



ChronoSync Manual

for macOS

Econ Technologies, Inc.
P.O. Box 195780
Winter Springs, FL 32719
www.econtechologies.com

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If you can't find the information you're looking for in this manual, you should also refer to ChronoSync's Help, located within the application, and our website in the [Guides](#), [Tech Notes](#), and [Documentation](#) sections.

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CHAPTER ONE

INTRODUCTION

Welcome to ChronoSync

ChronoSync is a file synchronization and backup utility for macOS. Its fundamental role is to take a collection of files stored in one place and maintain an identical copy of those files stored in another place. The 'places' that ChronoSync will synchronize are called targets and the process of keeping both targets identical is called synchronization. ChronoSync performs synchronization in a very efficient way. It identifies and copies only the files that have changed since you last synchronized. This intelligence is known as incremental or blind backup synchronization. Because it performs its job quickly and efficiently, using ChronoSync will not be a burden and will not significantly affect your daily workflow.

The situations in which synchronization is necessary are quite numerous and varied. ChronoSync offers a tremendous degree of flexibility so that virtually any synchronization scenario can be handled.

The most common need for synchronization is to simply maintain a redundant backup of your data. In this case, all the changes made in one target, the main target, will get copied over to another target, the backup target. The user rarely, if ever, directly accesses files on the backup target — they exist merely as a backup in case one of the files on the main target is accidentally deleted or becomes corrupt. In this scenario, ChronoSync would be configured to perform a backup, blind backup or bootable backup.

Another common need for synchronization is to keep two sets of files that are actively modified in sync with each other. A perfect example is a laptop and desktop computer. You may work on certain files on your desktop in your office — this would be your desktop target. You may then want to bring the same files home on your laptop so you can work on them at night or on a business trip — this would be your laptop target. When you return to the office, any changes you made to the files on your laptop need to be copied back to your desktop. In this scenario, ChronoSync would be configured to perform a bidirectional synchronization.

Synchronizations really can be as simple as outlined above. They can, however, be much more intricate and complex. ChronoSync is flexible and powerful enough to handle just about any synchronization scenario you can think of — some of which may even push the limits of the term synchronization.



CHAPTER TWO

BASIC OVERVIEW

ChronoSync Documents

ChronoSync utilizes a document-based interface. This means that all your configuration settings as well as specific information about the set of files being synchronized are contained in a single document. This document may be saved anywhere on your computer's hard disk. Likewise, a ChronoSync document can be opened at a later date by simply double-clicking it from the Finder. This differs from an application-based interface where only a single set of data and options are presented. A word processing program is an example of a document-based interface, because each document you create can be saved as a separate file. Conversely, Apple's Photos is an example of an application-based interface because only a single library of photos is managed and the user cannot open or save different libraries.

Once you configure a ChronoSync document to perform a desired synchronization, you're basically done — all your settings are stored within the document. You can then open the saved document at any time, run your synchronization then quit ChronoSync. If you desire, you can make changes to your ChronoSync document, but generally, you just set it and forget it!

Being document based, ChronoSync provides tremendous flexibility. The fact of the matter is that few people have a singular synchronization need. This means that, more likely than not, you may need different types of synchronizations in various situations. For example, you may want to keep a redundant backup copy of all your working documents. Additionally, you may need to keep your desktop and laptop computers synchronized with each other. With ChronoSync you would configure two separate documents to perform each task — you simply open and execute the appropriate document at the appropriate time.

ChronoSync allows the creation of two types of documents: synchronizers and containers. A *Synchronizer document* contains all the information necessary to synchronize two targets. A *Container document* contains one or more Synchronizer documents.

Synchronizer Tasks

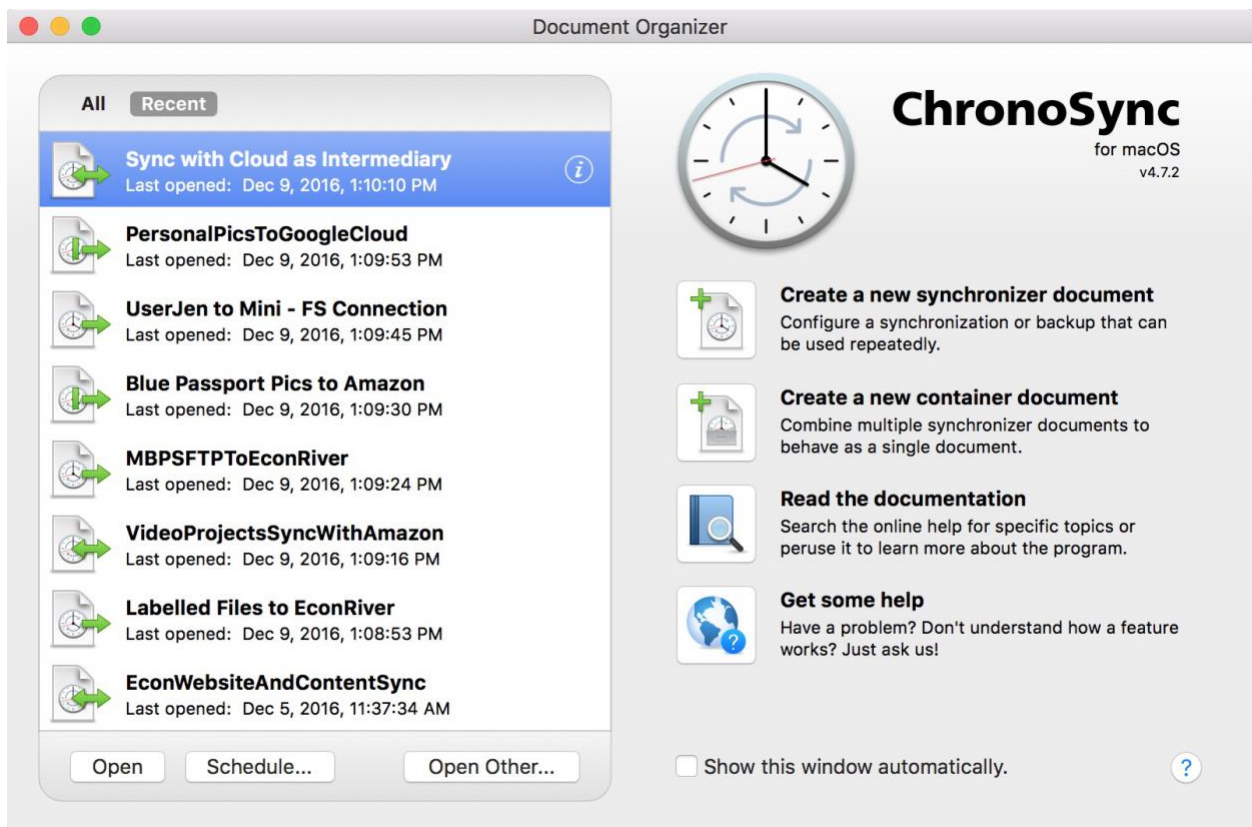
A ChronoSync Synchronizer task contains all of the information necessary to keep two targets synchronized with each other. This includes a reference to each target, the type of synchronization to be performed, numerous option settings to control ChronoSync's behavior and zero or more rules to inform ChronoSync of what type of files need to be synchronized. A Synchronizer task also contains a snapshot of every file being synchronized in each target. This snapshot is referred to as the synchronization tree because it maintains the same hierarchical relationships of files and folders as they exist in your targets.

Task Container

A Task Container contains one or more synchronizer tasks that have been previously saved. This allows you to synchronize several tasks in one easy step. You simply drag tasks in and out (or click the "Add..." or "Remove" toolbar icons) in the Documents panel. Running a synchronization on a task container will execute each contained task in the listed order. Tasks in a container can be rearranged by dragging them, affecting the order in which they run.

ChronoSync Organizer

The ChronoSync Organizer keeps track of all recently used tasks and presents them in a convenient-to-use window. You can also use a Setup Assistant, create new Synchronizer tasks and task Containers, view the online help and visit our support page from buttons within the window. Right-clicking an entry in the document list provides additional options such as duplication, renaming and deletion of the selected tasks. The “Show this window automatically” setting controls whether or not the window is automatically hidden when editing tasks or when switching away from the app. More advanced ChronoSync Organizer window behaviors can be controlled in General Preferences.













Setting Up a Synchronization

The first step to setting up a Synchronizer task is to decide which computer will be responsible for the synchronization. It is highly recommended that this computer be the one that has to connect to the other. Doing so will save you a step by automatically connecting to your shared computer. In our example, you should use your laptop. We also assume you'll be selecting your laptop as your left target. This is purely for the sake of example — if you prefer your laptop to be your right target, go ahead and select it as such.

Launch ChronoSync. The ChronoSync Organizer window appears. From here, you can create a new Synchronizer task. Once the task opens, supply a name that describes the operation you are about to perform, such as “Sync w/Laptop.” Then, choose your left target by clicking the “Choose...” button in the “Left” group of the Setup panel. Use the file selection dialog to locate the folder on your laptop that contains the documents you wish to synchronize. Note that you can also create a new task by choosing a [Creation Assistant](#) better explained in the next section.

Now select your operation. Below lists a summary of each operation. For a more detailed description, see the [Synchronization Operations Detailed](#) section.

	<p>Backup Left-to-right: The left target will be monitored for changes and compared to the right target. Any changes detected will be copied to the right target. Note: The first time a Backup Left-to-right synchronization is run, deleted files from the left target will not be deleted from the right target.</p>
	<p>Backup Right-to-left: The right target will be monitored for changes and compared to the left target. Any changes detected will be copied to the left target. Note: The first time a Backup Right-to-left synchronization is run, deleted files from the right target will not be deleted from the left target.</p>
	<p>Synchronize Bidirectional: Both targets will be monitored for changes. Any changes detected will be copied to the opposite target. Note that the first time a bidirectional synchronization is run, deleted files from one target will not be deleted from the other target.</p>

	<p>Blind Backup Left-to-right: The left target will be monitored for changes. Any changes detected will be copied to the right target. Important: If a file in the right target is modified or deleted, it will not get replaced by the same file in the left target unless the left file has actually changed. Also, the first time a Blind Backup Left-to-right synchronization is run, deleted files from the left target will not be deleted from the right target.</p>
	<p>Blind Backup Right-to-left: The right target will be monitored for changes. Any changes detected will be copied to the left target. Important: If a file in the left target is modified or deleted, it will not get replaced by the same file in the right target unless the right file has actually changed. Also, the first time a Blind Backup Right-to-left synchronization is run, deleted files from the right target will not be deleted from the left target.</p>
	<p>Mirror Left-to-right: Files will only be copied left-to-right. If a file on either the left or right target is modified, it will result in the left file overwriting the right file. Note: The first time a Mirror Left-to-right synchronization is run, deleted files from the left target will be deleted from the right target.</p>
	<p>Mirror Right-to-left: Files will only be copied right-to-left. If a file on either the left or right target is modified, it will result in the right file overwriting the left file. Note: The first time a Mirror Right-to-left synchronization is run, deleted files from the right target will be deleted from the left target.</p>
	<p>Bootable Left-to-right: A bootable clone of the left target will be copied to the right target. Only volumes can be specified for this operation.</p>
	<p>Bootable Right-to-left: A bootable clone of the right target will be copied to the left target. Only volumes can be specified for this operation.</p>
	<p>Bootable Mirror Left-to-right: A bootable clone of the left target will be copied to the right target. If a file on either the left or right target is modified, it will result in the left file overwriting the right file. Only volumes can be specified for this operation.</p>



Bootable Mirror Right-to-left: A bootable clone of the right target will be copied to the left target. If a file on either the left or right target is modified, it will result in the right file overwriting the left file. Only volumes can be specified for this operation.

Next choose your right target. This will be the folder on your desktop computer with which you will be synchronizing. Click “Choose...” in the “Right” group and navigate to the folder on your desktop machine.

Once you have selected your targets, you may specify any other desired settings, such as options or rules.

Take a look at our [ChronoSync Quick Start Guide](#) to get you up and running with ChronoSync. Learn how to set up a basic synchronizer task to backup or sync your files quickly.

Synchronization Operations Detailed

The synchronization operation is defined on a synchronizer task’s Setup panel. ChronoSync offers eleven synchronization operations. These operations have six variants, Backup, Blind Backup, Mirror, Bidirectional, Bootable and Bootable Mirror. This section defines these variants and offers examples of how and when each should be used.

Backup Operation

In a backup synchronization, as in all modes, the direction of the synchronization is used to determine which target should be monitored for changes. For instance, if left-to-right is the specified direction, only the files on the left target are monitored for changes. When a change is detected, those changes are applied to the right target. Thus, the change moves in a left-to-right direction, hence the name. Conversely, when right-to-left is the specified direction, only the right target is monitored for changes and, when detected, those changes are applied in a right-to-left direction.

A Backup operation would be chosen if you want to keep a copy of important files in another location. Cloud backup is a good example. If you have important work documents on your local Mac you’d like to have copies of up in the cloud, ChronoSync could place those documents there.

Note: Backup synchronization is the operation of choice for the overwhelming majority of synchronization tasks.

Blind Backup Operation

The Blind Backup operation essentially pays no attention to files in the destination target. It only pays attention to files in the source target. Basically, it performs similarly to Backup mode except the “[Last Identity Test](#)” is never performed, nor does it care if a file’s counterpart exists or not.

For example, suppose you modify a file in your source target then use the Finder to copy the file over to the destination target. In the Backup operation, the file will not be synchronized because it’s considered the same in both targets (the last identity test told it so). In a Blind Backup synchronization, however, it will be synchronized! Also, if a file in your destination target is deleted, the corresponding file in your source target will not get synchronized. Only a change to your source file will cause it to get synchronized. ChronoSync is “blind” to what is happening on the destination side of your synchronization.

There is one critical exception to the above behavior — initial synchronizations. If ChronoSync has never synchronized a file before, and thus has not collected any information on the file, then the Backup operation behavior is applied. This allows you to add files to your source target and have them get synchronized. It also allows you to perform an initial synchronization with an empty destination target and have all your files synchronized. Once ChronoSync has collected information on a file, however, the blind backup logic will forever after be used.

This is a good option to consider if you’re out working in the field (e.g. on a photo shoot) and need to backup often. Blind backup is a good idea because it performs fast scans and will only scan the source volume for changes.

Mirror Operation

When the Mirror operation is chosen, ChronoSync will create a mirror image, or “clone”, of your source target.

If you have mirror left-to-right enabled and modify a file on the right target, it will result in it being overwritten by its left-side counterpart. A similar behavior is applied to deletions. In this scenario, if a file were deleted on the right side, the left file will get copied back to the right side!

The Mirror operation is useful when you want files on your destination target to be the exact same (or a mirror image of) as what is on your source target at a given instant in time. For example, suppose you manage a set of computers in a high school lab. At the end of the day, you could use the Mirror operation to return the contents of the home folders of each of those computers to a pristine state after the students have used them for their lessons (and invariably, junked them up).

Synchronize Bidirectional Operation

When the bidirectional operation is specified, both targets are monitored for changes and the most 'up-to-date' file between the two targets is selected, making sure that file is synchronized to the other target.

Bidirectional includes both the "Left-to-Right" and "Right-to-Left" directions. Therefore, modifying a file on the right target would result in replacing its left side counterpart. If both files in the targets change, a conflict will arise.

One common use of a bidirectional operation is keeping files in sync between a work laptop and a home desktop. Any changes made on the laptop while at the office, can be synchronized to your home desktop computer so that your two sets of files will always be in sync.

Bootable Operation

Under normal circumstances, it makes little sense to backup your entire boot drive. Outside of the Users folder there are System and Application files. Backing up these files would serve no purpose since, in most cases, you could not restore them, i.e. doing so requires knowledge and expertise of what files are important and what role they play in the operation of the system. However, if you backup your entire drive with the correct settings, then you can restore files and even boot from this drive in the event your internal drive fails. This is called a bootable backup.

When you choose a Bootable operation, ChronoSync only monitors the source for changes. Therefore, any changes or additional files on the destination target are completely ignored. A standard bootable backup — as opposed to a mirrored bootable backup — allows you to utilize an external drive that is much larger than your system drive, in case you wish to store extra data unrelated to the bootable backup.

When choosing a bootable backup operation, ChronoSync will prompt you to enter your Admin password. This allows you to access all the files and folders on the system, rather than being restricted to just your 'Home' user files. To authenticate before setting up your synchronizer task, you can choose "Authenticate..." from the ChronoSync application menu. This menu item is just an option for entering your password instead of waiting for ChronoSync to prompt for the password. Once authenticated, ChronoSync will no longer ask for an Admin password and will allow Admin access to all files until the program is quit.

Note: A "Deauthenticate" choice appears in the menu after an authentication is complete, in case you decide to no longer have ChronoSync authenticated. You may want to revoke such access, such as in a situation where you are stepping away from your computer with ChronoSync still running and you don't want someone else to sit at the machine and have full access to all files via ChronoSync.

It's always a good idea to have a bootable backup (or clone) of your drive, especially if performing an operating system update. If any type of problem arises, you'll have a clone of your drive in a more stable or favorable state that you can resort to.

Bootable Mirror Operation

When the Bootable Mirror operation is selected, ChronoSync will create a mirror image, or "clone", of your entire drive.

If you have mirror left-to-right enabled and modify a file on the right target, it will result in it being overwritten by its left-side counterpart. A similar behavior is applied to deletions. In this scenario, if a file were deleted on the right side, the left file will get copied back to the right side!

The Bootable Mirror operation is useful when you want files on your destination target to be an exact copy of what is on your source target at a given instant in time. Unlike a standard bootable backup where other files outside of the synchronization scope can reside on the destination target, a bootable mirror deletes any existing files so that the result is an exact mirror image of your source.

Note that a standard bootable backup is faster than a mirrored bootable backup.



CHAPTER THREE

SETUP ASSISTANTS

Assistants Overview

Setup assistants are guided steps used to setup or modify a synchronizer or backup task. Assistants are accessible via the "Use a setup assistant" option on the ChronoSync Organizer window. Setup Assistants are far easier than the 'manual' method of setting up or editing a synchronizer task. They ask a series of questions that will be used to help configure your new synchronization task.

Assistants consist of two categories: Creators and Modifiers.



ChronoSync
for macOS
v4.8.4



Use a setup assistant
Create new sync or backup tasks or make batch changes to existing tasks quickly and easily.

Creation Assistants

Creation Assistants get your backups configured and running quickly and easily. They will guide you through the process of configuring a synchronizer task to achieve a specific goal. This helps to quickly get your task configured with the required settings without being exposed to the more advanced, optional settings that aren't always necessary for basic setup.

CREATE A NEW SYNCHRONIZER TASK:



Home Folder Backup

Make a backup copy of your home folder onto another volume.



Bootable Backup

Create a bootable clone of your system drive onto another drive.



Backup to a Disk Image

Make a backup copy of any folder onto a mounted disk image.



Synchronize Two Folders

Make two folders identical to each other.



Folder Backup

Make a backup copy of any folder onto another volume.



Multiple Folder Backup


Backup multiple folders to the same location on another volume.

	<p>Home Folder Backup: Make a backup copy of your home folder onto another volume. This assistant allows you to filter out sub-folders at the root level of your home folder. It provides the option of skipping unnecessary files and skipping your email folder.</p>
	<p>Bootable Backup: Create a bootable clone of your system drive onto another drive. This assistant provides the option of erasing or formatting your destination volume. You can even choose to enable encryption.</p>
	<p>Backup to a Disk Image: Make a backup copy of any folder onto a newly created or existing disk image. This assistant will intelligently size the disk image based on your source size. You can also filter files by data type and choose to encrypt the disk image.</p>
	<p>Synchronize Two Folders: Make folders identical to each other by bi-directionally synchronizing two folders of your choice. These folders can reside on different devices or mounted file servers (including NAS devices).</p>
	<p>Folder Backup: Make a backup copy of any folder onto another volume. This assistant allows you to optionally filter files by data type. The backup destination can reside on a different device or a mounted file server (including an NAS device).</p>
	<p>Multiple Folder Backup: Backup multiple folders to the same location on another volume. These folders can reside at different locations in your file hierarchy or even on different devices. You can optionally filter files by data type.</p>


Modifier Assistants

Modifier Assistants allow you to choose some or all of your previously created tasks and apply mass changes to them. Whether it be error handling behaviors, task monitoring, enabling Admin Access or setting up schedules, ChronoSync makes bulk modifications easy.


MODIFY EXISTING SYNCHRONIZER TASKS:




Error Handling
Modify the error handling behaviors of one or more sync/backup tasks.






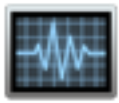
Simple Scheduling
Schedule one or more sync/backup tasks to run automatically.



Admin Access
Converts applicable targets to 'Admin Access' on one or more sync/backup tasks.



Task Monitoring
Modify various settings used to monitor the status of one or more sync/backup tasks.

	Error Handling: Modify the error handling behaviors of one or more sync/backup tasks. The following settings may be changed: continue after errors (for containers), retry on errors, ignore EA and ACL errors, error predetermination, conflict predetermination, and post-task script execution.
	Simple Scheduling: Schedule one or more sync/backup tasks to run automatically. In addition to supplying a simple scheduling interval, you can optionally enable the 'prompt before running' and 'retry on errors' settings. The assistant will also check your scheduling configuration and suggest changes, if necessary.
	Admin Access: Converts applicable targets to Admin Access on one or more sync/backup tasks. This assistant will convert the input documents to use 'Admin Access' to scan your local filesystem, allowing access to files that are normally off-limits to you.
	Task Monitoring: Modify various settings used to monitor the status of one or more sync/backup tasks. These includes: detailed logging, log mirroring, email notifications, push notifications, screen notifications and completion sounds.

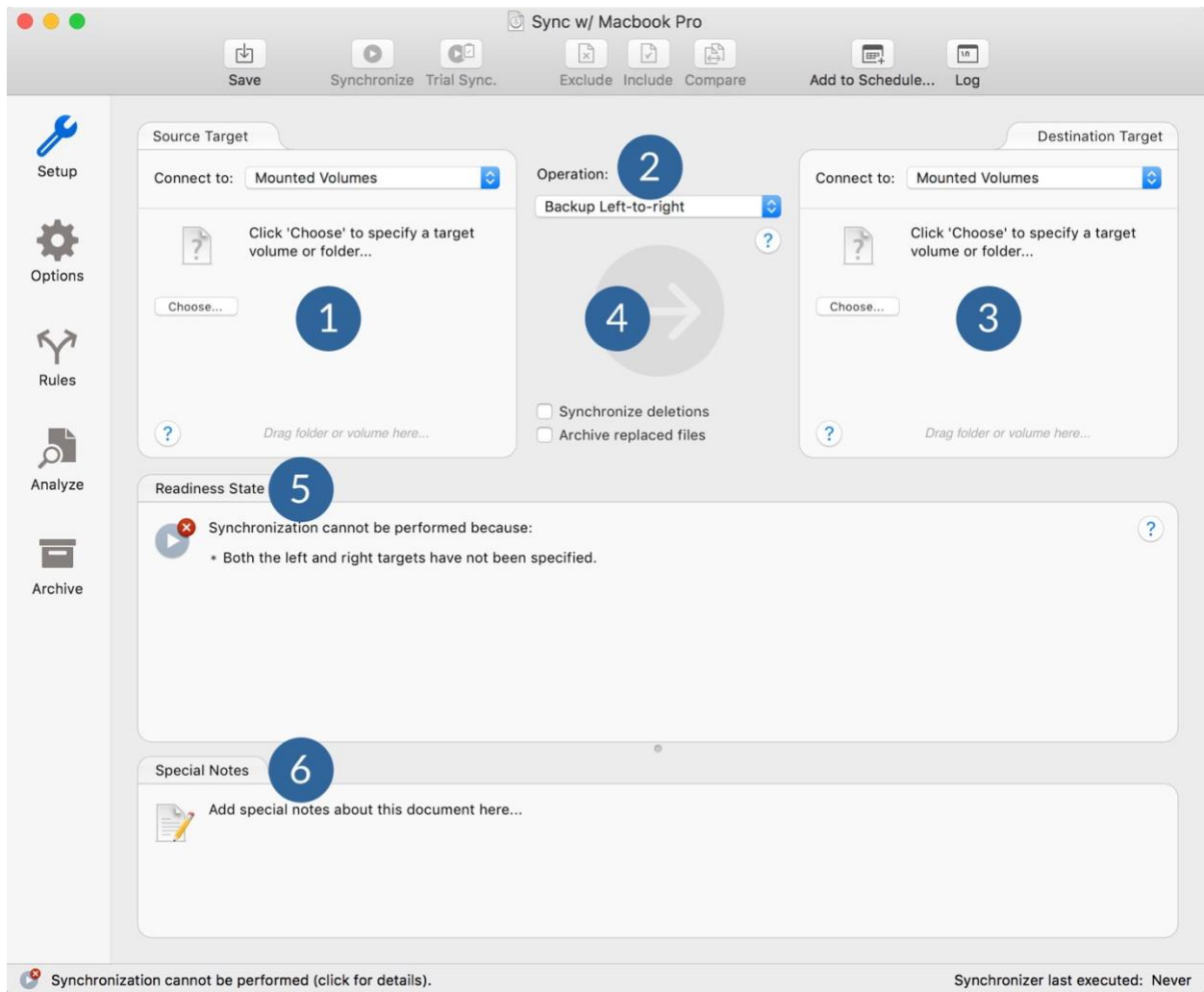


CHAPTER FOUR

SYNCHRONIZER TASK DOCUMENT USER INTERFACE

The Synchronizer task document user interface consists of 5 panels: Setup, Options, Rules, Analyze, and Archive. Within these panels, there are numerous options that you can specify. Or you may choose to not utilize any of the options. ChronoSync understands that there is no one-size-fits-all configuration. You can choose to take advantage of these options and fully customize your synchronization or you can choose to keep it simple and only specify a few. Whatever your case may be, take a look at these panels in more detail in the following sections to see all that ChronoSync has to offer.

The Setup Panel



<p style="text-align: center;">1</p>	<p>The Source/Left Target - The source target is where your original files and folders are stored. It may be a folder or an entire hard drive. It cannot be actual files. This is where ChronoSync will start scanning for changes and will copy any modified files and folders over to the destination target. To choose the source target, simply click the “Choose...” button.</p> <p>This area also contains the “Connect to” selector. Here you may choose to connect to a mounted volume or a pre-defined connection. These pre-defined connections may be cloud services, ChronoAgents, an InterConneX sharespace, or an SFTP server. If connecting to a mounted volume, you can choose to connect via Admin Access, giving you full access to that volume.</p> <p>You’ll also find an “Options...” button giving you specific options for the selected target.</p>
<p style="text-align: center;">2</p>	<p>Operation Selector - ChronoSync supports a variety of operations that can be chosen from the pop-up menu. The choices are detailed in the Synchronization Operations Detailed section.</p>
<p style="text-align: center;">3</p>	<p>The Destination/Right Target - The destination target is where a backup copy of your original files and folders will be placed. Selecting a destination is nearly identical to selecting your source.</p> <p>Just as in the source target area, you can also choose whether to connect to a mounted volume or a pre-defined connection by making a selection in the “Connect to” menu.</p> <p>You’ll also have “Options” for the chosen destination target.</p>
<p style="text-align: center;">4</p>	<p>Operation Button - You can run your backup by clicking on this button.</p>
<p style="text-align: center;">5</p>	<p>Readiness State Messages - After configuring any sync or backup task, you should always check the Readiness State. While some readiness warnings are serious and should be addressed immediately, most represent oddities that may or may not be a real problem.</p> <p>Clicking on the wrench allows you to “fix” the reported warning. Clicking the ‘X’ next to the warning will tell ChronoSync that we want to ignore this warning and not to bother us about it again. Note: You don’t have to fix or ignore warnings to run your tasks. It’s a good practice, however, so that any real problems that occur in the future will stand out!</p>
<p style="text-align: center;">6</p>	<p>Special Notes - You can add any text here. One idea is to add text that aids in describing what the task is doing.</p>

The Options Panel

The image displays four panels from the Options Panel, each with a numbered callout (1-4) and a sidebar on the left. The sidebar contains icons for Setup, Options, Rules, Analyze, and Archive.

Panel 1: Reporting & Error Handling

- Errors: Report to User
- Roll-backs: Ask User
- Conflicts: Ask User
- Automatic retry before handling errors
- Display summary after synchronization completes
- Post more detailed information to the log
- Ignore extended attribute and access control list errors

Panel 2: Special File/Folder Handling

- Custom: Custom
- SmartScan (when available)
- Progressive scanning
- Verify copied data
- Disable safe-copy
- Don't create empty folders
- Ignore invisibles
- Resolve aliases
- Only at root level
- Auto-exclude new items
- Only at root level
- Preserve comments
- Preserve access control lists (ACLs)
- Preserve extended attributes (EAs)
- Preserve resource forks

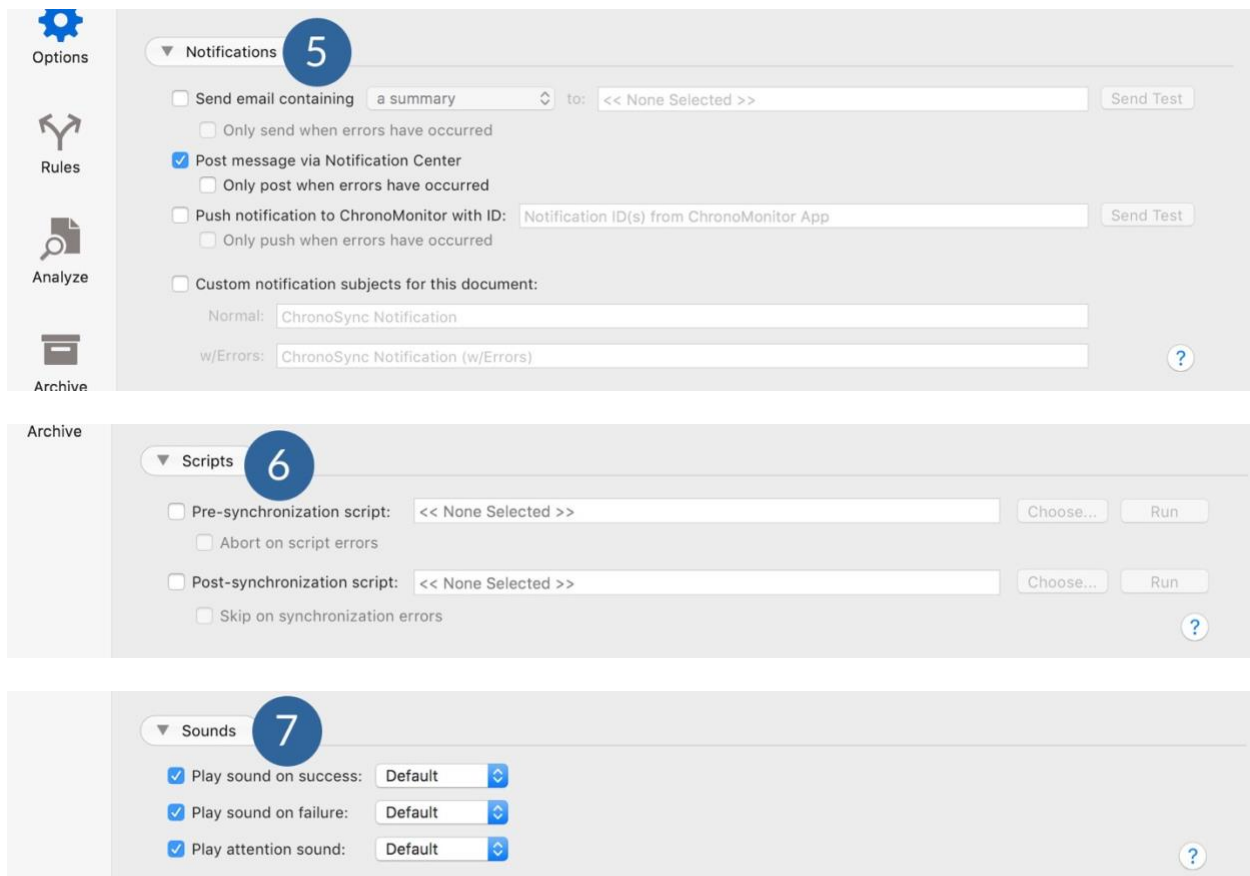
Package handling: Merge

Panel 3: Archive Handling

- Limit duplicates in archive to no more than 5 copies
- Purge files archived more than 180 days ago
- Keep at least 2 copies
- Compress files added to archive
- Copy files to archive instead of moving them

Panel 4: Sync Triggers

- Custom: Custom
- Data (files only):
 - Modification date (with allowed time difference: 1 seconds)
 - File size
- Simple Attributes:
 - Timestamps
 - Finder flags
 - HFS type/creator
 - BSD flags
- Complex Attributes:
 - Access permissions
 - Locked status
 - Owner/group
- Complex Attributes:
 - Filename case
 - Extended Attributes
 - Access Control List
 - Comments
- Always trigger



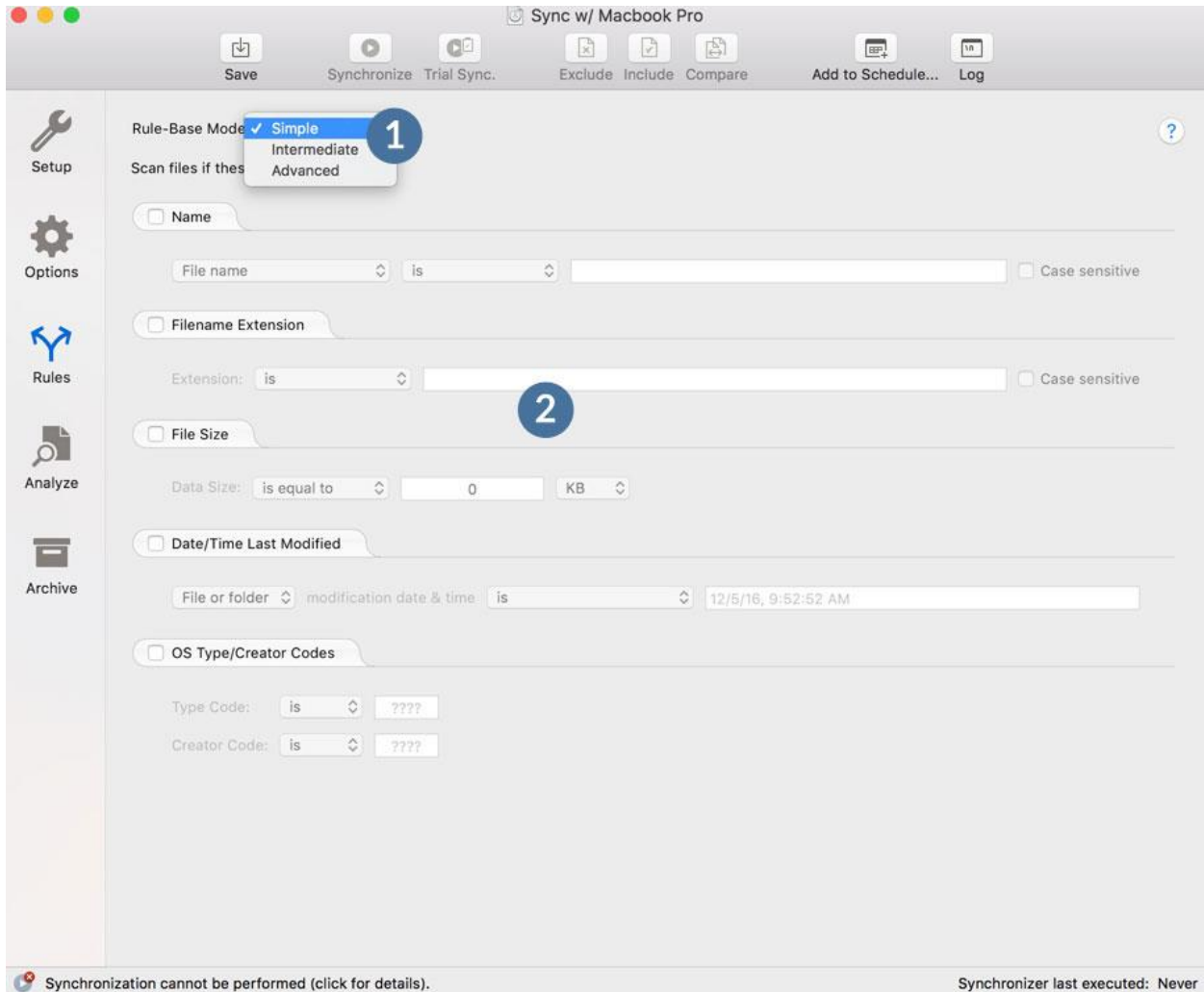
<p style="text-align: center;">1</p>	<p>Reporting & Error Handling - Options to define how ChronoSync reports information and handles errors, roll-backs, and conflicts.</p>
<p style="text-align: center;">2</p>	<p>Special File/Folder Handling - Options to define how ChronoSync handles special types of files and behaviors. This panel presents preset handling modes, selected via a popup.</p>
<p style="text-align: center;">3</p>	<p>Archive Handling - Options to define how the archiving of files are handled. Note that these options are only available if the "Synchronize deletions -> Move to Archive" or "Archive replaced files" options are enabled on the Setup panel.</p>
<p style="text-align: center;">4</p>	<p>Sync Triggers - Sync Triggers indicate what file attributes ChronoSync monitors to detect that a file has changed. This panel presents preset trigger modes, selected via a popup.</p>
<p style="text-align: center;">5</p>	<p>Notifications - Synchronization notifications can give you peace of mind after a synchronization runs. ChronoSync can post notifications to the</p>

	Notification Center or you can receive notifications in email or via a push notification.
6	Scripts - You can set up scripts to be executed either before or after a synchronization runs. ChronoSync can execute AppleScript files, shell script files and applications as a pre- or post- sync script.
7	Sounds - You can specify unique sounds to be played on error or successful completions and when your attention is needed.

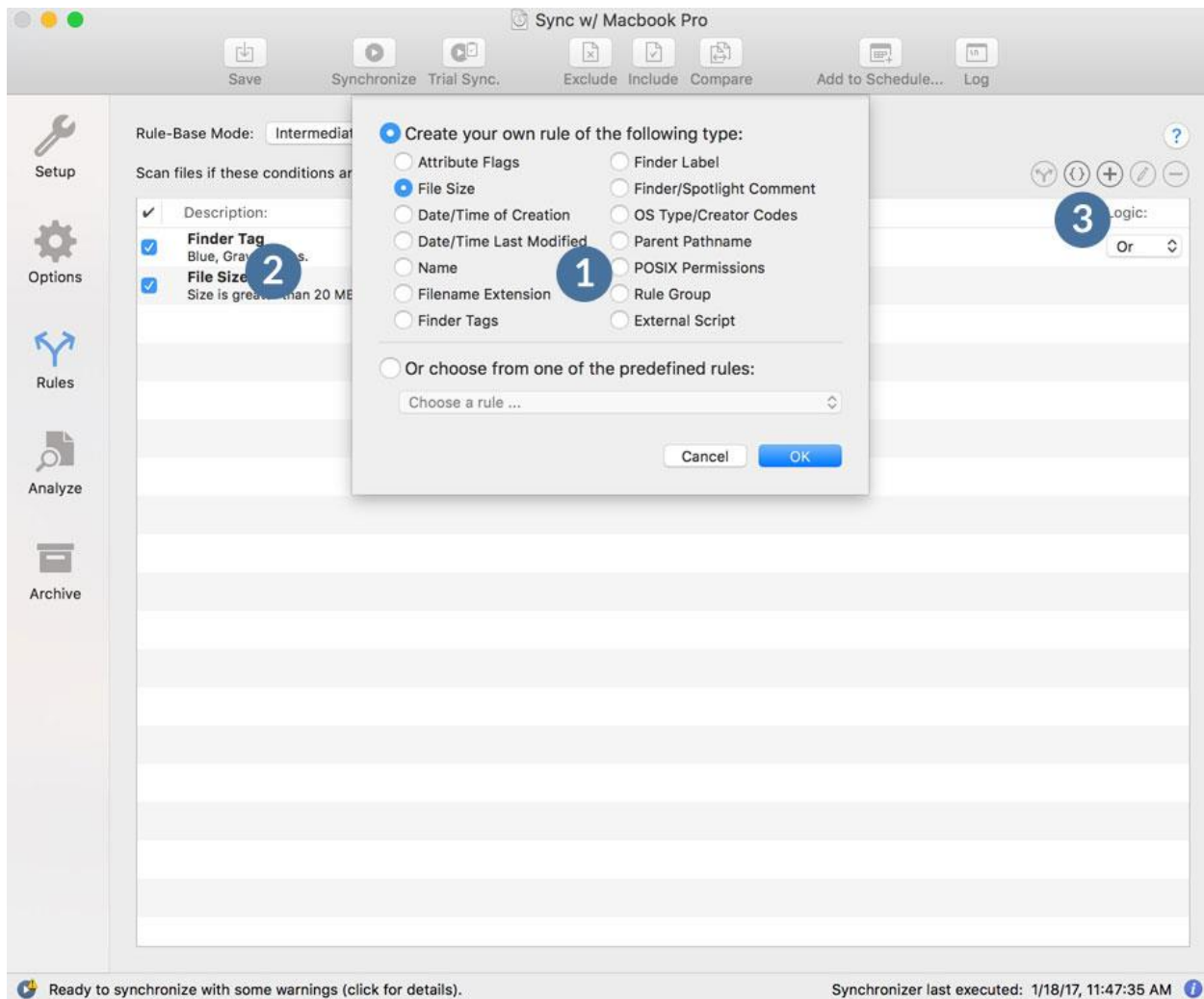
The Rules Panel

Defining rules is a powerful feature for narrowing down the scope of the synchronization. ChronoSync offers three different modes for the rule-base: “Simple”, “Intermediate”, and “Advanced.” It is important to understand that rules only determine what ChronoSync will consider for synchronization. This means that once a file passes a set of rules, ChronoSync will then examine the file to determine if it should be synchronized. If ChronoSync determines that the file in question has not been modified, it will not be synchronized.

Below are explanations and accompanying pictures for each rule base, detailing specific areas of each panel. There is a great amount of flexibility with rules and they can be very powerful in filtering files for synchronization.



<p>1</p>	<p>This is the menu to select which Rule panel to use.</p>
<p>2</p>	<p>Simple Rules - The “Simple” rule-based mode has five predefined rules in it: “Displayed Name”, “Filename Extension”, “File Size”, “Date/Time Last Modified” and “OS Type/Creator Codes.” All five rules are disabled by default. You can enable just the desired rules and supply the necessary criteria. The "Simple" rule-based mode is the quickest and simplest way to introduce rule logic into your synchronizations.</p>



<p>1</p>	<p>This is the sheet used to create rules in the Intermediate rule base. The “Intermediate” rule-base mode has no pre-defined rules. Instead, you must explicitly add rules to the rule-base. Unlike “Simple” mode, you have more than five rules to choose from. Furthermore, you can add the same type of rule multiple times (with different criteria, of course). The “Intermediate” rule-base mode uses <i>implied</i> inclusion/exclusion logic. This means that files that pass the rules in the “Intermediate” rule-base mode are considered for synchronization while files that fail the rules are never considered for synchronization.</p>
<p>2</p>	<p>Intermediate Rules – Once you create a rule from the sheet mentioned in #1, they are listed here.</p>

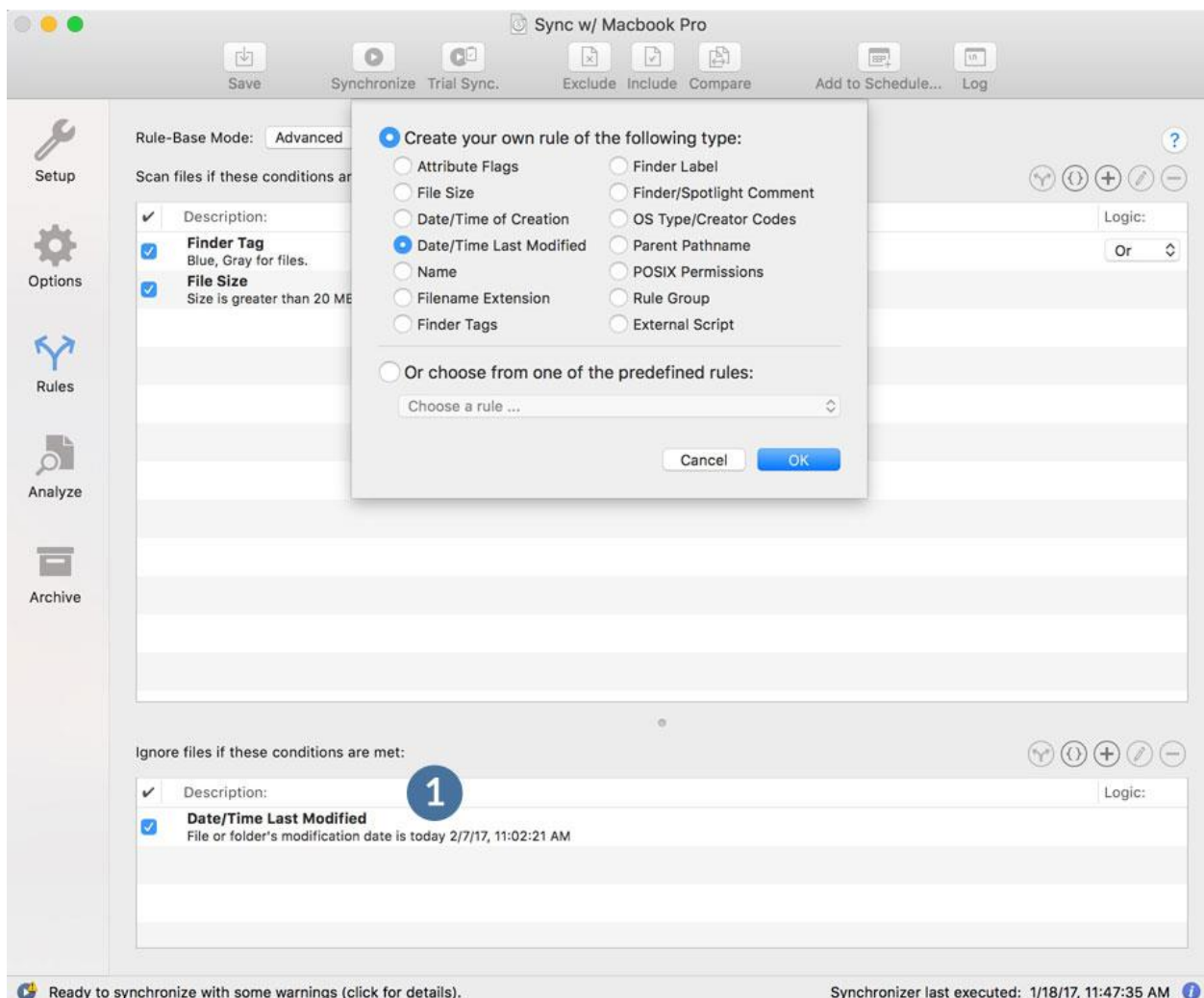
3

At the top right of the Intermediate rules panel, there is a set of buttons that aids with the listed intermediate rules. Add, edit, and delete are self-explanatory. The rule template and rule group buttons explained:

Rule templates allow you to assign certain rules as templates to be used for future set ups.

Rule groups act much like parenthesis do in a mathematical expression. A rule group is evaluated as a whole and the result is applied to the next rule or rule group in the expression. The entire rule group must evaluate to TRUE — and any other rules that may be set — for the file to be included or excluded.

Also at the top right of the Intermediate rules panel, there is a Logic menu. Rules can be evaluated by AND and OR relationships, depending on the value of this setting.



1

Advanced Rules – As you can see, the “Advanced” rule-based mode is similar to the “Intermediate” mode in that you can add any number or variety of rules. It differs from “Intermediate” in that it uses *explicit* inclusion/exclusion logic. This means that you can independently define rules that determine if a file should be considered for synchronization and/or excluded from or not considered for synchronization.

In the "Advanced" mode, rules are added to both an inclusion and an exclusion list. As mentioned above, the inclusion list contains rules that a file must pass to be considered for synchronization. The exclusion list, on the other hand, list rules that, if a file passes, excludes them from consideration. If using inclusion and exclusion rules together, the exclusion rules only apply to files and folders that pass an inclusion rule.

The Analyze Panel

Folder: Documents -> testing Show all entries




Source Target	Status	Destination Target	Δ Time:	Δ Size:	Last Synchronized:
Doxygen	→	Doxygen	∞		Never
Econ Office	→	Econ Office	∞		Never
Email Setup	→	Email Setup	∞		Never
Encode License	×	Encode License	∞		Never
In-app Trial Keys		In-app Trial Keys			1/18/17, 11:47:33 AM
InterConnex	→	InterConnex			1/18/17, 11:47:33 AM
Internet Presence	→	Internet Presence			1/18/17, 11:47:33 AM
iOS	→	iOS			1/18/17, 11:47:33 AM
JQuery	→	JQuery			1/18/17, 11:47:33 AM
Learning	→	Learning			1/18/17, 11:47:33 AM
License Key Lookup	→	License Key Lookup	∞		Never
Linux	→	Linux	∞		Never
Localization	→	Localization	∞		Never
Mac App Store	→	Mac App Store			1/18/17, 11:47:33 AM
Microsoft User Data	→	Microsoft User Data	∞		Never
Minion Reports	×	Minion Reports	∞		Never
Notifications	→	Notifications			1/18/17, 11:47:33 AM
Order Processing	→	Order Processing	∞		Never
PDLITIS	→	PDLITIS			1/18/17, 11:47:33 AM
Personal	→	Personal			1/18/17, 11:47:33 AM
Registration Keys	→	Registration Keys	∞		Never
Release Steps.rtf	✓	Release Steps.rtf			1/18/17, 11:47:33 AM

File/Folder Information:

Source Target	Destination Target
Name: In-app Trial Keys	In-app Trial Keys
Size: --	--
Kind: Folder	Folder
Created: 9/25/15, 11:45:06 AM	9/25/15, 11:45:06 AM
Modified: 2/16/16, 1:50:34 PM	2/16/16, 1:50:34 PM
Permissions: rwx r-x r-x [econ/staff]	rwx r-x r-x [econ/staff]

Configured and ready to synchronize. Synchronizer last executed: 1/18/17, 11:47:35 AM

The Analyze panel presents a hierarchal view of files contained in both targets. It shows the synchronization status of these files and provides helpful information concerning each file. It also allows commands to be quickly run on selected file pairs.

	At the top of the Analyze panel you'll find the "Folder" menu and "Show all entries" checkbox, both useful when navigating the targets' file structure. The "Folder" menu shows the relative path of the folder you are viewing. It's a quick way to jump up a level. When checked, "Show all entries" will display the list all files in the directory, included invisible files and files that are excluded by defined rules.
	In the Analyze list view, once a set of files is selected, various actions can be performed upon them. You can access these commands by right-clicking on a file pair and bringing up the contextual menu.
	The "File/Folder Information" is a good place to view the details of the selected file pair. Click on the '+' to expand the information area, showing greater detail.

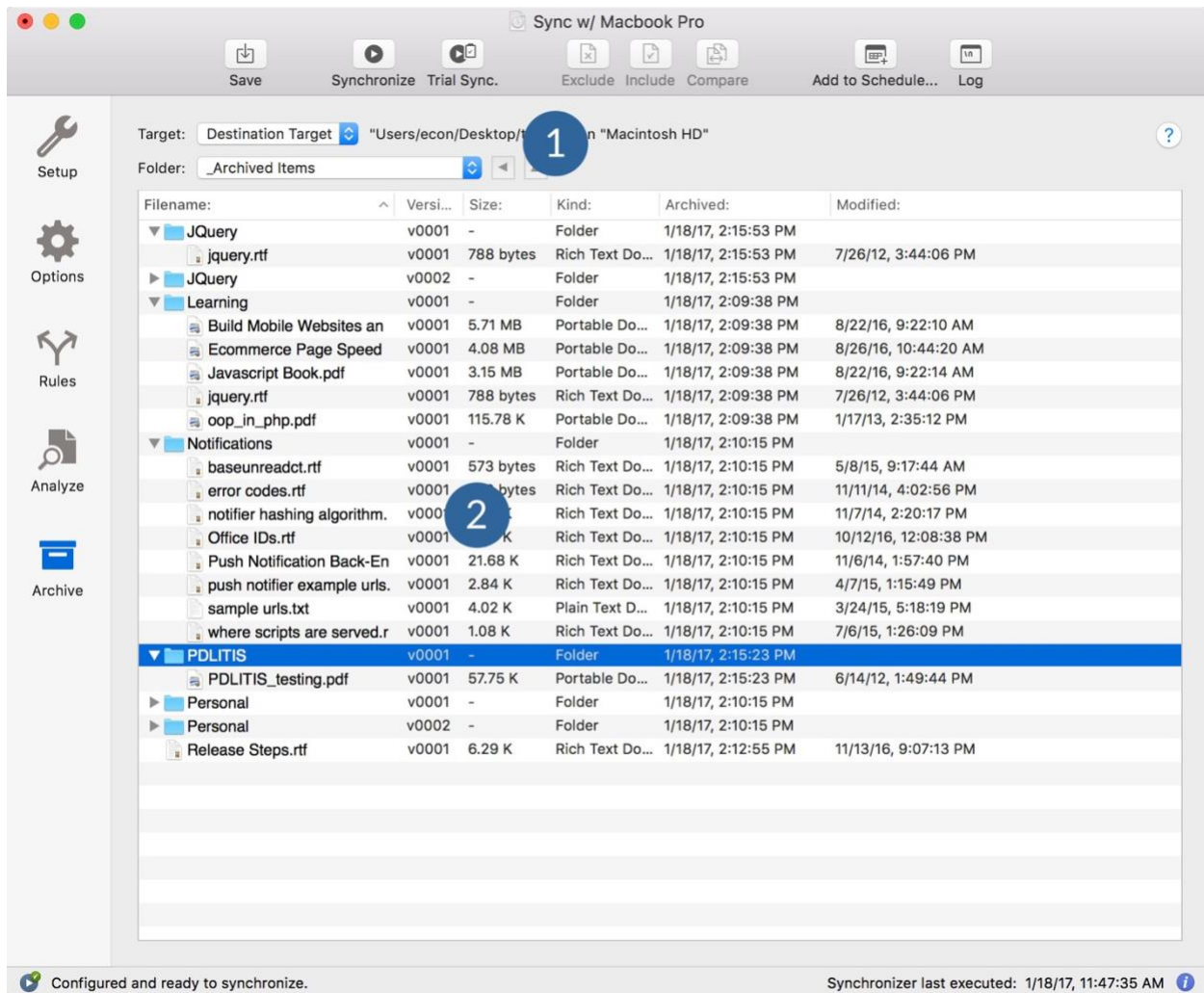
The Archive Panel

Archiving data refers to having multiple backup copies of your data that were made at various points in time. This maintains a 'history' of your data. The Archive panel presents a hierarchal view of the files placed in the Archive folder. This panel allows you to view and manipulate the contents of these files. Such actions allowed are review, delete and restore.

To activate the Archive panel, one of the following settings must be set. These settings can be found in the Setup panel:

- "Archive replaced files" or
- "Synchronize Deletions/Move to Archive"

Archiving behavior can be controlled in the Options panel. It is important to note that archiving files will consume disk space, so limiting the size of your archive is almost always something that you will want to do. Compressing files added to the archive is advantageous when space is an issue. Setting files to be compressed, though, will slow down the performance of the synchronization.



<p style="text-align: center;">1</p>	<p>At the top of the Archive panel you'll find the "Target" and "Folder" menus. The "Target" menu lets you choose which target's archive you'd like to view. The "Folder" menu shows the relative path of the folder you are viewing. It's a quick way to jump up a level.</p>
<p style="text-align: center;">2</p>	<p>In the Archive list view, once a set of files is selected, various actions — like Delete and Restore — can be performed upon them. You can access these commands by right-clicking on a file pair and bringing up the contextual menu.</p>

Toolbar Customization

All the tools necessary to manage your synchronizations and backups are available on the synchronizer task document toolbar. Choose "Customize Toolbar..." from the "View" menu to select the items that you would like to have on the toolbar. To place a new item, drag the desired tool to the toolbar. Once placed, the tools can be rearranged by dragging them to their desired location.

Drag your favorite items into the toolbar...

Save Synchronize Trial Sync. Exclude Include Compare Add to Schedule... Log

... or drag the default set into the toolbar.

Show Done



CHAPTER FIVE

TASK CONTAINER USER INTERFACE

A Task Container contains multiple synchronizer tasks, allowing you to control several tasks as if they were one.

The task container user interface consists of 2 panels: Options and Documents. Task containers have their own set of options and will override any similar option found in the contained synchronizer tasks.

The Options Panel

The screenshot displays the Options Panel for a task container, organized into four numbered sections:

- 1. Reporting & Error Handling:** Includes checkboxes for "Disable user interaction for errors & warnings" (unchecked), "Continue after synchronizer errors" (checked), and "Display summary after synchronization completes" (checked).
- 2. Notifications:** Includes options for "Send email concerning" (unchecked), "Post message via Notification Center" (checked), and "Push notification to ChronoMonitor with ID:" (unchecked). It also features input fields for "Normal:" (ChronoSync Notification) and "w/Errors:" (ChronoSync Notification (w/Errors)).
- 3. Scripts:** Includes options for "Pre-synchronization script:" (unchecked) and "Post-synchronization script:" (unchecked), each with a "Choose..." button and a "Run" button.
- 4. Sounds:** Includes checkboxes for "Play sound on success:", "Play sound on failure:", and "Play attention sound:", each with a "Default" dropdown menu.

1	Reporting & Error Handling - Options to define how the task container reports information and handles errors, roll-backs, and conflicts.
----------	---

2	Notifications - Task container notifications can give you peace of mind after a task container runs. ChronoSync can post notifications to the Notification Center or you can receive notifications in email or via a push notification.
3	Scripts - You can set up scripts to be executed either before or after a task container runs. ChronoSync can execute AppleScript files, shell script files and applications as a pre- or post- sync script.
4	Sounds - You can specify unique sounds to be played on error or successful completions and when your attention is needed.

The Documents Panel

The screenshot shows the 'Jen User Files to Blue' window in ChronoSync. The top toolbar includes buttons for Save, Synchronize, Add..., Remove..., Edit..., Add to Schedule..., and Log. On the left, there are 'Options' and 'Documents' sections. The main area displays a table of sync tasks:

Document Name:	Status:	Path:
<input checked="" type="checkbox"/> MBP Movies to Blue Passport BU.sync	Idle	/Users/econ/Library/Application Support/ChronoSync/Tasks/MBP Movies to Blue Passport BU.sync
<input checked="" type="checkbox"/> MBP Docs to Blue Passport.sync Last run: 1/11/17, 1:57:57 PM	Idle	/Users/econ/Library/Application Support/ChronoSync/Tasks/MBP Docs to Blue Passport.sync
<input checked="" type="checkbox"/> MBP Projects to Blue.sync Last run: 1/11/17, 1:58:00 PM	Idle	/Users/econ/Library/Application Support/ChronoSync/Tasks/MBP Projects to Blue.sync
<input checked="" type="checkbox"/> MBP Pics to Blue.sync Last run: 1/11/17, 1:58:04 PM	Idle	/Users/econ/Library/Application Support/ChronoSync/Tasks/MBP Pics to Blue.sync

4 item(s) contained in document. ?

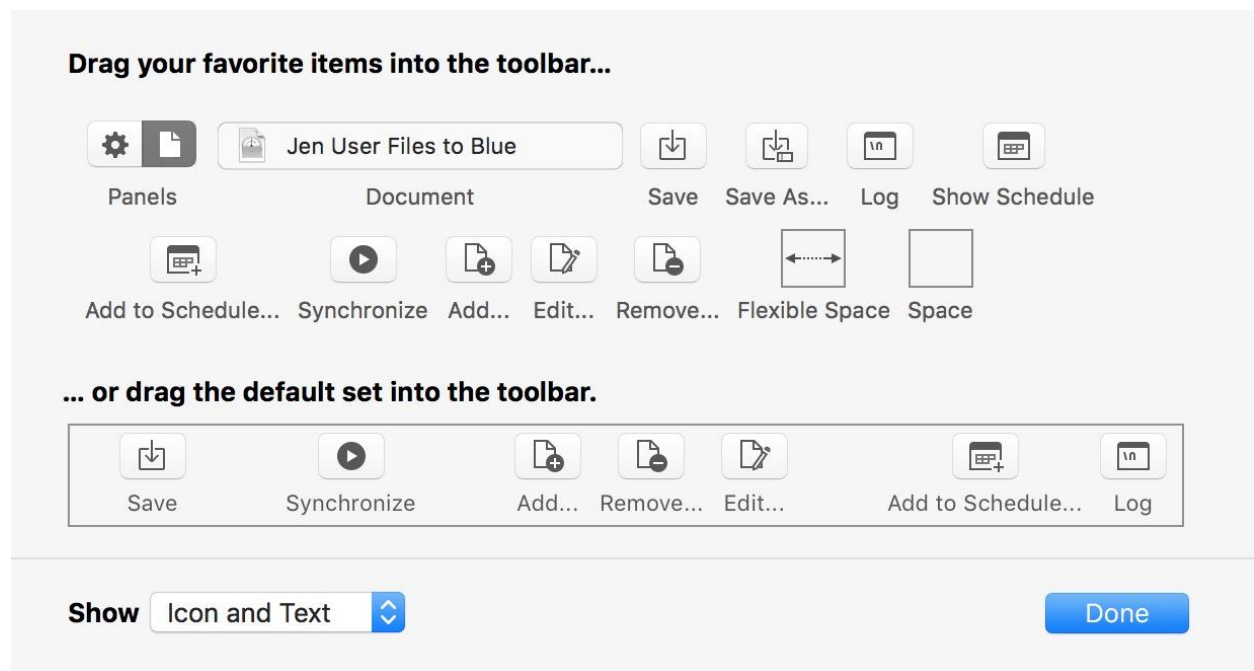
Container last completely executed: 1/11/17, 1:58:07 PM i

Tasks may be added to or removed from the task container by simply dragging them in and out or by selecting “Add...” or “Remove...” from the toolbar. Running a synchronization on a task container will execute each contained task in order. Just as with any other document based application, task container documents may be saved to disk.

Toolbar Customization

All the tools necessary to manage your task container are available on the toolbar. Choose “Customize Toolbar...” from the “View” menu to select the items that you would like to have on the toolbar. To place a new item, drag the desired tool to the toolbar. Once placed, the tools can be rearranged by dragging them to their desired location.

Drag your favorite items into the toolbar...



Drag your favorite items into the toolbar...

Panels Document Save Save As... Log Show Schedule

Add to Schedule... Synchronize Add... Edit... Remove... Flexible Space Space

... or drag the default set into the toolbar.

Save Synchronize Add... Remove... Edit... Add to Schedule... Log

Show Done



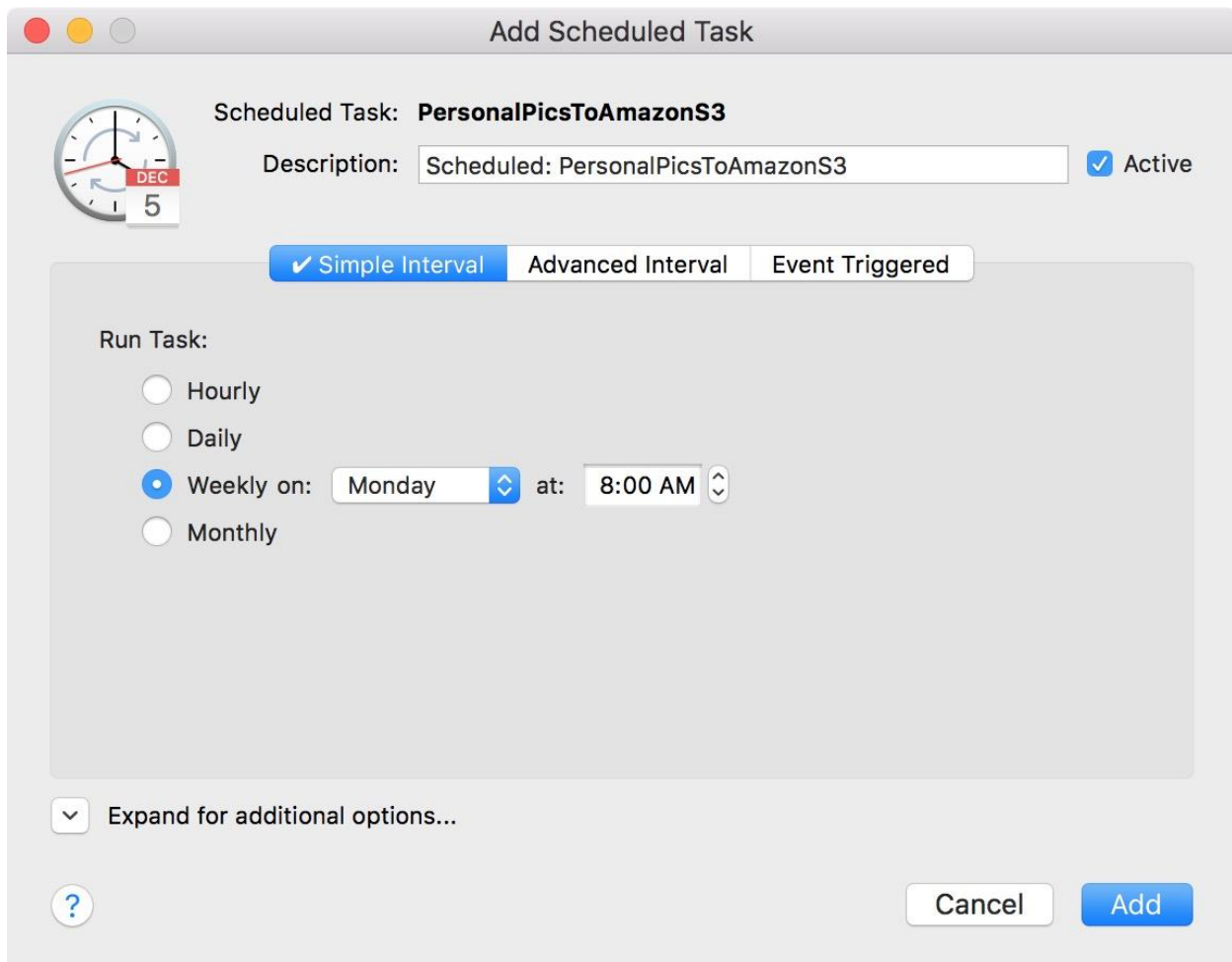
CHAPTER SIX

SCHEDULED TASKS

Setting up a Schedule

The “Chrono” in the name ChronoSync comes from the fact that synchronizations can be scheduled to run automatically at any time of the day. ChronoSync offers very sophisticated scheduling capabilities. You can schedule any number of tasks (synchronizers and containers) so they run automatically. You can even schedule the same task to run twice, at different intervals or on different days.

There are a handful of ways to create a schedule in ChronoSync: On the task itself via the “Add to Schedule...” toolbar option, by selecting the task in the ChronoSync Organizer and choosing “Schedule...”, in the Scheduled Tasks Manager and via a [Modifier Assistant](#). The Scheduled Tasks Manager window is where scheduled tasks are managed. It can be found by choosing “Scheduled Tasks Manager” from the “Window” menu.



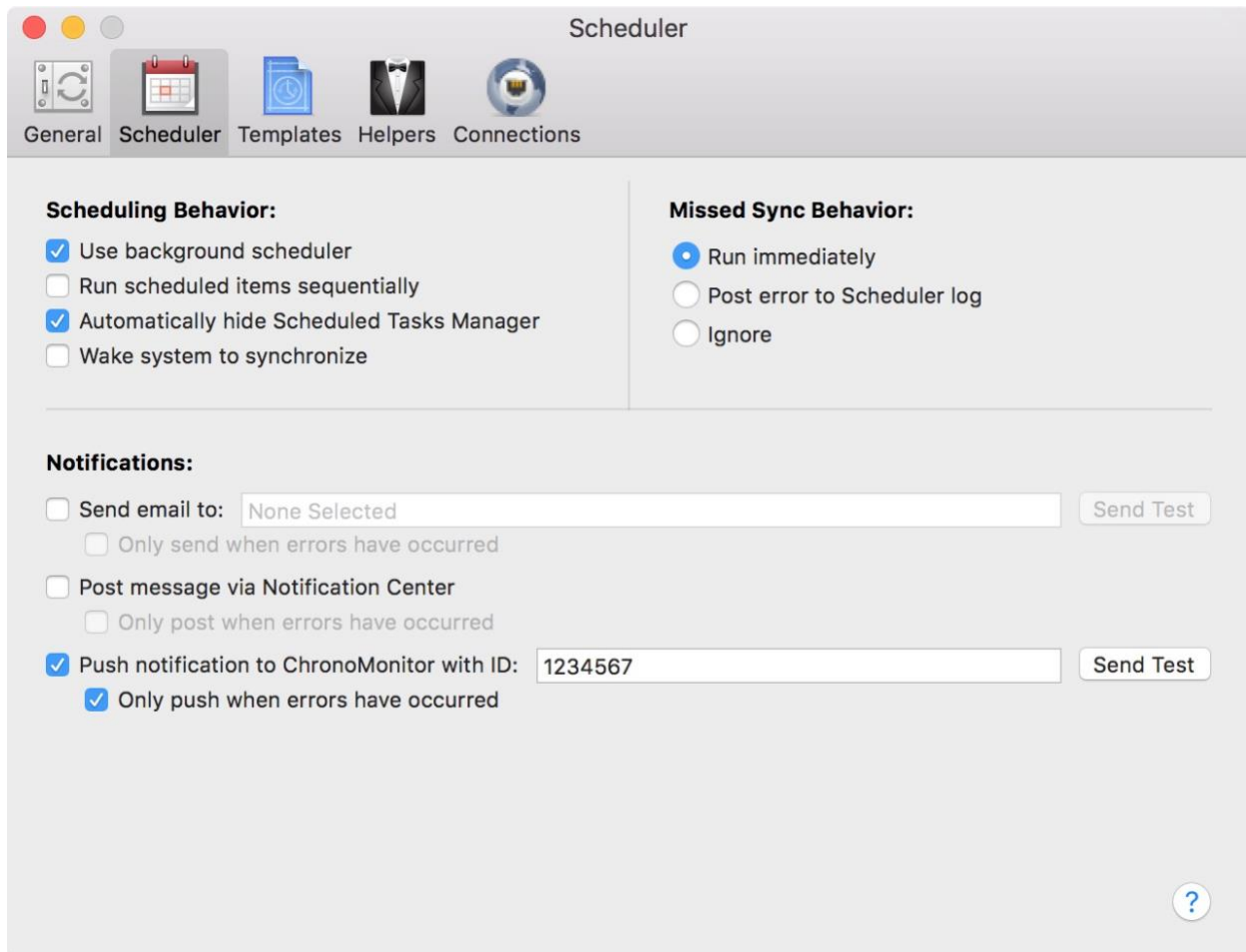
The “Add Scheduled Task” window has a handful of options to consider when setting up the schedule. The scheduling options are extremely flexible to handle almost any scenario. You can set the schedule to run at specific times each day, week, or month. You can even schedule tasks to run after ChronoSync launches or before ChronoSync quits. If your task targets a ChronoAgent or mountable volume, you can choose to run the schedule when the ChronoAgent becomes available or when the volume mounts. ChronoSync is also able to scan the targets for changes in the filesystem and synchronize when a change is detected.

Aside from the “when to run” options, there are also general scheduler options. Say you have a very large set of data you wish to synchronize overnight, while you sleep. You schedule it to begin at midnight and, knowing that you start your morning in the office at 9:00, you set “Abort if still running at” to 9:00 so that you can use your computer without ChronoSync running in the background. When you go to bed later that night, your synchronization will again run from 12:00 to 9:00. There is also a “Prompt user before running option” that will await your approval before starting the synchronization. This would be good to set if you don’t always go to bed at midnight and, instead, stay up later to get some work done. When prompted, you can tell the scheduler to skip the synchronization so that you can continue to work without ChronoSync’s interference.

This is just one example of how to use a couple of the general scheduler options. These options are explained in greater detail within the ChronoSync Help files. Click on any question mark on the user interface and check out the “Adding a Schedule” page in the “Scheduling” section for a more thorough explanation of each option.

Scheduler Preferences

To define the behaviors of the scheduler, visit the Scheduler Preferences. Here, you can control how missed synchronizations are handled, be notified once a scheduled synchronization completes, be notified of any errors that occur, and handle general synchronization behaviors.



Background Synchronizations

ChronoSync does not have to be running for a scheduled synchronization to occur. ChronoSync automatically installs a separate program called the ChronoSync Scheduler, which quietly and silently monitors the scheduled items database. When a scheduled task is due to occur, the scheduler will launch ChronoSync, instruct it to do its job, and then quit ChronoSync, all without requiring user intervention. It does this in a manner that won't affect any work you are performing in another application.

Utilizing the ChronoSync Scheduler is the default behavior. If, for some reason you do not desire this behavior, you can disable it via the Scheduler panel in ChronoSync's Preferences (located under the "ChronoSync" application menu). Simply turn off the "Use background scheduler" option. The "Use background scheduler" preference setting dictates whether or not the ChronoSync Scheduler is installed to run all the time, even when ChronoSync is not running. With this option OFF, the ChronoSync Scheduler is only running when ChronoSync is running and thus ChronoSync must be running in order for scheduled synchronizations to occur.

Sequential vs. Concurrent Execution

When two tasks are scheduled to run at the same time, ChronoSync will perform the synchronization in the order that they appear in the Scheduled Tasks Manager (top to bottom). This is called *sequential* (in-order) execution. If there are dependencies between synchronizations, and you have scheduled multiple tasks to occur simultaneously, you may want to enable sequential execution to ensure the proper order of execution in the Scheduled Tasks Manager. To modify the order, simply click-and-drag the entries. When you do so, a divider line appears where the entry will be placed if you were to release the mouse. To enable sequential execution, visit the Scheduler pane of ChronoSync's Preferences. Turn ON the setting labeled "Run scheduled items sequentially."

If there are no dependencies between tasks, and you have scheduled multiple tasks to occur simultaneously, you may want to execute your tasks concurrently (simultaneously). Concurrent execution will take advantage of macOS's multi-threading capabilities. It will generally result in faster synchronizations, especially if you have a computer with multiple CPUs (*disclaimer: Your mileage may vary here. The speed of your synchronizations is completely dependent on the capabilities of your hardware and nature of your synchronizations.*) To enable concurrent execution, visit the Scheduler pane of ChronoSync's Preferences. Turn OFF the setting labeled "Run scheduled items sequentially."

Waking from Sleep

If you schedule your tasks in the middle of the night, there is a good possibility that your computer may be asleep at the time. *Sleep* is a low power mode in which the contents of the computer's memory are retained, but no application programs are actually running. Many users configure their computers to go to sleep after a certain period of inactivity.

If your computer is asleep when it's time to run a task, there is no way for the scheduler to perform that task because all programs are suspended while the computer is asleep. Fortunately, however, ChronoSync has the ability to program your computer to wake itself up when the time draws near to run a task. This is called the *wake system to synchronize* feature.

Wake system to synchronize is disabled by default. To enable it, visit the Scheduler pane of ChronoSync's Preferences.

Note: Once you have enabled this feature, you typically will not have to re-enable it. ChronoSync will correctly handle any changes made to your schedule after enabling this feature. From time-to-time, however, ChronoSync may “lose” the authorization to wake the computer up. This will typically happen after installing a new version of ChronoSync or perhaps upgrading your system software. If such occurs, the ChronoSync Scheduler will display a dialog informing you of the situation and you’ll have to re-visit Preferences to turn this feature on again.

Scheduler Notifications

Scheduler notifications get sent by the scheduler in response to scheduled runs of individual tasks and are independent of any notifications that the tasks themselves may be sending. You can choose to send a notification every time a scheduled task is run or only when errors occur during the scheduled task. Notifications can be sent by email, via the Notification center, or by a [ChronoMonitor](#) notification.

To gain an understanding of how a scheduler notification differs from a task notification, consider when a task document is stored on an external drive but that drive is not mounted at the time its scheduled execution comes due. The scheduler will not be able to start it so any notifications configured within the task itself will fail to send. The scheduler itself can send a notification of the failure, however.



CHAPTER SEVEN

ADVANCED CONCEPTS

There are so many powerful features you can take advantage of within ChronoSync. This section is geared for those more advanced users who are interested and willing to push ChronoSync to the limits. This section covers some advanced concepts in synchronization.

Note: If you encounter a specific situation not covered in this manual, use our [online support form](#).

The ChronoSync Difference Engine

The ChronoSync Difference Engine (CDE) is a core component of the ChronoSync application. The CDE is comprised of 1) a database containing a snapshot of a pair of file systems and 2) a set of algorithms used to analyze and maintain that snapshot. When ChronoSync performs its initial scan of a pair of targets, it collects information regarding all the files and folders contained in those targets. It then updates the CDE database with all this collected information. This database gets stored within the task document. Subsequent synchronizations and backups correlate the current state of the target file systems with the recorded state in the CDE database. The CDE algorithms then determine exactly what items need to be copied based on the user configured settings in the task document. More information on the ChronoSync Difference Engine can be found in the following tech note:

<https://www.econtechologies.com/chronosync/TN-CS-difference-engine.html>

Change Detection

ChronoSync detects changes differently from how most other synchronization programs do so. Because of this, we've prepared a simple primer on the logic employed for change detection. Understanding just how ChronoSync detects file changes is very useful when configuring synchronizations. This understanding will also help with the advanced concepts presented in this chapter.

The technique employed by ChronoSync for change detection is called *relative state analysis*. In a nutshell, what this means is that ChronoSync compares the current state of a given file against the last known state of the same file — the comparison is *relative* to the last known *state*. For example, if the current modification date of a file is January 13th, 2018 12:15 PM, but the last known modification date of the file is January 19th, 2018 7:45 AM, ChronoSync determines that the file has changed, even though the current modification date is older than the last known modification date. By monitoring for changes relative to the last known state, ChronoSync can detect changes in various scenarios that would go undetected (or worse, detected the wrong way) by simply comparing the files in each target against each other.

Collection

The first time ChronoSync encounters a file, as in your initial synchronization or when a new file has been created in a target, that file is in an *uncollected* state. This means that ChronoSync has never encountered this file before and thus has no reference information to compare it against. In such an instance, ChronoSync has no choice but to compare the file against its *counterpart* — the same file in the opposite target. If a difference is detected, the file is tagged

for synchronization. After synchronization occurs, or if the counterpart was determined to be identical, ChronoSync *collects* information on both files in the file pair. Once it does this, ChronoSync will have recorded the last known state of both files and will employ relative state analysis for each subsequent synchronization.

Note: You can tell if ChronoSync has collected the state information for a file pair if the “Last Synchronized” column in the Analyze panel contains a date and time.

The Last Identity Test

When ChronoSync determines that a file has changed relative to its last known state, before it goes ahead and tags that file as needing synchronization, it will perform one last test between the actual files on each target. Basically, it tries to determine if the files stored in each target possess the same attributes as each other. If so, it simply updates the information it has recorded on the files and moves on without synchronizing the file pair. This prevents unnecessary synchronizations from occurring in instances where you may have manually copied a file from one target to another using the Finder or another program (which may be ChronoSync via another task).

Deletions

Relative state analysis makes it very easy for ChronoSync to detect deletions. In some synchronization programs, deleting a file from one of your targets may result in its counterpart getting copied back over the deleted copy. ChronoSync, however, can easily detect the deletion because a file for which it has previously collected state information simply doesn't exist anymore — a clear sign that it has been deleted!

Triggers

Using a file's modification date as the criteria for determining whether or not a file has changed is by far the most common and universal method for detecting file changes since the operating system automatically updates a file's modification date when data is written to it. However, there is some information about files that aren't stored within the file itself but are necessary to synchronize. This information is known as *metadata* and it covers pieces of information such as who owns the file, its access permissions, its Finder color tag and whether or not its file extension is hidden, to name a few. ChronoSync can detect changes to a file's metadata. Exactly which metadata ChronoSync should monitor for changes are user definable and are called *triggers*.

You can mix and match which attribute changes will trigger a synchronization. This is useful in situations where you may simply not care about changes to certain metadata or when you are synchronizing to a device that does not support certain metadata and/or cannot support it reliably. An example would be a file server for which there is no way to maintain the same owner/group membership as your local machine.

Anomalies?

While relative state analysis produces more accurate synchronizations than alternate approaches, there are times when it may appear that it is not synchronizing a file pair accurately. In such a case, for instance, you may have selected a file pair in the Analyze panel that ChronoSync indicates is synchronized with each other (a check-mark for status), yet clearly, the detailed file information displays a discrepancy. The cause for such a discrepancy could be many things, but is usually one of the following:

Discrepancy #1: Incapable File System

Not all file systems are created equal. Most non-HFS/APFS file systems, in fact, cannot associate all of the metadata that macOS associates with its files. In such cases, ChronoSync will attempt to apply the metadata to the destination file, but if the file system doesn't support it, nothing more can be done. However, since ChronoSync records the last known state of the destination file, it will know that the file cannot retain all of the properties of the original. Thus, it won't consider the discrepancy a problem — it may be a 'problem' in the purest sense of the word, but it isn't a 'problem' that ChronoSync, or any other application, could do anything about!

Note: Most external Thunderbolt and USB drives are shipped pre-formatted with a Microsoft Windows-specific file system. This filesystem is accessible by macOS but does not support all of the metadata that HFS/APFS supports. Unless you need to share such drives with Windows based computers, they should be reformatted with the HFS-Extended/APFS file system using Disk Utility. See our ['Formatting and Partitioning Hard Drives'](#) guide for more information.

Discrepancy #2: Source File Hasn't Changed

If performing a unidirectional (left-to-right or right-to-left) synchronization, and ChronoSync has collected information on a file pair, all that ChronoSync cares about is whether or not the source file has changed. For example, if synchronizing left-to-right and you modify a file on your right target, ChronoSync will still list that file pair as in sync. This is because the file in your left target (your source target) hasn't changed at all, and its counterpart, which has changed, is newer than your source. If you were synchronizing bidirectionally, however, ChronoSync would indicate the file pair as out-of-sync and needing to be copied right-to-left.

Note: It is possible to configure ChronoSync so that it would detect the file pair in this example as out-of-sync. Setting up this synchronization as a Mirror operation would do this.

Baseline Synchronizations

A baseline synchronization goes through all the steps normally performed by a full synchronization, but it doesn't actually synchronize any files. It collects the states of all files in

your targets, saving this recorded information in the task document. Baseline synchronizations are invoked using the “Baseline scan...” command in the “Action” menu.

Baseline synchronization is useful when starting with two targets that already contain a set of files that you consider synchronized. For example, suppose you used the Finder to copy all your files over to an external Thunderbolt hard disk that is formatted using a Microsoft Windows compatible filesystem. As mentioned previously, numerous pieces of metadata will not get associated with the copied files. If you then use ChronoSync to set up a synchronization, it will detect countless file differences because of the fact that metadata was not correctly associated with the files. Rather than isolate and disable the trigger associated with the metadata discrepancy, you can simply perform a baseline synchronization — ChronoSync will collect state information on every file and use that for its relative state analysis on all subsequent synchronizations.

Another popular use of a baseline synchronization is when configuring a Blind synchronization to function in a blind backup capacity. You may initially want to start with an empty target. The only way to prevent ChronoSync from copying all files to your empty target on its initial synchronization is to perform a baseline synchronization first.

Note: Baseline synchronization performs a specific role that is useful only in very specific and advanced scenarios. You do not need to invoke this function for so-called “ordinary” synchronizations. If you do not understand this feature, but feel you may need to use it, [contact support](#) and we’ll help determine if a baseline synchronization is necessary.

Extended Attributes & Access Control Lists

ChronoSync supports both *Extended Attributes* and *Access Control Lists*. Extended Attributes are arbitrary pieces of information that you can attach to any file. The information can be small — such as a version number — or large — such as PDF data containing an entire user manual on how to use the file it is attached to.

Access Control Lists are an extension to the standard UNIX access model. They provide much finer-grained control over what users and groups can access specific files. They can also override standard user/group access limitations.

Whenever possible, ChronoSync will try to preserve extended attributes and access control lists. There are occasions such as when communicating with a foreign file system and/or file server, that such preservation is not possible. In this instance, you may want to enable the “Ignore extended attribute and access control list errors” option in the “Reporting & Error Handling” group in the Options panel or else a large number of files may report errors when synchronized.

Package Files

In macOS, packages are simply folders disguised to look like single files when presented in Finder. The most common examples are applications. Within an application's package file, you may find property lists, icons, string files, resources and any other supporting files necessary to run the application.

By default, ChronoSync presents and treats packages as single files, not folders. Thus, when ChronoSync detects a package file has changed, it really means that some file within the package has changed and that when ChronoSync copies a package file, it is actually copying a folder and all its contents.

If you wish to change how ChronoSync handles package files, make a selection in the "Package Handling" menu under "Special File/Folder Handling" in the Options panel. 'Standard' treats packaged files as a whole, 'Merge' attempts to merge changes of the packaged files, and 'Dissect' treats packaged files as regular folders and examines their content.

In addition to synchronizing package files, you also have the option of selecting a package as one of your targets. This is useful for cases where packages are used to store massive amounts of data, such as Photos libraries and such. To do this, choose the "Allow package selection" option in the file selection sheet.

More information on package files and how ChronoSync handles them, check out our tech note ['The Package Conundrum'](#).

File Comparison Helpers

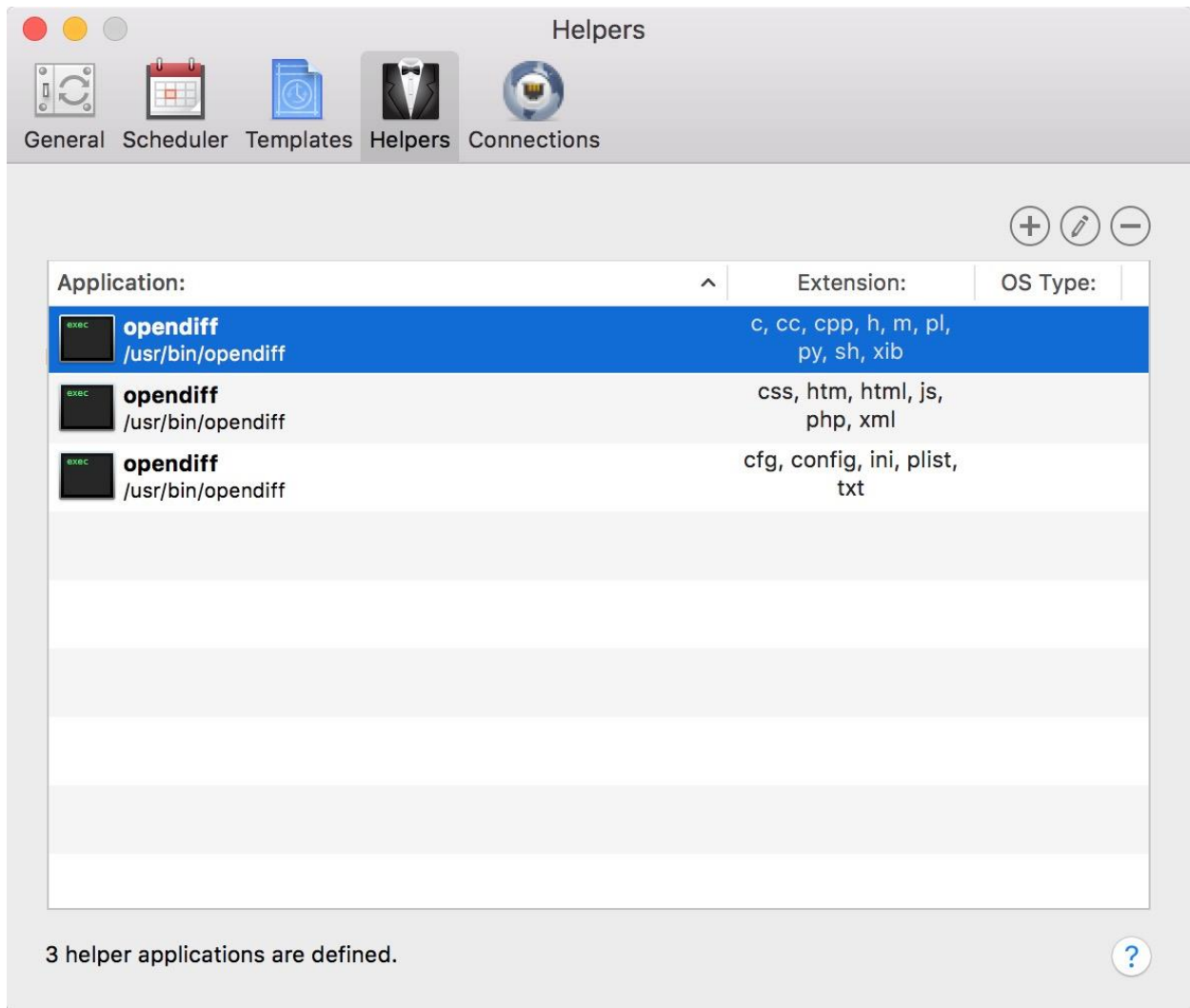
The purpose of file helpers is to give you the ability to select the desired application that should be used to open the specified types of files when the "Compare" function is chosen from the Analyze panel or in the Conflict Resolution sheet. The Compare feature works by opening both files simultaneously so you can compare them side-by-side.

In ChronoSync, you can define comparison helpers to override the default application used to open a file or when the file has no default application. If you wish to use the file's default application, then no file helper entry needs to be created.

The following is the logic that is used to determine which application will be launched when the "Compare" function is chosen:

- First the file helper database is scanned for a helper associated with the file's extension.
- If no helper is found, then the file helper database is scanned again. This time it is scanned for a helper associated with the file's type/creator code (if they are defined).

- If no helper is found, then an attempt is made to determine the default application that is used to open the file (i.e. the application that would launch if the file were to be double-clicked on in Finder).
- If no default application is found, then an alert is sounded and the file will not be opened. In this case the user must set up a File Helper in order to use the "Compare" function.



You may add, edit or remove entries in the file helper list. When adding or editing an entry, the file helper editor sheet window appears. Below is an explanation of each property in the file helper editor sheet window:

Application:

Drag file here to capture attributes...

Filename Extension:

OS Type Code:

Drag file here to capture attributes...

Application

This is a read-only field that displays the complete path of the application selected. The area surrounding this field is also a drop-zone allowing you to drag an application to the area rather than using the accompanying "Choose..." button. The selected application's icon and name will appear in the "Application:" column of the File Helpers list.

Choose...

This will open the Open File dialog and allow you to select the desired application that should be used to compare the specified type of files.

Filename Extension

This is used to specify the filename extension that a file must have in order for the specified application to be used when opening the file. The filename extension is not case-sensitive. The chosen filename extension will be displayed in the "Extension:" column of the File Helpers list.

OS Type Code

This is used to specify the OS type that a file must have in order for the specified application to be used when opening the file. The OS type is case-sensitive and must be 4 characters long. The chosen OS type code will be displayed in the "OS Type:" column of the File Helpers list.

Note: The area surrounding the “Filename Extension” and “OS Type Code” fields is a drop-zone for drag operations. This allows you to drag a file to the area, drop it, and have these fields automatically populated with the information that is derived from the file.

Archiving

Archiving data refers to having multiple backup copies of your data that were made at various points in time. This maintains a ‘history’ of your data. Archiving is often important since not all changes are necessarily improvements. After toiling with a spreadsheet for a week, for instance, you may come to realize that all you’ve achieved is really screwing up the formulas — if only you could start over with last Friday’s version!

With archiving, it is possible to restore old files that you may have accidentally (or intentionally) deleted or overwritten. Within the Archive panel, where these files are listed, the *Restore* operation can be performed to restore old files to their original location or any other location specified on the hard disk. Restoration can be accomplished by choosing “Restore...” from the Actions menu or by customizing your toolbar and choosing the “Restore...” toolbar icon.

Archiving is used as a way to maintain a collection of files that have been deleted or overwritten by the synchronization process. It’s good to use when using ChronoSync as a backup utility. Using archiving capabilities assures that older files are still available. It essentially allows you to go back in time to view older files.

In the Archive panel view, you are able to expand/collapse folders, select files, perform actions and tunnel into a folder path. You can also sort and re-arrange the columns. The Archive panel allows you to view all of your archived files and lists information about the files. Note that a separate archive is maintained for both targets. You can select which one you wish to view from the “Target” pop-up menu at the top of the Archive panel. You can also open, restore and delete files directly from the list by control-clicking on a file selection.

There are two archiving instances worthy of mentioning: deleted files/folders and overwritten/replaced files/folders.

Deleted

If the “Synchronize Deletions” option is turned on in the Setup panel and a file is deleted from one target, ChronoSync will delete that file from the other target. If the “Move to Archive” option is selected, the deleted file will be moved to the archive where it can later be retrieved.

Overwritten/Replaced

If a newer file or folder exists in one target, ChronoSync will replace the older file with the newer file. If archiving, the older file will be moved to the archive where it can later be retrieved.

Archive Handling Options

ChronoSync offers archive handling options to help with the maintenance of the archived items. These are located in the Options panel, under “Archive Handling. The “Limit duplicates in archive to no more than # copies” will act as a maximum number and will always keep no more than the listed number of versions of a file archived. The “Purge files archived more than # ago” will remove files when their archive date matches the time listed. If both features are used, the “Limit Duplicates...” feature will take precedence.

With the above options enabled, you can expect very little overhead during the archiving process. However, if you turn on compression and you copy rather than move files to the archive, you can expect a more time-consuming process. Copying files to the archive instead of moving them should only be done if your destination filesystem does not properly support file-move operations.

Note: It is important to understand that archiving requires additional hard disk space to accommodate the extra files.



CHAPTER EIGHT

TARGET CONNECTIONS

Connecting to File Servers

Using ChronoSync to connect to a file server is a popular way to synchronize data between two computers or to backup your data in a central repository. You typically connect to a file server via a wired connection, such as Ethernet, or a wireless connection, such as Airport. Once connected, the remote computer appears as a volume on your desktop. You can specify this volume or, more likely, a folder within this volume as one of your targets in a synchronizer task.

Regardless of the physical connection method, one of the two computers will have to be set up to allow the other to share files. If you are synchronizing with a central file server, your server's administrator will have to set up a user account and password for you. Once this is provided, you may skip ahead to [Connecting Via File Sharing](#), later in this section.

However, if you are connecting directly to another computer, you must enable *file sharing* on one of your computers. Either computer can have file sharing enabled, but you will have to do so on the machine that will not be running ChronoSync. Thus, if you have a desktop/laptop configuration, and prefer to run ChronoSync from your laptop, you'll have to configure file sharing to be enabled on your desktop machine.

Enabling File Sharing

To enable file sharing, launch "System Preferences" and choose the "Sharing" pane. If "File Sharing" is unchecked, turn it on by clicking the checkbox in the list (you may have to authenticate first). When file sharing is enabled, a descriptive message on the Sharing pane provides information on how you can connect to this computer — you may want to make a note of this. Once file sharing is turned on, it will remain on, even between restarts of the computer. The only way to turn it off is to revisit the Sharing preferences panel and turn it off.



Connecting Via File Sharing

The next step is to connect to the shared computer from your other machine. For the sake of this example, we will assume you are doing so from a laptop computer. To do this, open a Finder window and look under the “Shared” group in the sidebar to find a list of servers.

A list of all available computers should appear, among which should be your desktop machine. Select it and click “Connect As...”. You will be prompted for a name and password.

You should use the same name and password used on the desktop machine as your local user — thus if your username on the desktop machine is “jdoe”, that is what you should specify when connecting to your desktop machine via file sharing. This ensures you have access and privileges to all your local documents. After doing this, a new icon will appear on the sidebar in Finder windows. This icon represents your shared computer and you can open it and navigate the folders, just as if they were stored on your laptop.

Automatically Connecting to File Servers

The steps above show you how to enable file sharing, connect to a shared computer and specify the files on a shared computer as one of your targets. When you select a folder on your shared computer as one of your targets, ChronoSync automatically identifies that the target is residing on a file server. ChronoSync then records information that it can use to automatically re-establish the connection to that file server when performing synchronizations in the future. Seamlessly performing this operation requires a little more information from you, however.

The first thing you need to decide is how will ChronoSync log in to your file server. There are three options:

No Login

ChronoSync will not attempt to connect and login to your file server. In such situations, it is your responsibility to connect to the file server before asking ChronoSync to perform a synchronization.

If this option is desired, you will have to explicitly instruct ChronoSync that it should not try to automatically connect to the file server. Doing so is simple. When you specified your file-server based target in the Setup panel, an “Options...” button appeared below the “Choose...” button in the respective target box. Click the “Options...” button to see a list of server mounting options. You’ll see an “Attempt to mount server” option. Turning this option OFF is all you must do to instruct ChronoSync to never attempt to connect to the selected file server when working with this task.

Keychain Based Login

ChronoSync will automatically attempt to connect and login to your file server, but it will do so using a name and password that has been added to your user's keychain.

The *keychain* is an operating system feature that serves as a repository for various services that require user authentication. It is a handy way to store names and passwords for various services and has the advantage of allowing the user to lock or unlock all entries in the keychain in a single step.

Instructing ChronoSync to connect to a server using a keychain-based name and password requires no extra configuration in ChronoSync — it is the default technique that ChronoSync uses to connect to file servers. When you specify a target that resides on a file server, ChronoSync assumes it should automatically attempt to connect to that file server and it should do so using a keychain-based authentication.

The extra steps that you do have to take, however, involve adding your name and password to the keychain. This is purely optional — if you don't take these steps, ChronoSync will present you with a name and password authentication dialog whenever it is attempting to connect to a file server. If you correctly supply this information, a connection will be established and synchronization may proceed. If not, the synchronization process will be aborted.

If, however, you want to add your name and password to the keychain, you must take a couple extra steps. These steps are taken when you initially connect to your file server. First, you must follow the steps presented earlier in the [Connecting Via File Sharing](#) section (if you are presently connected to a file server, you should *dismount* it by ejecting its icon). Once presented with the login dialog (where you specify a name and password) you will notice the “Remember this password in my keychain” checkbox at the bottom of the dialog. Choose this. You may then proceed to log in. If successful, the name and password you specified will be added to your keychain. You must then specify the logged in file server, or a folder on that server, as one of your targets in ChronoSync. Forever after, ChronoSync will attempt to connect to the file server using the name and password you just added to your keychain.

Direct Login

If you prefer not to add your name and password to your keychain, you can still configure your task to automatically connect to the file server. Doing so is done in the server options sheet, displayed by clicking “Options...” in the Target pane.

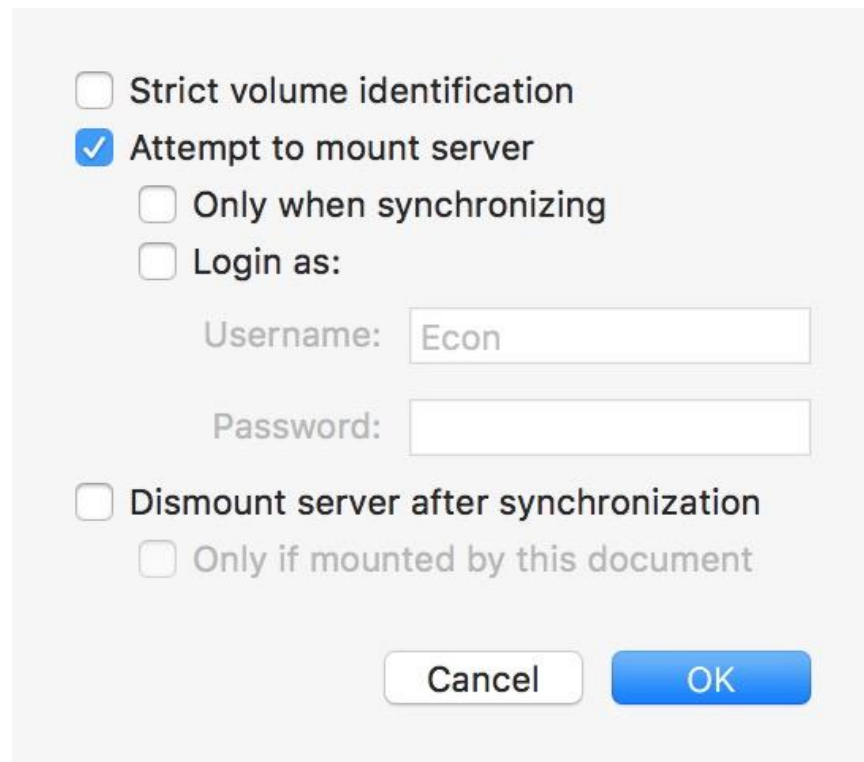
Turn ON the “Login as” option. This enables direct login. You must then specify a username and password to connect to your file server. This should be the same user name and password you would specify when connecting to the file server from the Finder.

When specifying direct login, your username and password are encoded in the task document (in encrypted form) and used when ChronoSync attempts to connect to the file server.

Note: If a volume cannot be mounted for whatever reason, scheduled synchronizations will not grind to a halt. An error will be logged and the program will continue. Notifications are highly recommended to inform you that scheduled synchronizations are regularly occurring.

Other Server Options

In addition to controlling the technique used for connecting to a file server, a few other options are present in the server options sheet dialog:



Strict volume identification

Attempt to mount server

Only when synchronizing

Login as:

Username:

Password:

Dismount server after synchronization

Only if mounted by this document

Strict volume identification

If turned on, it instructs ChronoSync to differentiate between volumes with the same name by comparing several low-level properties. Enabling this setting is required if you have multiple volumes with the same name and you want to ensure that ChronoSync uses the correct one. If, however, you want to rotate an external volume for backup purposes, just make sure this setting is OFF and that all rotated volumes share the same name.

Only when synchronizing

This option is associated with the “Attempt to mount server” option. Turning it on instructs ChronoSync that it should only attempt to mount the server when a Synchronize or Trial Synchronize operation is invoked. Leaving this setting off, ChronoSync will not attempt to mount the server when the task is first opened. The purpose of this setting is to allow you to work with a task even when the file server it synchronizes with is unavailable.

Dismount server after synchronization

Instructs ChronoSync that it should automatically dismount the server after synchronization completes. This is useful in situations where you connect to a file server only to synchronize and have no other reason to directly access files on it.

Only if mounted by this document

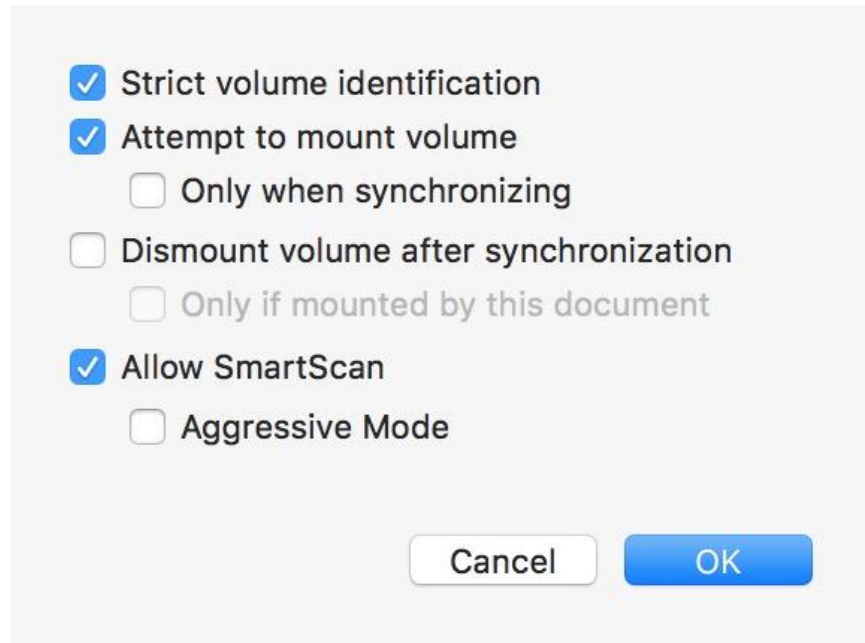
This option is associated with the “Dismount server after synchronization” option. If turned on, it instructs ChronoSync to only dismount a server after synchronization if ChronoSync itself was responsible for mounting the server in the first place. This option is useful if you occasionally do have the need to connect to a server and directly access files on it outside of the synchronization process. If you established connection to the server prior to having ChronoSync perform a synchronization, you won't have to worry about ChronoSync disconnecting from the server when it completes.

Removable Media

Using ChronoSync with removable media is really no different than using ChronoSync with local drives. The only requirement is that your media must be mountable on the desktop, i.e. when you insert the media into its device, an icon appears on Finder's desktop. ChronoSync possesses no special knowledge about exotic devices and thus, if it cannot be mounted as a standard volume, it will not work with ChronoSync.

When a volume is removable, ChronoSync detects it as such. Thus, when you specify a target in a task that exists on a removable volume, the Setup panel will display the “Options...” button below the “Choose...” button. Clicking “Options...” will display several removable media options.

Note: If ChronoSync can't locate the media that contains one of its targets, the “Cannot locate target” message is displayed. It is your first indication that something is amiss. You can then simply mount the volume by inserting it in the appropriate device. ChronoSync will recognize the mount and correct its state.



Strict volume identification

If turned on, it instructs ChronoSync to differentiate between volumes with the same name by comparing several low-level properties. Enabling this setting is required if you have multiple volumes with the same name and you want to ensure that ChronoSync uses the correct one. If, however, you want to rotate an external volume for backup purposes, just make sure this setting is OFF and that all rotated volumes share the same name.

Attempt to mount volume

When this option is ON, ChronoSync will attempt to mount the volume (if available) when the document loads.

Only when synchronizing

This option is associated with the “Attempt to mount volume” option. It indicates that the volume mount will only be attempted when a Synchronize or Trial Synchronize operation is performed.

Dismount volume after synchronization

When turned ON, this option causes ChronoSync to eject the volume containing one or both of its targets after synchronization completes.

Only if mounted by this document

This option is associated with the “Dismount volume after synchronization” option. This indicates that the volume dismount will only occur if ChronoSync mounted the volume in the first place.

This way, if you previously inserted the media and are working with files on it, you don't have to worry about having the volume dismounted after ChronoSync completes a synchronization.

Allow SmartScan

SmartScan is a feature that can greatly increase performance when a synchronization or backup is configured to compare a very large number of files. This option allows you to turn it ON or OFF for a specific target, which is useful when you want SmartScan enabled on one target but not the other. To learn more about SmartScan, check out our ['SmartScan'](#) technote.

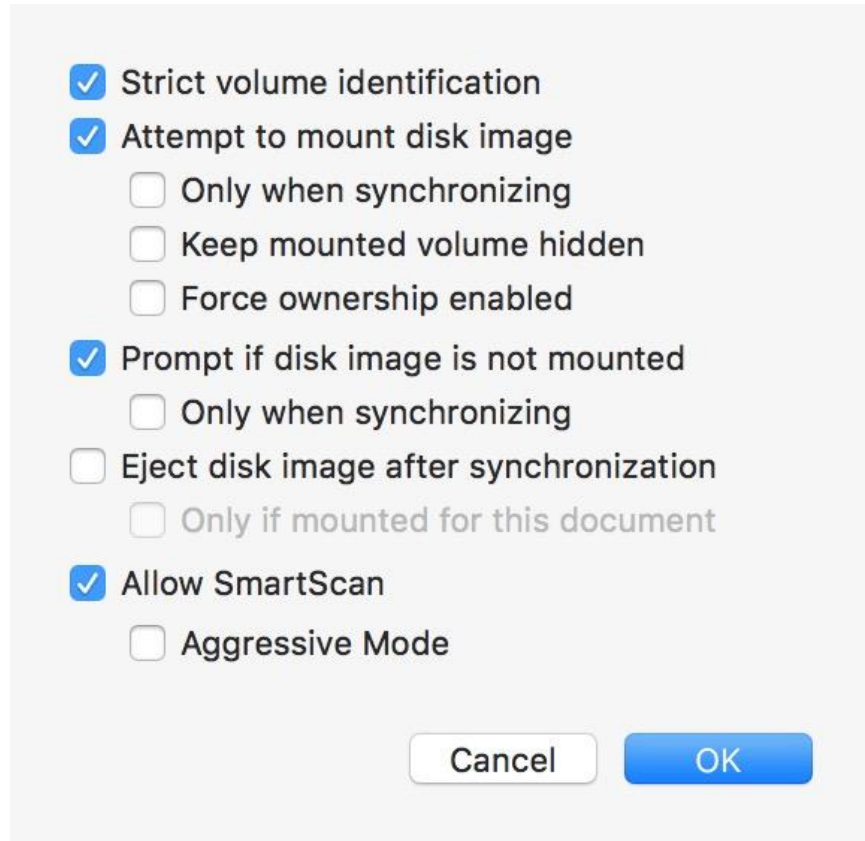
Aggressive Mode

This option is associated with the "Allow SmartScan" option. When enabled, SmartScan will operate even faster than its standard variant. But this setting comes at the expense of disabling some safeguards for recognizing certain kinds of file system events. More information can be found in our ['SmartScan'](#) technote.

Disk Images

Selecting a disk image as a target requires that you turn the "Allow disk image file selection" option ON in the file navigation window. Once ON, you can select it and then treat it as any other target.

ChronoSync is able to detect that a disk image has been selected as a target. Thus, the Setup panel will display the "Options..." button below the "Choose..." button. Clicking "Options..." will display several disk images options.



Strict volume identification

If turned on, it instructs ChronoSync to differentiate between volumes with the same name by comparing several low-level properties. Enabling this setting is required if you have multiple volumes with the same name and you want to ensure that ChronoSync uses the correct one.

Attempt to mount disk image

When this option is ON, ChronoSync will attempt to mount the disk image (if available) when the document loads.

Only when synchronizing

This option is associated with the “Attempt to mount disk image” option. It indicates that the disk image mount will only be attempted when a Synchronize or Trial Synchronize operation is performed.

Keep mounted volume hidden

This option is associated with the “Attempt to mount disk image” option. When this option is ON and ChronoSync has mounted the disk image, the disk image volume will not be visible in Finder.

Force ownership enabled

This option is associated with the “Attempt to mount disk image” option. When mounted, file ownership will not be ignored on the volume.

Prompt if disk image is not mounted

If this option is not turned ON, ChronoSync will prompt the user to mount the disk image.

Only when synchronizing

This option is associated with the “Prompt if disk image is not mounted” option. If ON, ChronoSync will only prompt the user to mount the disk image when running a synchronization.

Eject disk image after synchronization

When turned ON, this option causes ChronoSync to eject the disk image containing one or both of its targets after synchronization completes.

Only if mounted by this document

This option is associated with the “Eject disk image after synchronization” option. This indicates that the disk image ejection will only occur if ChronoSync mounted the disk image in the first place. This way, if you previously mounted the disk image and are working with files on it, you don't have to worry about having it ejected after ChronoSync completes a synchronization.

Allow SmartScan

SmartScan is a feature that can greatly increase performance when a synchronization or backup is configured to compare a very large number of files. This option allows you to turn it ON or OFF for a specific target, which is useful when you want SmartScan enabled on one target but not the other. To learn more about SmartScan, check out our [‘SmartScan’](#) technote.

Aggressive Mode

This option is associated with the “Allow SmartScan” option. When enabled, SmartScan will operate even faster than its standard variant. But this setting comes at the expense of disabling some safeguards for recognizing certain kinds of file system events. More information can be found in our [‘SmartScan’](#) technote.

Mounted Volumes

Mounted Volumes refer to your locally available drives connected to your Mac. This could be files servers, your startup volume, any external drives you have connected, thumb drives, or even network shares you have mounted. Most everything you have access to in Finder.

Mounted Volumes (Admin Access)

Mounted Volumes (Admin Access) adds elevated permissions when accessing the file system. What this means is that with 'Admin Access', you can access any file or folder on your Mac or externally-connected drives. Admin Access allows access to system files and folders, and even files and folders in other user accounts. This is why when selecting Admin Access, you are prompted for an administrator password.

Admin Access is not supported on network shares because the file sharing protocols don't allow this.

Connecting to ChronoAgent

ChronoAgent is a transparent piece of software that, when installed on a computer, allows a copy of ChronoSync, located on another computer, to access files on the ChronoAgent machine as if it was a locally attached drive. ChronoAgent gives ChronoSync full Admin Access to the destination computer. This allows you to perform operations such as backing up all remote user accounts or even remote bootable backups. These tasks are impossible over a standard file sharing connection!

The agent is configured and controlled via a System Preferences pane. Once ChronoAgent has been configured on a computer, another computer running ChronoSync can connect to it. Before it can do so, however, a Connection Profile must first be defined in order to establish communication with the agent. A connection profile can be set up within ChronoSync's Preferences or quickly created by choosing "Create connection..." from the "Connect to:" popup menu. Check out our ['Configure and Backup to a Remote ChronoAgent'](#) guide for instructions on configuring and backing up to a remote ChronoAgent.

For more information on ChronoAgent and how ChronoSync connects, please consult the ChronoAgent manual.

Note: ChronoAgent is a separate product available in a separate download.

Connecting to Cloud Storage

ChronoSync 4.7 introduced the capability to directly connect to select cloud services. Having a copy of your data in an offsite location has many advantages. Many services offer several tiers of storage with varying sizes and costs so it's a very cost-effective solution. The most obvious benefit of cloud storage is having your data accessible from virtually any location with an internet connection. With society always on-the-go, we understand the appeal of having your data available at all times "in the cloud."

Cloud storage backup has disadvantages, as well. Many things such as the level of service that you purchased, the kind of data you're backing up, the cloud service's responsiveness, or the internet connection being used can all play a role in how well (or not so well) your cloud backups perform. Take a look at our "[Effective Cloud Strategies](#)" guide to get a better understanding of what to expect when performing cloud storage backups, how to optimize your settings, how to choose the best data to backup, and how using disk images (DMG's) may speed up your data transfer.

Even with the limitations mentioned, ChronoSync and cloud-based backup can be an effective layer in a multi-tiered strategy to keep your data safe. We recommend choosing one (or more) of the cloud services ChronoSync offers and setting up an account.

For more information on connecting and backing up to cloud storage, take a look at our [cloud service guides](#).

Connecting to an SFTP Server

SFTP, which stands for SSH File Transfer Protocol, or Secure File Transfer Protocol, is a protocol packaged with SSH that is a popular method of secure file transfer between two remote systems. ChronoSync 4.7 introduced the capability of directly connecting to an SFTP server so that you can access your remote backed up data on the SFTP server from any computer, given that you enter the necessary security credentials.

Our "[Configure and Backup to an SFTP Server](#)" guide goes over how to set up ChronoSync to access an SFTP Server and things that you should be aware of when doing so.

Connecting to InterConneX

InterConneX is a file management app for the iPad and iPhone. With InterConneX, you can manage all your files on your iDevice, connect and access your files on Macs and other iDevices, share your files with others, and control accessibility of your files.

With InterConneX installed on an iPad or iPhone, you can set up ChronoSync to connect to an InterConneX sharespace and synchronize files between your iDevice and the Mac. To do this, a Connection Profile must first be defined. To aid with the process of connecting to InterConneX, take a look at the help resources available on our website:

<https://www.econtechologies.com/interconnex/ipad-manuals.html>

<https://www.econtechologies.com/interconnex/iphone-manuals.html>

<https://www.econtechologies.com/interconnex/guides.html>

<https://www.econtechologies.com/interconnex/video-guides.html>

<https://www.econtechologies.com/interconnex/tech-notes.html>

Note: InterConneX is a separate product available in the App Store.



CHAPTER NINE

EXAMPLES

Synchronizing Desktops with Laptops

One of the most popular uses for file synchronization software is the synchronization of documents between laptops and desktop computers. In a hypothetical scenario, work in the office is usually performed on a desktop computer, taking advantage of its greater processing power and additional resources. At the end of the day (or the beginning of that business trip), all the work performed on the desktop computer needs to be transferred over to your laptop.

Conversely, while at home (or on the road), changes are made to various documents. When returning to the office, all changes made to documents on the laptop will need to be copied to the desktop machine, in order to avoid accidentally modifying an out-of-date file.

The first step in providing a solution for this scenario is to [establish connectivity](#) between the two computers. This simply means that the two computers must be able to physically exchange information before synchronization can occur. There are usually several ways to do this, and the exact method you use depends upon your hardware configuration and personal preference.

Setting Up Your Synchronization

Regardless of the physical connection method, one of your computers will be accessible to the other via an icon on the desktop. The process of obtaining a connection to the other computer and having its icon appear is called *mounting*. Once mounting has occurred, launch ChronoSync and [set up your synchronizer task](#).

After your first synchronization is performed, you will want to experiment and see how each successive synchronization will occur. The first step is to quit ChronoSync. Next, disconnect from the shared computer. This is called *dismounting*. To do this, browse to the mounted volume in Finder and then drag that volume to the trash in your Dock (the trash can changes to an “Eject” icon when doing so).

Once you’ve performed these steps, your computer is basically in the same state it would be when you first come into the office. Locate the synchronizer task you created and double click it. If you disconnected from the shared computer as instructed, the first thing that ChronoSync will do is to try to reconnect to it.

If the connection is via file sharing, this may involve a login dialog appearing where you need to specify your name and password.

Now that you’ve done all this, how will you actually use ChronoSync on a daily basis? Given the scenario we’ve been discussing, and assuming you’re connecting via file sharing, here’s how: At the beginning of the day, you show up at the office and connect to your network using the usual means (Ethernet, AirPort, etc.). Boot up both your laptop and desktop. After booting is complete, double click the “Sync with my desktop computer” synchronizer task on your laptop that you previously created. A connection will automatically be made with your desktop. After this, simply

click “Synchronize.” When the process completes, you can quit ChronoSync and proceed with your busy day.

At the end of the day, assuming your laptop is still connected to the network, just repeat the process — double click “Sync with my desktop computer” and click “Synchronize.” Any changes made to tasks on either machine will be synchronized. As long as you begin and end the day with this procedure, all will be well.

Controlling Which Folders to Synchronize

ChronoSync is designed to be flexible. It can meet the needs of almost any synchronization or backup strategy no matter how simple or complex. In some instances, your needs may not be as simple as synchronizing one folder to another folder. You may, for example, want to synchronize many different folders at the same level or perhaps synchronize one folder but not synchronize some of the folders contained within it. Fortunately, there are many ways to narrow down your synchronization scope using ChronoSync. Find the one that best suits your situation below:

Option #1: Select a root folder and everything beneath it. For instance, if you want to synchronize all your personal files you would simply select your Home folder.

Option #2: Create separate synchronizer tasks for each folder you wish to synchronize. This is a great solution if you want to synchronize some folders but not other folders. For example, instead of creating one synchronizer task for your Home folder, perhaps you want to create three: one for “Documents”, another for “Pictures” and a third for “Music.” Each task can be synchronized separately.

Option #3: Add multiple tasks to a single task container and then synchronize them all as one. For instance, if you created three tasks for your “Documents”, “Pictures” and “Music” folders, you could add them to a single task container so all three behave as one.

Option #4: You can permanently exclude any file or folder by selecting it from the Analyze panel and choosing the “Exclude” command. The exclusion will be saved with the synchronizer task and the excluded file/folder will be skipped every time a synchronization is performed. When a folder is excluded, all the files and folders contained within it are likewise excluded. For example, if you wanted to synchronize your entire Home folder but did not want to synchronize your “Library” folder, you could select your Home folders as one of the targets and then exclude your “Library” folder from the Analyze panel.

Option #5: Create rules. Rules allow you to exclude specific files and folders from a synchronization. For instance, if you just want to backup all your Photoshop files to an external drive no matter where they are located on your Mac you could select your entire Mac’s drive as one target and a folder on the external drive as the other Target. You could then create a rule to only synchronize Photoshop files — all other types of files will be skipped.

Option #6: Use a combination of the above methods to synchronize exactly what you want. For instance, what if you wanted to synchronize your entire Home folder but not your “Library” folder, but you do want to synchronize your “Mail” folder (which resides in “Library”)? You could

create a synchronizer task to synchronize your entire Home folder but excluding your “Library” folder via the “Exclude” action. Then you could create a second task to synchronize just your “Mail” folder. Finally, you could combine both tasks in a single task container. This way your “Library” folder gets completely excluded but the “Mail” folder still gets synchronized. Furthermore, any new folders added to your “Library” folder would not get synchronized so you would not have to modify your exclusions in the future.

Cloning Data Using a Mirror Synchronization

The terms *synchronization* and *cloning* are often used interchangeably and for good reason — they each represent a process that many consider functionally identical. We at Econ, however, make a distinction between the two. Cloning is the process of making one target appear identical to another. Thus, any change in one target is projected to the other, no matter what. It is a “brute force” technique that makes no consideration for the possibility that data is legitimately changing in both targets, often simultaneously.

Synchronization, on the other hand, is a process that involves a little more finesse. It seeks to identify changes in one target and to merge those changes with the opposing target. It does take into consideration the possibility that data is changing in both targets and it also takes into consideration that there may be data in the opposing target that is not a part of the synchronization.

The difference between synchronization and cloning are subtle but real. Both techniques have their uses and which one is “better” depends on the specific task that is being performed.

Mirrored synchronizations look for differences between file pairs, just as the Backup synchronization does. However, when a difference is detected, it always copies the file in a predefined direction, even if that means a newer file will be replaced by an older one.

For example, suppose you run a computer lab in a school and you want each computer configured with a certain set of applications and documents for your students to use. Kids being kids, they frequently delete important files, modify and overwrite existing ones or create new files altogether. At the end of the day, you need to restore each machine to a pristine state. To do this, you could just copy all the files over using the Finder. But if we're talking hundreds or thousands of files (especially if they're big), this can be quite time consuming.

Instead you could set up a “mirror left-to-right” synchronization task that synchronizes a master set of files (the left target) with the student’s computer (the right target). The result is that any file the student modified will get updated; any file the student deleted will get copied back over; and, if synchronize deletions is enabled, any files the student created will get removed. This practice gets more efficient when you realize that any changes that you may make to the master target will get intelligently merged with all the students' computers.

Changing Archive Location

ChronoSync saves deleted and modified files by storing them in an archive folder. The Archive panel shows the contents of your archive folder and makes it easy to find, sort, and manage your archived files. It maintains a 'history' of your archived files.

At this time, the archive folder is placed at the root level of your target. ChronoSync places it there. To maintain the archived items folder in a different location, you must create a symbolic link at the root level of your target named "_Archived Items." That symbolic link can point to any other folder on your drive or even an external drive or file server. If you don't have a graphical tool for creating symbolic links, you can do so using the Terminal application.

Note: It is important to mention that this process is a bit of a hack and is considered an unsupported feature.

Here are the steps to follow:

1. Create a folder that will serve as your "real" archived items folder. This can be on any locally attached drive or even a file server. Once created, make sure the folder icon is accessible in the Finder, i.e. keep a Finder window open that displays the newly created folder (the folder icon itself, not its contents).
2. Using Finder, make sure the root folder of the target in which you want to create the symbolic link is accessible, i.e. keep a Finder window open that displays the target's root folder (the folder icon itself, not its contents).
3. Launch Terminal.
4. Type "cd " (DON'T type the quotes and DO type the space at the end).
5. Drag & drop the target's root folder icon from the Finder over to the terminal window. This automatically pastes the pathname of the folder icon into the Terminal shell.
6. In Terminal, press the RETURN key. You should have now changed the current working directory in Terminal to the root folder of your target.
7. In Terminal, now type "ln -s " (again, DON'T type the quotes; DO type the space at the end).
8. Now drag & drop the folder icon you created in step 1 to the Terminal window. This pastes the full pathname of the "real" archive folder into the Terminal shell.
9. In Terminal, now type "_Archived Items" (just to confuse you, this time you DO type the quotes).
10. In Terminal, press the RETURN key.

Assuming you did everything correctly, you have just created a symbolic link to the "real" "_Archived Items" folder. You can verify this by looking inside your target folder using Finder — you should see what appears like a folder alias that takes you to the "real" archive folder. ChronoSync will resolve this alias and manage the archive in the new location.

Why is this an unsupported feature? Because ChronoSync does nothing to check the validity of the symbolic link. If it becomes broken, it is going to fail miserably. The most likely situation that this can happen is if the archive is on a file server or external drive that is not mounted. ChronoSync will not try to mount the volume. Things could also go wrong if the "real" archive folder is moved or renamed. If this unsupported feature is utilized in a situation where the "real" archive folder could become unavailable, you should combine it with a pre-synchronization script that ensures the validity of the archive folder before allowing synchronization to proceed.

In a future version of ChronoSync, this will become an official feature, providing a full user interface and archive validation that will make selecting an alternate location for your archive easy.

Synchronize 3 Macs

As mentioned earlier, ChronoSync is designed to be flexible and can meet the needs of almost any synchronization or backup strategy. You can even set up ChronoSync to synchronize three Macs — or even three computers provided at least one of them is a Mac. However, there are two very important rules:

1. You cannot work on more than one computer at a time. If two users are working on the same file, then one of the files will get copied over and lost.
2. You must always run your synchronizations when switching Macs so that the data is kept up to date.

First you need to decide which computer will be the Master. Then you need to decide if you want to synchronize from the Master to the two other computers or synchronize from the two other computers to the Master. Regardless of your choice, you must synchronize from a Mac.

Example #1: Synchronizing from the Master

A = Master

B = Remote

C = Remote

Master must be a Mac.

From the Master Mac (A), set up two synchronizer tasks that Synchronize Bidirectionally with deletions checked. The first task synchronizes the Master (A) to a Remote (B) and the second task synchronizes the Master (A) to the other Remote (C).

Example #2: Synchronizing from the Remotes

A = Master

B = Remote

C = Remote

Remotes must be Macs.

From Remote Mac 'B', set up a synchronizer task that synchronizes bidirectionally with deletions checked to the Master (A). From Remote Mac 'C', set up a task that synchronizes bidirectionally with deletions checked to the Master (A).

For more examples of how to use ChronoSync, check out the [ChronoSync guides](#) on the Econ Technologies website.



CHAPTER TEN

COMMON ERRORS

At times, while running a synchronization, errors may occur, alerting you to some problem with a certain file within the synchronization tree. Below lists some common errors you may encounter while using ChronoSync.

Dealing with Conflicts & Errors

Sometimes a file will not get copied because of an error or conflict between the two files. In all such cases ChronoSync will notify you of the problem. In the case of an error it will notify you of the problem by displaying an error message. In the case of a conflict, ChronoSync will provide you with a file conflict sheet to let you resolve which file should be used in the synchronization.

Conflicts

A conflict arises when two files have been determined to have both changed since the time of last synchronization. While one file will likely be more recent than the other, ChronoSync decides to err on the side of caution and flag these files as a conflict. When such is detected, a conflict resolution sheet appears.

When presented with this sheet, you can decide which file should actually be used. Do so by clicking the radio button associated with the desired file and then clicking the “Continue” button.

If you can't decide which file should be used, just click “Skip.” Synchronization will resume as normal, only nothing will be done with the conflicting files. You can then use the Analyze panel to determine which one is the correct one.

You may also select the “Handle all additional conflicts by...” option that provides you with a popup menu of options. Choosing one of the options will inform ChronoSync what to do with future conflicts. This choice only applies to the synchronization being performed — it does not “stick” for all future synchronizations.

If you determine that the conflict exists for a reason, and there's nothing you can do to resolve it, click the “Exclude” button. This will exclude the file pair from synchronization and won't report a conflict for them ever again. You can undo an exclude in the Analyze Panel using the “Include” command.

If you are unsure which file to choose but wish to resolve conflicts as they arise, you can choose to [“Compare”](#) the two files. Once you determine which file to use, you can select it and continue on with the synchronization.

Choosing the “Abort” button will abort the synchronization process. When this is done, only the remaining files that have not been copied yet remain out of sync.

Conflict encountered: 401.shtml

Resolve the conflict by selecting which file to use:

Left (Real Site)	Right (Content Site)
Name: 401.shtml	401.shtml
Size: 971 bytes	971 bytes
Kind: HTML text	HTML text
Created: 12/26/14, 7:38:30 PM	12/26/14, 7:38:30 PM
Modified: 12/16/16, 1:35:06 PM	12/16/16, 1:35:02 PM
Permissions: rw- r-- r-- [econ/staff]	rw- r-- r-- [econ/staff]
Tags: --	--
Comments: --	--
BSD Flags: --	--
ACL: --	--
X-Attribs.: 3 properties	3 properties
<input checked="" type="radio"/> Use this file	<input type="radio"/> Use this file

Handle all additional conflicts by

Note: Because conflicts are dependent on two files changing, they can only occur while doing a bidirectional synchronization. In the Options panel, you will find settings that allow you to automatically handle file conflicts. If your task is scheduled, conflicts will automatically be skipped unless these conflict handling options have been specified.

Errors

When an error arises in the course of synchronization, an error sheet window will appear. If it is a scheduled synchronization, the error will be skipped but posted to the Log or, if notifications are set up properly, emailed to you.

At this stage, you can abort the entire process by clicking “Abort”. This gives you a chance to immediately resolve the problem and then re-invoke the synchronization.

Synchronizing: .DS_Store

*** An error occurred ***

Destination Target encountered error: "Permission denied."

Occurred while copying file:

/work_documents/.DS_Store

Skip any additional errors

Exclude

Retry

Skip

Abort

Instead of aborting, you can choose to ignore the error and continue synchronizing. Do this by clicking "Skip." The error will get posted to the log for later review. If a string of errors arises and you just want to finish synchronizing what you can, enable the "Skip any additional errors" check box. This will still post errors to the log, but won't annoy you with additional error sheets.

The "Retry" button, as the name implies, will retry the operation that induced the error. Sometimes, the condition that caused the error can be rectified, such as if the file in question is reported as being used by another application. If it succeeds, it will resume the synchronization as normal. If not, it will display the error message again.

Sometimes an error will repeatedly occur that simply cannot be corrected. For example, a file name may be too long to be synchronized with a target whose file system doesn't support long file names. In this case, you may quickly and easily exclude the offending file from future synchronizations by clicking the "Exclude" button in the error sheet. You can undo an exclude in the Analyze panel using the "Include" command.

Date Roll Backs

Date roll backs occur when the modification date of a file has gone back in time from its previous known setting. Under normal circumstances, this should never happen. It can accidentally happen, though, when you inadvertently replace a new file with an older one or it can also happen if something has gone wrong with clock synchronization between two computers or the system clock setting on your computer. When dealing with this, extra care should be taken to make sure something isn't seriously wrong with your computer.

Synchronizing: 401.shtml

Warning: Modification Date Roll-back Detected!

Proceeding with synchronization will result in an older version of this file replacing a newer one.

Path: /Users/econ/Projects/Website/Content/401.shtml

Apply to all

Exclude

Skip

Proceed

Abort

Note: If your task is scheduled, date roll backs will automatically be skipped unless you have specified date-roll back handling in the Options panel.

To track down the files, you can get a list of the files and errors in the document's Log.

To handle date roll back errors before they occur, you can use the Pre-determination feature in the Options Panel. This lets the synchronizer task know how to handle a roll back error in case one is encountered. It makes it so that user interaction isn't needed during the synchronization.

The most common cause is that the files were open and modified by an application at the time of the previous synchronization, but when they were closed by their respective application, the application took it upon itself to restore their original modification date. Microsoft applications are notorious for this, but it isn't purely a Microsoft behavior. Other legitimate causes would include the manual restoration of some files by you; such as files you previously modified but then decided to replace them with original versions.

This said, we suggest you first try to determine why the files are going back in time. Once you understand the cause and determine that there isn't a deeper issue, dealing with them in ChronoSync is pretty easy.

Your first option is to do nothing. A roll back is usually a relatively rare event; so, dealing with the warning messages as they come up shouldn't be that much of a nuisance. This also allows you to catch legitimate instances where a file has gone back in time but you don't want it to synchronize.

In some cases, living with the warning messages may not be practical, especially if the synchronization is scheduled. If this is the case, you can "predetermine" how ChronoSync deals with roll backs. In the Options panel of your synchronizer task, in the "Reporting & Error Handling" section, you'll notice some "Pre-Determination" settings. You can enable roll back pre-determination via the check box and choosing the desired method of dealing with roll backs from the popup menu. Your options are:

Ask User

ChronoSync will stop at each date roll back error and ask you how you would like to proceed. Once you choose your selection from the dialog, ChronoSync will continue on with the synchronization.

Skip

Don't synchronize the file just because it has gone back in time. If you always want your backed-up file to have a more recent time-stamp, then this is the way to go.

Exclude

This will mark such files as "Excluded" and then they will be permanently ignored. You'd have to have a really good reason to choose this option. Otherwise, stay away from it!

Copy

This will copy files that have gone back in time. If you want your backed-up files to be an exact image of your source files, then choose this. We recommend enabling "Archive when replacing." That way, "accidental" rollbacks won't permanently wipe out a critical file.

Abort

This selection will cause the synchronization to abort if a date roll back error occurs. In this instance, you can look into why the error occurred, handle it and then restart the synchronization.

Daylight Saving

When you run into a synchronization problem that is related to a Daylight Saving Time switch, it is not a ChronoSync issue but an issue with macOS.

Notice that the time difference appears if you do "Get Info" on the files from Finder. That is because the OS is reporting the difference in time. It is due to an incompatibility between either the connection method or the format of the destination. The best thing to do is to copy over the differences and then everything will be in sync again. We must rely on the OS for reporting the correct times. It is impossible for ChronoSync to try and interpret when a time is correct and when it is not.

Disk Full

If ChronoSync returns a disk full error, check your destination for available space. ChronoSync needs enough space to handle all the files plus twice the size of your largest file.

Also, if you have an Archive, make sure the synchronization can accommodate this.

Apple Error Codes

Oftentimes ChronoSync will spit out error codes in its log messages. Mostly these error codes are generated by the OS, not ChronoSync. To get a better understanding of these codes, visit our tech note [Error Numbers Reported by ChronoSync](#).