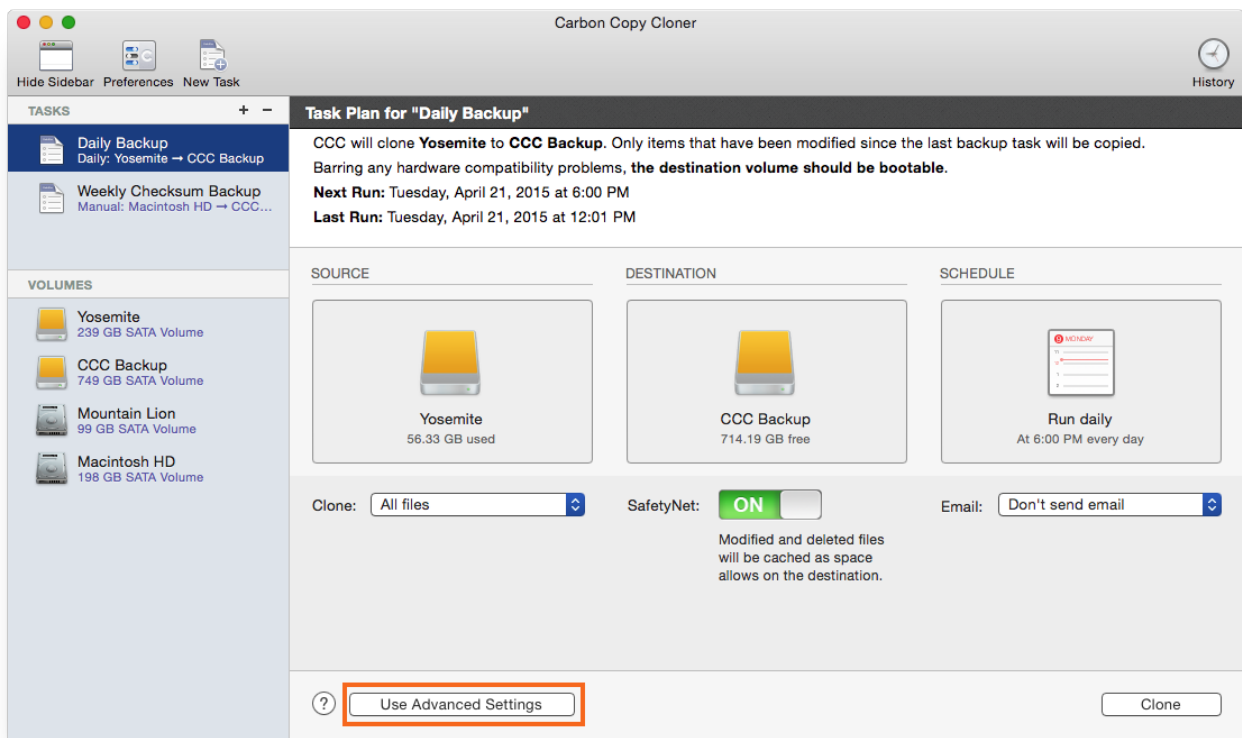
CCC SafetyNet folders

When CCC's SafetyNet feature is enabled, CCC creates a `_CCC SafetyNet` folder at the root of the selected destination volume or folder. When CCC encounters an item on the destination that does not exist on the source, or an item that will be replaced with an updated item from the source, that item gets placed into the SafetyNet folder rather than being deleted immediately. The SafetyNet folder is literally a safety net for files on your destination. If you accidentally delete a file from the source and you don't realize it until after your backup task runs, you'll find the item in the SafetyNet folder. Likewise, if you accidentally specify the wrong volume as a destination to a CCC backup task, the mistake does not catastrophically delete every file from the selected destination; you simply recover the items from the `_CCC SafetyNet` folder.

The protection that the SafetyNet folder imparts is specific to the volume upon which the SafetyNet folder resides. As such, CCC never includes the contents of the `_CCC SafetyNet` folder in a backup task. So, for example, if your hard drive fails and you restore your backup to a replacement disk, the `_CCC SafetyNet` folder is automatically excluded from that restore task. This exclusion is applicable to any folder with the `"_CCC"` prefix. If you have several tasks backing up to separate folders on a backup volume, for example, the `_CCC SafetyNet` folders that are created in those subfolders would not be included in a secondary backup task that copies your backup disk to a third disk.

Performing actions Before and After the backup task

Often when you have a backup task that runs on a scheduled basis, there are associated tasks that you would like to perform before or after files are actually copied. CCC offers the option to run shell scripts before and after a backup task, unmount or set the destination as the startup disk, run another CCC backup task, and power management options such as restart and shutdown. If you would like to perform any of these pre or post clone tasks, click on the "Use Advanced Settings" button at the bottom of of CCC's window.



Mounting the source or destination volume before a backup task begins

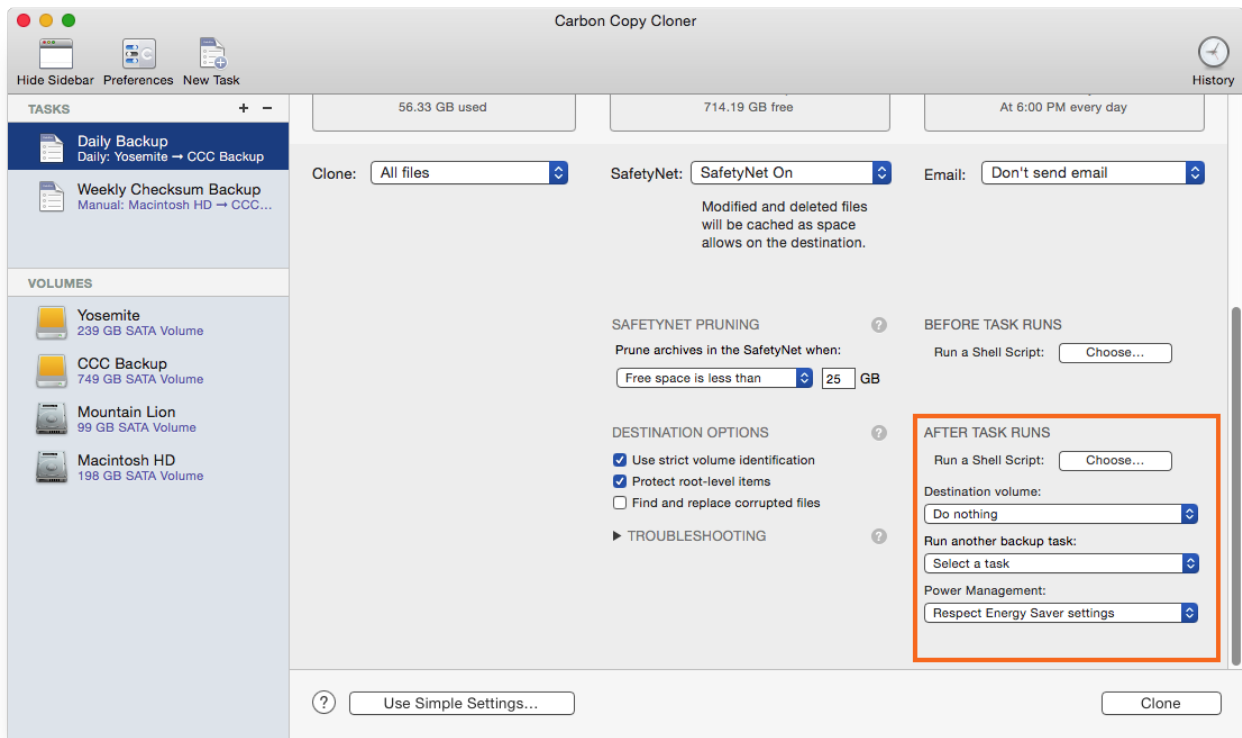
Without any additional configuration, CCC will attempt to mount your source and destination volumes before a backup task begins. This applies to many different volume types — ordinary volumes on locally-attached hard drives, disk images, network volumes, and encrypted volumes. If your source or destination volume is on a disk that is physically attached to your Mac (e.g. via Firewire, Thunderbolt, or USB), but it is not mounted, CCC can "see" that device and will attempt to mount it. If your source or destination is a network volume, CCC will obtain the credentials that you use to mount that device when you create the backup task, and will use those credentials to mount the volume before the task begins.

This also applies for nested volumes. For example, suppose you are backing up to a disk image on a network volume. CCC will first attempt to mount the network volume, then it will attempt to mount

the disk image. Likewise, suppose you have a task configured to back up the contents of a folder on an encrypted volume. If you have saved the encrypted volume's passphrase in CCC's keychain, CCC will unlock and mount the encrypted volume before the backup task begins.

CCC's attempts to mount the source and destination volumes occur automatically before any other tasks, including pre clone shell scripts (described below), therefore it is not necessary to implement a shell script to pre-mount the source or destination.

Performing automated tasks before and after copying files



Destination volume options

If you would like CCC to unmount your destination volume at the end of the backup task, choose "Unmount the destination volume" from the Destination volume management menu. If your destination is a folder, the text will be "Unmount the underlying volume". If the destination is a disk image, CCC always unmounts the disk image volume, so this setting refers to the underlying physical volume upon which the disk image resides.

CCC will not forcefully unmount the destination volume. If an application has open files on the destination volume, CCC's attempt to unmount the volume will fail. CCC does not report this as an error, though it will make a note of it in the task's history.

If you would like to set the destination volume as the startup disk, for example to automate the regular testing of your backup volume, choose "Set as the startup disk" from the Destination volume management menu. El Capitan users note: CCC cannot change the startup disk setting if System Integrity Protection is enabled. We do not recommend disabling System Integrity Protection to make this feature work, rather we recommend that you use the Startup Disk Preference Pane to change the startup disk selection.

Power management options

By default, at the end of a backup task, CCC will not perform any power management tasks. Instead, the system will perform as defined by the settings in the Energy Saver preference pane. For example, if you have the system configured to idle sleep after 20 minutes, the system will go to sleep if there hasn't been any user activity in the last 20 minutes. CCC activity is not considered user activity, so often the system will go to sleep immediately after CCC finishes a backup task.

If you choose one of the options from the Power management menu, CCC will reboot or shut down your Mac when the backup task finishes. The reboot and shutdown options are not forceful. If you have a document open with unsaved modifications, for example, the application would prompt you to save the document. If a save dialog is not attended to, the shutdown or reboot request will time out.

Turn off the computer if it was previously off

If your backup task is scheduled to run on a regular basis, this option will be enabled in the Power Management popup menu. This option is applicable if you would like to have CCC shut down your Mac at the end of the task, but only in cases where the Mac was booted at the task's scheduled run time. If your backup task runs when the system has been on for a while or has been sleeping, CCC will not shut down the Mac when using this option.

Power Management options are ignored in some cases

Power management options will not be applied to backup tasks that are cancelled (e.g. you click the Stop button). Additionally, power management tasks will not be applied if other CCC backup tasks are running or queued to run immediately after the current task finishes running.

Power Management options are applied regardless of task success

Power management options will be applied whether the backup task completes successfully or not. If you prefer for a backup task to perform the power management action only when the backup task exits without error, see the [pm_on_success.sh <#examples >](#) postflight script below.

Run another backup task (task chaining)

If you have more than one CCC backup task configured, the other tasks will be listed in this popup menu. To create a task chain (e.g. to run tasks sequentially), simply choose one of these tasks to have that task run automatically after the current task finishes. Tasks run in this manner will start after the current task has finished completely. Chained tasks will run regardless of the exit status of a preceding task in the chain, e.g. if the first task reports errors or fails to run at all, the second task will still run.

Running shell scripts before and after the backup task

If there is functionality that you need that does not exist within CCC, pre and post clone shell scripts may be the solution for you. Pre clone shell scripts run after CCC has performed "sanity" checks (e.g. are the source and destination volumes present, is connectivity to a remote Macintosh established) but before copying files. Post-clone shell scripts run after CCC has finished copying files and performing its own internal cleanup, but before unmounting any volumes.

CCC passes several parameters to pre and post clone shell scripts. For example, the following shell script:

```
#!/bin/sh

echo "Running $0"
echo `date`
echo "Source: $1"
echo "Destination: $2"
echo "Third argument: $3" # Exit status for post-clone scripts, underlying volume path for a disk
image for pre-clone scripts
echo "Fourth argument: $4" # Destination disk image path, if applicable
```

Would produce the following output (you can redirect this output to a file of your own specification) if implemented as a post clone script:

```
Running /Library/Application Support/com.bombich.ccc/Scripts/postaction.sh
Wed Oct 8 21:55:28 EDT 2014
Source: /
Destination: /Volumes/Offsite Backup
Third argument: 0
Fourth argument:
```

First parameter

The path to the source volume or folder.

Second parameter

The path to the destination volume or folder. If the destination is a disk image, this is the path to the mounted disk image.

Third parameter

The contents of this parameter has changed since CCC 3, so take care to update the logic in any shell scripts that you used with earlier versions of CCC.

- Pre clone script: The underlying mountpoint for the volume that holds the destination disk image, if applicable.
- Post clone script: The exit status of the file copying phase of the backup task.

Fourth parameter

The path to the destination disk image, if applicable. The contents of this parameter has changed since CCC 3, so take care to update the logic in any shell scripts that you used with earlier versions of CCC.

If your pre clone script exits with a non-zero exit status, it will cause CCC to abort the backup task. This can be used to your advantage if you want to apply preconditions to your backup operation. If you want to be certain that errors in your pre clone shell script never cause the backup task to be aborted, add "exit 0" to the end of your script. If you would like that script to silently cancel the backup task, add "exit 89" to the end of the script. If the script is a global preflight script (specified in the Advanced section of CCC's Preferences window), you can add "exit 104" to the end of the script

to cancel the backup task **and** to avoid recording a Task History event.

The post clone script will run whether the backup task exits successfully or not. If your script should behave differently depending on the result of the task, you can test whether the third parameter is zero (an exit status of "0" means the task ended successfully). For example:

```
#!/bin/sh

source="$1"
dest="$2"
exitStatus=$3

if [ "$exitStatus" = "0" ]; then
    # foo
else
    # bar
fi
```

Note: You cannot specify an AppleScript as a pre or post clone script, CCC currently only supports running shell scripts.

Shell scripts require a shell interpreter line

CCC does not assume a default shell environment when running your pre or postflight script. Not doing so gives users a great deal of flexibility; they can choose to write their scripts in any shell or programming language (e.g. bash, python, perl, ruby, C). For CCC to execute a shell script as an application, though, the system needs to know what shell should be used to interpret the script, and that value needs to be defined in your shell script. This is done simply by placing a shell interpreter line at the top of the file, e.g. `#!/bin/sh`.

Security implications of pre and post clone shell scripts

CCC's pre and post clone shell scripts are executed as the System Administrator. To prevent non-administrative users from making unauthorized modifications to your shell scripts, you should restrict which users have write access to these scripts and to the folder in which they are contained. The parent folder and scripts should be writable only by the owner (e.g. you). For example, running the following in the Terminal application would secure any shell scripts located in the default location for pre and post clone scripts:

```
chmod 755 /Library/Application\ Support/com.bombich.ccc/Scripts/*.sh
```

Example pre and post clone shell scripts

To use any of these example scripts, download the script and place it somewhere on your startup disk. By default, CCC looks in `/Library/Application Support/com.bombich.ccc/Scripts`.

[parallels_pause.sh <http://bombich.com//software/files/tools/parallels_pause.sh.zip>](http://bombich.com//software/files/tools/parallels_pause.sh.zip)

This is a pre clone script that you can use to pause all currently-running Parallels VM containers. This script will also retain state information that can be read by the corresponding `parallels_start.sh` post clone script to resume these VMs after the backup task has completed. Note: This script relies on command-line tools offered only in Parallels Desktop for Mac Pro or Business Edition.

[parallels_start.sh <http://bombich.com//software/files/tools/parallels_start.sh.zip>](http://bombich.com//software/files/tools/parallels_start.sh.zip)

This post clone script will resume any Parallels VM containers that were suspended by the

`parallels_pause.sh` pre clone script. Note: This script relies on command-line tools offered only in Parallels Desktop for Mac Pro or Business Edition.

[play_sound.sh <http://bombich.com//software/files/tools/play_sound.sh.zip>](http://bombich.com//software/files/tools/play_sound.sh.zip)

If you want to play a unique sound, use this script. You can plug in the path to any audio file of your liking or try one of the examples included.

[eject_destination.sh <http://bombich.com//software/files/tools/eject_destination.sh.zip>](http://bombich.com//software/files/tools/eject_destination.sh.zip)

CCC's option to [automatically unmount the destination volume <#dest_postactions>](#) is a volume-level task, not a device task. If you want to eject the destination device, use this post clone script instead. Note that ejecting the destination device will unmount all volumes on the device. Also note that this example script adds a 60-second delay to accommodate macOS's desire to automatically regenerate various cache files. This delay can be adjusted if necessary by editing the script.

[timelimits.sh <http://bombich.com//software/files/tools/timelimits.sh.zip>](http://bombich.com//software/files/tools/timelimits.sh.zip)

This pre clone script will abort the backup task if the task is running outside of your specified time limits. Use this script, for example, to indicate that a task should run only on weekdays and only between 9AM and 5PM. If the task tries to run at a time outside this time window (e.g. you have a task configured to run every hour), the task will abort and will run at the next scheduled run time.

Note:To apply this script globally to all of your backup tasks, click on **Preferences** in CCC's toolbar, then click on **Advanced**, then specify this script as the **Preflight shell script**.

[rename_dmg.sh <http://bombich.com//software/files/tools/rename_dmg.sh.zip>](http://bombich.com//software/files/tools/rename_dmg.sh.zip)

This post clone script will rename the destination disk image, adding a timestamp to the disk image name. This is useful if you want to create snapshots of the source in disk image files for posterity. Note that this will cause CCC to create a new disk image during every backup task, and recopy everything from the source each time. Additional notes for configuring this post clone script are available in the script header.

[pm_on_success.sh <http://bombich.com//software/files/tools/pm_on_success.sh.zip>](http://bombich.com//software/files/tools/pm_on_success.sh.zip)

This post clone script will perform the requested power management option (e.g. shutdown, restart, sleep) at the end of the backup task if the backup task completes without errors. Use this in lieu of one of the [Power Management postflight options <#power_mgmt_options >](#) if you prefer the power management action does not occur when a task ends with errors (e.g. if the destination volume is missing).

[quit_application.sh and open_application.sh](#)

[<http://bombich.com//software/files/tools/quit_and_open_application.zip>](http://bombich.com//software/files/tools/quit_and_open_application.zip)

This pair of scripts can be used to quit and open an application before and after the backup task. Open these scripts in a text editor to define the application that should be quit or opened.

Restoring non-system files

Watch a video of this tutorial on YouTube <https://www.youtube.com/watch?v=n_7jgLKy_W0>

Because CCC backups are non-proprietary copies of your original volume, you can navigate the contents of your CCC backup volume in the Finder and find your files exactly where you would find them on the original source volume. If you need to restore a single file, **you can copy it directly from your backup volume in the Finder**. CCC *is not required* to gain access to your data. If you have a larger restore need, though, CCC is ready to help make the restore process as easy as it was to back up in the first place.

Restoring non-system files

The restore process is virtually identical to the backup process. The notable differences are that you will probably be restoring a smaller subset of files than what you backed up, and that you may want to indicate that files newer on the original volume shouldn't be overwritten by potentially older versions on your backup.

1. Launch CCC and create a new task
2. Select **Choose a folder...** from the Source selector and select a folder on your backup volume as the source
3. Select **Choose a folder** from the Destination selector and choose a folder on your original source volume as the destination
4. Click the Clone button

Note: If you choose your startup disk as the destination volume directly (rather than choosing a folder on that volume), CCC will impose a protective filter on system files and folders. It wouldn't be a good idea to overwrite or delete system files on the OS that you're booted from, so this isn't something that CCC will allow. If you need to restore system items or items in the Applications folder, we recommend that you boot from the backup volume before attempting to restore.

Backing up to a disk image

Disk images are not bootable backups. To create a bootable backup, you must back up to a hard drive that is attached directly to your Mac. We recommend that you only use a disk image if you are backing up to a network volume.

A disk image is a single file residing on your hard drive that contains the entire contents of another hard drive (except for the free space). When you want to access the contents of that filesystem, you double-click on the disk image to mount the disk image as if it were an external drive attached to the machine. Carbon Copy Cloner leverages disk images to provide you the flexibility of storing several complete backups on a single shared external hard drive. Disk images also greatly improve the performance of backing up to network attached storage (NAS) devices, such as the Airport Extreme Base Station and Time Capsule.

To back up to a new disk image:

1. Choose your source volume from the Source selector
2. Choose "New disk image..." from the Destination selector
3. Provide a name and choose a location to save your disk image
4. If you plan to back up to this disk image again in the future, set the image format to one of the read/write formats. If you want a read-only disk image for archival purposes, set the image format to one of the read-only formats.

To back up to an existing disk image, select "Choose disk image..." from the Destination selector and locate your disk image.

Read/write "sparse" disk images

A sparse disk image is a type of read/write disk image that grows as you copy files to it. In general, sparse disk images only consume as much space as the files they contain consume on disk, making this an ideal format for storing backups.

Read/write "sparsebundle" disk images

A sparse bundle disk image is similar to a sparseimage insofar as it grows as you add data to it, but it retains its data in many smaller files inside of a bundle rather than inside a single file. A sparse bundle may be desirable if the underlying filesystem upon which you save the disk image has a file size limitation (such as FAT32).

Running out of space on a sparseimage or sparsebundle disk image

CCC reported that the destination is full, but the underlying disk has plenty of free space.

CCC initially sets the capacity of your disk image to the amount of free space on the underlying disk. If you have freed up some space on that disk since you created the disk image, you can manually expand the capacity of the destination disk image in Disk Utility. Choose **Resize...** from the Images menu in Disk Utility, select your destination disk image, then expand it as desired. We recommend that you do not expand the disk image such that it is larger than the capacity of the underlying disk.

The disk image file is larger than the amount of data it contains, why? Sparseimage and sparsebundle disk images grow as you add data to them. They do not, however, automatically shrink when files are deleted from them. As a result, the amount of disk space that the disk image file consumes will not necessarily reflect the amount of data that they consume. To reclaim disk space

that is occupied by the free space on your sparse disk image, CCC will compact the disk image before attempting to mount it if the free space on the underlying volume is less than 25GB, or is less than 15% of the total disk capacity. In most cases, you do not need to compact the disk image yourself, but this functionality is documented here so you'll understand why you might see CCC spending time "Compacting the destination disk image" at the beginning of a backup task.

If you would like to compact a disk image manually, drop the disk image file onto this application:

[Compact Sparse disk images](#)

http://bombich.com//software/files/tools/Compact_Sparse_Image.app.zip>. Be sure to unmount the disk image volume if it is already mounted. Also, note that the compacting process can take a while (e.g. an hour for a 100GB disk image on a locally-attached volume). Finally, be sure that your system is running on AC power. The system utility that compacts the disk image will refuse to run while the system (e.g. a laptop) is running on battery power.

Read-only disk images

Read-only disk images cannot be modified without invalidating the built-in checksum, therefore they are a good container for storing archived material. Whether to choose read-only versus read-only compressed comes down to time and space. If your destination is tight on space and you have a bit of extra time, you can compress the disk image. Compression rates vary on the content of your source, but you can typically expect to reduce the size of your disk image by about half when using compression. There is a subtle behavior that you should take note of when considering this option as a space-saving measure: CCC will first create a read/write disk image, copy the selected items to it, then convert the disk image to read-only compressed. In this case, you will actually need twice the space on your destination as the items to be copied consume on the source.

Encrypting disk images

If any of the data that you are backing up is sensitive, and if your backup device may be in an insecure location, encrypted disk images can improve the security of your backup. CCC offers [128 bit and 256 bit AES encryption](#) https://en.wikipedia.org/wiki/Advanced_Encryption_Standard> to encrypt disk images. To create an encrypted disk image, select one of the encryption levels from the Encryption menu. After you click on the OK button, you will be prompted to specify a passphrase for the new disk image, and CCC will give you an opportunity to save the passphrase in your own keychain. CCC will also store the passphrase in a private keychain so the disk image can be mounted automatically during scheduled backup tasks.

Note: If you create a read-only, encrypted disk image, the intermediate disk image that CCC creates is NOT encrypted. This intermediate disk image file is deleted once the final, read-only, encrypted disk image has been created, but it is not shredded. Take this into consideration when choosing your destination media. If the destination may be placed in an insecure location, use Disk Utility to securely erase free space on the underlying destination volume after you have created your encrypted disk image archive.

Running a backup task whose destination is a disk image on the startup disk

If you specify a disk image that resides on your startup disk as the destination to a scheduled task, CCC will impose some more conservative requirements on this task. To proceed with this configuration, **one of the following requirements must be met**:

- The amount of free space on the startup disk is at least 1GB larger than the amount of consumed space on the source volume.

- The disk image won't grow, e.g. it is a .dmg file, not a sparseimage or sparsebundle disk image.

These requirements avoid a scenario in which the startup disk runs out of free space, causing instability on macOS. If you cannot accommodate the free space requirement, we recommend that you create a **.dmg** disk image in Disk Utility (choose File > New... > Blank Disk image, set the image format to **read/write disk image**). Disk Utility will pre-allocate exactly as much space as you request, and CCC will gladly use this disk image without fear of filling up the startup disk.

Sparsebundle disk images are not supported on some filesystems

If your Mac is running an OS older than macOS Sierra, CCC will refuse to save or mount a sparse bundle disk image if the underlying filesystem that the disk image file resides upon does not support the `F_FULLFSYNC` file control. Most filesystems support this file control, but the SMB file sharing protocol does not. Most people that encounter issues with creating a sparsebundle disk image on a network volume are encountering issues because the network volume is mounted via SMB.

Starting in Mavericks, Apple's preferred file sharing service is SMB. As a result, if you attempt to connect to a sharepoint, Finder will use SMB to establish that connection unless you explicitly specify AFP as the protocol to use. In this configuration, a sparse bundle disk image will not work, and CCC will issue an error. To avoid this error, connect to the sharepoint explicitly using AFP:

1. Eject the network volume if it is currently mounted
2. Choose "Connect to server" from the Finder's Go menu
3. Type in "afp://yourserver.local" (changing the hostname, of course), then click the Connect button and mount the sharepoint
4. Go back to CCC and choose "Choose disk image" from the Destination selector, then select the sparsebundle disk image on your network volume

Why can't I use a sparsebundle disk image on a filesystem that does not support the F_FULLFSYNC file control?

When your computer writes a file out to the hard drive, the data usually goes to a "write buffer" — a small portion of RAM that is installed on the circuit board of the hard drive. By accumulating smaller write operations onto this RAM chip, the hard drive can increase overall write performance by writing large blocks of cached data to the physical media all at once. While this write buffer improves performance, it also carries a risk. If the power fails or the disk's connection to the computer is suddenly broken between the time that data was written to the buffer and when the buffer is flushed to the disk, your filesystem will have an inconsistency. Filesystem journaling typically mitigates this risk, however it doesn't offer enough protection for Apple's sparsebundle disk image type.

In Mac OS 10.5, Apple implemented the `F_FULLFSYNC` file control for network servers and clients. The `F_FULLFSYNC` file control is a command that is sent to the hard drive after some (or all) write operations that tells the disk to immediately flush its cache to permanent storage. To provide better protection for data on sparsebundle disk images, Apple disabled support on Mac OS 10.6 for using sparsebundle disk images that reside on filesystems that do not support the `F_FULLFSYNC` file control. Apple relaxed this requirement in macOS 10.12 (Sierra).

You are likely to encounter this error condition if your sparse bundle disk image is hosted on a pre-Mac OS 10.5 Macintosh or various Network Attached Storage (NAS) devices (especially SMB). When you encounter this error, copy the sparsebundle disk image to another network sharepoint, or ask CCC to create a new sparseimage disk image file (sparseimage disk images are not the same as sparsebundle disk images).

A message for new Mac users coming from the Windows world

Backups on a Windows system are very different from those on a Macintosh. If you're coming from a Windows background, the term "imaging" and the concept of making a disk image backup is probably familiar to you. Restoring from disk image backups is made simpler on Windows because the startup environment is built around them. That's not the case for a Macintosh. When you create a disk image backup of your Mac's startup disk, the logistics of restoring that backup are actually fairly complicated. Due to these complications, we don't recommend using a disk image as your primary backup on a Mac. Disk images are useful for storing a backup of your user data on a network volume, but for your Mac's startup disk, we recommend that you back up directly to a disk that is attached to your Mac; not to a disk image.

Related Documentation

- [Restoring from a disk image <http://bombich.com//kb/ccc4/restoring-from-disk-image>](http://bombich.com//kb/ccc4/restoring-from-disk-image)

Restoring from a disk image

You can access the contents of a disk image the same way that you access other volumes and external hard drives on macOS. Double-click on the disk image file to mount its filesystem, then navigate the filesystem in the Finder to access individual files and folders. If you have the permission to access the files that you would like to restore, simply drag those items to the volume that you would like to restore them to.

Restoring individual items or an entire disk image to another hard drive using CCC

While you cannot boot macOS from a disk image directly, you can restore the disk image to a volume. When you use CCC to restore the disk image to a volume, the resulting restored volume will be bootable (assuming that you had initially backed up a bootable system). To restore files or an entire filesystem from a disk image:

1. Launch CCC
2. Select "Restore from disk image..." from the Source selector and locate your backup disk image. CCC will mount the disk image for you.
3. Choose a volume from the Destination selector. You may choose the startup disk as a destination, but CCC will not permit you to restore system files to the currently-running OS.
4. If you do not want to restore everything, choose "Selected files..." from the Clone menu (below the Source selector) and deselect any item that you do not wish to restore.
5. Click the Clone button. The files will be restored to their original locations.

Restoring system files to your startup disk

If you want to restore system files to your startup disk, you must start up your Macintosh from an installation of macOS on another hard drive, such as a bootable backup created by CCC. Once you have booted your Mac from another volume, follow the steps from the previous section.

Restoring system files to your startup disk when you don't have a bootable backup

If you do not have an installation of macOS on another hard drive, you can boot your Mac from your macOS Recovery volume and use Disk Utility to restore the entire disk image:

El Capitan and later

1. Hold down Command+R while you restart your computer
2. Choose "Disk Utility" in the Utilities application
3. Click on the volume you want to restore **to** in the sidebar
4. Choose **Restore...** from the File menu
5. Click on the **Image...** button and locate the disk image that you would like to restore
6. Click the **Restore** button

Mountain Lion, Mavericks, Yosemite

1. Hold down Command+R while you restart your computer
2. Choose "Disk Utility" in the Utilities application



3. From the File menu, choose "Open Disk Image..." and locate the disk image that you would like to restore
4. In the list in the pane on the left, click on the mounted disk image's volume
5. Click on the "Restore" tab on the right side of the window
6. Drag the mounted disk image to the Source field. If the Source field does not accept the dragged volume, right-click on the disk image's mounted volume and choose "Set as source" from the contextual menu.
7. Drag the hard drive that you would like to restore to into the "Destination" field
8. Check the box to erase the destination (if present), then click on the Restore button.
9. Restart your Mac from your newly restored volume, then use [CCC to restore the Recovery HD volume](http://bombich.com/kb/ccc4/cloning-apples-recovery-hd-partition) <<http://bombich.com/kb/ccc4/cloning-apples-recovery-hd-partition>> from the archive on your startup disk.

Using Migration Assistant to migrate data from a disk image

If you have a clean installation of macOS and simply want to restore your user data from a full-system backup on a disk image, you can use Migration Assistant for this task. Simply mount the disk image, then open Migration Assistant and proceed as directed, using the mounted disk image as the source. Note that Migration Assistant will only accept a disk image that has a full system backup, it will not accept a disk image that has only user data.

Migration Assistant and Mavericks, Yosemite, El Capitan

On Mavericks through El Capitan, Migration Assistant will ask that you close all applications, and it will then log you out before presenting migration options. This poses a problem for migrating data from a disk image because the disk image will be unmounted when you are logged out, and Migration Assistant doesn't offer any interface to choose a disk image. To work around this problem, you can use our [Mount disk image for Migration Assistant](http://bombich.com/software/files/tools/Mount_disk_image_for_Migration_Assistant.app.zip) <http://bombich.com/software/files/tools/Mount_disk_image_for_Migration_Assistant.app.zip> application. Simply drag the disk image containing your full system backup onto the application and it will guide you through a fairly simple procedure that will make the disk image available to Migration Assistant after a short delay.

Preliminary tests indicate that this workaround is not required on Sierra.

I have a full-volume backup in a folder or a disk image, but I don't have a bootable backup. How can I restore everything?

CCC makes bootable backups specifically to avoid this kind of situation. When you have a bootable backup, you simply boot from that, then restore everything to a replacement disk or the original disk. One step, minimal time, couldn't be easier. Occasionally people get into this sticky situation though -- I have a backup of everything in a disk image or in a folder on the backup volume, there's a clean installation of macOS on my replacement disk, now how do I get everything back to the way that it was before?

The first thing that you need to do is **make a boot volume that is not the volume you want to restore to**. Once you have done that, you can boot from that volume and then do a complete restore of your backup to the replacement disk. There are several options for how and where you create this other bootable volume. For example, you could install macOS onto a thumb drive, or you could use CCC to clone your clean installation of macOS to a thumb drive. You could also create a new partition on your replacement disk and clone the fresh installation of macOS to that. The steps below attempt to make very few assumptions about the resources you'll have in this scenario: a) You have a fresh installation of macOS on a hard drive and b) you have your backup in a folder or disk image on some other disk. Given those assumptions, here is how we recommend that you proceed.

Create a new partition on your replacement disk

1. Open the Disk Utility application and click on the disk icon that represents your internal hard drive. Don't click on the **Macintosh HD** icon, click on the one above that.
2. Click on the Partition tab.
3. Click on the + button.
4. Set the size of the new partition to 15GB and name it something like **Rescue**.
5. Click the **Apply** button.

This video <<https://www.youtube.com/watch?v=XQG6-Ojiv3s>> describes the same procedure (albeit in a slightly different context).

Clone your fresh installation of macOS to the Rescue volume

1. Open Carbon Copy Cloner and create a new task.
2. Choose your current startup disk as the source.
3. Choose the Rescue volume as the destination.
4. If you aren't working from a fresh installation of macOS, choose **Selected files...** from the Clone popup menu and take a moment to exclude third-party applications from the list of items to be copied, as well as any large items in your home folder (e.g. /Users/yourname/Music).
5. Click the Clone button.

Boot from the Rescue volume and restore your data to the replacement disk

1. Open the Startup Disk Preference Pane, set the Rescue volume as the startup disk, then click on the Restart button.
2. Once restarted from the Rescue volume, attach the backup volume to your Mac and open the Carbon Copy Cloner application.
3. If your data is backed up in a folder, choose **Choose a folder...** from the Source selector and select that folder as the source. Otherwise, choose **Restore from a disk image...** and locate your backup disk image.
4. Choose your **Macintosh HD** volume as the destination.
5. Verify that CCC's SafetyNet feature is enabled.
6. Click the Clone button.

Reboot from your restored volume and clean up

1. Open the Startup Disk Preference Pane, set the restored volume as the startup disk, then click on the Restart button.
2. Open the Disk Utility application and click on the disk icon that represents your internal hard drive.
3. Click on the Partition tab.
4. Click on the Rescue volume, then click on the - button to delete that volume.
5. Click the Apply button.

Finally, make a new backup to the root of a locally-attached hard drive so you'll have a bootable backup from here forward.

Using Carbon Copy Cloner to back up to another Macintosh on your network

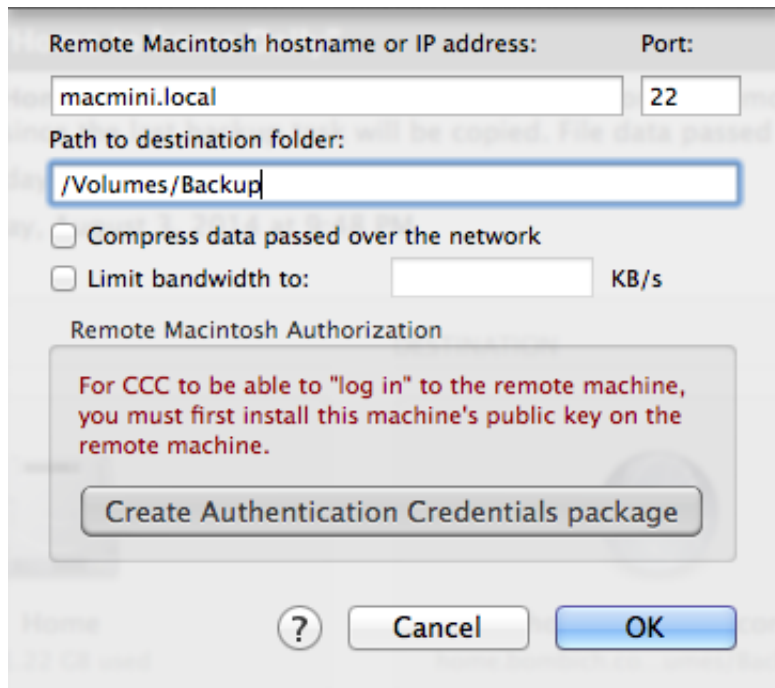
Carbon Copy Cloner offers the option of securely copying your selected data to another Macintosh on your network (or anywhere on the Internet for that matter) via the "Remote Macintosh..." options in the Source and Destination selectors. After a brief setup procedure to establish trust between your Mac and the destination Mac, simply indicate the IP address or hostname of the remote Mac and CCC will take care of the rest.

Note: Backing up to a remote Macintosh is not the same as backing up to a network filesystem. If you don't require a bootable backup and you are only backing up files for which you are the owner, it will be easier to enable file sharing on the remote machine and back up to a disk image on the mounted sharepoint.

To successfully set up CCC to back up to a remote Macintosh, you must:

1. Confirm that the remote Macintosh is running [a supported OS](http://bombich.com/kb/ccc4/system-requirements-carbon-copy-cloner) <<http://bombich.com/kb/ccc4/system-requirements-carbon-copy-cloner>>
2. Enable Remote Login on the remote Macintosh.
3. Determine the Unix path to the folder on that machine that you would like to back up to.
4. Create an "Authentication Credentials" package on your local machine (CCC will place this package on your Desktop).
5. Transfer the "Authentication Credentials" package to your remote Macintosh and install it there.
6. Verify that the system time on each Macintosh is reasonably in sync with the other.
7. Confirm that the backup device on the remote Macintosh is ready and mounted (CCC does not currently perform this verification).
8. Manually disable the "Ignore ownership on this volume" setting in the destination volume's Get Info window in the Finder.
9. Verify that any firewalls between the two Macs are permitting "secure shell" traffic over port 22 (or a custom port that you specify).

Configuring CCC to back up to a remote Macintosh is an advanced configuration scenario. If you are unsure of any of these settings, please seek advice at the [Bombich Software Help Desk](http://bombich.com/software/get_help) <http://bombich.com/software/get_help> before proceeding.



Enabling Remote Login on the remote Macintosh

To enable Remote Login on your remote Macintosh:

1. Log in to that machine as an admin user.
2. Open the System Preferences application.
3. Open the Sharing Preference Pane.
4. Check the box next to "Remote Login".
5. **Be sure to allow access to "All users", or explicitly add the "Administrators" group to the list of restricted users and groups.**

Determining the "Remote Macintosh hostname or IP address"

To determine the value to enter into this field:

1. Log in to the remote Macintosh as an admin user.
2. Open the System Preferences application.
3. Open the Sharing Preference Pane.
4. Click on the Remote Login service in the list of services.
5. In the settings area on the right, you will see a message to the effect of "To log in to this computer remotely, type "ssh username@yourhost.yourdomain.com" at a shell command prompt." The text after the "@" symbol is the hostname or IP address that you will provide in the "Remote Macintosh hostname or IP address" text field.

If you have customized the Remote Login service on the remote Macintosh to use a custom port, specify that port in the "Custom Port" text field. The default port is 22.

Determining the "Path to source/backup directory"

To produce a backup that your source Macintosh can boot from, we recommend that you dedicate a volume to the backup task. The backup volume can be an internal or external volume, though an external volume will be most convenient in a disaster recovery scenario. Be sure to prepare the

volume for use with CCC per the instructions in the article titled [Preparing a hard drive for use with Carbon Copy Cloner](http://bombich.com/kb/cccl4/preparing-your-backup-disk-backup-os-x) <<http://bombich.com/kb/cccl4/preparing-your-backup-disk-backup-os-x>>. When you have identified a volume to use on the remote Macintosh for backup, do the following to determine the value to enter in the "Path to backup directory" text field:

1. Log in to the remote Macintosh as an admin user.
2. Open the Disk Utility application.
3. Click on the backup volume in the list of devices on the left side of the window.
4. Locate the "Mount point" value at the bottom of the window — this is the value that you will enter into the "Path to backup directory" field in CCC's Remote Macintosh dialog window on the source machine. The format of this value is typically `"/Volumes/Backup Disk"`.

If you do not intend to create a bootable backup, you may also create a folder on the remote Macintosh that can be used for the backup task:

1. Log in to the remote Macintosh as an admin user.
2. Create a folder in your desired location.
3. In the Finder, click on the destination folder that you created.
4. From the Finder's "File" menu, choose "Get Info".
5. In the "General" section of the Get Info panel, the "Where" attribute indicates where that folder is located. The path to your backup directory will consist of that location, plus "/", plus the name of your destination directory. For example, if you created a folder named "Backups" in the `/Users/Shared` folder on your remote Macintosh, the Get Info panel would indicate that it is located at `"/Users/Shared"`, therefore the path to the backup directory is `"/Users/Shared/Backups"`.

Bandwidth management options

CCC offers two options that can help you address bandwidth concerns. The option to "Compress data passed over the network" can greatly reduce your backup time and total bandwidth used. The time savings depends on just how slow the connection is between the two Macs. If you have a connection that is slower than 10MB/s, compression will make the transfer faster. If your bandwidth is better than that, compression will actually slow down your transfer. CCC will not compress certain file types that are already compressed, such as graphics files, movies, and compressed archives. Specifying the option to compress data passed over the network does not create a proprietary or compressed backup; files are automatically decompressed on the destination volume on the remote Macintosh.

CCC also offers a bandwidth limitation option. If your ISP requires that your transfers stay below a certain rate, you can specify that rate here. Note that CCC errs on the conservative side with this rate, so the average transfer rate may be slightly lower than the limitation that you specify.

The "Authentication Credentials" package installer

Before you can back up to a remote Macintosh, you must first set up "[public key authentication](https://en.wikipedia.org/wiki/Public-key_encryption)" (PKA) between the Macintosh that you're running Carbon Copy Cloner on and the Macintosh that you'd like to back up to. With PKA, you don't need to provide a username/password to access the remote Macintosh. Instead, CCC uses pre-shared, 1024-bit DSA key pairs to identify the source and destination Macs.

To create the Authentication Credentials installer package:

1. Choose "Remote Macintosh..." from the Source or Destination selector
2. Click on the button to "Create Authentication Credentials package"

When you click on the button to create an Authentication Credentials package, CCC will generate this key pair, create a package installer, then install the package onto your local Macintosh. When this procedure is complete, transfer the package to your remote Macintosh and install it there as well by double-clicking on the package. If you use FTP or a non-HFS+ formatted volume to transfer the package to the remote Mac, right-click on the Authentication Credentials package and choose the option to compress the package first. FTP and non-HFS+ formatted volumes will strip important information from the Authentication Credentials package and render it unusable on the remote Mac.

Note that you are NOT required to enable the root account on either Mac. This is avoided by using public key authentication instead of password-based authentication.

“Authentication Credentials can’t be installed on this disk. A Newer version of this software already exists on this disk.”

The Authentication Credentials installer package is explicitly configured to allow upgrades (e.g. installing multiple copies of the package from different Macs), but sometimes the Installer application will errantly disallow it. These steps will allow the installation of the package on the remote Mac when this error is presented:

1. Choose "Go to folder" from the Finder's Go menu
2. Type `"/var/db/receipts"` and click the Go button
3. Find the files that start with `"com.bombich.ccc.tgt_keys.authenticationCredentials"` and drag them to the Trash
4. Try installing the package installer again

Remote Macintosh prerequisites

At this time, CCC requires the use of the root account (though it does not have to be enabled) on both the source and destination Macs. To successfully back up to a remote Macintosh, you must have administrative privileges on both machines.

CCC also requires that the remote Macintosh be running macOS 10.8 or later. Non-Macintosh systems are not supported with the "Remote Macintosh" feature.

Note for Yosemite, El Capitan, & Sierra users: If your source contains macOS Yosemite (or later) system files, the Remote Macintosh must be running macOS 10.9.5 or later. If the Remote Macintosh is not running 10.9.5 or later and you attempt to back up macOS Yosemite (or later) system files, the backup task will report numerous "Input/output" ("Media") errors. Filesystem changes introduced on Yosemite cannot be accommodated by older OSes. Apple added support for those filesystem changes in 10.9.5 to offer a modest amount of backwards compatibility.

Additional pointers for advanced users

Carbon Copy Cloner's public key-based authentication is designed to work with no additional configuration of the services required for backing up over a network connection. CCC uses rsync over an ssh tunnel to perform the backup. If you do make modifications to the sshd configuration, consider how that may affect your backup. For example, CCC requires use of the root account over ssh. If you set the "PermitRootLogin" key in the sshd_config file to "no", you will not be able to use CCC to or from that machine. It's an important distinction to note that the root account does not have to be **enabled**, but sshd must permit the use of the root account. The "PubkeyAuthentication" key must also not be set to "no", because Public Key Authentication is required for CCC to authenticate to the remote Mac.

Troubleshooting connectivity problems to a remote Macintosh

Problems connecting to a remote Macintosh generally are caused by configuration problems with the Remote Login service on the remote Macintosh. Try the following if you are having trouble making a backup to a remote Mac:

1. Verify that the Remote Login service is enabled in the Sharing preference pane on the Remote Macintosh.
2. Verify that access to the Remote Login service is allowed for "All users".
3. Confirm that you have created an "Authentication Credentials Installer Package" on the local Mac, then transferred it to the remote Mac and installed it there.
4. Verify that your firewall and the remote Mac's firewall permits traffic on port 22. If you have an application firewall in place (e.g. Little Snitch), verify that access is granted to CCC's privileged helper tool, "com.bombich.ccchelper".
5. If your local Mac and remote Mac are not on the same network (e.g. you're connecting across a VPN or through a router and over the Internet), confirm that a connection can be established between the two Macs. How you do this will vary from one scenario to the next, but you can generally verify connectivity by typing "ssh root@192.168.1.1" into the Terminal application (replace 192.168.1.1 with the hostname or IP address of your remote Mac). If you see a request for a password, then connectivity is established. If not, your network configuration isn't permitting the traffic or the hostname that you're connecting to is invalid or unavailable. If you are accessing a remote Mac that is behind a router, consult the router's port forwarding documentation and verify that port 22 traffic is directed to the internal IP address of the remote Mac.

VPN and port forwarding configuration is outside of the scope of support for CCC, though our support staff will make every effort to identify whether problems occur within that configuration or within the service configuration on your remote Mac. If you have worked through the troubleshooting steps above and are still having trouble backing up to a remote Macintosh, please choose "Report a problem" from CCC's Help menu and submit a support request.

After submitting the support request, there's one more thing you can do to collect some information about the connectivity problem between the two Macs:

1. Copy [Remote Authentication Debugger](http://bombich.com/software/files/tools/Remote_Authentication_Debugger.app.zip) <http://bombich.com/software/files/tools/Remote_Authentication_Debugger.app.zip> to both Macs
2. Open the Remote Authentication Debugger application on the remote Mac (this will temporarily place the Remote Login service on the remote Mac into debugging mode).
3. Open the Remote Authentication Debugger application on the local Mac and enter the remote host information for the Remote Mac when prompted.
4. The Remote Authentication Debugger application will attempt to connect to the remote Mac using the CCC authentication keys. The debug information will then be collected into reports on the Desktop of both Macs. Please attach those two reports to the automatic email reply that you received when you submitted a support request to our Help Desk.

Meraki router intercepts Secure Shell traffic

Some users that have a Meraki router involved in their configuration have reported that its default configuration will interrupt Secure Shell traffic. The firewall rule that causes interference is in place to protect the network from [vulnerabilities that are irrelevant between two modern Macs](http://cve.mitre.org/cgi-bin/cvename.cgi?name=2002-0639) <<http://cve.mitre.org/cgi-bin/cvename.cgi?name=2002-0639>>. Nonetheless, the firewall intercepts traffic after initially allowing a connection, which is presented by CCC as a "lost connection" or a failure to authenticate to the remote Mac. The following steps correct the Meraki configuration concern:

1. Log into the Meraki as an administrative user and open the "Security report"
2. Filter the log for SSH events
3. Click the "SSH_EVENT_REPOVERFLOW" event from the list to open it and review the blocked event
4. To allow the blocked traffic of this type, click "Yes" to add this event to the whitelist.

macOS Sierra requires newer authentication credentials

OpenSSH in macOS Sierra requires RSA key pairs when using public key authentication. In the past, CCC created DSA key pairs. When you upgrade your local or remote Macintosh to Sierra, authentication will fail. To correct this problem, simply recreate the Authentication Credentials Installer Package and reinstall it on the remote Macintosh:

1. Open CCC and select your backup task
2. Select **Remote Macintosh** from the source or destination selector (whichever is applicable to your backup task)
3. Click the **Create Authentication Credentials** button
4. When CCC has completed creating the installer, copy the installer package from your Desktop to the remote Mac and install it there
5. Run your backup task again

A note about access privileges to backed up data

While logged in to your remote Macintosh, you may not have permission to view the contents of your backup in the Finder. Your access to the files will be based on the unique id that is associated with the user account that you're logged in to on the remote Macintosh and the one associated with the account(s) on the other Mac(s) that you're backing up. The first administrator account always gets a uid of "501", and subsequent accounts are assigned incrementally higher uids — 502, 503, etc. For security and privacy purposes, macOS restricts access to the contents of user home directories to the owners of those home directories, and these restrictions are preserved when your data is backed up to a remote Macintosh.

To learn what user id is associated with your account:

1. Open System Preferences and click on the User Accounts preference pane.
2. Click on the lock and authenticate.
3. Control+click on your account in the accounts table and choose "Advanced options".

You will see your User ID in the panel that appears.

This may be annoying from the perspective of trying to access those files on your remote Macintosh, but it is important for CCC to preserve the ownership and permissions information when backing up your data. If/when you want to do a restore, you could do either of the following:

- a) Attach the external drive directly to the machine that you want to restore files to — the accounts on those systems will be able to access their backed up files.
- b) [Do a restore directly within CCC <http://bombich.com//kb/ccc4/restoring-from-backup-on-remote-macintosh>](http://bombich.com//kb/ccc4/restoring-from-backup-on-remote-macintosh) from the original source Macintosh.

If you must have read access to some of this data (e.g. the original Mac is gone, the user account changed, etc.), you can change the ownership of the home folder and its contents in the Finder:

1. Choose "Get Info" from Finder's File menu.
2. In the "Sharing and Permissions" section at the bottom, click on the lock icon to make the



permissions editable.

3. Click on the "+" button.
4. In the window that appears, select your account, then click the Select button.
5. Set the access privileges to "Read & Write".
6. Click on the Gear menu and choose to apply the change to enclosed items.

Related Documentation

- [Restoring from a backup on a remote Macintosh <http://bombich.com//kb/ccc4/restoring-from-backup-on-remote-macintosh>](http://bombich.com//kb/ccc4/restoring-from-backup-on-remote-macintosh)
- [A caveat for backing up to a remote Macintosh that has no user logged in <http://bombich.com//kb/ccc4/caveat-backing-up-remote-macintosh-has-no-user-logged-in>](http://bombich.com//kb/ccc4/caveat-backing-up-remote-macintosh-has-no-user-logged-in)

A caveat for backing up to a remote Macintosh that has no user logged in

For improved detachability, macOS will unmount any non-internal volumes that are attached to the system when you log out. So, for example, if you log out of your computer while a USB or Firewire hard drive enclosure is attached, you can detach those hard drive enclosures from the system without having to manually unmount them first. This is a good thing — it would be annoying if you had to log back in to your system just to eject a drive. The downside of this, though, is that if you have a CCC backup task that runs when no user is logged in, the destination volume may be unavailable. For a local backup, CCC will attempt to manually mount the destination volume. When the destination of your backup task is a remote Macintosh, however, CCC will not be able to mount that volume prior to backing up.

If you anticipate backing up to a remote Macintosh that may be sitting at the loginwindow, you can change the behavior of macOS to not unmount detachable volumes. To change this behavior, run this command in the Terminal application on the remote Macintosh:

```
sudo defaults write /Library/Preferences/SystemConfiguration/autodiskmount  
AutomountDisksWithoutUserLogin -bool YES
```

Related Documentation

- [Using Carbon Copy Cloner to backup to another Macintosh on your network <http://bombich.com//kb/ccc4/using-carbon-copy-cloner-back-up-another-macintosh-on-your-network>](http://bombich.com//kb/ccc4/using-carbon-copy-cloner-back-up-another-macintosh-on-your-network)

Restoring from a backup on a remote Macintosh

Restoring files from a remote Macintosh is nearly the same procedure as backing up to a remote Macintosh:

1. Open CCC
2. Click the "New Task" button in the Toolbar
3. Select "Remote Macintosh..." from the Source selector*. Configure the hostname of the remote Macintosh and the path to the volume or folder that has the backup.
4. Select a destination volume
5. Click the Clone button

* The option to clone "Selected files" will be disabled. CCC won't know the contents of the remote folder until the copying task has begun. If you need to limit what files are restored, you can specify a custom filter via Advanced Settings.

Related Documentation

- [Advanced Filter Settings <http://bombich.com//kb/ccc4/excluding-files-and-folders-from-backup-task#advanced>](http://bombich.com//kb/ccc4/excluding-files-and-folders-from-backup-task#advanced)

I want to defragment my hard drive

A welcome side-effect of cloning one volume to another is that the files on the resulting volume are largely defragmented. While fragmentation is not as significant of an issue as it used to be (e.g. in the Mac OS 9 days), people that have begun to fill the last 10-15% of their boot volume may see some performance benefit from defragmentation. If you find yourself in this situation, this is also a really good time to consider migrating to a larger hard drive altogether, or to an SSD, which is not affected by fragmentation.

Defragmentation is a natural result of backing up your data to an empty backup volume. Simply [prepare your backup volume for use with Carbon Copy Cloner](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x) [<http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x), then use CCC to clone your source volume to your destination volume.

"Clone, wipe, restore" — think twice before you wipe that original volume

It may be really tempting to do the following:

1. Clone your boot volume — the one with your lifetime of irreplaceable data — to another hard drive
2. Boot your Mac from that cloned volume
3. Use Disk Utility to wipe the original volume
4. Restore the cloned volume to the original volume

Very quickly you'll be booted back up from your boot volume and you'll have a backup to boot, right? In most cases, this would work out great for you, and you'd be fine. There are two really good reasons, however, to stop after the second step and take a breather:

1. As soon as you erase the original volume, you're down to one copy of your data — you have no backup. The restore task will stress both the source and target disks with massive reads and writes. If either disk were on the verge of failure, this level of stress could push it over.
2. You really should take the time to verify your backup. I trust CCC with my data, but do I trust that I asked it to copy the right items? Did my source volume have a filesystem problem that went unnoticed?

The Best Practice for defragmenting your hard drive

1. Establish a backup regimen to a primary backup volume. Test your backups regularly.
2. Quit open applications and use CCC to update your backup one last time.
3. Use CCC to clone your hard drive to some physical volume other than your primary backup.
4. Boot from the cloned volume.
5. Use Disk Utility to reformat your original volume.
6. Use CCC to restore your cloned volume back to the original volume.
7. Boot from the original volume.

Performance upon first boot from a cloned volume will always be slightly slower than normal as Spotlight reindexes your data. When the system has "settled down", you will be able to evaluate whether the defragmentation has offered any performance benefit.

Using the ccc Command Line Tool to Start, Stop, and Monitor CCC Backup Tasks

Carbon Copy Cloner includes a command line utility that allows you to start, stop, and monitor the progress of specific CCC backup tasks. The utility is located inside of the CCC application bundle. To get basic usage instructions, invoke the utility without arguments in the Terminal application, e.g.:

```
[user:~] /Applications/Carbon\ Copy\ Cloner.app/Contents/MacOS/ccc
Usage: ccc [options]
ccc -v|--version
    Prints the version of the CCC command-
line utility (this is not the same as the main application version)
ccc -s"Task Name" | --start="My Backup Task" (-w|--watch)
    -w|--watch: Keep running and print task output until the task is finished.
ccc -x["Task Name"] | --stop["My Backup Task"]
    Stop all tasks, or the specified task.
ccc -h|--history [-c]
    Print a summary of task history, i.e. the data you would see in the table at the top
of the Task History window.
    -c prints in CSV format
ccc -p|--print-schedules
    List each task and when it will next run.
ccc -w["Task Name" | --watch=["Task name"]]
    Watch task progress (press Control+C to exit)
    Specify a task name to limit task output to the indicated task
ccc -i|--status
    Print a status line for each task.
ccc -g|--global globalDefaultName [bool|int|float|string] globalDefaultValue
    Set a global default value.
ccc -g|--global globalDefaultName delete
    Delete a global default value.
ccc -n|--notification notificationTitle notificationBody
    Send a notification to the Notification Center.
```

Backing up databases on OS X Server

Databases are proprietary file types that often cannot be backed up in the conventional manner. In CCC, you can leverage a preflight shell script to perform an "out of band" backup of various databases using database-specific tools. The CCC backup task will subsequently back up the database archive files, from which you could restore the database at a later time.

The following pre-clone shell script will dump the contents of any MySQL databases. In the event that your standard backup of the database doesn't open, you can later restore it from the dump.

```
#!/bin/sh
PATH="$PATH:/Applications/Server.app/Contents/ServerRoot/usr/bin"
PATH="$PATH:/Applications/Server.app/Contents/ServerRoot/usr/sbin"
PATH="$PATH:/Applications/Server.app/Contents/ServerRoot/usr/libexec"
export PATH

# Path to recovery directory (permissions should be 700 -- read-only root or admin)
recover="/etc/recover"
ts=`date "+%F"`

echo "Removing manual archives older than two weeks"
find $recover/ -mindepth 1 -mtime +14 -exec rm '{}' \;

# mysqldump the databases
dbs="some_database another_database mysql"
for db in $dbs; do
    echo "Dumping $db"
    mysqldump --user=root --password='s3kr!t' $db > $recover/${db}_${ts}.dump
    gzip $recover/${db}_${ts}.dump
done

# If you ever need to restore from a database dump, you would run:
# gunzip $recover/database_name_(timestamp).dump.gz
# mysql -u root -p database_name < $recover/database_name.dump
```

Backing up an Open Directory Master

Archiving an OD master database requires encryption, and providing the encryption password interactively can be challenging in an automated backup. The expect shell environment can be helpful for this task. The following pre-clone shell script will archive a macOS Server Open Directory master to a disk image for later restoration via the server administration application.

```
#!/usr/bin/expect -f

set date [timestamp -format "%Y-%m-%d"]
set archive_path "path/to/you/backup/dir"
set archive_password "password"
set archive_name "opendirectory_backup"
set timeout 120
```



```
spawn /usr/sbin/slapconfig -backupdb $archive_path/$archive_name-$date
expect "Enter archive password"
send "$archive_password\r"
expect eof
```

Related Documentation

- [Example pre and post clone shell scripts <http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples)

Backing up large files, mounted disk images, and Virtual Machine containers

Mounted disk images and running Virtual Machine container files pose an interesting problem to incremental backup utilities. By simply being mounted and accessed (e.g. via browsing the contents, booting the VM), the content of these large files are subject to modification by the applications that use those files. If you run a CCC backup task while a read/write disk image is mounted or while a VM container's OS is booted, there is a chance that the disk image file or VM container will be modified while it is being backed up, resulting in a corrupted version of the file on your backup volume.

If you have disk image files or VM containers that are regularly in use on your system, you should exclude these items from your backup routine and configure an alternate backup task for these items that runs when they are not in use. Alternatively, you could quit or suspend the applications that modify those files for the duration of the backup (see the "Example pre and post clone shell scripts" link below for examples of how to automate this).

If errors do occur while backing up large files, quit or suspend the applications that modify those files, then simply run the backup task again to correct the copy of the file on the backup volume.

Related Documentation

- [Example pre and post clone shell scripts <http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples)
- [Creating a separate task to prevent VM container versions from bloating the SafetyNet <http://bombich.com//kb/ccc4/creating-separate-task-prevent-vm-container-versions-from-bloating-safetynet>](http://bombich.com//kb/ccc4/creating-separate-task-prevent-vm-container-versions-from-bloating-safetynet)

Automated maintenance of the CCC SafetyNet folder

Carbon Copy Cloner will move previous versions of modified files, as well as files deleted since previous backup tasks to a SafetyNet folder at the root of the destination. If left unmanaged, this SafetyNet folder would eventually consume all free space on your destination volume. To prevent that from happening, CCC offers three different ways of managing the contents of the SafetyNet folder. You can customize this behavior by clicking on the "Use Advanced Settings" button in CCC's main window.

SafetyNet pruning occurs at the beginning of a backup task, so CCC will never delete an item that was archived in the current backup task. Additionally, pruning is always limited to the contents of the `_CCC` SafetyNet folder that is at the root of the destination. CCC's pruner won't delete the current versions of files on your destination, or anything outside of the scope of the CCC backup task. Lastly, archive pruning works at a macro level. If any portion of an archive pushes past the limit that you have imposed, the entire archive (e.g. the time-stamped folder) will be pruned.

Automatically prune archived content before copying files

Prune archives in the SafetyNet when free space is less than [xx] GB

If your destination volume has less free space than the limit that you have specified, CCC will prune the oldest archive. CCC will continue to prune the oldest archive until the requested amount of free space has been achieved. Note that if the archives cumulatively consume less space than the limit requested and the destination volume is full, CCC will prune all of the archives.

Prune archives in the SafetyNet when they are older than [xx] days

CCC will prune archives that were created more than "xx" days ago.

Prune archives in the SafetyNet when they are larger than [xx] GB

Starting with the most recent archive, CCC will determine the amount of disk space that each archive consumes. When the cumulative total exceeds the limit that you have imposed, CCC will prune the remaining, older archives. If the newest archive is larger than the limit that you have specified, that archive will be pruned in entirety.

Never prune archives in the SafetyNet

CCC will not automatically prune the contents of the `_CCC` SafetyNet" folder at the root of the destination. Archived files may eventually consume all of the free space on the destination, so you should periodically delete older archive folders to maintain enough free space for future backups. You may delete the contents of the SafetyNet folder without harm to the rest of your backup set.

"CCC is pruning my SafetyNet, but the disk is still pretty full at the end of the backup task"

The purpose of CCC's SafetyNet pruning is to make space for additional backups. CCC also avoids pruning items that were very recently archived — after all, it wouldn't make sense to archive an item

on the destination, then immediately delete it. To accommodate both of these goals, CCC prunes archives within the SafetyNet before the backup task runs. Pruning the SafetyNet immediately before copying files gives a greater level of assurance that the requested amount of free space (for example) will be available for the current backup. Be sure to consider this detail when specifying your SafetyNet pruning settings. If you want to retain additional space on your backup volume beyond what is required for your CCC backups, specify more liberal limits (e.g. 100GB of free space rather than 25GB).

"Can I use the _CCC SafetyNet folder for long-term archiving of specific items?"

We don't recommend using the SafetyNet for long-term storage. CCC is configured to automatically prune the SafetyNet, by default, when free space on the destination is less than 25GB at the beginning of the backup task. CCC doesn't consider whether items in the _CCC SafetyNet folder were placed there by CCC or another application, everything is considered safe to delete when the time is right. If you would like to maintain a permanent archive of items on your backup volume, outside of your CCC backup, we recommend that you create a specific folder for this purpose at the root level of your backup volume.

We also recommend that you maintain a backup of your archived data on another volume! If you don't have a backup of your long-term archived items, you're going to lose them forever if your backup disk fails. If you don't have another hard drive to back up to, consider archiving this content to DVDs as a secondary backup.

"I manually moved the _CCC SafetyNet folder to the Trash, but now I get an error when trying to empty the Trash"

When CCC backs up your startup disk, it runs with the privileges required to access system files that are not normally accessible to your account. Naturally, some of these files will be updated on the source, and subsequently archived on the destination. When you place these items in the Trash (by placing the _CCC SafetyNet folder in the Trash), and subsequently try to empty the Trash, the Finder typically requests that you authenticate to remove these files. Sometimes the Finder is having a bad day, though, and it simply reports the enlightening "-8003" error when you try to empty the Trash (or something equally obtuse). This error isn't defined or documented anywhere, but through trial and error, we have figured out that it simply means "I can't cope with your request to empty the Trash".

There are two solutions to this problem. The first is to simply allow CCC to manage the "pruning" of the _CCC SafetyNet folder. CCC will use elevated privileges to remove inaccessible items and won't have any trouble with them. The second solution is to use this simple [Shredder application](http://bombich.com/software/files/tools/Shredder.app.zip) <<http://bombich.com/software/files/tools/Shredder.app.zip>>. Simply drop an item on it (e.g. the entire _CCC SafetyNet folder in the Trash), and Shredder will remove the problematic file or folder.

Additional References

- [You can't empty the Trash or move a file to the Trash <https://support.apple.com/en-us/HT201583>](https://support.apple.com/en-us/HT201583)

SafetyNet pruning is not currently available when using a Remote Macintosh destination

The SafetyNet pruning settings will be disabled if the selected task has a remote Macintosh specified as the destination. CCC's SafetyNet pruning utility currently can only work with a volume that is



locally mounted. We hope to extend SafetyNet pruning functionality to remote Macintosh destinations in the future.

Related Documentation

- [Frequently asked questions about the Carbon Copy Cloner SafetyNet <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet>](http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet)
- [Video: How to adjust CCC SafetyNet pruning settings in CCC 4 <https://www.youtube.com/watch?v=SENmzS-THTc>](https://www.youtube.com/watch?v=SENmzS-THTc)

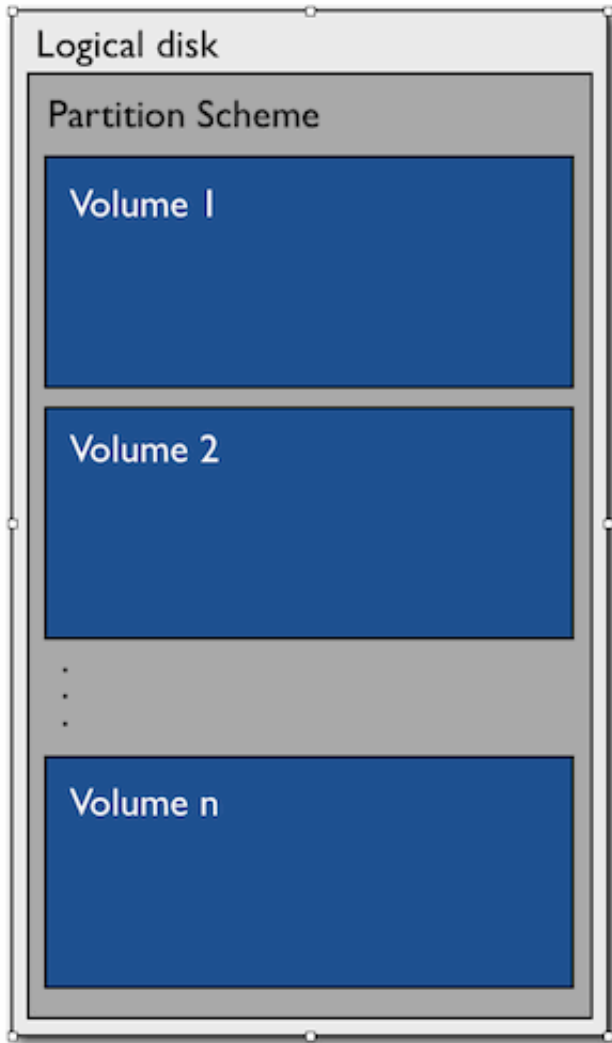


"My disk is already formatted HFS+, why am I getting this warning?"

If your disk is not partitioned using the scheme recommended and supported by Apple, CCC will indicate a warning when you start the backup task such as:

You may have difficulty booting from this destination volume, the underlying disk is not partitioned with a partitioning scheme that Apple recommends for Intel Macs.

How your destination volume is formatted is not actually relevant to this warning. The problem is not a matter of how your destination **volume** is formatted, rather it is a matter of how the **disk** is partitioned. The following graphic explains the relationship between a disk and a volume:



Every disk has exactly one partition scheme. A disk can be partitioned as "Apple Partition Map" (APM), "GUID Partition Table" (GPT), "Master Boot Record" (MBR), or the Fdisk partitioning scheme. PowerPC Macs could only boot from a disk that is partitioned with the APM partitioning scheme. Intel Macs can boot from a disk that is partitioned with either the APM or GPT partitioning scheme. Note, however, that Apple only supports booting an Intel Mac from a disk partitioned with the GPT partitioning scheme. **Because Apple no longer supports the APM partitioning scheme, CCC will warn you if your destination disk is not partitioned with the GPT partitioning scheme.** As the warning indicates, you **may** have difficulty booting from the destination volume, but it may work just fine. We expect that Intel Macs will eventually drop support for booting from APM-partitioned disks.

Here's what you need to do about the warning

If you haven't copied any data to the destination disk, then take the time to repartition your disk using the GPT partitioning scheme (see above) so you have a sanctioned, bootable backup volume. If you cannot repartition the disk because you already have a considerable amount of data on the disk, proceed with the backup task, but [confirm whether it can actually boot your Mac](http://bombich.com//kb/ccc4/how-verify-or-test-your-backup) [<http://bombich.com//kb/ccc4/how-verify-or-test-your-backup>](http://bombich.com//kb/ccc4/how-verify-or-test-your-backup). If it can, you're all set and you shouldn't be bothered by the warning again. If you cannot, you will have to back up the other data

on your destination disk and repartition the disk using the GPT partitioning scheme to get a bootable backup.

Backing up to/from network volumes and other non-HFS volumes

In addition to backing up to volumes formatted with the macOS standard "HFS+" format, CCC can back up user data to network volumes (e.g. AFP and SMB via macOS and Windows File Sharing) and to other non-HFS+ formatted volumes such as FAT32. Non-HFS+ formatted volumes are presented in CCC's Source and Destination selectors in the same manner as HFS+ formatted volumes, so there are no special steps required for backing up to or from these filesystems. However, these filesystems offer limited support for HFS+ filesystem features, so special consideration must be given when backing up to these volumes. In general, you can reasonably expect to back up user data — files that belong to your user account — to and from non-HFS+ formatted volumes. Specific considerations are noted below.

Instructions for gaining access to network filesystems is available in the macOS Help Center. If your network volume does not appear in CCC's Source or Destination selector, consult the documentation that came with the storage device you are trying to access, or choose "Mac Help" from the Finder's Help menu and search for "connecting to servers".

CCC will only back up system files to locally-attached HFS+ filesystems

macOS can only be installed on an HFS+ formatted volume. This requirement is also carried to a backup volume. When system files are copied to non-HFS+ filesystems, important metadata are invariably lost, resulting in files that cannot be restored to their original functionality. In short, you cannot restore a functional installation of macOS from a backup stored on a non-HFS+ volume. To prevent any misunderstandings about this limitation, CCC will exclude system files from a backup task if the destination is not a locally-attached, HFS+ formatted volume. Likewise, CCC will not copy system files **from** a network volume, e.g. if you were to mount the startup disk of another Mac, the system files on that network volume cannot be copied in a meaningful way.

Note that the "locally-attached" caveat is an important distinction. Even if your destination volume is HFS+ formatted, if it is attached to an Airport Base Station (for example), then you're accessing the volume via file sharing. If you open the Get Info panel for the volume, you will see that the volume format is "AppleShare", not HFS+. It is not possible to update an OS backup on a network volume. If you would like to maintain a backup of macOS on a network volume, you can back up to a disk image on the network volume. See the related documentation below for additional information on this backup strategy.

Related Documentation

- [Backing up to a disk image <http://bombich.com//kb/ccc4/backing-up-disk-image>](http://bombich.com//kb/ccc4/backing-up-disk-image)
- [Learn about alternatives to backing up macOS to non-HFS+ volumes <http://bombich.com//kb/ccc4/i-want-backup-multiple-machines-or-hard-drives-same-hard-drive#disk_image>](http://bombich.com//kb/ccc4/i-want-backup-multiple-machines-or-hard-drives-same-hard-drive#disk_image)
- [Preparing your backup disk for a backup of macOS <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x)

Ownership and permissions concerns

Network filesystems pose some interesting challenges in regards to preserving ownership and permissions. When you connect to another computer that is hosting a shared volume, you usually

authenticate by providing a username and password. The account whose credentials you provide is an account on that other computer, and it is this account's privileges that determine what access you have to files and folders on the shared volume. Additionally, any files that are copied to the shared volume will be owned by that user account, regardless of the ownership of those files on the source volume. This is not a behavior specific to CCC, it is simply the nature of network filesystems.

An example will be very helpful in understanding the implications of this behavior. Suppose Sally would like to back up some Movies from her Mac's home folder to another Mac shared by Bob and Joe. On Sally's Mac, there is a user account named "sally". On Bob and Joe's Mac, File Sharing has been enabled in the Sharing Preference Pane, and there are two user accounts, "joe" and "bob". Bob has attached an external hard drive named "Backup" to his Mac that he and Joe have been using for backup, and he has created a folder named "Sally's Movies" on this volume to which Sally will copy files. Sally does the following to connect to Bob and Joe's Mac:

1. In the Finder, open a new window, then click on "Bob and Joe's Mac" in the Shared section of the sidebar.
2. Click on the "Connect as..." button.
3. In the authentication dialog, provide Bob's username and password, then click on the Connect button.
4. Choose the "Backup" volume from the list of shared volumes.

The Backup volume now appears on Sally's Desktop, and in CCC's Destination selector in the Network Volumes section. Next, Sally chooses "Choose a folder..." from CCC's Source selector and locates the folder of movies that she would like to copy to Bob and Joe's Mac. She then chooses "Choose a folder..." from the Destination selector and locates the "Sally's Movies" folder on the Backup network volume. She clicks the Clone button and the Movies are backed up.

Later that day, Joe is using his computer and he notices that he can see some of the movies in the "Sally's Movies" folder, but some of the subfolders have a universal "No access" badge and he cannot view those folders' contents. This occurred for two reasons:

1. Sally mounted the network volume using Bob's credentials, so the files and folders created when she copied her files to the Backup volume are now owned by Bob's user account.
2. Some of the folders on Sally's computer prevented access by "other" users.

As a result, the folders on the Backup volume are owned by Bob and some of them limit access to other users (Joe in this case). Joe asks Sally about this and she decides to try copying some of the movies to one of Joe's folders on the backup volume. When she chooses "Choose a folder..." from CCC's Destination menu, however, she sees the same universal "No Access" badge on Joe's folder. Sally can't copy files to this folder (nor can CCC) because the Backup volume was mounted using Bob's credentials, and Joe's backup folder on the backup volume happened to be inaccessible to Bob. Sally unmounts the backup volume and reconnects to it using Joe's credentials, and she is then able to copy files to Joe's private folder.

"What can I do when there are permissions or ownership issues that prevent CCC from copying items to/from or updating items on a network volume?"

First, it is important to keep in mind that no application can modify the ownership of a file or folder on a network share. Ownership changes must be applied on the computer or device that is hosting the network sharepoint. Additionally, permissions changes can only be made to files and folders owned by the user whose credentials were used to mount the network volume. For this reason, it is generally easier to apply both ownership and permissions changes on the computer or device hosting the network volume.

If the computer hosting the sharepoint is a Mac, you can modify ownership and permissions in the Get Info panel for that folder (on the Mac hosting the sharepoint):

1. In the Finder, click on the folder whose permissions or ownership you would like to change.
2. Choose "Get Info" from the File menu.
3. In the "Sharing & Permissions" section at the bottom, click on the lock icon to make the permissions editable.
4. To change permissions, choose "Read & Write" from the popup menu next to the owner of the file or folder.
5. If the owner of the item is not the user account that you use to connect to this Macintosh, click on the "+" button
6. In the window that appears, select the user account that you use to connect to this Macintosh, then click the Select button.
7. Set the access privileges to "Read & Write".
8. Click on the Gear menu and choose to apply the change to enclosed items.
9. Try your backup task again.

If the computer or device that is hosting the sharepoint is not a Macintosh, consult that device's documentation to learn how to change permissions and ownership of files and folders.

Alternative #1: If you have mounted the network volume with **Guest** privileges, unmount and remount the network volume using the credentials of an account on the machine or device hosting the network volume.

Alternative #2: You can create a new folder on the shared volume and specify that folder as the destination in CCC by choosing "Choose a folder..." from the Destination selector.

Alternative #3: You can have CCC [create a disk image](http://bombich.com//kb/ccc4/i-want-back-up-my-whole-mac-time-capsule-nas-or-other-network-volume) on the network volume rather than copying files directly to a folder. When CCC creates a disk image on the destination, the disk image is formatted as HFS+ and attached locally, so CCC can preserve the permissions and ownership of the files that you are copying to it.

Limitations of non-HFS+ filesystems

When you choose a non-HFS+ formatted volume as a destination, CCC's Cloning Coach will proactively warn you of any [compatibility issues](http://bombich.com//kb/ccc4/closer-look-how-ccc-determines-bootability-destination-volume) between the source and destination volumes. You can view the Cloning Coach's warnings by clicking on the yellow caution button in the Task Plan header. If you have selected a source and destination volume, and the caution button is not present, then there are no configuration concerns.

Support for third-party filesystems

CCC offers limited support for third-party filesystems, such as those provided by [FUSE for OS X](https://osxfuse.github.io). Due to the large number of filesystems that can be provided by FUSE, CCC provides generic support for these "userland" filesystems rather than specific support. CCC takes a "best effort" approach by determining the capabilities of the source and destination filesystems, warns of potential incompatibilities, then presents only unexpected error conditions that arise during a backup.

Backing up to FUSE volumes mounted without the `allow_root` flag is not currently supported (e.g. PogoPlug, BitCasa). Please contact the vendor of your proprietary filesystem to ask that they offer the ability to mount the volume with the `allow_root` flag

if you would like to use that volume as a source or destination to a CCC backup task.

Writable NTFS filesystems

We have seen several reports of problems copying large amounts of data (e.g. > 4GB) to writable NTFS filesystems. In most cases, the underlying software that vends the filesystem (e.g. Tuxera, Paragon, and others) crashes and the volume is rendered "mute". While it may be possible to complete a backup to these filesystems in chunks (e.g. 4GB at a time), we recommend using a more reliable, writable filesystem if you encounter these problems.

Related Documentation

- [Learn more about formatting volumes on macOS <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x)

Backing up a Boot Camp installation of Windows

CCC can back up the user data on a Boot Camp volume, but it cannot make an installation of Windows bootable. If your goal is to back up your user data on the Boot Camp volume, CCC will meet your needs. If you're looking to migrate your Boot Camp volume to a new hard drive, you might consider an alternative solution such as WinClone, or one of the commercial virtualization solutions that offer a migration strategy from Boot Camp.

Backing up the contents of an NTFS volume

The NTFS filesystem supports "named streams", a feature that is comparable to extended attributes on HFS+ and many other filesystems. Unlike extended attributes, however, there is no limit to the amount of data that can be stuffed into NTFS named streams (aside from standard file size limitations). Extended attributes on macOS have a 128KB size limit. As a result, any attempts to copy a named stream larger than 128KB to a non-NTFS filesystem will fail. CCC will copy the standard file data just fine, but will not copy named streams larger than 128KB. CCC's Cloning Coach will warn of this kind of incompatibility, and any errors related to this limitation will be logged to the CCC log file, however these errors will not be raised to your attention.

This limitation applies when copying files between volumes on Windows as well, so application developers tend to use named streams only for data that can be regenerated (e.g. thumbnail icons, summary or statistical information), not for storage of irreplaceable user data.

Resource limitations encountered while backing up resource forks to/from AFP volumes

We have received sporadic reports of a problem that can occur while copying files to or from some Apple File Protocol sharepoints (e.g. a volume shared from another Macintosh using the "File Sharing" feature of the Sharing preference pane). When the problem occurs, the server erroneously maintains open references to hundreds of resource forks. Eventually the file sharing service encounters a system-imposed resource limitation and is unable to continue sharing files until it closes the open resource fork files. Misleading errors are subsequently returned to CCC, reported as "Input/output" errors or "Bad file descriptor" errors. CCC will report that "An error occurred while CCC was getting or setting information about this item on the source/destination".

This problem is due to a bug in the AppleFileServer application, and affects several different implementations of the AppleFileServer (e.g. on macOS as well as on some other NAS devices). We have identified a few solutions/workarounds to try when encountering this problem:

- Unmount the sharepoint, then restart the Macintosh or Network Attached Storage device that is hosting the AFP sharepoint. Reconnect to the sharepoint and try the backup task again.
- Connect to the sharepoint using SMB instead of AFP. Choose "Connect to server" from the Finder's Go menu, then specify "smb://servername.local/sharepoint " to connect to the server using SMB rather than AFP. Then drag the network volume onto the source or destination selector for your CCC backup task so that the task will use SMB rather than AFP to connect to the sharepoint.
- Reduce the number of files/folders in your backup set, e.g. split your backup task into multiple tasks.

"This error may have been caused by a problem with the file sharing service that hosts your network volume."

Access to the contents of a network volume is provided by an application that runs on another computer or Network Attached Storage (NAS) device. Every NAS device and operating system has its own vendor-specific version of the file sharing application, so we occasionally see problems with some NAS devices that don't occur on others. Problems can be minor, such as being unable to set file flags (e.g. hidden, locked) on an item, or more significant, like not being able to store or retrieve resource forks. When these problems are encountered during a backup task, CCC will copy as many files and as much data as possible, then offer a report on the items or attributes that could not be copied.

When you encounter an error caused by the file sharing service that hosts your network volume, there are a few workarounds that you can try to avoid the errors:

- Eject the network volume on your Mac, then restart the computer or NAS device that is hosting the sharepoint. Reconnect to the sharepoint and try the backup task again.
- Connect to the sharepoint using a different protocol. A different application is responsible for each protocol, so if the AFP service on your server has a bug, connecting to the SMB service may work more reliably (and vice versa). Choose "Connect to server" from the Finder's Go menu, then specify "smb://servername.local/sharepoint " or "afp://servername.local/sharepoint " to connect to the server using a different protocol. If you are unsure which protocol you are currently using, click on the mounted volume in the Finder, then choose "Get Info" from the Finder's File menu to find out.
- If the errors persist when connecting to the network volume via both AFP and SMB, and restarting the file server does not change the outcome, try [backing up to a disk image on the network volume <http://bombich.com/kb/ccc4/i-want-back-up-my-whole-mac-time-capsule-nas-or-other-network-volume>](http://bombich.com/kb/ccc4/i-want-back-up-my-whole-mac-time-capsule-nas-or-other-network-volume) instead.

What makes a volume bootable?

Bootability comes down to a few simple rules:

1. The hard drive enclosure must support booting a Macintosh (applies to external hard drives only).
2. The computer must support booting from the interface used to attach the hard drive (e.g. USB, Firewire, Thunderbolt).
3. The computer must support booting from the hard drive's partition format (e.g. GPT vs MBR).
4. The cloned filesystem must have all the required components of macOS.
5. The cloned operating system must be properly "blessed".

When you buy a hard drive enclosure that you intend to use to boot your Mac, *caveat emptor* — not all enclosures will boot a Mac (or any machine for that matter). Be sure to check that the manufacturer or vendor supports booting a Mac with the enclosure.

The interface that is used to connect the hard drive enclosure to your Mac also has an effect on bootability. Macs that did not ship with native support for USB 3.0, for example, may have difficulty booting from a USB 3.0 device. Some Macs can only boot from a particular USB 3.0 enclosure if it is connected to the Mac via a USB 2.0 cable. Some enclosures offer both Firewire (or Thunderbolt) and USB connectivity, but only one of the interfaces works for booting a Mac.

Once you have your new hard drive (in an enclosure or installed into your computer), you need to a) apply a partitioning scheme to the disk and b) format one or more volumes on the disk. Even if you do not plan to "partition" the disk, that is, slice the disk into smaller volumes, you still need to [apply the correct partitioning scheme to the disk <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x). Every disk has a partitioning scheme, even if it only has a single volume.

Rules #1, #2 and #3 are external to the functionality of CCC. CCC will not apply a partition scheme to your disk, nor will it affect or modify your partition scheme during an ordinary backup procedure (modifications are made to partitioning when creating a Recovery HD, but this is a manual task within CCC). Also, if a hard drive enclosure won't boot macOS, there's no software solution that will resolve that problem. Once you're sure you have those rules in hand, we can look at rule #4.

Rule #4 is pretty intuitive — if you want the operating system to boot, it must be whole. If you've cleared rules #2 and #3, CCC will tell you whether your destination will have all the necessary components to boot macOS. CCC's analysis is not exhaustive — CCC will verify that the following items are present on the source and will be copied in their entirety to the destination volume:

```
/Library
/System
/bin
/etc
/mach_kernel
/private
/sbin
/tmp
/usr
/var
```

So, if you choose to exclude /Applications or /Users for example, the cloned volume would still very

likely boot. Likewise, if the source volume's OS is not whole and, as a result, not bootable, CCC doesn't do an extensive analysis of the OS to confirm that it will boot. The bottom line, though, is that CCC will give a pretty good indication about whether your destination volume will have the right OS components to actually boot.

Rule #5 is perhaps the least understood (and most technical), so I'll do my best to explain it here. When a Macintosh boots, the following sequence of events occur:

1. The computer performs a Power On Self Test. When that test succeeds, you hear the characteristic Macintosh startup chime.
2. The computer's pre-boot firmware (software that is embedded in a chip on the computer's motherboard) takes account of the hardware that is present, builds a device tree, and determines which hardware device to boot from (more on this in a bit). For the sake of simplicity, let's suppose a machine is configured to boot from particular volume on a particular hard drive.
3. The firmware of the computer accesses the filesystem of that volume and determines the location of the file, or folder containing the file, that is "blessed" to initiate the operating system.
4. That file is executed by the firmware and control of the hardware is handed over from firmware to the booter.
5. The booter executes the kernel of the operating system and pre-loads a kernel extensions cache (or in later OSes, the booter loads a pre-linked kernel cache file).
6. The kernel initiates the rest of the boot process (primarily by executing `launchd`).

The gist of all of this is that every bootable volume must indicate the location of the system folder. The path of the folder turns out to be irrelevant, because the HFS+ filesystem simply stores the "inode" of this particular folder. The inode is basically like a street address for the file, it indicates where on the disc platter the folder is located. This information is stored in the HFS+ Volume Header, but you can easily see the current state of this information using the "bless" command in the Terminal application. For example:

```
bash-3.2# bless --info "/Volumes/Backup"
finderinfo[0]: 116 => Blessed System Folder is /Volumes/Backup/System/Library/CoreServices
finderinfo[1]: 546345 => Blessed System File is
/Volumes/Backup/System/Library/CoreServices/boot.efi
finderinfo[2]: 0 => Open-folder linked list empty
finderinfo[3]: 0 => No OS 9 + X blessed 9 folder
finderinfo[4]: 0 => Unused field unset
finderinfo[5]: 116 => OS X blessed folder is /Volumes/Backup/System/Library/CoreServices
```

The relevant information in this case is that the blessed system folder is at inode 116, and that path (for the human reader) is `/System/Library/CoreServices`. The "Blessed System File" information indicates where the secondary boot loader ("booter") resides. In this case, that is the file at inode 546345 and (again, for the human reader), that file is located at `/System/Library/CoreServices/boot.efi`.

If you ever need to bless a volume manually (for example, if CCC indicated that it was unable to bless the volume), you could run this command in the Terminal application:

```
sudo bless --folder "/Volumes/Backup/System/Library/CoreServices"
```

It is important to note that blessing a volume is different than specifying a boot device. Blessing a volume simply updates the information in the HFS Volume Header that indicates where the blessed system folder and file are located. When you specify a particular volume as the startup disk, on the other hand, the computer stores a reference to that volume in the "Non volatile RAM" — basically a



small section of RAM whose contents are not lost when the machine loses power or is shutdown. The importance of this distinction, and all five of these rules for that matter, is that simply setting a volume as the startup disk may not be sufficient to actually boot from that volume.

A closer look at how CCC determines the "bootability" of a destination volume

CCC determines whether your destination volume will be bootable and indicates any configuration concerns in the "Cloning Coach" window. If you see a yellow warning icon in the Task Plan header, you can click on that icon to see these concerns. CCC will also present these concerns to you the first time that you configure a backup task to any particular destination volume.

If CCC doesn't raise any configuration concerns, and the destination volume has an OS on it when the backup task is completed, and barring any hardware problems that might interfere, your backup volume should be bootable.

Configuration concerns that affect the bootability of the destination volume

CCC looks for the following configurations to determine if a destination volume will not be bootable:

- The destination volume cannot be a disk image — you cannot boot your Macintosh from a disk image.
- The files and folders required by macOS must be present on the source volume. These include: /Library, /System, /bin, /etc, /mach_kernel, /private, /sbin, /tmp, /usr, and /var.
- The files and folders that are required by macOS must not be excluded from the backup (applicable only if you have chosen to back up "Selected files").
- The hard drive on which the destination volume resides must be partitioned using the GUID Partition Table partitioning scheme.
- CCC will issue a warning if the operating system that you're backing up (or restoring) is older than the OS that your model of Mac shipped with.
- CCC will issue a warning if the destination volume is larger than 2TB and the device is connected to your Mac via USB.

CCC does not maintain an exhaustive list of hardware:shipping OS pairs. CCC also cannot determine whether the destination will be bootable when the source or destination are remote Macintosh volumes.

Related documentation:

- [What makes a volume bootable? <http://bombich.com//kb/ccc4/what-makes-volume-bootable>](http://bombich.com//kb/ccc4/what-makes-volume-bootable)
- [Don't install older versions of macOS <http://bombich.com//kb/ccc4/i-want-clone-my-entire-hard-drive-new-hard-drive-or-new-machine#dont_install_older_os_versions>](http://bombich.com//kb/ccc4/i-want-clone-my-entire-hard-drive-new-hard-drive-or-new-machine#dont_install_older_os_versions)

Configuration concerns that affect the preservation of filesystem metadata

CCC will note a concern if there is a compatibility mismatch between the source and destination filesystems. For example, if you are backing up files from an HFS+ volume to a network filesystem, some of the filesystem metadata cannot be preserved. In many cases this is acceptable and you can

ignore the message. Each of the possible concerns that CCC might raise are listed below. The "risk" associated with not preserving each type of metadata is explained plainly, so you can decide whether the destination volume will suit your needs.

The destination doesn't support Access Control Lists

[Access Control Lists](https://en.wikipedia.org/wiki/Access_control_list) <https://en.wikipedia.org/wiki/Access_control_list> specify a granular list of the privileges that users and groups have for a particular file or folder (e.g., read, write, get information, delete, etc.). These advanced privilege settings generally apply only to user accounts that have been created on your Macintosh — for example, to prevent other users from deleting items from your home directory. If you are backing up your own files to a locally-attached hard drive, or to a network file share on a trusted computer, the Access Control List filesystem metadata is relatively unimportant. If you are backing up to or from a network filesystem in a business or education setting, however, check with your tech support staff for additional advice on whether this metadata must be preserved.

The destination doesn't support hard links

A [hard link](https://en.wikipedia.org/wiki/Hard_links) <https://en.wikipedia.org/wiki/Hard_links> makes a single file appear to be located in multiple places on your hard drive. If a single file had 20 hard links scattered across the disk, each hard link file would consume no additional space on the hard drive, and editing the content of any one of those files would immediately affect the content of every other hard link to that file.

When you back up the contents of a volume that contains hard links, ideally you want to preserve the hard links. If the destination filesystem doesn't support hard links, each hard linked file will be disassociated from the original file and will become a copy on the destination. This won't result in any loss of data, but your backup set will consume more space on the destination than on the source. Hard links are leveraged quite a bit on macOS by the operating system, though they are generally less common among user data.

The destination doesn't support ownership

File ownership indicates which user account on your Mac has control of a file. The owner of a file can limit access to that file from other users on the same computer. If the destination doesn't support ownership, then the owner of each file copied to the destination will be set to the user that mounted the destination. If the destination volume is accessed elsewhere (e.g. mounted on another Mac or even by a different user on the same Mac), then any restrictions that you have placed on those files may not be honored. If you are backing up files and folders that are not all owned by the same user (e.g. you), you should consider backing up to a local, HFS+ formatted volume or to a disk image instead.

Some filesystems have file size limitations

Some filesystems have restrictions on how large a file can be. FAT32, for example, limits files to 4GB or less. CCC will proactively warn you of this limitation if you choose to back up a volume whose filesystem supports files larger than 4GB to a filesystem that does not support files larger than 4GB. CCC will then automatically exclude files larger than 4GB from the backup task. Files that were excluded will be reported at the end of the backup task.

If you require that files larger than 4GB are backed up, you must reformat the destination volume with a format that supports larger files.

Related documentation:

- [Preparing your backup disk for a backup of macOS <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x)

The destination already has an installation of macOS. Merging a different version of macOS into this destination may cause problems with that installation of macOS

This message appears if you choose the "Don't delete anything" SafetyNet setting. While that setting will protect any data that you have on the destination volume that is unique to that volume, it does a disservice to the installation of macOS on your destination. This message will also appear if you use the "Don't update newer files on the destination" advanced troubleshooting setting.

Suppose, for example, that you have a complete backup of Mac OS 10.9.3 on your backup volume. When you apply the 10.9.4 update to your source volume, many system files are updated, some new files are added, and some files may be deleted. If you use CCC to update your backup volume, but you don't allow CCC to delete the items on the destination that the OS update had deleted from the source, then there will be a bunch of "cruft" left over on the backup volume. If you should ever need to boot your Mac from your backup volume, these cruft files could cause the OS to behave unexpectedly, and they may prevent it from booting altogether.

CCC can help you perform a clean upgrade or downgrade of macOS on the destination volume by moving items that should be deleted to the SafetyNet folder. Any files and folders that you keep only on the destination would also be moved to the SafetyNet folder. See the [Protecting data that is already on your destination volume <http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet>](http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet) section of the documentation for more details on these settings.

CCC warns that Macs cannot boot from USB devices larger than 2TB

In the past we received several reports of bootability problems related to USB devices larger than 2TB. At that time, we performed a simple litmus test: create an "x"TB partition at the beginning of the disk (varying x from 0.5 to 2.5TB) and a second partition consuming the remainder of the disk, then install macOS onto both partitions. The results of those tests suggested that some Macs couldn't "see" the partition that lied past the 2TB mark on the disk. This limitation was specific to USB devices — none of these problems occurred if you were to place the same disk into a Thunderbolt or Firewire enclosure.

At the time of those initial reports and testing, the results were consistent. We concluded that there was likely a 32-bit addressing limitation imposed by the USB drivers that are embedded in the Macs' firmware ("likely" — unfortunately none of this information is documented by Apple). More recently, however, we've been unable to consistently reproduce the same results. Apple may have addressed the problem with a firmware update. It's also possible that our initial conclusion was wrong, e.g. that the problem was due to a partition alignment error; an error specific to macOS El Capitan and apparently only USB devices (you'd see "disk2s2: alignment error" messages in the system log when the affected volume is mounted).

In any case, CCC's warning was issued out of an abundance of caution. Our current recommendation is to [partition the destination device using the same procedure as defined for all other destination devices <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x). In other words, don't create a 2TB partition at the beginning of the disk. Once you have completed your first backup, though, we encourage you to [verify that your Mac will boot from the backup volume <http://bombich.com//kb/ccc4/how-verify-or-test-your-backup>](http://bombich.com//kb/ccc4/how-verify-or-test-your-backup). If your Mac is unable to boot from

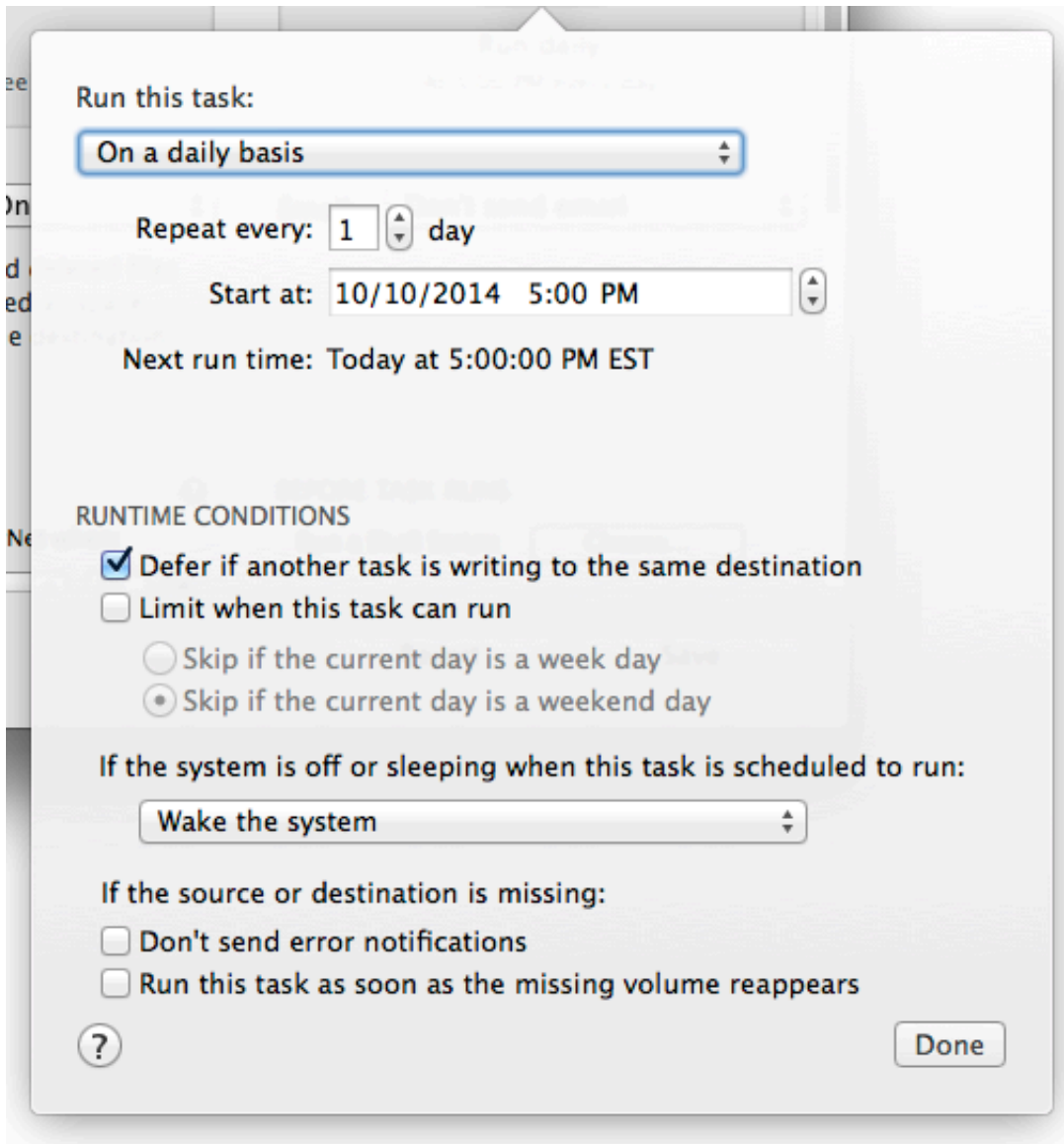
the backup volume, [please reach out to us <http://bombich.com//hc/requests/new>](http://bombich.com//hc/requests/new) so we can investigate your specific configuration further.

Help! My clone won't boot!

See [this section of CCC's documentation <http://bombich.com//kb/ccc4/help-my-clone-wont-boot>](http://bombich.com//kb/ccc4/help-my-clone-wont-boot) for troubleshooting advice if you're having trouble getting your backup volume to start your Mac.

Configuring Scheduled Task Runtime Conditions

Sometimes time-based scheduling is insufficient to describe exactly how you want your tasks to run. CCC offers **runtime conditions** which allow you to restrict the running of your tasks under certain conditions when the task is normally scheduled to run.



Defer if another task is writing to the same destination

If you have more than one scheduled task that writes to the same destination volume, you may want to configure the tasks to wait for one another such that only one task is writing to the volume at a time. When you configure a task with this setting and the scheduled run time elapses, CCC will place the task into a queue for deferred execution if another task is already writing to that same destination. Assuming another run time condition does not prevent it, CCC will run the deferred task as soon as the first task finishes writing to the shared destination volume.

Limit when this task can run

This option allows you to limit a task to running only during weekdays or only during weekend days. This option is not applicable to the "weekly" and "monthly" scheduling settings.

Handling system sleep events

By default, CCC will wake your computer when your tasks are scheduled to run. You can change this setting in the **Runtime Conditions** section of the Scheduler popover. There are four options:

Wake the system

CCC will configure a wake event to wake the system shortly before the task runs, so the task should run on schedule. If the system is turned off, this wake event will not turn on the system.

Wake or power on the system

CCC will configure a **wake or power on** event to wake the system or turn it on shortly before the task runs, so the task should run on schedule.

Run this task when the system next wakes

Upon a wake notification, CCC will run the backup task if its scheduled run time has passed. The task will not run exactly when it is scheduled, though CCC can run tasks during macOS **Dark Wake** events (aka **PowerNap**, aka **Maintenance Wake**), which occur every couple hours. If you want your backup tasks to run in the middle of the night without turning on your display, this is the right option for you.

Skip this task

CCC will run the task only at its scheduled run time if the system is awake at that time. Upon a wake event, CCC will not run a backup task if the scheduled run time has passed.

Don't send error notifications

By default, CCC will report an error if the source or destination volume is unavailable when the task is scheduled to run. By enabling this option, CCC will suppress these errors. Additionally, if you have configured your task to send an email when errors occur, this option will suppress that email.

This option is not applicable for the "When the source or destination is reconnected" scheduling setting, because a task configured in that manner will only attempt to run if both the source and destination are present.

Run this task as soon as the missing volume reappears

If a backup task is missed because the source or destination was missing at the scheduled run time, this option will cause CCC to run the backup task as soon as that missing volume reappears.

Related Documentation

- [Frequently asked questions about scheduled tasks <http://bombich.com//kb/cccl4/frequently-asked-questions-about-scheduled-tasks>](http://bombich.com//kb/cccl4/frequently-asked-questions-about-scheduled-tasks)

Modifying CCC's Security Configuration

Rather than requiring you to enter admin credentials every time you want to run a task or make changes to a task, CCC 4 now only requires you to authenticate once when CCC is initially installed. While this new configuration is easier to use and has been requested by countless users, there are situations where this configuration is not appropriate. If you leave your system unattended with an admin user logged in, someone with physical access to your system can modify or run your CCC backup tasks. If you cannot rely upon the physical security of your Mac to prevent someone from using your Mac, you can use the information below to apply a stricter security policy to CCC.

Require administrator authorization to make changes to tasks and to run or stop tasks

CCC identifies a subset of activity that causes changes to CCC tasks and preferences or that require access to privileged data (e.g. CCC's private keychain). Performing these tasks requires that the user is authorized for the "com.bombich.ccc.helper" privilege. The default rules for this privilege require that the requesting user is either an admin user, or can provide administrator credentials. Once the authorization is obtained, the user is allowed to perform the privileged tasks without additional authorization until the login session ends.

You can modify these rules in several ways. Most commonly, you may want to require the logged-in user to explicitly provide admin credentials to gain this authorization (vs. having the privileged granted simply because the user is an administrator). Additionally, you may want this authorization to expire after a specific amount of time, e.g. 5 minutes (vs. "when the user logs out"). To apply these stricter rules, paste the following into the Terminal application:

```
security authorizationdb read com.bombich.ccc.helper > /tmp/ccc.plist
defaults delete /tmp/ccc "authenticate-user"
defaults write /tmp/ccc "authenticate-admin" -bool YES
defaults write /tmp/ccc timeout -int 300
defaults write /tmp/ccc shared -bool NO
plutil -convert xml1 /tmp/ccc.plist
security authorizationdb write com.bombich.ccc.helper < /tmp/ccc.plist
security authorize -ud com.bombich.ccc.helper
```

Immediately revoking authorization to modify CCC tasks

If you have decided to apply a liberal timeout value to the "com.bombich.ccc.helper" privilege, you may occasionally want to revoke that authorization immediately. To immediately revoke that authorization, paste the following line into the Terminal application:

```
security authorize -ud com.bombich.ccc.helper
```

Resetting CCC's authorization rules back to default values

To reset CCC's authorization rules back to the default values, paste the following into the Terminal application:

```
security authorizationdb remove com.bombich.ccc.helper
```



```
security authorize -ud com.bombich.ccc.helper
```

The next time you attempt to modify or run a CCC backup task, CCC will re--apply its default rule set in macOS's Authorization database.

Creating a separate task to prevent VM container versions from bloating the SafetyNet

If you frequently use virtual machine container files (e.g. with Parallels, VMWare, VirtualBox, etc.), you may find that CCC's SafetyNet folder tends to get very large, very quickly. Every time you open your virtual machine, the monolithic virtual machine container file is modified, and CCC will require that it gets backed up during the next backup task. If the SafetyNet is on, CCC will move the older version of the VM container file into the SafetyNet folder. If you run your backup tasks on a daily basis and use your virtual memory container file every day, these large VM container files will quickly consume all of the free space on your backup volume.

You can avoid archiving the older versions of these virtual machine container files by creating a separate backup task for the parent folder of the virtual machine container files. Here's how to set things up:

1. Create a new task and name it something like **Everything except Parallels**
2. Choose your startup disk from CCC's Source selector
3. Choose **Selected files...** from the Clone popup menu (underneath the Source selector)
4. In the list of items to be copied, navigate to the location where your Parallels VM is saved (e.g. Users > yourname > Documents > Parallels) and uncheck the box next to the folder that contains your virtual machine container. You could exclude the container file itself, but choosing the parent folder gives you more flexibility in renaming the VM container, should you want to (e.g. Windows XP > Windows 7).
5. Choose your backup volume from the Destination selector
6. SafetyNet should be **ON**
7. Configure the task to run Daily and Save the changes
8. Create a new task and name it something like **Parallels Backup**
9. Choose **Choose a folder** from the Source selector and select your Parallels folder as the source (e.g. the same folder that you excluded previously). By selecting this folder directly, you're explicitly limiting this task's scope to this folder.
10. Choose **Choose a folder** from the Destination selector and select the Parallels folder on your backup volume as the destination
11. Turn SafetyNet **OFF** for this task
12. Schedule this task, then save the changes

Additionally, if you enable Advanced settings for the first task, you can configure it to run that second task as a postflight action.

Outgoing network connections made by CCC

If you're using an application firewall such as [Little Snitch <https://obdev.com>](https://obdev.com), you will see several outgoing network connections coming from CCC. We explain below what connections you should expect to see, and also explain why some connections that **look** unexpected are simply misreported by Little Snitch.

Ordinary activity

CCC will make external network connections for the following activity:

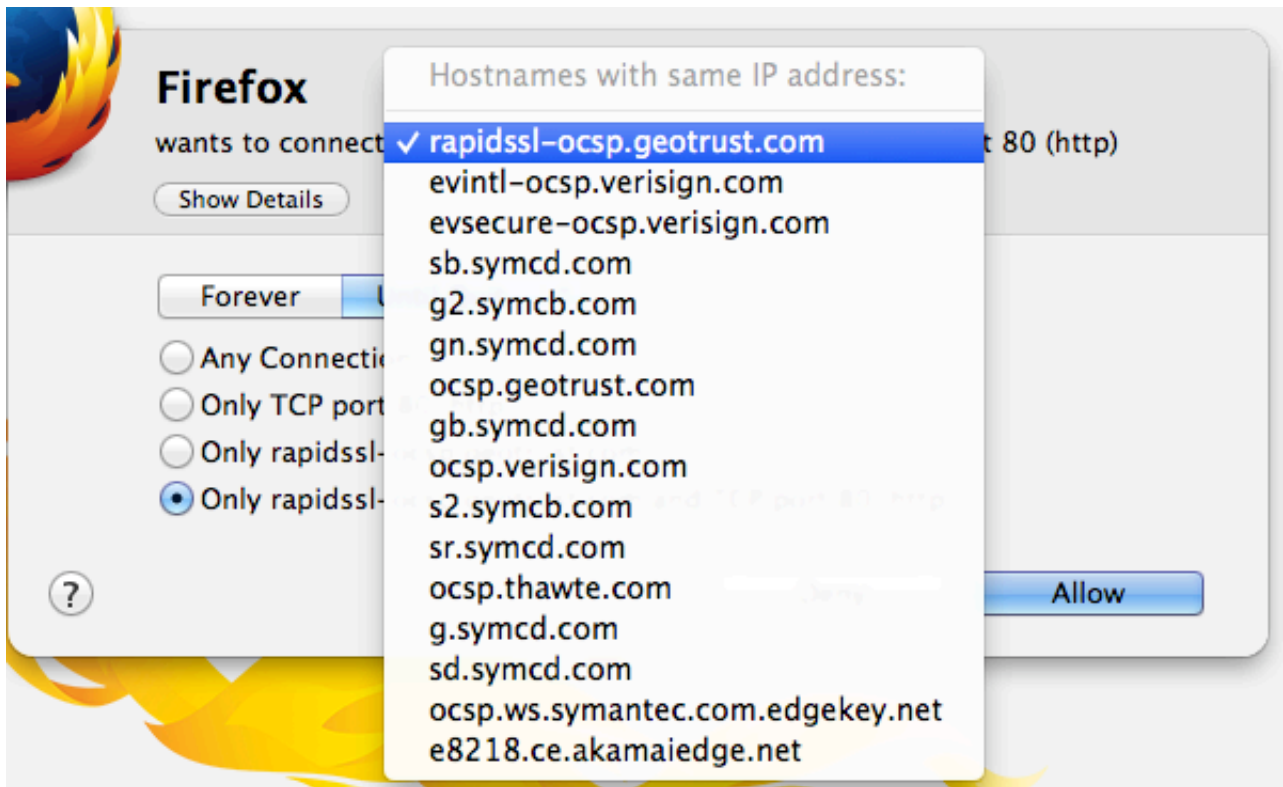
- When you launch CCC and it is a scheduled time to check for a software update (bombich.com and mc.bombich.com)
- When you submit a ticket to our help desk (mew.bombich.com and carboncopycloner.zendesk.com)
- When you view the documentation (which takes you to our website, bombich.com)
- When you visit our store (which also takes you to our website, bombich.com and our sales vendor, sites.fastspring.com)
- If you have set up email notifications for completed tasks
- If your backup task specifies a network volume or remote Macintosh as the source or destination

When you view the documentation via CCC, you connect to bombich.com just as you would in your web browser. Like most websites, bombich.com connects to other domains for certain purposes. We use [Content Delivery Networks \(CDNs\) <https://en.wikipedia.org/wiki/Content_delivery_network>](https://en.wikipedia.org/wiki/Content_delivery_network) to serve our static content, such as file downloads, images, styling, fonts, and so on. The CDNs we use are bootstrapCDN (which is hosted by maxCDN) for styling, jquery and fastly for scripts, Google for fonts, Rackspace (rackcdn, hosted by akamai) for files and images. CDNs not only provide powerful servers, they also have servers around the world and pick the one nearest to the user so that content can be delivered faster.

FastSpring is our e-commerce partner that handles everything to do with pricing and purchasing. If you go to our store, you are directed to their website. They use Cloudfront, Amazon's CDN service, to host some of their static content.

Why does Little Snitch indicate that CCC is connecting to google.com and other unrelated-seeming domains?

When CCC connects to any server, Little Snitch (or any monitor) sees the IP address only. It then makes a guess as to the domain name associated with that connection, which makes it much easier for the user to recognize. Because CDNs are used to serve files for hundreds of different websites and companies, everything is very interconnected, and sometimes an IP address has dozens of different domain names associated with it. You can actually see Little Snitch's other possible guesses by clicking the domain name in bold in the Little Snitch window:



It could pull any host name from the list, and we don't know what algorithm Little Snitch uses to decide which one to choose.

The result: google.ca, google.com, googleapis.com, and ytiming.com are all domains associated with Google's servers. We aren't actually connecting to all these domains, but when we connect to Google Web Fonts, for example, we're accessing some of the same servers.

You can view a [list of the CDNs that we use here](http://www.cdnplanet.com/tools/cdnfinder/#site:http://bombich.com) [<http://www.cdnplanet.com/tools/cdnfinder/#site:http://bombich.com>](http://www.cdnplanet.com/tools/cdnfinder/#site:http://bombich.com) (and also look at any other websites you are curious about). This forum post at the ObDev website describes a similar report of the same problem (unrelated to CCC): .

When I boot from my backup, Little Snitch reports that its rules have been replaced by a different version. Why, and how can I avoid this?

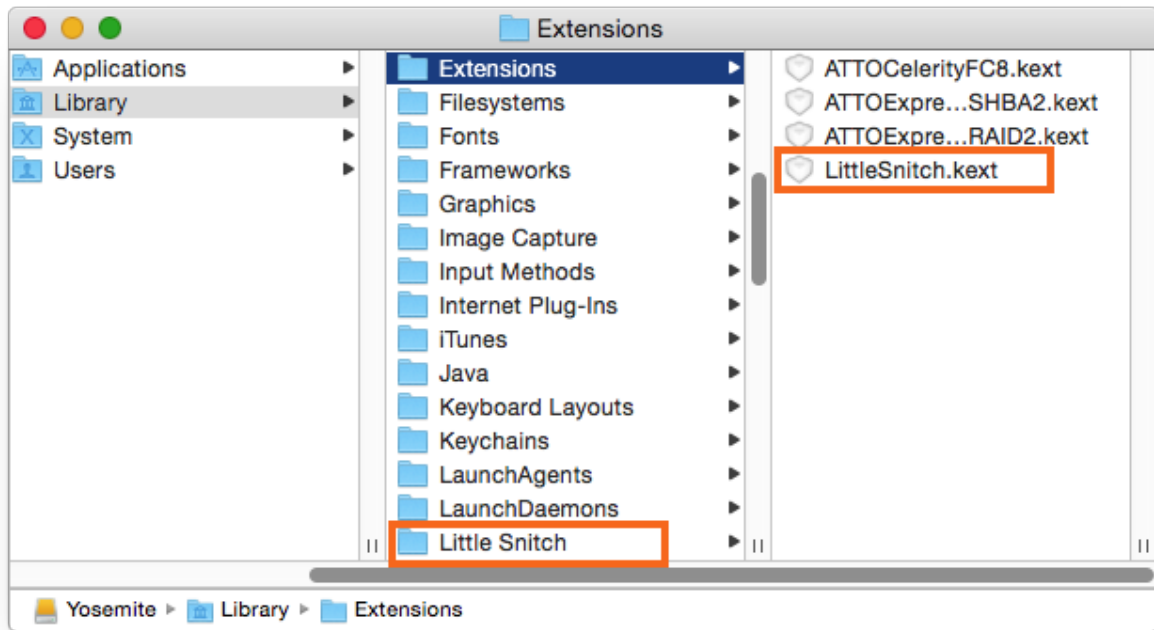
According to ObDev developers, it is crucial for Little Snitch to avoid unnoticed ruleset changes. Little Snitch therefore has numerous mechanisms to detect whether it is using the **exact** same ruleset file, as in, on the same volume and at the same physical address on that disk. This sort of mechanism makes it impossible for Little Snitch to use the ruleset on the booted backup volume without physical intervention from a user at the system (thus the dialog asking if it's OK to use the current version of rules or to use a default ruleset).

In cases where you have physical access to your computer while booting from the backup, the solution is straightforward — simply click the button to use the current rule set and everything behaves as normal.

In cases where you do not have physical access to the system, e.g. [you have a server in a colocation facility <https://markandersononline.com/blog/2015/05/mac-os-x-server-little-snitch-carbon-copy-cloner/>](https://markandersononline.com/blog/2015/05/mac-os-x-server-little-snitch-carbon-copy-cloner/), there is a logistical challenge. While Little Snitch is reporting that the ruleset doesn't match, it's also preventing network connectivity to and from the server. If you rely on VNC screen sharing to access the system, you will be unable to access the system to accept the current version of the Little Snitch ruleset.

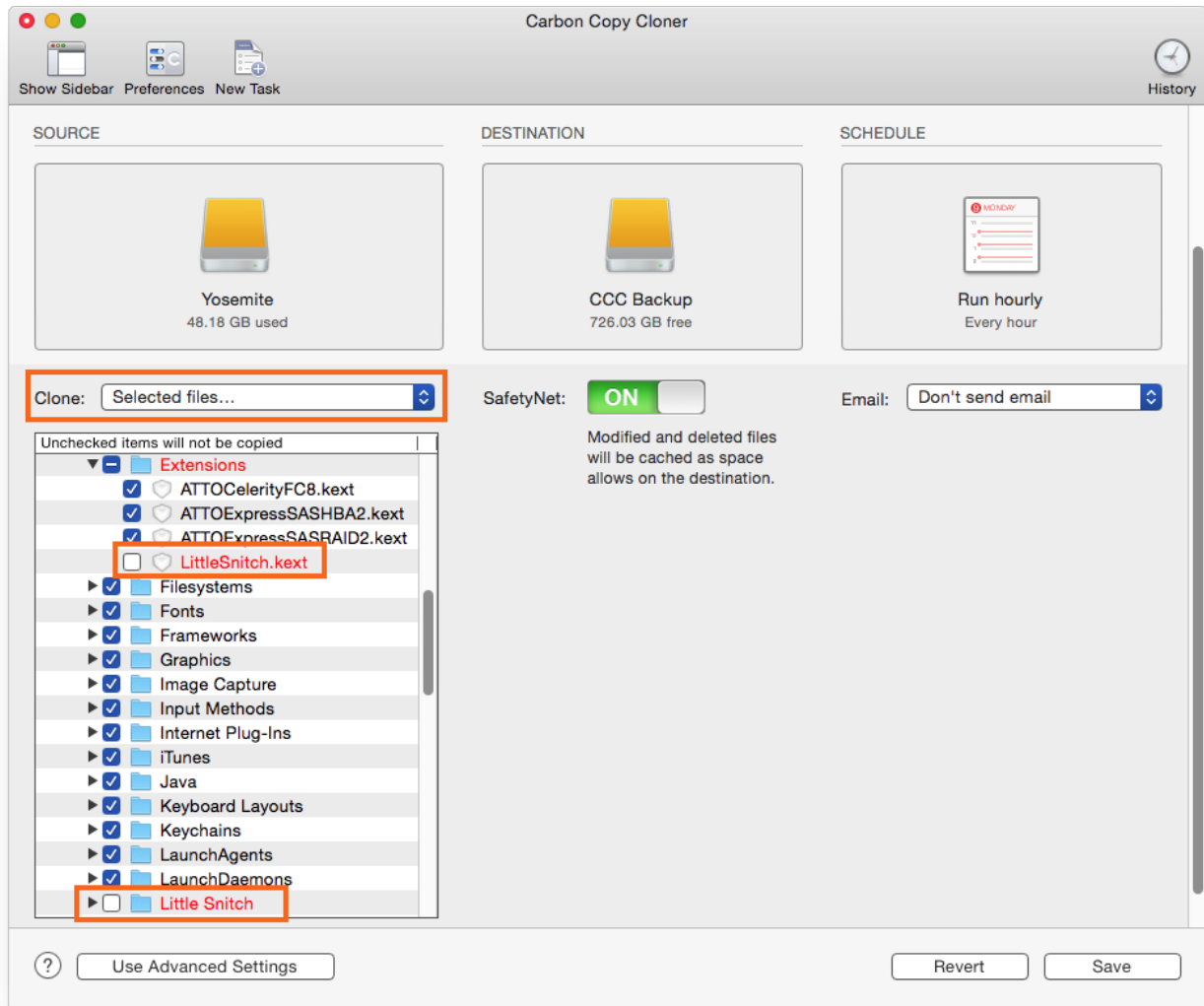
According to ObDev developers, you can avoid this logistical lockout by removing the following two items from your backup volume before rebooting from it:

```
/Library/Extensions/LittleSnitch.kext  
/Library/Little Snitch
```



Once rebooted, reinstall Little Snitch to regain the application firewall and all is well.

While that method works fine for cases in which you plan to reboot from the backup volume, you're potentially in a lurch if you have an **unplanned** incident, e.g. the server's hard drive fails. To avoid encountering this problem altogether, you can [exclude those files from your backup task](http://bombich.com/kb/cc4/excluding-files-and-folders-from-backup-task) <<http://bombich.com/kb/cc4/excluding-files-and-folders-from-backup-task>>:



CCC does not delete files from the destination that are excluded from the backup task http://bombich.com//kb/ccc4/excluding-files-and-folders-from-backup-task#delete_excluded, so be sure to remove those items from your destination if you have already established your backup.



Frequently Asked Questions

Glossary of Terms

A <#a> B <#b> C <#c> D <#d> E <#e> F <#f> G <#g> H <#h> I <#i> J <#j> K <#k> L <#l> M <#m> N <#n> O <#o> P <#p> Q <#q> R <#r> S <#s> T <#t> U <#u> V <#v> W <#w> X <#x> Y <#y> Z <#z>

A

Apple Filing Protocol (AFP) — AFP is a file sharing protocol that allows you to access the files on other computers and NAS devices on your network. CCC can copy files to and from folders and sharepoints on SMB and AFP sharepoints. AFP is deprecated in favor of the SMB protocol starting with OS X Yosemite.

B

Backup — A [backup](https://en.wikipedia.org/wiki/Backup) <https://en.wikipedia.org/wiki/Backup>, or the process of backing up, refers to the copying and archiving of computer data so it may be used to restore the original after a data loss event. The verb form is *back up*, in two words, whereas the noun is *backup*. In other words, you back up your data using CCC. When you have done that, you have a backup of your data on physically disparate media.

Bootable backup — Same as backup, but a backup of a volume that contains an operating system that can be used to boot the computer if the primary startup volume fails.

Boot selector — See [Startup Manager](#) <#s>.

C

Checksumming or "Find and replace corrupted items" — With this option, CCC will calculate an MD5 checksum of every file on the source and every corresponding file on the destination. CCC then uses these checksums to determine if a file should be copied. This option will increase your backup time, but it will expose any corrupted files within your backup set on the source and destination. This is a reliable method of verifying that the files that have been copied to your destination volume actually match the contents of the files on the source volume.

Clone — A copy of a folder or volume; a non-proprietary backup. While not identical (some caches should not be copied as they must be rebuilt on a bootable backup, and files like trash are excluded), clone is a common word used for a CCC bootable backup.

D

Destination — The location where files from the source are copied. The destination can be a disk attached directly to your Mac, a network location (e.g. a NAS or a share from another computer), or a disk image file. Destination is a relative term. When making an ordinary backup, the destination is your backup volume. When restoring, however, the destination is your original volume, or a replacement device.

Differential backup — A differential backup is a type of data backup that preserves data, saving only the difference in the data since the last full backup. CCC uses a differential backup method, but does not store the differential data in a proprietary manner. Rather, the files are copied to the destination among the already-up-to-date items such that the destination is a clone of the source.

Disk image — Disk images are data containers that emulate disks. When you open a disk image file, a virtual volume is mounted that allows you to browse the files held by the disk image – as if you were browsing a physical disk device. Disk images are recommended only when backing up to a network destination to protect attributes that are not supported by the network volume. Disk images are not bootable. [Backing up to a disk image <http://bombich.com//kb/ccc4/backing-up-disk-image>](http://bombich.com//kb/ccc4/backing-up-disk-image)

E

EFI Partition — The EFI partition is an Apple-proprietary partition. That partition is created automatically when a disk is partitioned with the GUID partition scheme, and its contents are managed internally by OS X. Third-party applications shouldn't attempt to modify, nor copy that volume.

Extended Attribute — Extra data that is associated with a file. Extended attributes typically contain non-user-created data that was placed there by the application that created the file. For example, photo applications may place thumbnail icon data into an extended attribute. CCC attempts to copy extended attributes when possible, but extended attribute data is generally considered to be disposable because it can be regenerated by the application that created it. [Advanced Settings: Don't preserve extended attributes <http://bombich.com//kb/ccc4/advanced-settings#ignore_xattrs>](http://bombich.com//kb/ccc4/advanced-settings#ignore_xattrs)

F

FileVault Encryption — Volume level encryption built into the macOS. When enabled on a volume, a password is required to unlock and mount that volume. Unlike ownership-based restrictions, FileVault protection persists when attaching the disk to another computer. [Apple Kbase: About FileVault encryption <https://support.apple.com/kb/PH21783>](https://support.apple.com/kb/PH21783)
[Apple Kbase: Encrypt the contents of your Mac with FileVault <https://support.apple.com/kb/PH21750>](https://support.apple.com/kb/PH21750)

Firewire — Firewire is an interface standard developed by Apple that allows the connection of external peripherals to a computer. Firewire devices provide reliable bootability and excellent performance that rivals USB 3. This interface has largely been supplanted by Thunderbolt on newer Macs.

I

Incremental backup — An incremental backup is one that provides a backup of files that have changed or are new since the last backup; it is one that backs up only the data that has changed since the last backup. When making a backup for the first time, an incremental backup copies all files.

M

Migration Assistant — A tool from Apple that allows you to migrate applications, settings, and documents from a backup or older computer to a new computer or fresh installation of the OS. You can use a CCC bootable backup as a source for Migration Assistant. [Apple Kbase #HT204350: Move your content to a new Mac \[Mavericks and later\] <https://support.apple.com/en-us/HT204350>](https://support.apple.com/en-us/HT204350)

N

Network Attached Storage (NAS) — NAS systems are networked appliances (e.g. a router or a specialized storage device that connects to your router) that contain one or more hard drives. They

typically use SMB add/or AFP networking protocols to make sharepoints available to macOS, Windows, and Linux clients.

P

Partition — In verb form, partition refers to the process of creating a division on a hard drive that defines one or more volumes. When you purchase a new hard drive, it often must be partitioned to make it suitable for use on your Macintosh. In noun form, partition is colloquially used in the same manner as a volume. A partition table refers to a hidden structure on a disk that defines the size and position of the volumes on a disk. CCC does not copy the partition table, nor multiple partitions on a disk. Rather, a CCC backup task is defined with one source volume and one destination volume. [Preparing your backup disk for a backup of OS X <http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x>](http://bombich.com//kb/ccc4/preparing-your-backup-disk-backup-os-x)

Prune — Remove older, archived material that was cached on the destination volume. [Automated maintenance of the CCC SafetyNet folder <http://bombich.com//kb/ccc4/automated-maintenance-ccc-safetynet-folder>](http://bombich.com//kb/ccc4/automated-maintenance-ccc-safetynet-folder)

Permissions — A file and folder specification that defines the access that various users and groups will have with regard to reading or modifying that item.

Preflight/Postflight script — An advanced feature; shell scripts that can be added to the beginning or end of a CCC backup task to extend the task's functionality. [Running shell scripts before and after the backup task <http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#scheduler_shell_scripts>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#scheduler_shell_scripts)

R

Recovery HD — A hidden, Apple-proprietary volume associated with a macOS startup volume. The Recovery HD offers a method to reinstall macOS, and also must be present prior to enabling FileVault encryption on the associated startup volume. The presence of a Recovery HD volume is not required for maintaining a bootable backup of your startup disk, nor for recovering from a bootable backup. [Cloning Apple's Recovery HD partition <http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition>](http://bombich.com//kb/ccc4/cloning-apples-recovery-hd-partition)

Root — the root folder (also known as the root directory) is the first or top-most folder in a hierarchy. When you double-click on a hard drive icon in the Finder, the folder that appears first is the root-level folder.

S

SafetyNet — A feature in CCC that protects files on the destination from being accidentally deleted. If you have files on your destination device that don't exist on the source, those files get placed in the SafetyNet. CCC will also place the older version of modified files into the SafetyNet. The SafetyNet is a *temporary* safe haven for files unique to the destination. When space is constrained on the destination, CCC will start to remove older items from the SafetyNet. [Protecting data that is already on your destination volume: The Carbon Copy Cloner SafetyNet <http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet>](http://bombich.com//kb/ccc4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet)

Simple Mode — A simplified user interface. Simple Mode significantly reduces the number of user interface elements — the sidebar, toolbar, scheduling selector, and advanced settings are all suppressed, leaving the user with only three primary controls: Source, Destination, Clone button. [Simple Mode <http://bombich.com//kb/ccc4/simple-mode>](http://bombich.com//kb/ccc4/simple-mode)

Sidebar — An interface element that appears on the left side of CCC's main window when you click the **Show Sidebar** button in CCC's toolbar. A table at the top of CCC's sidebar lists your CCC backup tasks, while a table at the bottom of the sidebar lists all of the locally-attached volumes that are currently mounted on your Mac. The contents of the sidebar are also accessible via CCC's **View** menu.

Source — The folder or volume that holds the data that you want CCC to copy.

Seed — Initially populating a destination volume while it is attached directly to your Mac. This "seeded" volume can then be attached to a remote Macintosh at a distant location, and subsequent backups will be faster because less data will be copied over the Internet.

Span — When a backup extends past a destination for more room. CCC does not support spanning multiple destinations.

Shell Script — A text file containing command-line arguments that can automate tedious tasks. CCC backups can be configured with pre and postflight shell scripts to extend the functionality of the backup task. For example, you could implement a postflight script to unmount the source volume. [Running shell scripts before and after the backup task <http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#scheduler_shell_scripts>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#scheduler_shell_scripts)

Server Message Block (SMB) — SMB is a file sharing protocol that allows you to access the files on other computers and NAS devices on your network. CCC can copy files to and from folders and sharepoints on SMB and AFP sharepoints.

Startup Manager — A system tool from Apple that allows you to select a startup volume as the Mac is starting up. The Startup Manager is part of your Mac's firmware; hold down the Option key while turning on your Mac to bring up the Startup Manager.

[Apple Kbase: How to choose a startup disk on your Mac <https://support.apple.com/en-us/HT204417>](https://support.apple.com/en-us/HT204417)

T

Target Disk Mode — An alternate startup configuration in which the computer does not boot to the loginwindow nor Finder. Rather, a Firewire or Thunderbolt icon appears on the Mac's screen, and when you attach the Mac to another Mac via Firewire or Thunderbolt, the internal storage of the Mac in Target Disk Mode appears on the Desktop of the other Mac. In other words, Target Disk Mode makes your Mac behave like an ordinary external hard drive enclosure.

[Apple Kbase: Transfer files between two computers using target disk mode <https://support.apple.com/kb/PH19021>](https://support.apple.com/kb/PH19021)

Task — A collection of settings in CCC that define a source, destination, items to be copied, and automation.

Task chaining — A feature in CCC that allows you to run another task at the end of a task, see: [Performing actions Before and After the backup task: Run another backup task \(task chaining\) <http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#chain_tasks>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#chain_tasks).

Thunderbolt — Thunderbolt is a hardware interface developed by Intel that allows the connection of external peripherals to a computer. Thunderbolt is a popular, albeit pricier interface for connecting external hard drives to your Mac. Thunderbolt devices provide excellent performance and reliable bootability.

U

Universally Unique Identifier (UUID) — A 36-character hexadecimal code (characters A-F, 0-9) that uniquely identifies a volume, e.g. "F5B1D7B0-66EC-4082-A34C-86FFD294FA61". When you erase a volume with Disk Utility, the new volume gets a new unique identifier. CCC uses this identifier, along with the name of the volume, to positively identify the source and destination before copying any files. Due to the unique nature of these identifiers, they prove more reliable than volume name when identifying a volume, because there's nothing stopping you from naming all of your disks "Macintosh HD".

Universal Serial Bus (USB) — An industry standard for cables, connectors, and communication between a computer and some external devices like a hard drive, keyboard, or mouse. Macs and USB devices can adhere to the USB 2 or USB 3 versions of the protocol, depending on when the device was manufactured. USB 3 is considerably faster than USB 2. Macs produced before 2012 do not have native support for USB 3. USB 3 devices can be used with those Macs, but will be connected at USB 2 speeds.

V

Volume — The terms "disk" and "volume" are often used interchangeably. Ambiguity arises, however, when you modify the partitioning of a disk such that it has multiple volumes. The term "disk" refers to the physical, whole device. A disk contains volumes, and its a volume that you see in the Finder (frequently with a hard disk icon, bringing the confusion full circle). A helpful graphic is available in [this section of CCC's documentation](http://bombich.com//kb/cccl4/my-disk-already-formatted-hfs-why-am-i-getting-warning). <<http://bombich.com//kb/cccl4/my-disk-already-formatted-hfs-why-am-i-getting-warning>>

"The disk usage on the destination doesn't match the source — did CCC miss some files?"

There are a couple legitimate explanations for a mismatch between the capacities reported in Disk Utility. First, some system files and folders are excluded from a backup task either because they are regenerated every time your machine reboots, or they are not appropriate to back up or because they won't work properly on another hard drive or computer. The largest and most notable excluded item is the `/private/var/vm/sleepimage` file. The sleepimage file contains the live state of your Mac's RAM, so it will be as large as the amount of RAM that you have installed. Considering that the amount of RAM pre-installed is only increasing, and that this file changes constantly and gets recreated on startup, CCC excludes this file from every backup task.

CCC doesn't copy virtual memory or the Trash

CCC also excludes the contents of the Trash, so you may want to empty the Trash, then compare again the source and destination. The complete list of items that CCC excludes from every backup task is documented here: [Some files and folders are automatically excluded from a backup task](http://bombich.com//kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task) <<http://bombich.com//kb/ccc4/some-files-and-folders-are-automatically-excluded-from-backup-task>>

If your source volume is the startup disk, the [Size of Trash and VM](http://bombich.com//software/files/tools/Size_of_Trash_and_VM.app.zip) <http://bombich.com//software/files/tools/Size_of_Trash_and_VM.app.zip> application will quickly tell you exactly how much data is in these folders that CCC is excluding. In most cases, this explains all of the discrepancy that users notice during an initial backup task.

The sum of all your files may never match the disk usage value reported by Disk Utility

While the exclusion of these items explains much of the disk capacity discrepancy you may see in Disk Utility, it does not explain it all. A 1-3GB discrepancy is not uncommon when you're booted from the source or (subsequently) the destination. The problem is that the disk usage value that is reported by Disk Utility (and Finder Get Info for the volume) is a bit misleading. The value that Disk Utility reports is the amount of space consumed on the volume as reported by the HFS+ filesystem. It is not, however, the amount of space consumed on the drive by all the files and folders that can be seen by the OS and applications. There are other filesystem "implementation details" that consume space on the volume, but cannot be seen by the OS and cannot, and should not, be copied by any application.

Does this mean you're losing data? Absolutely not. It's pretty easy to prove it to yourself too, just boot from your cloned volume and take a look at the capacity reports in Disk Utility. Here's an example we performed on a test machine:

```
** Booted from the original source volume
Source: 5,258,776,576 bytes
Clone: 5,025,562,624 bytes
```

```
**Booted from the clone volume  
Source: 4,996,599,808 bytes  
Clone: 5,250,097,152 bytes
```

Disk Utility can't really be used as a good measure of success for your clone. That's not to say that what it reports is wrong, it simply isn't telling the whole story.

"So how can I tell that all of my data was actually copied?"

A basic enumeration of the files and folders on your source and destination volumes will give you meaningful numbers to compare. The [Volume Disk Usage Details <http://bombich.com//software/files/tools/Volume_Disk_Usage_Details.zip>](http://bombich.com//software/files/tools/Volume_Disk_Usage_Details.zip) tool can help you collect this kind of enumeration. When this tool has completed scanning the source and destination volumes, you can compare the reports to find any discrepancies. You can use this tool to enumerate individual folders as well if you need to get more granular details about a discrepancy in a particular folder. Note: This utility has not been tested for use on network volumes. It can do no harm, but you may encounter permissions errors with items on network volumes, or it may simply report inaccurate values for those volumes. We recommend using this tool only on locally-attached volumes or mounted disk images.

If you find a discrepancy that you cannot explain, or that appears to be errant, [please let us know <http://bombich.com//software/get_help>](http://bombich.com//software/get_help) and we'll help you get to the bottom of it.

I want to back up multiple Macs or source volumes to the same hard drive

Backing up multiple volumes or multiple Macs to a single hard drive can be a messy proposition. If you back up each source volume to the same destination volume without some pre-planning, data from each source volume will be merged in a heap on the backup volume. Additionally, your tasks will archive or delete each other's backed up content. Carbon Copy Cloner can solve this problem! We lay out a few different scenarios and solutions below.

"I want a bootable backup for each Mac on the same hard drive"

Creating a bootable backup requires that you provide a dedicated backup volume for each Mac that you want to back up. If you want to maintain each bootable backup on the same hard drive, you simply create a partition for each computer that you want to back up using the Disk Utility application.

Related Documentation

- Learn more about partitioning a hard drive for use with Carbon Copy Cloner <<http://bombich.com/kb/cccl4/preparing-your-backup-disk-backup-os-x>>
- [Video] Partitioning a new hard drive [10.10 Yosemite and earlier OSes] <<https://www.youtube.com/watch?v=WZ1sstRdWjk>>
- [Video] Adding a partition to your backup disk [10.10 Yosemite and earlier OSes] <<https://www.youtube.com/watch?v=XQG6-Ojiv3s>>

"I want to back up my startup disk and a data volume to the same backup disk"

If you prefer not to partition your backup volume as described above, you can use two CCC backup tasks to manage these backups. The first task will back up your startup disk directly to the backup volume for a bootable backup, the second task will back up your data volume to a subfolder on the backup volume. Thanks to CCC's SafetyNet <<http://bombich.com/kb/cccl4/protecting-data-already-on-your-destination-volume-carbon-copy-cloner-safetynet>> feature, the two backup tasks will coexist peacefully.

1. Configure a CCC task to back up your startup disk to the backup volume. Choose your startup disk from the Source selector and choose the backup volume from the Destination selector.
2. Verify that the SafetyNet feature is "On". [Note: If you have Advanced Settings enabled, be sure that the **Protect root-level items** <<http://bombich.com/kb/cccl4/advanced-settings#protect>> option is checked.]
3. Schedule the task, if desired, or choose "Save" from Carbon Copy Cloner's File menu. You can run this task immediately or let it run on schedule later.
4. Click the "New Task" button in CCC's toolbar.
5. Choose your data volume from CCC's Source selector.
6. In the Finder, create a new folder at the root level of the destination volume to store your data volume's backup. Finder may prompt you to authenticate if you ran the first task already, and that's OK.

7. Drag the new folder from the Finder onto CCC's Destination selector.
8. Schedule the task, if desired, or choose "Save" from Carbon Copy Cloner's File menu. Again, you can run this task immediately or let it run on schedule later.

CCC's SafetyNet will prevent the first task from erasing the content that you're backing up to a subfolder on that same destination volume.

"I want to back up multiple data volumes (no OS files) to the same backup disk"

The easiest way to back up multiple data-only volumes to the same backup disk is to create a folder on the backup disk for each volume you want to back up. Then you'll configure a task for each source volume that you want to back up, setting the destination to that disk's dedicated folder on the backup disk.

1. Click the **New Task** button in CCC's toolbar.
2. Choose your data volume from CCC's Source selector.
3. Choose **Choose a folder...** from the Destination selector
4. Select your destination volume in the sidebar
5. Click the **New Folder** button to create a new folder at the root level of the destination to store your data volume's backup, then select that folder as the destination.
6. Schedule the task, if desired, or choose **Save** from Carbon Copy Cloner's File menu. You can run this task immediately or let it run on schedule later.
7. Repeat the steps above for other source volumes, creating a new folder for each at the root level of the destination volume.

"My backup volume isn't formatted as HFS+ because I also use it to back up my PC"

There are a couple options for backing up to a volume that isn't formatted as HFS+. If you're only backing up user data — files that reside in your home folder, for example, then you can back up directly to the backup volume. Non-HFS+ volumes often don't support all of the filesystem metadata that is associated with files on an HFS+ formatted volume, but that's generally OK if you aren't backing up system files or files that belong to another user account on your computer.

If you are backing up system files to a non-HFS+ formatted volume, you can back up to a disk image. A disk image is a single file residing on your hard drive that contains the entire contents of another hard drive (except for the free space). When you want to access the contents of that filesystem, you double-click on the disk image to mount the disk image as if it were an external drive attached to the machine. Carbon Copy Cloner leverages disk images to provide you the flexibility of storing several complete backups on a single shared external hard drive. To back up to a disk image:

1. Choose your source volume from the Source selector.
2. Select "New disk image..." from the Destination selector.
3. Unless you're making an archival backup of your data, choose the option to create a read/write "sparse bundle disk image" file
4. Specify the location where you want to save the disk image file.
5. When you run the backup task, CCC will create a disk image on the backup volume, back up the specified data, then unmount the disk image when the task is complete.

Note: While disk images themselves are not bootable, you can mount them and restore their content to a physical hard drive to produce a copy of the original volume. If the original volume was bootable, the restored volume should be able to boot the original Mac as well.



Related Documentation

- [Learn more about backing up to and restoring from disk images](http://bombich.com//kb/ccc4/backing-up-disk-image)
<<http://bombich.com//kb/ccc4/backing-up-disk-image>>

Some applications behave differently or ask for the serial number on the cloned volume. Did CCC miss something?

Some applications won't work when transferred to a new disk or when run on a different Mac. This has nothing to do with whether or how CCC backs up your data, it comes down to the serialization requirements imposed by the software vendor (i.e. their anti-piracy strategy). Some applications will work just fine, some will simply require that you re-enter your serial number, while other applications will require a reinstallation from the original install media or online reactivation via the vendor's website. CCC cannot (technically or legally) subvert activation requirements imposed by other software vendors.

Also note that some applications consider the presence or absence of peripherals as well as other hardware characteristics during the installation process. If these conditions are different when running the application on a new hard drive or Macintosh, you may encounter problems. We have seen these types of problems with some high-end audio software packages in the past, particularly with the installation or configuration of various plugins.

We recommend that you always retain a copy of your applications' installation disks and serial numbers in case the applications have special serialization or installation requirements.

Non-registration-related, application-specific oddities

In addition to application registration issues that occur when running your apps on a new volume, there are occasionally other oddities that you may encounter when booting from your cloned volume. The following is a list of potentially unexpected behavior that has been reported to us that a) appears to be a consequence of running an application from a different volume or on a different Macintosh and b) does not appear to be or cannot be accommodated/resolved in the backup/cloning process:

- Dropbox may ask you to reconfigure your account settings
- A dialog may appear asking you to locate the "System Events" application (this one appears to be a one-time deal, dismiss the dialog and you shouldn't see it again)
- Time Machine may no longer recognize your original source volume because the UUID has changed ([potential solution <http://pondini.org/TM/B6.html>](http://pondini.org/TM/B6.html))
- "Google Drive" must be disconnected, then reconnected to your account. [Details here <http://bombich.com/kb/discussions/google-drive-reports-google-drive-folder-missing>](http://bombich.com/kb/discussions/google-drive-reports-google-drive-folder-missing)
- Finder preferences may not be respected (e.g. whether to show disks on the Desktop, the contents of the "All my files" item may be empty)
- Photoshop may require that you reset the Scratch Disk preference [potential solution <https://forums.adobe.com/thread/370733?tstart=0>](https://forums.adobe.com/thread/370733?tstart=0)
- Finder may not resolve aliases to files on a backup volume if those aliases were created on Snow Leopard or later. Finder will give you the opportunity to "readdress" these aliases when you try to open them.
- Network settings may not be respected on another Macintosh. If you have an extensive VPN configuration that you want to preserve, we recommend that you export those settings to a file before you lose access to the original Mac.

- Mavericks and later: The "Prevent App Nap" setting applies to specific instances of applications, so this setting will not be applied to copies of an application (e.g. on a backup volume).
- Mavericks and later: The "Local Items" Keychain is a local repository of passwords and other form data eligible to be synced via iCloud to your other devices running iOS 7 or newer. The "Local Items" Keychain is only respected on the original volume on which it was created, it cannot be restored from any backup. If you enable iCloud Keychain syncing (before you find yourself in a need-to-restore position), however, the passwords in this keychain will be stored in iCloud and shared with a restored volume once you log in to iCloud on that restored volume.
- Little Snitch settings, or a subset of them, may not be recognized while booted from a backup volume. that you export your rules first, then re-import them while booted from the backup volume.
- If you open an Adobe Lightroom catalog from a cloned or restored volume, Lightroom may indicate that your photos cannot be found because the catalog references the name and path of the original source volume. See [this Adobe support article <https://helpx.adobe.com/lightroom/help/locate-missing-photos.html>](https://helpx.adobe.com/lightroom/help/locate-missing-photos.html) for instructions on how to re-link your catalog to the photo folders on your cloned volume.
- TeamViewer Product Support recommends that TeamViewer be reinstalled when restoring a backup to a different Macintosh.
- If configured to start on login, when booted from a backup, the Box Sync application will delete the contents of your Box Sync folder, then re-download all of the content from Box.com. The Box Sync application uses a folder inode number to identify the Box Sync folder, and that attribute cannot be preserved during a backup or a restore.
- Signatures in the Preview application won't be recognized when booting another Macintosh from the backup volume, they're only recognized on the Mac upon which they were created.

References to third-party solutions/workarounds are provided as information only. We have not tested these solutions and we cannot endorse them.

Can I run a backup while I'm using my computer? If I have open files, will they be backed up?

Generally, yes. Performance will be affected during the backup task (especially the first one) as CCC reads the entire source volume and writes to the destination volume. If your work is "disk bound" — that is your applications are reading or writing to either the source or destination, then you'll notice a performance hit. If you're just reading email or writing a document, then you probably won't notice the performance hit.

Affecting the accuracy of the backup task is something else that should be considered. Typically it's OK to work from the source volume while you're copying it, with the understanding that if CCC copied a file, then you open it, make changes, save it, then CCC completes the backup task, the modified version of your document is not backed up (this time around). Typically that's no big deal, the modifications will get backed up the next time the backup task runs. More importantly, though, if you're [working with large files](http://bombich.com//kb/ccc4/backing-up-large-files-mounted-disk-images-and-virtual-machine-containers) (mounted disk image, Entourage email database, VMWare/Parallels container) during the backup operation, it is possible that those large files could be modified while CCC is backing up that file. This won't affect the source file, but there's a good chance that the backup version of that file will be corrupt. For this reason it is a good idea to stop using applications that may be modifying large files for the duration of the backup task.

Related Documentation

- [Backing up large files, mounted disk images, and Virtual Machine containers](http://bombich.com//kb/ccc4/backing-up-large-files-mounted-disk-images-and-virtual-machine-containers)

Can I back up one computer and use the clone to restore another computer?

Often, the answer is **probably yes**. However, there are some caveats.

Don't install older versions of macOS than what your computer shipped with

When you get a brand new Mac from Apple, it has a specific version of macOS installed on it, and further, a "build" that is specific to that exact model of Mac. If you install an older version or build of the OS, for example by cloning your older Mac to it, then it may behave unexpectedly, or it may not boot at all. If your new Mac is brand new, use Migration Assistant to migrate your data to your new Mac.

If your "new" Mac is just different, but not really hot off the lines, then cloning another Mac to the new Mac may work fine. When cloning your source Mac to your new Mac, be sure that your source Mac has been updated to at least one later release than what came on the newer Mac. For example, if your newer Mac came with 10.9.3, update your source Mac to 10.9.4 before migrating. If such an update is not available, use the Migration Assistant instead.

Some of your preferences on macOS are considered "host-specific"

Preferences such as these will be ignored if you boot another machine from your cloned operating system and data. For example, the screen saver preferences are host-specific — if you boot another machine from your bootable clone and the screen saver kicks in, you will notice that it has reverted to default settings. Do not fear that you have lost any data, your original preferences will be "restored" when you boot again from your original Mac. To learn exactly what preferences are host-specific, hold down the Option key and choose "Library" from the Finder's go menu, then navigate to Library > Preferences > ByHost.

Network settings may not be respected on another Macintosh

In addition to application-specific preference files, the network configuration of one Mac may not be accepted by another Mac. macOS network settings are stored in `/Library/Preferences/System Configuration/preferences.plist`, and CCC will copy that file unless you explicitly exclude it. Sometimes a Mac will respect the settings configuration file from another Mac, but often there are enough differences in the networking hardware configuration that macOS decides to ignore the contents of that file.

So how can I find out if it will actually work?

Determining whether this type of clone will work for you is really easy — simply boot the destination Mac from the source Mac or from a backup of the source Mac:

1. If both the source Mac and the destination Mac have Firewire or Thunderbolt ports, boot the source Mac into Target Disk Mode by holding down the "T" key on startup, then attach the



source Mac to the destination Mac with a Firewire or Thunderbolt cable. If not, attach a backup of the source Mac (or the source Mac's hard drive in an external hard drive enclosure) to the destination Mac with a Firewire, Thunderbolt or USB cable.

2. On the destination Mac, open the Startup Disk preference pane in the System Preferences application and set the source Mac's volume as the startup disk, then click the Restart button.

If the destination Mac booted from the source Mac's installation of macOS, then it works! Open CCC, then clone the source Mac's disk to the destination Mac's internal hard drive. If the destination Mac could not boot from the source Mac's installation of macOS, use the Migration Assistant to transfer your user data and applications instead.

Related documentation

- [Apple Kbase #HT2186: Don't install older versions of Mac OS than what comes with your computer <https://support.apple.com/kb/HT2186>](https://support.apple.com/kb/HT2186)
- [Apple Kbase #HT2681: What's a "computer-specific OS X release"? <https://support.apple.com/kb/HT2681>](https://support.apple.com/kb/HT2681)

I have a clone created by another application. Will CCC recognize that data, or will it want to recopy everything?

CCC always examines the files on the destination to determine if they already match those on the source. If you have a volume that is virtually identical to your source, CCC will copy only the items that are different between the two volumes.

Scenario 1: Clone created by another cloning utility

If the software you used previously created a non-proprietary clone of your source to the destination, then CCC will copy only the items that have changed since you created the backup. CCC doesn't care what application you used to copy the files previously, only whether the files match based on name, path, and modification date.

Scenario 2: I replaced my hard drive with an SSD, and now I want to use the HDD as my backup

Whether you cloned your HDD to the SSD or used Migration Assistant to get your data there, the bulk of the data on your HDD and SSD are identical. Once again, CCC doesn't care how the data got there or what application put it there, CCC will copy only the items that are different between the two volumes.

Scenario 3: My backup is in a folder on the destination. Why is CCC recopying everything?

The common use of CCC is to create a bootable clone of your startup disk. To do this, CCC copies all of the stuff from your source volume directly to the destination volume — not into a subfolder, but directly to the destination. At the end of the task, the destination looks exactly like the source. Typically you see "Applications", "Library", "System", and "Users" on the source volume, so that's exactly what you should see on the destination volume.

If your previous backup was placed in a folder, however, then you must instruct CCC to place your backup into that same folder (assuming that's what you want — macOS will not work when placed in a folder on the destination). To do this, choose "Choose a folder" from the Destination selector to select the folder that your backup should be placed into.

Can CCC back up my BootCamp (Windows) partition?

CCC can back up the contents of the Boot Camp partition, but it cannot make a bootable clone of the partition. If your goal is to back up your user data on the Boot Camp partition, CCC will meet your needs. If you're looking to migrate your Boot Camp partition to a new hard drive, you might consider an alternative solution such as [WinClone <https://twocanoes.com/products/mac/winclone>](https://twocanoes.com/products/mac/winclone), or one of the commercial virtualization solutions that offer a migration strategy from Boot Camp. **CCC is not designed to accommodate backing up or restoring Windows system files or applications.**

Yosemite: Avoid copying Windows System files

We have received some reports that macOS will crash when Windows system files are accessed on an NTFS volume. If you encounter this problem, exclude the Windows system files from your backup task:

1. Open CCC and select the relevant backup task
2. Choose **Selected files...** from the popup menu underneath the Source selector
3. In the file listing that appears, exclude **WINDOWS** and **Program Files**
4. Click the Save button or choose **Save** from CCC's **File** menu

"Will CCC clone both my macOS and Windows partition at the same time?"

No, CCC will copy only one volume at a time, and CCC will not modify the partitioning of the destination disk. You should apply your custom partitioning prior to restoring anything to your new disk.

"I'm migrating to a larger disk, will CCC work for my Windows volume?"

No, CCC will not create a bootable backup of your Windows volume.

"Will CCC copy my Parallels/VMWare virtual machine containers?"

Yes! These are just ordinary files as far as CCC is concerned, CCC can copy these just fine. Note that these files can be quite large, so occasionally problems are encountered when these files are in use or when the destination volume does not have sufficient space to accommodate the updated copy of the VM container file. These three sections of the documentation address these matters:

[Can I run a backup while I'm using my computer? If I have open files, will they be backed up? <http://bombich.com//kb/ccc4/can-i-run-backup-while-im-using-my-computer-if-i-have-open-files-will-they-be-backed-up>](http://bombich.com//kb/ccc4/can-i-run-backup-while-im-using-my-computer-if-i-have-open-files-will-they-be-backed-up)

["My destination has exactly enough space to accommodate the data on the source, why can't CCC complete the backup task?" <http://bombich.com//kb/ccc4/ccc-reported-destination-full.-what-can-i-do-avoid#destination_is_tight_on_space>](http://bombich.com//kb/ccc4/ccc-reported-destination-full.-what-can-i-do-avoid#destination_is_tight_on_space)

[Example pre and postflight shell scripts \(e.g. how to automatically suspend Parallels\)](#)



[<http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples>](http://bombich.com//kb/ccc4/performing-actions-before-and-after-backup-task#examples)

Slow performance of network appliances can be mitigated by backing up to a disk image

Network appliances are well suited to the task of serving media to multiple workstations, but they aren't necessarily great backup appliances. Media files are generally large and the required data rate for streaming media is relatively low. Consider a 1-hour, 1GB HD movie file. Streaming 1GB over the course of an hour requires only 0.27MB/s. That's a fairly easy task, even over a weak wireless network. If you want to back up 100GB in an hour, and that 100GB is comprised of a million smaller files, that's when you need some more muscle behind the file server.

Performance of network storage appliances varies greatly

Network file sharing is a CPU-intensive task, so targeting an actual Mac or PC hosting the network sharepoint will likely offer a significant performance advantage over cheaper network appliances. If you choose to host your storage on a network router anyway, *caveat emptor*. It's difficult, or impossible, to determine how a network appliance will perform based on its specifications. Vendors of network appliances rarely report CPU specifications, choosing instead to report performance in terms of achievable bandwidth. The actual bandwidth that you achieve, however, will be based on the number of files you're copying, the file size distribution, and the number and size of extended attributes in the source data set. Copying large files (e.g. media files) to a network volume will achieve the maximum potential bandwidth, while copying lots of small files will take quite a bit longer due to network filesystem overhead.

Our Recommendation

If the data that you're backing up consists primarily of large files, e.g. music, photos, video — backing up directly to a network appliance will be fine.

If you're backing up system files or applications, or many files that are smaller than a few MB, we strongly recommend that you back up to a disk image on your network appliance to improve performance and to maintain important filesystem metadata.

Can I use Carbon Copy Cloner to clone a Time Machine backup?

No, CCC will exclude the Backups.backupdb folder during a backup task because Time Machine backup folders contains Apple-proprietary filesystem devices. Apple's recommended procedure for copying a Time Machine volume is documented in [this Apple Kbase article](https://support.apple.com/en-us/HT202380) <<https://support.apple.com/en-us/HT202380>>.

Backing up Time Machine sparsebundle disk images

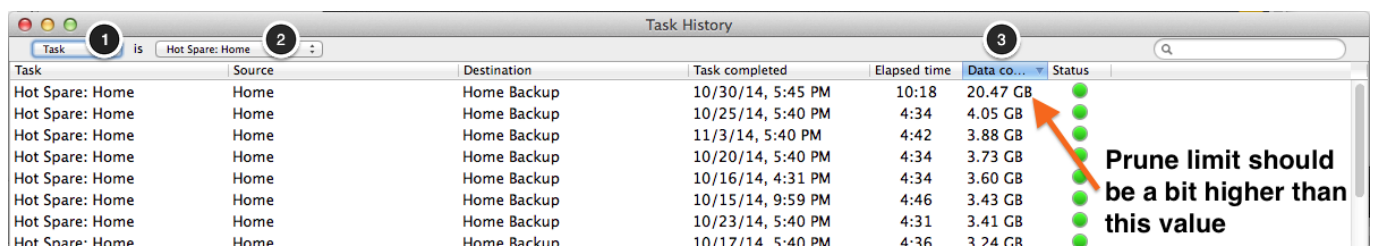
When Time Machine is configured to back up a Macintosh to a network volume (such as a Time Capsule device), Time Machine stores the backup in a sparsebundle disk image. CCC can copy these sparsebundle disk image files without any special configuration; simply choose your network volume as the source of your CCC backup task. In fact, CCC quite capably copies only the bands within the sparsebundle that have changed, so you can add CCC to this type of setup for a second tier backup to an offsite network share.

Note that CCC will exclude the Backups.backupdb folder at the root level of a volume by default. If your source volume has a folder by that name, and you want CCC to copy sparsebundle disk images from this folder, you can choose "Choose a folder..." from CCC's Source selector and choose the Backups.backupdb folder directly to configure CCC to back up the sparsebundle disk images. Note that the only items in a Backups.backupdb folder that CCC will copy are sparsebundle disk images. Other folders, e.g. local Time Machine backups will be excluded. Further, CCC will only consider sparsebundle images for deletion in a Backups.backupdb folder on the destination. Other items in this folder on the destination will be protected from deletion.

"CCC reported that the destination is full. What can I do to avoid this?"

If you are using CCC's default SafetyNet settings, then you may need to apply a more liberal pruning limit using Advanced Settings. The amount of free space required on your destination depends on the size of files that you normally edit during the day. In general, you should have as much space available at the beginning of the backup task (e.g. right after pruning is complete) as you ordinarily see copied during a backup task. So if CCC ordinarily copies 9GB of data, maybe with a spike to 14GB every once in a while, you should configure your pruning settings to accommodate that maximum value (e.g. leave at least 15GB of free space). Especially if you modify large files on a regular basis, the nominal amount of data copied each time could be fairly high. If you use a Windows virtual container that is 80GB on a daily basis, for example, the nominal amount of data copied during your daily backup task will be at least 80GB, so you will have to accommodate that with your pruning settings.

Determining the optimum SafetyNet pruning limit



Task	Source	Destination	Task completed	Elapsed time	Data copied	Status
Hot Spare: Home	Home	Home Backup	10/30/14, 5:45 PM	10:18	20.47 GB	●
Hot Spare: Home	Home	Home Backup	10/25/14, 5:40 PM	4:34	4.05 GB	●
Hot Spare: Home	Home	Home Backup	11/3/14, 5:40 PM	4:42	3.88 GB	●
Hot Spare: Home	Home	Home Backup	10/20/14, 5:40 PM	4:34	3.73 GB	●
Hot Spare: Home	Home	Home Backup	10/16/14, 4:31 PM	4:34	3.60 GB	●
Hot Spare: Home	Home	Home Backup	10/15/14, 9:59 PM	4:46	3.43 GB	●
Hot Spare: Home	Home	Home Backup	10/23/14, 5:40 PM	4:31	3.41 GB	●
Hot Spare: Home	Home	Home Backup	10/17/14, 5:40 PM	4:36	3.24 GB	●

Use these steps to determine the optimum pruning limit for your task:

1. Click the **History** button in CCC's toolbar to open the Task History window
2. Select the affected task as a sort operator in the second popup menu
3. Click on the "Data Copied" column header to sort the table by this value in descending order
4. The value at the top indicates the most data that CCC has copied for this particular task. The pruning limit should be a bit higher than this value, such that at the beginning of every task, CCC will make at least that much free space available before copying files.

The default pruning behavior is to prune the SafetyNet when the amount of free space on the destination is less than 25GB. To change CCC's SafetyNet pruning settings, select your task in CCC's main application window, then do the following:

1. Click the "Use Advanced Settings" button at the bottom of the window.
2. In the **SafetyNet Pruning** section, indicate how CCC should prune the SafetyNet folder, e.g. based on free space available on the destination, age of the archives, or size of the archives.
3. Specify a limit.
4. Save the changes to your task.

"Why does CCC report that the destination is full when it appears to have enough room for newer files?"

To prevent overwriting a good backup file with a corrupted file on the source, CCC uses a special file

copying procedure called an "atomic" copy. If a file has changed since the last backup, it will be copied to the destination using a temporary filename, e.g. .filename.XXXXXX. When CCC has finished copying the file successfully, CCC deletes (or moves to the SafetyNet) the older version on the destination, then renames the updated file to the correct filename.

Because CCC uses this special procedure, the destination volume must have, at minimum, enough free space to accommodate all of the data that will be backed up plus enough room to accommodate a temporary copy of the largest file on the source volume. If you frequently modify very large files, such as movies, disk images, or virtual machine containers, you should designate a backup volume that has considerably more space than is consumed by your source volume to avoid running out of space during a backup task, and you should configure CCC's SafetyNet pruning settings to accommodate a temporary copy of the largest file on the source volume.

"I have SafetyNet turned off, how could the destination be too full?"

If you have disabled CCC's SafetyNet setting, note that deletions occur as the items to be deleted are encountered. CCC traverses the files and folders on your source and destination volumes in alphabetical order, so it is possible that CCC will attempt to write new files to the destination before deleting items that were deleted from the source. If you have made large organizational changes on the source (e.g. renamed or moved folders, deleted and created many items), you may want to run your backup task with the troubleshooting option to [Run a deletion pass first](http://bombich.com/kb/ccc4/advanced-settings#troubleshooting) [<http://bombich.com/kb/ccc4/advanced-settings#troubleshooting>](http://bombich.com/kb/ccc4/advanced-settings#troubleshooting). **Additionally, if there is a _CCC SafetyNet folder on the destination volume, move that folder to the Trash and empty the Trash before proceeding.**

Related Documentation

- [Automated maintenance of the CCC SafetyNet <http://bombich.com/kb/ccc4/automated-maintenance-ccc-safetynet-folder>](http://bombich.com/kb/ccc4/automated-maintenance-ccc-safetynet-folder)
- [Creating a separate task to prevent VM container versions from bloating the SafetyNet <http://bombich.com/kb/ccc4/creating-separate-task-prevent-vm-container-versions-from-bloating-safetynet>](http://bombich.com/kb/ccc4/creating-separate-task-prevent-vm-container-versions-from-bloating-safetynet)

Frequently Asked Questions about encrypting the backup volume

- Can I back up an encrypted volume to a non-encrypted volume? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-encrypting-backup-volume#can_i_backup_to_an_unencrypted_volume>
- If I back up an encrypted volume to a non-encrypted volume, will the copied files be encrypted on the destination? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-encrypting-backup-volume#will_dest_be_encrypted>
- Will Carbon Copy Cloner enable encryption on my backup volume? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-encrypting-backup-volume#can_ccc_enable_encryption>
- What happens if I change my account password on the source volume? Does the encryption password on the backup volume get updated automatically? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-encrypting-backup-volume#update_encryption_password>
- I enabled encryption on my 3TB USB backup disk. Why can't I boot from that volume any more? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-encrypting-backup-volume#fde_usb_3tb>

Can I back up an encrypted volume to a non-encrypted volume?

Yes.

If I back up an encrypted volume to a non-encrypted volume, will the copied files be encrypted on the destination?

No, encryption occurs at a much lower level than copying files. When an application reads a file from the encrypted source volume, macOS decrypts the file on-the-fly, so the application only ever has access to the decrypted contents of the file. Whether your backed-up files are encrypted on the destination depends on whether encryption is enabled on the destination volume. If you want the contents of your backup volume to be encrypted, follow the [procedure documented here](http://bombich.com//kb/ccc4/working-filevault-encryption) <<http://bombich.com//kb/ccc4/working-filevault-encryption>> to enable encryption.

Will Carbon Copy Cloner enable encryption on my backup volume?

No. You can enable encryption in the Security & Privacy preference pane while booted from your bootable backup, or in the Finder by right-clicking on your backup volume.

What happens if I change my account password on the source volume? Does the encryption password on the backup volume get updated automatically?

The encryption password(s) on the backup volume will **not** be automatically updated when you change the password for an account on the source volume. When you boot from the backup volume, you may notice that your user account icon is a generic icon, and the text indicates "[Update needed]". The update that is required is within the proprietary encryption key bundle that macOS maintains for your encrypted volume. This encryption key is not maintained on the backup volume, and it is Apple-proprietary, so it isn't something that CCC can or should modify. To update the encryption password on the destination volume:

1. Choose the backup volume as the startup disk in the Startup Disk preference pane and restart your computer. You will be required to provide the old password to unlock the volume on startup.
2. Open the Users & Groups preference pane in the System preferences application.
3. Click on the user whose password was reset on the source volume and reset that user's password again. Resetting the password while booted from the backup volume will update the encryption key for that user on the backup volume.
4. Reset the password for any other user accounts whose password was reset on the original source.

I enabled encryption on my 3TB USB backup disk. Why can't I boot from that volume any more?

Some versions of OS X have difficulty recognizing USB devices that have been encrypted with FileVault. The Western Digital My Passport Ultra 3TB disk, for example, works fine as a bootable device when not encrypted. In our tests, however, this device was no longer recognizable when FileVault encryption was enabled. This problem appears to be limited to OS X 10.11 El Capitan. The same volume was accessible using older and newer OSes, and also functioned fine as an encrypted startup device using older and newer OSes.

Frequently asked questions about scheduled tasks

- Does CCC have to be running for a scheduled task to run? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#must_ccc_be_running>
- What happens if no one is logged in when a task is scheduled to run? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#no_user_logged_in>
- Will CCC run when the computer is turned off? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#computer_off>
- Will CCC run when the my laptop's lid is closed? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#laptop_lid_closed>
- How is system sleep handled? <<http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#sleep>>
- Why does my laptop sometimes go to sleep during a backup task? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#battery_sleep>
- Why does my screen turn on shortly before a backup task starts? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#display_wake>
- What if the backup drive is not available when a task is scheduled to run? <<http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#tgt-missing>>
- Can I stop a backup task before it finishes? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#stop_and_resume>
- How do scheduled tasks "work"? <<http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#launchd-detail>>
- How can I disable/suspend a task? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-scheduled-tasks#disable_task>

Does CCC have to be running for a scheduled task to run?

No. Once you have saved your tasks, you can quit CCC. Even if tasks are running, it's OK to quit CCC -- they will continue to run. A helper application, named "com.bombich.cchelper" will be running quietly in the background, handling task operations. This helper application also loads automatically when you restart your computer, so you don't have to launch CCC again unless you want to make changes to your task configurations or scheduling.

What happens if no one is logged in when a task is scheduled to run?

The scheduled task will run whether someone is logged in to the machine or not. You can also log in or log out while tasks are running and the tasks will continue to run.

Will CCC run when the computer is turned off?

If your backup task is configured to "Wake or power on the system", CCC will schedule a "Wake or power on" event with the Power Management service and your system will turn on shortly before the task is scheduled to run.

FileVault exception

There is one notable exception to powering on the system for a scheduled task: **If you have**

FileVault enabled on your startup disk, your computer will turn on, but it will not proceed past the FileVault authentication prompt. It is not possible for CCC to subvert this security feature. After a certain amount of time with no user input, your system will turn itself back off. This limitation is applicable only when the system is turned off; CCC can wake a system with FileVault protection enabled and proceed to run a backup task.

Related Documentation

- [How to modify a scheduled backup <http://bombich.com//kb/ccc4/how-modify-scheduled-backup>](http://bombich.com//kb/ccc4/how-modify-scheduled-backup)

Will CCC run when the my laptop's lid is closed?

If your laptop is running on battery power, the system will not wake while the lid is closed and CCC backup tasks will not run. If your laptop is plugged in to AC power, then CCC can wake the system to start your scheduled task if the lid is closed. See the section above for the settings that indicate whether a task can wake the system.

How is system sleep handled?

By default, CCC will wake your computer when your tasks are scheduled to run. You can change this setting in the **Runtime Conditions** section when scheduling a task.

Related Documentation

- [Handling system sleep events <http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions#sleep>](http://bombich.com//kb/ccc4/configuring-scheduled-task-runtime-conditions#sleep)
- [How to modify a scheduled backup <http://bombich.com//kb/ccc4/how-modify-scheduled-backup>](http://bombich.com//kb/ccc4/how-modify-scheduled-backup)

Why does my laptop sometimes go to sleep during a backup task?

If your Mac is a laptop, note that CCC will only be able to wake the system or prevent idle sleep if the system is running on AC power. CCC (nor any application) cannot keep the system awake while running on battery power -- macOS aggressively sleeps the system if there is no user activity while running on battery power.

Why does my screen turn on shortly before a backup task starts?

By default, CCC schedules a wake event to occur 15 seconds before a scheduled task is configured to run. Whether the system is sleeping or not, macOS turns on the display when a scheduled wake event occurs, and there is nothing that CCC can do to prevent this. If you prefer that your display does not turn on, e.g. in the middle of the night, use the **Run this task when the system next wakes** setting instead to have CCC tasks run during macOS **Dark Wake** cycles (aka **PowerNap**, aka **Maintenance Wake**).

What if the backup drive is not available when a task is scheduled to run?

If your backup drive is attached to your Mac and unmounted, CCC will attempt to mount the backup volume, then proceed with the backup task if that is successful. If the volume cannot be mounted or is not attached to your Mac, CCC will, by default, report an error, then run the task immediately when the backup disk is reattached to your Mac. You can fine-tune CCC's handling of this scenario using the options at the bottom of the Scheduler panel.

Can I stop a backup task before it finishes?

Yes, you can stop the backup task at any time. The next time you run the backup task, CCC will copy only the files that have changed or were missed since the last backup task.

How do scheduled tasks "work"?

Carbon Copy Cloner tasks are managed by a background helper application named "com.bombich.ccchelper". Task configuration files are stored in /Library/Application Support/com.bombich.ccc/Tasks. When the helper application is loaded (i.e. on startup, or when you save your first CCC backup task), it will read each of the task configuration files and schedule it as required. You should not make changes to task configuration files directly.

How can I disable/suspend a task?

If CCC's sidebar is not revealed, reveal it by choosing **Show Sidebar** from CCC's View menu. To disable a task, right-click on that task in the sidebar and choose **Disable** from the contextual menu. Use the same procedure to re-enable the task. If you would like to disable all tasks, choose **Disable all tasks...** from the CCC menubar application, or hold down Command+Option and choose **Disable All Tasks & Quit** from the Carbon Copy Cloner menu.

Frequently asked questions about the Carbon Copy Cloner SafetyNet

- How do I restore files from the _CCC SafetyNet folder? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet#restore_archives>
- Why can't I open some files in the _CCC SafetyNet folder? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet#archived_bundles>
- Can I restore a previous version of the OS using one of the archives in the _CCC SafetyNet folder? <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet#restore_os_from_archives>
- I deleted files from my startup disk to make more room, but now it's hard to find some of those files on my backup volume <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet#bundle_archive_organization>
- Why can't I delete some items from the SafetyNet folder? The Finder says that some items are in use. <http://bombich.com//kb/ccc4/frequently-asked-questions-about-carbon-copy-cloner-safetynet#sip_prevents_delete>

How do I restore files from the _CCC SafetyNet folder?

CCC's SafetyNet folder ("_CCC SafetyNet") is excluded from CCC's backup tasks by default because it contains older versions of modified files, and files that were deleted from the source volume. Typically when you restore data from your backup volume, you will want to avoid restoring the items in this folder, choosing instead to restore the most recent backup of your files.

If there is something that you would like to restore from the CCC SafetyNet folder, a drag and drop restore in the Finder is usually the easiest way to do so. If you would like to restore many items, or merge them into an existing folder, choose "Choose a folder..." from CCC's Source selector and choose the folder from which you would like to restore. If you choose the _CCC SafetyNet folder as the source, note that the full path to your archived files will be preserved, e.g. 2014-09-27 (September 27) 14-11-18/Users/fred/Documents/some file.pdf. In most cases, you will want to choose a subfolder within the archives folder as your source. Likewise, choose "Choose a folder..." from CCC's Destination selector and select the specific folder that you want to restore items into.

Why can't I open some files in the _CCC SafetyNet folder?

When CCC evaluates the items on your destination and determines whether they should be archived or left in place, it does so on a file-by-file basis. This poses a challenge for bundle files — files that are actually a folder of files, but presented by the Finder as a single file. As a result, bundle files (e.g. applications, some types of libraries, some custom file types) may appear in an incomplete form within the CCC SafetyNet folder.

Unless all of the components within a bundle file are modified, only the items that have been updated will be present. Incomplete bundle files are generally not useful on their own, but their contents can be. For example, if you accidentally deleted a photo from your iPhoto library, you would be able to recover that lost photo from the archived iPhoto library bundle. To reveal the content of an incomplete bundle file in a CCC SafetyNet folder, right-click (or Control+click) on the item and choose "Show package contents" from the contextual menu.

Can I restore a previous version of the OS using one of the archives in the _CCC SafetyNet folder?

While it is possible to recover an older, complete version of a bundle file from the CCC SafetyNet and complete backup (e.g. by overlaying the incomplete archived bundle file on top of the current backup of the bundle file), this is generally too tedious of a task to be practical for application and OS restores. CCC's SafetyNet feature is not intended to provide a method for rolling back software updates, OS restores should always be done from the complete backup at the root level of your destination. If you would like to make "snapshot" backups of your OS, choose **Choose a folder...** from CCC's Destination selector and choose a folder on the destination volume for the purpose of a one-time backup.

I deleted files from my startup disk to make more room, but now it's hard to find some of those files on my backup volume

This generally isn't a concern for ordinary "flat" file types, but it can be a concern for certain applications that store lots of files in a single, monolithic-appearing container file. Some applications offer highly customized interfaces to access a specific file type. iPhoto, for example, allows you to manage tens of thousands of photo files. These files are all stored in a proprietary bundle file in your home folder, but because photos are so easy to organize within iPhoto, many people don't consider how those files are organized on the hard drive. Usually you really don't have to either. That is, of course, until you can no longer use iPhoto to access your photo files, and that's exactly what happens when you delete files from your iPhoto library, abandoning them to the SafetyNet folder on your backup volume.

If you have a habit of periodically deleting photos, music, or movies from iPhoto, iTunes, Aperture, or any other application that uses a proprietary bundle file format so that you can "free up some space on your startup disk", consider how those files will be organized on the destination. Specifically, keep in mind that you use a very elaborate application to access these files on the source volume, but you will only have the Finder to access these files on the backup volume.

CCC can't reorganize your deleted files in a way that's logical to you, it can only place them at the same path in the _CCC SafetyNet folder as they were on the source volume. For files buried in a bundle file on the source (as is the case for iPhoto, for example), this means that the files will be buried in bundle files in various time-stamped archive folders on the destination. These files will also be subject to deletion if you configure CCC to periodically prune the contents of the SafetyNet. In short, simply archiving deleted files from applications such as these isn't going to be the best way to store these items long-term if your goal is ultimately to keep them.

When you want to free up some space on your startup disk, consider this approach instead, using iPhoto as an example:

1. Create a new folder at the root level of your backup volume, named something like "Archived Photos 2011".
2. In iPhoto, delete all of the photos that you want to remove from your source volume. When you delete these items, they are placed in the iPhoto Trash.
3. Click on the iPhoto Trash in the iPhoto sidebar and select all of the photos in that folder.
4. Drag all of the selected photos from the iPhoto Trash to the "Archived Photos 2011" folder on the backup volume.
5. Once the photos are safely copied to and neatly organized on the backup volume (and ideally, after you have made a second backup of these precious files on some other volume), go ahead and empty the iPhoto Trash via the iPhoto menu.

Not all applications have this kind of internal Trash folder, so be sure to see how it works for other applications before applying these exact steps. The general idea, though, is that you should deliberately archive the items that you're removing from your source volume in a way that makes sense to you rather than passively allowing CCC to archive them in a manner that makes sense to

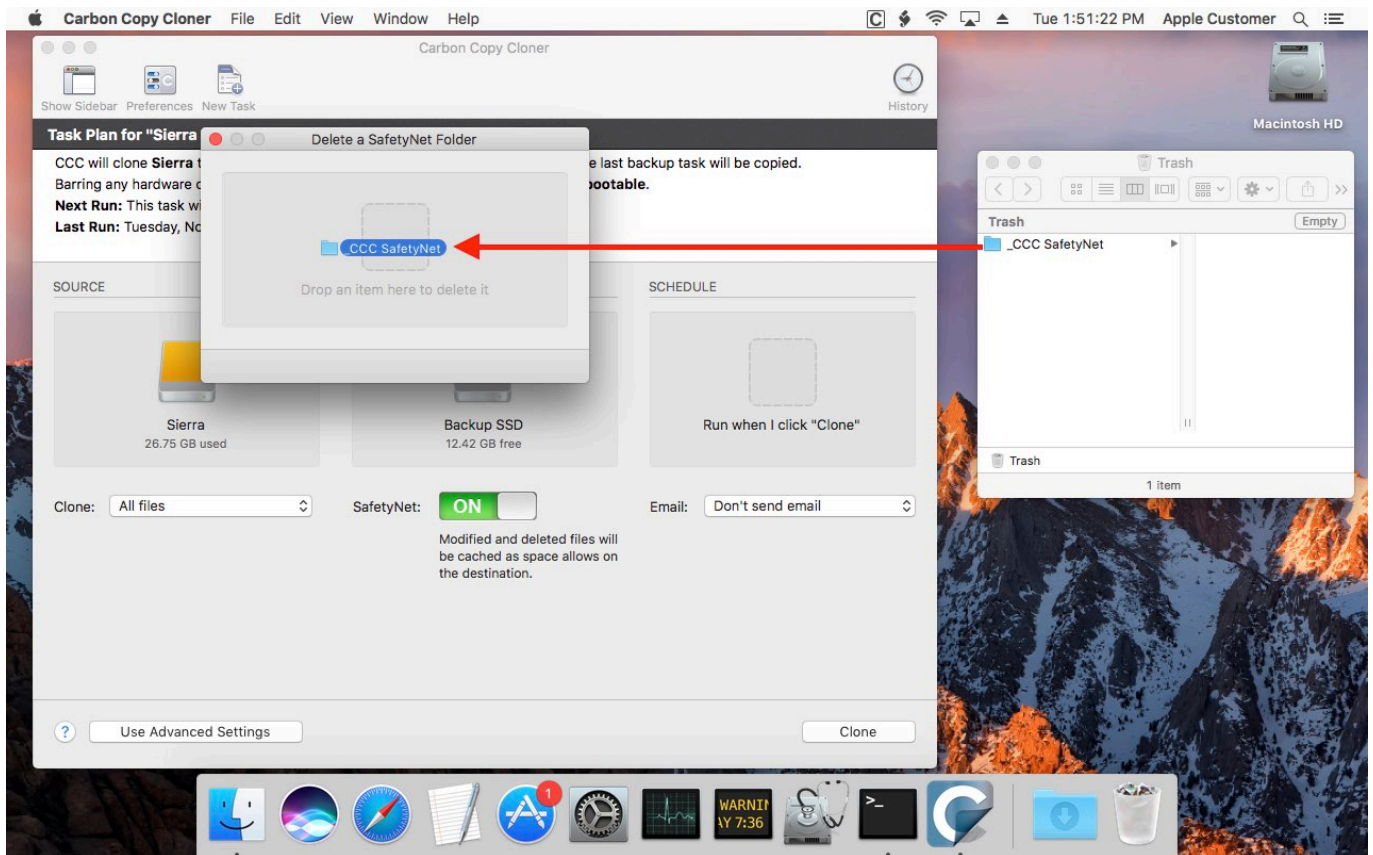
the computer.

Why can't I delete some items from the SafetyNet folder? The Finder says that some items are in use.

In OS X El Capitan, Apple introduced a new feature called **System Integrity Protection (SIP)**. SIP works by preventing any user from deleting certain protected system items on the startup disk. If you boot your Mac from a backup volume and restore system files to your startup disk, CCC will place outdated versions of those system files into the SafetyNet folder. These modifications are allowed because CCC is making changes to that volume while it is not the current startup disk. When you restart your computer from that destination volume, however, SIP re-engages and may then prevent you from deleting the protected items that were placed into the SafetyNet folder. If you attempt to delete these items, the Finder will report that they cannot be deleted because they are in use, or because they are protected. If you try to delete these items in the Terminal application, you'll get a more distinct error message, "Operation not permitted".

CCC won't have any trouble pruning the SafetyNet folder on its own during ordinary backup tasks. If you would like to remove an item from the SafetyNet manually, however, or if you would like to remove the entire folder:

1. Choose **Delete a SafetyNet folder** from CCC's Help menu
2. Drag the folder you want to delete onto the window that is presented. Alternatively, you can click on the drop zone in the window that is presented to make your selection from a navigation panel.



If the item you're trying to remove is on your current startup disk, CCC will move the item to the root of your startup disk, then instruct you to boot your Mac from some other volume (e.g. your backup disk). Once booted from the backup volume, you can repeat the same steps with CCC to remove the

SafetyNet folder.

If you're still having trouble after trying that, don't hesitate to [ask us for help](http://bombich.com//software/get_help) <http://bombich.com//software/get_help>.

Frequently Asked Questions about cloning Apple's "Recovery HD" partition

Carbon Copy Cloner offers complete support for archiving, cloning, and recreating Apple's Recovery HD partition. See the [Cloning Apple's Recovery HD partition <http://bombich.com/kb/cccl4/cloning-apples-recovery-hd-partition>](http://bombich.com/kb/cccl4/cloning-apples-recovery-hd-partition) section of CCC's Disk Center documentation for instructions to create a Recovery HD volume on your backup disk.

When do I need to create a Recovery HD volume?

CCC bootable backups offer similar functionality to the Recovery HD volume, so the Recovery HD volume is not strictly required on a backup volume. Unless you have a specific reason to not create a Recovery HD, though (e.g. because it could affect a Boot Camp partition on the same disk, you don't want to give up the 1GB, etc), we recommend that you maintain a Recovery HD volume on your backup disk. Especially if you intend to use your destination volume in production (e.g. you are migrating to a larger disk, or restoring to a replacement disk), or if you intend to enable encryption on the backup volume, then you should create a Recovery HD volume for the destination volume. If you intend to enable encryption on the destination volume, we recommend that you create the Recovery HD volume **before** enabling encryption. **A Recovery HD volume is not required for restoring an installation of macOS from a CCC bootable backup.**

What is the difference between archiving the Recovery HD and creating a new Recovery HD?

During the course of an ordinary backup of a volume that contains macOS, CCC will **automatically** create an archive of the Recovery HD associated with that volume. This archive is stored on the source volume, and is subsequently backed up to the backup volume along with everything else. This archive of the Recovery HD volume can be used in the future to create a new Recovery HD, and it's the first source that CCC considers when you choose to create a Recovery HD. The archive is not, however, an **operational** Recovery HD volume, it's just a backup file.

CCC's Disk Center offers the ability to create an operational Recovery HD volume as well. This functionality is completely separate from creating an archive of the Recovery HD. Unlike the archiving of the source Recovery HD, creating a new Recovery HD is not something that happens automatically, you have to ask CCC to do this in the Disk Center. When CCC creates a new Recovery HD, it borrows space from your destination volume to create a new, hidden volume on that disk. The resulting Recovery HD is fully operational — you can boot your Mac from it and reinstall macOS. Refer to the previous section to determine if creating a Recovery HD is required in your situation.

Why were other volumes on my disk unmounted when I created a Recovery HD?

CCC uses a command-line version of Disk Utility to resize the donor volume. Resizing that volume requires making changes to the partition table on the disk, and Disk Utility may choose to unmount other volumes on the disk while it makes those changes. CCC will specifically remount the donor volume, but whether Disk Utility remounts the other volumes is a function (or bug) of Disk Utility. You can remount these volumes manually in Disk Utility.

Can I configure CCC to not automatically archive the Recovery HD onto my source volume?

Yes. Click the "Preferences" button in CCC's toolbar and uncheck the box next to "Create an archive of Apple's Recovery HD volume".

Can I create a Recovery HD on an Apple Fusion (aka "CoreStorage") volume?

No, not with CCC. Creating a Recovery HD requires borrowing space from a physical volume, and that is not a modification that we recommend making to an underlying member of an Apple Core Storage logical volume. The only Apple-supported method of creating a Fusion volume is via Disk Utility or the macOS Installer, and each of those will create a Recovery HD volume before the Fusion volume is created. If you intend to create your own Fusion volume using one of the various tutorials available on the Internet, and if you want that volume to have an associated Recovery HD volume, we strongly recommend that you create a Recovery HD volume **before** creating the Fusion volume. You can use CCC to create the Recovery HD volume on the slowest disk that you intend to add to the Fusion logical volume group. See the following document for a demonstration.

[Creating a Fusion volume with a Recovery HD](#)

<http://bombich.com//software/files/tools/Creating_a_Fusion_volume_with_a_Recovery_HD.pdf>

Can I run backup tasks while my system is on battery power?

CCC **can** run backup tasks while the system is running on battery power, but will not (by default) start **automated** tasks when your laptop is running on battery power. Backup tasks generate a lot of disk read and write activity, and that can run your battery down. Additionally, macOS tends to aggressively put the system to sleep when it's on battery power, causing task completion to be deferred until the system is awoken. For the best performance of your backup tasks and your battery, we recommend running your backup tasks when the system is attached to an AC power supply.

Can I configure CCC to start automated tasks when the system is running on battery power?

Yes. Click the Preferences button in CCC's toolbar to access settings related to running tasks while on battery power.