

Successful iCloud Desktop and Documents Folder Storage on macOS Sierra

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This article tells the story of what happened after I turned on iCloud Desktop and Documents Folder storage in the iCloud pane of System Preferences, shortly after installing macOS v10.12 Sierra on my Mac Pro (Late-2013) and my MacBook Pro (Late-2013). My aim is to help others to feel comfortable doing it themselves while avoiding the pitfalls I discovered along the way. I include a lot of detail here, most of it not yet mentioned in other online commentaries. The process took a few days and was full of unexpected turns and hard decisions, but it came out well in the end. I can now happily use continuity, switching freely between my two Macs, my iPhone and my iPad, editing the same document on all of them.

Given the sparse Apple documentation of iCloud Desktop and Documents Folder storage at this time, as well as the large amount of misinformation circulating online, many people seem afraid to turn it on. Scare stories of failure abound already. See, for example, talkingpointsmemo.com/edblogger/maybe-be-careful-with-osx-sierra on the TPM EDBLOG. For myself, I wanted to be able to take full advantage of the promised continuity improvements without delay. I have good enough backups in place that I was willing to take the chance. I'm glad I took this step forward.

For context, here are the details of my setup when I started. I use the Mac Pro as my primary computer. It has a 1 TB SSD startup drive. Its Documents Folder contained about 103 GB of files in a large number of deeply nested subfolders. Its Desktop folder was very different, containing only 4 items, all exposed out on the desktop of the main screen. All of them were alias files, 3 of them representing my network printer queues. I use the MacBook Pro as a secondary computer, usually sitting on my desk alongside the Mac Pro but often traveling with me down the hallway, across town, or across the country. I do, however, use it as my primary computer for certain tasks that I often perform both at home and on the road, such as email and financial record keeping. It, too, has a 1 TB SSD startup drive. The contents of its Documents folder are nearly, but not quite, identical to the contents of the Mac Pro's Documents folder. The contents of the Desktop folders on both Macs are also nearly identical. I have a 1 TB iCloud account because of my extensive photography collection, for which I enabled iCloud Photo Library some time ago. A wired Ethernet home network connects these two Macs and several other devices. Internet access is provided by a high-speed residential broadband connection.

It is important to understand that the contents of my Mac Pro's and MacBook Pro's Documents folders have always been nearly identical, because for purposes of iCloud Desktop and Documents Folder storage it makes a difference. Mine is not an uncommon setup. However, it appears that having very different contents on multiple Macs is much more common among typical users, perhaps because, until now, it has taken extra work to keep multiple computers synchronized. I have the impression that Apple introduced iCloud Desktop and Documents Folder storage in part to change this dynamic by making synchronization nearly automatic. The skeptic in me suspects that this may be yet another tactic in Apple's longstanding business strategy to create an integrated ecosystem, sometimes less charitably referred to as "customer lock-in." Personally, I have found it worth the trouble to maintain synchronization between my two Macs, even before Apple introduced continuity to facilitate moving between devices while working on a single document. The job of synchronization was greatly eased by my longstanding use of ChronoSync, www.econtechologies.com. Like many Mac users, I scheduled sync scripts to run automatically every night, bringing my Documents folder and others into sync once a day. I look forward to the move to continuous synchronization as a dramatic usability improvement.

When you decide to turn on iCloud Desktop and Documents Folder storage on multiple Macs, you should consider approaching the task differently depending on whether you currently keep your Desktop or Documents folders synchronized between Macs. For one thing, if you use an automatic synchronization utility as I did, be sure to turn it off before you turn on iCloud Desktop and Documents Folder storage. Fortunately, it did occur to me to engage ChronoSync's Suspend Scheduler command first, so that ChronoSync would not interfere with the new procedure or distort my interpretation of it. (As a fan, let me say that I will continue to make heavy use of ChronoSync in order to sync files to archives and to redundant backups that I maintain on external drives and on Dropbox. Yes, long experience causes me to fear data loss beyond all else.)

More to the point, you may want to approach iCloud Desktop and Documents Folder storage differently if you currently keep your Macs synchronized than if you currently have diverse Desktop or Documents folder contents. The result should come out the same in the end, leaving you with fully synchronized contents on all

your Macs, but one approach may take less time and manual cleanup than the other. Be forewarned, however, that you will have to do some manual work during the initial synchronization process either way. I will make clear why this is so throughout this article.

1. The Syncing Process on the First Mac

When you turn on iCloud Desktop and Documents Folder storage, syncing begins immediately. I monitored the progress closely after first turning it on for the Mac Pro, seeking to understand how the process works and how to take best advantage of it in the future. Apple's documentation of what is really going on is minimal, and this is clearly leading a lot of people to overlook details and reach incorrect conclusions. Apple's basic instructions on how to turn on syncing are at support.apple.com/en-ca/HT206996, and I will not repeat them here. Almost all of the information below is derived from my observation of the syncing process itself after it started. At the time of writing, most of this information has not yet been mentioned online as far as I can determine.

a. Monitoring the Upload to iCloud

Things happened so quickly that at first I missed some of the action, and what I did notice in the first few seconds and minutes came in a somewhat fortuitous order depending on where on the screen I happened to be looking. As time went on, I came back and found what I had missed initially. The sense of drama and suspense were intense, and I will try to reproduce a bit of it here.

The first thing I noticed when I turned on syncing was that the 4 alias files visible on the Mac Pro's monitor vanished instantly, without warning. The only thing missing from the experience of their disappearance was the "poof" effect. A moment later, a folder named "Desktop - BillCheesemanMP" appeared on the desktop in their place. When I opened it, I saw that this folder contained the 4 alias files that had just disappeared, and I double-clicked them to make sure they all still worked. A little later, in an effort to confirm that I could still use the Mac Pro while the syncing process continued, I added three normal documents to the desktop by drag and drop, and they remained on the desktop, outside the new folder, throughout the syncing process.

Clearly, Apple should put up a warning dialog before the desktop is altered so dramatically, as John Gruber has pointed out in *Daring Fireball*, daringfireball.net. The current approach has led to nothing but confusion, bad publicity, and a widespread reluctance in the user community to use iCloud Desktop and Documents Folder storage. I was lucky that my desktop is so sparsely populated, because the replacement "Desktop - BillCheesemanMP" folder appeared immediately, while I was still watching the screen. I had nothing to lose that was important on my desktop, and I could see immediately that the desktop contents were apparently being saved. Others, having lots of files and folders on their desktops, have had a much more fearsome experience.

To continue monitoring the ongoing syncing process, I opened a Finder window in List View. I wish I had thought to open it before turning syncing on, because I discovered later that I had missed a few initial signs of progress. More on this later, when I describe turning on syncing on the second Mac. The first thing I noticed was that the Favorites section at the top of the window's sidebar no longer contained a Documents folder. It did still contain a Desktop folder, but I now believe that this may be an anomaly and that the folder can safely be removed from the Favorites section. More on this later, too. The next section I saw in the sidebar, the iCloud section, was new. It contained two new items, Desktop and Documents, below the iCloud Drive item that had been moved to the iCloud section from the Favorites section where it had lived since I first enabled iCloud Drive months ago. Seeing the Desktop and Documents folders in the sidebar gave me some additional comfort that my data was still safe.

Given their placement in the iCloud section of the sidebar, I quickly realized that the two new Desktop and Documents items gave me access to the Desktop and Documents folders as they were created in iCloud Drive when I first turned on syncing. Unlike the old Desktop and Documents folders in the Favorites section, they did not refer to the Desktop and Documents folders on my startup drive. Neither did the Desktop item that "remained" in the Favorites section. It is more accurate to think of this item as an outright replacement for the old Favorites Desktop item, which did refer to the Desktop folder on the startup drive.

At the cost of giving away the plot, I should mention here that I later confirmed that the original Desktop and Documents folders do nevertheless remain in existence on the startup drive, with their contents intact. Apple has gone to great lengths to hide them from you so as to focus your attention on the iCloud Drive folders, which

you are supposed to use from now on. This has had the unfortunate side effect of scaring a lot of early adopters into believing, wrongly, that these folders no longer exist on their startup drives.

When I opened the Desktop item in the sidebar's iCloud section, the main body of the Finder window showed me the same "Desktop - BillCheesemanMP" folder that had appeared on the desktop on my main screen, as described above, containing the 4 alias files. The "Desktop - BillCheesemanMP" folder also contained the 3 new files at the top level of the Desktop folder that I added after I started syncing. This seemed to be the iCloud Drive copy of the Desktop folder, so I concluded initially that the Mac Pro's main screen was now showing me the iCloud Drive copy of the Desktop folder, not the original Desktop folder on the startup drive. I believe I may have been wrong, though, because it turned out that the Desktop folder still exists on the startup drive and its contents are identical to those of the iCloud Drive copy. More on this later.

I next noticed, when I opened the Documents item in the sidebar's iCloud section, that many of the items in the Documents folder included an image of a cloud at the end of the item's name. Some of the cloud images had a solid but slightly faint outline; one or two of them had an even fainter, dim outline; and one (for the "Microsoft User Data" folder) had a slash through it. I could find nothing about these images in a quick online search, so I looked where I should have looked in the first place -- in the Finder's Help menu. In Mac Help, I searched for "iCloud desktop and documents" and, scrolling down the results, I clicked the "View file, folder, and disk information" Help page. It provides a detailed explanation of each of these cloud images and several other cloud images that I had not yet seen. The full implication of the explanations was not entirely understandable, but it helps if you read them from the viewpoint of iCloud Drive, not from the perspective of the startup drive. I highly recommend that you read this Help page before proceeding.

I also noticed that the iCloud Drive item in the sidebar included a progress indicator and that it showed less than 1% progress. A day later, it showed about 65% progress, so I expected the syncing process to complete that night or the next morning. In fact, it completed early the next afternoon, taking about 2 days to upload 103 GB of data to iCloud.

I also noticed that many of the numbers in the Size column of the Finder window included an up-arrow before the GB, MB, KB or bytes numbers. I interpreted this to mean that some of these items still needed to upload at least part of their contents to iCloud Drive. I see nothing in Mac Help about these arrows.

I did not notice at this time, but only later when I began syncing the MacBook Pro, that the Finder window's path bar showed that the Desktop and Documents folders in the iCloud section of the sidebar were in fact located in iCloud Drive, not on the startup drive.

Finally, I noticed at one point later in the Mac Pro syncing process that the status bar at the bottom of the Finder window contained detailed upload information, and that it was changing constantly. At that point, the legend disclosed "637.75 GB available on iCloud, uploading 27 items (68.38 GB of 103.74 GB)". The total number, 103.74 GB, remained unchanged since then, as expected, but the number of items and the partial GB number changed over the course of the process. Both numbers went up and down alternately by small increments at first, which confused me, but the number of items declined over time from 8,000 or so when I first looked at the status bar to only 27 at a later point, suggesting that this is the number of items remaining to upload. The partial GB number trended upwards over time, suggesting that it represents the amount of data already uploaded. When I added up all the numbers in the Size column that contained up-arrows, the total always exceeded the difference between the total GB and the partial GB numbers in the status bar by about 10 GB. The number of up-arrows declined as syncing progressed, presumably as various items completed their upload to iCloud Drive. From all of this, I concluded that the partial GB number represents how much data has been uploaded so far (although this feels somewhat inconsistent with the meaning of the "uploading 27 items" part of the status report), and that the difference between this and the total GB is the amount of data remaining to upload. The numbers with up-arrows in the Size column apparently overstate the total amount of data remaining to upload because part of the data in those items has already been uploaded. "68.38 GB of 103.74 GB" pretty well describes the state of the progress indicator at that time -- a little over 60%.

One of the online articles I had read noted that the Finder's View Options dialog contains an item in List View that lets you add an "iCloud Status" column. When I did this, the new column (whose header is an image of a cloud with a very dark outline) contained a cloud image for every item in the window, not just for some of them, and the cloud images formerly shown at the end of the items' names disappeared, presumably to avoid redundancy. The up-arrows in the Size column also disappeared. Every image in the column now showed a

solid outline except for the "Documents - BillCheesemanMP" folder at the top, which showed a dim outline, and the "Microsoft User Data" folder, which showed a slash. The overall state of these symbols suggested to me that the upload was complete, yet the status bar and the progress indicator puzzlingly indicated that I still had 33 GB of data to upload. I would suggest that it is best to hide the iCloud Status column during the initial syncing process, because it is useful to be able to monitor the up-arrows in the Size column and the cloud symbols in the name column. Showing the iCloud Status column is useful during daily use after synchronization completes to see the status of everything in iCloud Drive.

I checked the iCloud Drive app on my iPhone and on my iPad from time to time during the syncing process. This showed me that files and folders were in fact being added to iCloud Drive as the process continued.

b. Accessing the Original Files on the Startup Drive

At one point, I began trying to determine whether the original files and folders remained on the startup drive. I had turned off the Optimize Storage option on the Mac Pro at the beginning because I wanted to be sure I always have local copies of all documents on this, my primary Mac, which has not yet run out of available memory. I handle iCloud Photo Library the same way. As long as I have sufficient space on the Mac Pro, I treat it as my primary computer despite the fact that iCloud Drive now holds "the truth." I will turn on Optimize Storage only on other devices until the Mac Pro gets too tight on memory. To make sure that my strategy would be effective, I needed to confirm that the original files and folders were in fact still on the startup drive.

Before turning syncing on, this was easy: Just select the home folder in the Favorites section of the sidebar and see the Desktop and Documents folders in the main body of the window -- or just click the Desktop or Documents items directly in the Favorites section of the sidebar. But those items are no longer visible after syncing is turned on. Even taking the long route by clicking the Mac Pro in the Devices section of the sidebar, then clicking the startup volume, followed by the Users folder, followed by the home folder, yields a list of startup drive folders that does not include the Desktop or Documents folders. As we will see later, they are not marked with a Finder invisible flag, but Apple does something to make sure you can't see them. This does help us to focus on the iCloud Drive folder instead of the startup drive, but it is no wonder that a lot of people thought their original files had been purged from the startup drive.

My first attempt to find the original files on the Mac Pro's startup drive took a wrong turn, but I only discovered this the next day. I will first describe my mistake so you can avoid it yourself, and then I will turn to the proper technique. I opened the Mac Pro from the Devices section of the Mac Pro Finder window's sidebar. In the main body of the window, I then saw what I thought was my user folder on the startup drive, and in the user folder I saw both Desktop and Documents folders. This gave me comfort, but I realized later that I was in fact looking at my user folder on the MacBook Pro, which was by happenstance then mounted on my Mac Pro's desktop. The user folders on all my Macs have the same name, and I did not notice that I was looking at a virtual drive icon instead of a home folder icon. The MacBook Pro had not yet been synced and therefore obviously still had the original Desktop and Documents folders on its startup drive, and I came away thinking that I had just confirmed that these two folders remained on the Mac Pro's startup drive. Unfortunately, despite a lifetime of experience as a trial lawyer, I had relied on inadmissible evidence.

As noted above, the new Desktop and Documents folders in the iCloud section of the Finder window's sidebar represent what is in iCloud Drive, as does the Desktop item that replaces the one that was originally in the Favorites section. I will now describe the correct way to access the original files on the startup drive, as I worked it out the next day. From the information that follows, I conclude that Apple intends us to access and manipulate our documents using these two iCloud Drive folders exclusively, when syncing is turned on. For that reason, Apple hides the folders showing the contents of the startup drive's Desktop and Documents folders, much like it hid the user Library folder a couple of years ago while leaving it available by less obvious means. What follows are the less obvious means to find your startup drive's Desktop and Documents folder when syncing is turned on.

I eventually got the bright idea of using the MacBook Pro to examine the Mac Pro's hard drive. I first mounted the Mac Pro's home folder on the MacBook Pro's desktop using the standard technique of clicking the BillCheesemanMP item in the Shared section of a Finder window's sidebar and then double-clicking its home folder in the main body of the window; the password is in my keychain, but you can enter it manually if asked. In the resulting window, I could see the Mac Pro startup drive's Desktop and Documents folders and all of their contents, out in plain sight! There were no cloud images associated with any of these folders; the path bar

showed that they are on the startup drive; and of course the status bar did not contain the "on iCloud" legend. Furthermore, when I opened View Options, the "iCloud Status" checkbox was disabled -- it was dimmed and could not be selected. Plainly, these folders contained the hard drive's data. I wonder if Apple just forgot to take the necessary steps to hide the startup drive's Desktop and Documents folders when the home folder is accessed over a network. If so, I suppose there is a strong likelihood that this hole will be plugged in short order. Fortunately, there is a second technique.

Another way to access the startup drive's Desktop and Documents folders is to use Path Finder from Cocoatech, cocoatech.com, a utility to which I turn whenever I have a task like this. I launched Path Finder on the Mac Pro itself. In its main window, I selected the startup drive, MP, in the Devices section of the sidebar, and I then opened the User folder and its home folder. (I almost made the familiar mistake of opening the MacBook Pro's home folder, which was still mounted on the desktop from previous activities.) There in the main window I saw the hard drive's Desktop and Documents files and their contents. The Attributes view showed that their Finder Invisible flags were not set, so Apple does something else to hide these folders in the Finder; whatever it is, it does not affect Path Finder. Later, after both the Mac Pro and the MacBook Pro were fully synced, Path Finder calculated the size of this Documents folder to be 208.7 GB. This is approximately double the original size of the Mac Pro's Documents folder, because as we shall see the completed sync process caused the entire contents of the MacBook Pro's Documents folder to be downloaded from iCloud Drive to the Mac Pro, duplicating everything that was already in the Mac Pro's Documents folder originally. Ironically, given all the public fear that the data has been removed from the startup drive, it is not only preserved on the startup drive but duplicated there -- at least when you start with synchronized Documents folders on both Macs, as I did. More on this later.

This is very interesting for a number of reasons. For one thing, it seems to help explain why, as I've read elsewhere but not yet tested, AppleScript scripts to manipulate hard drive files and folders still work without editing the paths they use. The same should be true of shell script commands and others. The files have not moved; they're right where they always were. They have just been made a little harder for the average user to reach, because Apple wants us to use iCloud Drive access once syncing is enabled. Sadly, a number of people in online discussions have concluded that their data files have disappeared, and through impatience or fear of data loss they have tried to cancel the syncing process prematurely or even reinstalled macOS. Apple needs to document this process and provide some sort of reassurance about what is really happening. However, there are circumstances where original files are not kept on the hard drive, notably when syncing is turned on for a second Mac and Optimize Storage is turned on.

What remained for me to discover at this point was what would happen once the syncing process completed. I had read hints that things on my Mac Pro might change, so I was very curious. It turned out not to be true, and some potentially major manual cleanup may be required.

2. Completion of Syncing on the First Mac

I hoped that, once the syncing process completed, the desktop on my Mac Pro's monitor would revert to showing the 4 alias files out in the open, as they still appear in the hard drive Desktop folder. I also hoped that the new "Desktop - BillCheesemanMP" folder would go away. It is so much easier to click an alias file that is out in the open. Ideally, this hoped-for reversion to my original desktop organization should happen automatically. It should not require me to make the change manually, especially in the absence of any documentation about what will happen if I do try to accomplish it manually. Unfortunately, my hopes proved not to be realized, and manual cleanup is needed at the end to put things right.

At first, I thought I had discovered a hint that this might happen automatically, but it was wishful thinking on my part. The hard drive's Desktop folder contained, in addition to the 4 alias files, a different alias file that exists only on the desktop on my MacBook Pro (Late-2013), which is on the same home network. Furthermore, the hard drive's Desktop folder contains only the 4 alias files on my original Mac Pro desktop, even though 4 alias files with the same names exist on the MacBook Pro desktop. I thought initially that the syncing process might have already picked up the MacBook Pro's desktop contents and added this alias file to my Mac Pro's desktop, while declining to duplicate the 4 other alias files with the same names. However, I now believe that this was a leftover effect from a brief preliminary test of syncing on the MacBook Pro that I performed a little while ago, under one of the Sierra GM releases. I have not yet turned on syncing on the MacBook Pro under the final release of Sierra (I turned it off after testing on the GM release), and that machine therefore should not be affected by what I've been doing on the Mac Pro. Others who have played with iCloud Desktop and Documents

Folder storage on beta or GM release of Sierra should take this as a warning that turning on this feature on the final Sierra release may involve some surprises.

At about the 48-hour mark, the uploaded GB number reached equality with the total GB number in the Finder window's status bar. The sync was not yet done, however, because the status bar still indicated that 3 items were left to upload. I watched for about an hour, and that number finally dropped to 2, reassuring me that something was still going on. I was away from the computer when the count dropped to 0, so I don't know whether anything particular happened then to signify completion of the syncing process. When I returned, I found that the status bar contained the familiar "1 of x selected, xxx.xx GB available" legend seen in almost every Finder window, but it added "on iCloud" at the end. While I sat looking at this, the system happened to perform a routine periodic update and for a couple of moments the status bar changed to "updating 1 item", then it returned to the "available on iCloud" legend. All of the cloud images in the iCloud Status column had solid outlines, except for the "Microsoft User Data" folder having a slash through the image. I did not find any notification on the screen that the syncing process had completed, and there was no notification in the Notification Center.

The phrase "on iCloud" in the "available" legend in the status bar is a nice touch. It appears whenever I select the iCloud Library folder, or its Desktop folder, its Documents folder, or any other subfolder of the iCloud Drive folder. It provides a constant reminder -- or reassurance -- that I am working on the master version of a document in iCloud Library, not on the local copy on my hard drive. I am concerned that editing the local copy might not result in synchronization to iCloud and other devices -- a test to be performed later. Just to make sure, I looked at the local Desktop and Documents folders in the Home folder of my startup device, and the "available" legend did not include the "on iCloud" phrase.

I could swear that, when I first examined the iCloud Drive folder and its subfolders on the Mac Pro after syncing completed, they did not include a "Documents - BillCheesemanMP" subfolder to hold the uploads that came from the Mac Pro. Perhaps, I thought, the "Desktop - BillCheesemanMP" folder was created on the desktop only to hold the alias files on the Mac Pro desktop whose originals reside on the Mac Pro. However, when I examined the Documents folder in the iCloud Drive app on my iPhone the next morning, I saw that there was in fact a "Documents - BillCheesemanMP" folder at the top level of the Documents folder in iCloud Drive. The entire contents of the Mac Pro Documents folder were contained in that folder. I then went back to the Documents folder in the iCloud section of the Finder window's sidebar on the Mac Pro, and I saw that the "Documents - BillCheesemanMP" folder also existed there. Perhaps I was hallucinating the night before. I therefore concluded that I would see another top level folder containing all of the MacBook Pro Documents folder's contents alongside it when I turned on syncing on the MacBook Pro, and I was right.

I assumed this would require attention at the end of the process, because AppleScript and other scripts should not be able to work without editing the paths they use to access Finder items unless the paths are unchanged. Having a "Documents - BillCheesemanMP" inserted in the middle of the path would ordinarily disrupt such things. More on this later.

The iPhone and the Mac Pro both also show a top level "SecuritySpy" folder in the Documents folder of iCloud Drive, containing two folders, "Backup Files" and "Captured Files", both of which are empty. SecuritySpy is a surveillance camera application that I have used for years, and I don't know how this folder came to appear on iCloud Drive in this position. It has no counterpart that I can see on the hard drive. "Backup Files" and "Captured Files" folders also appear in a proper SecuritySpy folder inside the "Documents - BillCheesemanMP" folder where they belong, and that Captured Files folder contains the one item that it contains on my Mac Pro hard drive. My assumption is that Security Spy created these folders when the syncing process moved the original into the "Documents - BillCheesemanMP" folder, because SecuritySpy is set up to require the existence of these folders at the top level of the Documents folder. Many other Mac applications have user-settable paths to their documents, and they may have similar effects. More on this later.

The monitor on the Mac Pro still displayed the "Desktop - BillCheesemanMP" folder with the 4 alias files inside it, along with the three files out in the open that I had added to the desktop while syncing was in progress. This seems to demonstrate that, after synchronization is complete, new files and folders created during normal daily work will be stored in the top-level Desktop or Documents folder, both on iCloud Drive and on the hard drives, so that continuity can be used to edit them on any Mac without manual cleanup. It is only the original files and folders that were on the hard drive when synchronization was turned on that are moved into device-specific subfolders of the top-level Desktop and Documents folders. After those are cleaned up, no further manual

cleanup should be required.

The Desktop item in the Favorites section of the Finder window's sidebar was still there, and its status bar also contained the "available on iCloud" legend. I went ahead and removed this item using the Remove from Sidebar command in the contextual menu, because its presence in the Favorites section struck me as inconsistent with placing the Desktop item in the iCloud section of the sidebar. Besides, it takes up space for no reason. Given the way the Favorites section works, I assume you could leave it there and even add a duplicate of the Documents folder, if you feel differently than I do about it. Removing the Desktop item does not seem to have caused any problems.

Finally, I examined the window that opens when clicking the Manage button in the Storage tab after choosing About This Mac from the Apple menu. The first item, "Store in iCloud", still showed a Store in iCloud button instead of the checked checkbox that I expected from reading about this feature. The text still invites me to "Store all files and photos and save space by keeping only recently opened files and optimized photos on this Mac when storage space is needed." I have seen online screenshots of different wording in this item when different settings have been made in System Preferences. I assume that my having turned off Optimize Storage in the iCloud pane of System Preferences and in iCloud Photo Library on the Mac Pro means that the system still thinks I might be interested in saving space by turning it back on. As Adam Engst has pointed out in his TidBITS article, "Explaining Sierra's Optimized Storage," tidbits.com/article/16765, the title of this item "Store in iCloud," is extremely confusing. The following item is titled "Optimize Storage," when in actuality it seems that both items have to do with optimized storage, at least when iCloud is set up in System Preferences as it is on my Mac Pro.

Now that the Mac Pro syncing process was complete and I had sorted it out as much as I could, I was ready to turn to syncing the MacBook Pro.

3. The Syncing Process on a Second Mac

a. Expectations

Given the lack of documentation, the big puzzle for me was how to avoid ending up with unnecessary duplicate files in the Mac Pro's and the MacBook Pro's Desktop and Documents folders or in iCloud Library. The contents of those folders on the MacBook Pro were already almost completely identical to their Mac Pro counterparts due to my years-long use of ChronoSync to keep them synced. I hated the thought of seeing all those files remain on the hard drive while duplicates were added by download to the same hard drive from iCloud Drive, just as I hated the thought of seeing duplicates added to iCloud Drive during the upload process. At the same time, I hesitated to move them all to a folder named something else before starting the syncing process to prevent them from uploading to iCloud, and then to expend all the bandwidth and time required to download them all to an empty Documents folder from iCloud Drive, as some have suggested in online commentary. Online discussions have already posed this dilemma, and Apple's documentation sheds no light on it. Surely, I thought, Apple must have realized that lots of people already keep their Documents folders synchronized between Macs. I was spoiled by ChronoSync, which is very good at identifying and dealing with duplicates automatically.

I was wrong, however. As others have already said online, Apple does not touch the folders and files once synchronization is complete. Identifying duplicates is a difficult task, as is figuring out the best way to organize files and folders for any one user's workflow. Presumably for this reason, Apple leaves it to you to rearrange things manually to suit your needs. The bottom line is that, the first time you invoke synchronization, the system puts all of the files from any one Mac's Desktop and Documents folders into a subfolder for that device, both in the iCloud Drive folder and on the startup drive. This preserves all of your existing organization while at the same time making all files available on all devices. It is up to you to weed out duplicates and move files back to their original hierarchies if that is what you want. As noted above, you can arrange for some of this before you start the synchronization process, or you can do it at the end. Doing it first may save upload and download time, but doing it at the end may make manual cleanup easier. I chose to leave it to the end, certainly to some extent as a result of wishful thinking, but mostly because instinct told me that it would be easier at the end. I am glad that I did, but I believe doing it first would also have worked.

It should also be noted that even users with completely disparate content in the Documents folders of multiple Macs will face this issue. Even for them, files and folders from each device will be moved into subfolders

unique to that device. Although these users may not have to deal with issues of duplication, they still have to deal with the organization of the files after synchronization is complete.

But as I approached the syncing process on the MacBook Pro, I didn't yet know this. The most likely possibility, it seemed to me based on what I had seen so far, was that the files on the MacBook Pro would be uploaded to a "Documents - BillCheesemanMBP" folder in iCloud Drive's Documents folder alongside the "Documents - BillCheesemanMP" folder. I expected, incorrectly, that over some short period of time the contents of those two folders would in some sense be merged to eliminate duplicates without intervention on my part. Maybe, I thought, iCloud Drive would use hard link techniques like those used in Time Machine to avoid the disk space otherwise required by what looks like duplicates. And, of course, I thought, the process must merge unique files from either Mac into a common list so that all files can be edited on both Macs, even for users who have completely different contents in the Documents folders on two or more Macs. Whatever it does, the process must eventually result in the Mac Pro and the MacBook Pro having access to all of the same folders and files, since the whole point of Desktop and Documents Folder syncing is to enable us users to take advantage of continuity by editing the same files from two different devices interchangeably.

To perform the merge operation automatically, Apple would have to be able to identify identical files reliably. I know that the ChronoSync folks have spent years figuring out how to tell whether two files are identical for exactly this reason, and ChronoSync offers many settings to let you adjust how that determination is made. Surely, I thought, Apple does something similar, but perhaps more direct and simpler, to avoid unnecessary duplicates without requiring user intervention, but I had no idea what that might be.

Overnight I decided to take a chance and assume that Desktop and Documents Folder syncing on the MacBook Pro would do the right thing by avoiding downloading or uploading duplicates unnecessarily and by eventually merging everything in some fashion in order to support continuity. I decided I would behave like an average user and just turn on syncing on the MacBook Pro without any preparation. It should "just work," I thought. To ferret out a few more answers, I first created a couple of standard files on the desktop and in the Documents folder of the MacBook Pro that had no counterpart on the Mac Pro, so that I could examine the result of syncing disparate files as well as identical files.

b. Monitoring the Synchronization Process

When I first turned on iCloud Desktop and Documents Folder storage on the MacBook Pro, the Setup legend appeared for a few seconds. Immediately after it disappeared, I saw the desktop on the monitor change by removing the 5 alias files that had been visible as well as the two new standard files I had just added to it. In their place appeared the two folders "Desktop - BillCheesemanMP" and "Desktop - BillCheesemanMBP," the former created a couple of days ago when I turned syncing on on the Mac Pro, and the latter just created. The three standard files I had added to the Mac Pro's desktop after turning on syncing there two days ago also appeared on the MacBook Pro's desktop. This effect was familiar to me and expected, because I had seen it on the Mac Pro already.

On the Mac Pro, I had missed what happens in the Finder window because I had opened the window too late. For the MacBook Pro process, I already had the window open. The window that I had opened to the MacBook Pro's Documents folder in the Favorites section of the sidebar changed at the same time the desktop changed, with the same startling suddenness and without any warning dialog. It instantly added the iCloud section to the sidebar, moved the iCloud Drive item into that section from Favorites, and added new Desktop and Documents items to the iCloud section. The Documents item formerly in the Favorites section vanished, but a Desktop item "remained" in the Favorites section -- I saw no animation or flicker, but I knew that in reality it replaced the original Desktop item in the Favorites section. I will remove the latter from the sidebar, as I did earlier on the Mac Pro. The Path Bar showed that all of these folders were in iCloud Drive. As the process continued, any of the iCloud items that I selected showed overall current progress in the status bar. Early on, for example, it showed that about 60,000 items were "uploading" and that, apparently, the data uploaded so far constituted 114.9 MB of 104.74 GB. The progress indicator beside the iCloud Drive icon showed less than 1% progress. The window showed the contents of the Documents window in iCloud as containing only 3 items; namely, the "Documents - BillCheesemanMBP" folder, the "Documents - BillCheesemanMP" folder, and the mysterious "SecuritySpy" folder. The "Documents - BillCheesemanMBP" folder showed a cloud image with a solid outline, indicating that all of the documents were fully present on the MacBook Pro -- these were what the status bar indicated were being uploaded to iCloud Drive and of course they were already all on the startup drive. The "Documents - BillCheesemanMP" folder showed a cloud image with a down-arrow, indicating that its contents

were being downloaded from iCloud Drive to the MacBook Pro. The "SecuritySpy" folder had no associated cloud image.

Seeing folders and files that were uploading and downloading simultaneously immediately showed me that my earlier guesses had been wrong. I was seeing the worst of all possible worlds in terms of bandwidth usage and time. All of the identical files were being uploaded from the MacBook Pro to iCloud and downloaded from iCloud to the MacBook Pro simultaneously. I confirmed this by expanding both of the Documents folders in the Finder window. The Size column showed up-arrows for all of the large subfolders being uploaded to iCloud, and the cloud images showed down-arrows for all of the large subfolders being downloaded from iCloud.

The progress indicator beside the iCloud Drive item in the sidebar was also behaving differently. It, along with the status bar, showed progress in very short spurts of activity involving a very small number of items at any one time. The progress indicator would go from 0% to 100% in a couple of seconds, then start over, and the status bar would change from describing 1 item's upload to describing 8, then down to 3, then up to 16, and so on. The "available" GB changed, always showing very small numbers, apparently referring only to the current piece of the overall operation. The progress indicator even went backwards sometimes. I assume this behavior reflected the fact that, when synchronizing a second Mac, the process includes both uploads and downloads. I refer to these as occurring simultaneously, but in fact they apparently alternate rapidly.

While this was happening on the MacBook Pro, I had the iCloud Drive window open on the Mac Pro. The Desktop folder was open showing both the "Desktop - BillCheesemanMP" subfolder and the "Desktop - BillCheesemanMBP" subfolder with their respective contents. Both subfolders contained the 4 alias files that were on both Macs' desktops. Although the alias files were named the same, they pointed to different original items. The "Desktop - BillCheesemanMBP" subfolder also contained the 5th alias file and the two new standard files that were on the MacBook Pro's desktop when syncing started. The "Desktop - BillCheesemanMP" folder contained only its 4 alias files. The three standard files that I had added to the Mac Pro's desktop during its syncing process were at the top level of the Desktop folder, but not in either of the device-specific subfolders.

The same pattern appeared in the Documents folder in iCloud Drive, also open in a Finder window on the Mac Pro. The two device-specific subfolders, "Documents - BillCheesemanMP" and "Documents - BillCheesemanMBP", had almost identical contents. I could see by looking at them at the same time that they did have significant differences, even at the top level, because my ChronoSync scripts were deliberately designed to maintain some differences between the two Macs. For example, the "Microsoft User Data" file existed only in the Mac Pro's subfolder, and there were a file and a handful of folders that existed only in one or the other. The two standard files that I added to the MacBook Pro's documents folder just before turning on syncing there existed only in the MacBook Pro's subfolder.

While files were uploading from the MacBook Pro to iCloud Drive, I noticed that the status bar of the Finder window open on the Mac Pro showed that files were downloading to the Mac Pro. I investigated this later, as described below, and found that as files were uploaded from the MacBook Pro to iCloud Drive they were immediately downloaded from iCloud Drive to the Mac Pro.

I wondered how this would turn out. On the one hand, I was glad I had not tried to sort out differences between the two Macs' Documents folders before syncing, because that would have been a long and hard manual process prone to human error. But I didn't yet know whether I would still have to perform the process manually afterward, or whether I would instead receive automated help from a system merge process. I apparently faced three or four days of suspense, because I thought the combined upload and download process was bound to take longer than the Mac Pro upload-only process had taken.

4. Completion of Syncing on a Second Mac

The syncing process on the MacBook Pro took only half a day, as it turned out, despite the fact that it involved both uploads and downloads. This is apparently because Optimized Storage was turned on on the MacBook Pro. Not everything was downloaded to it. In particular, based on my reading, very large files should not have been downloaded.

With the process completed on both Macs, I was very curious to know how it would feel to return to normal daily use of my Macs. With the iCloud Drive folder open in a Finder window, I looked at a Mac Pro file that had, according to its cloud symbol, been downloaded from iCloud to the MacBook Pro. It was a small PDF file, and it

opened immediately. I then opened a Mac Pro file that, according to its cloud symbol, had not been downloaded. It was also a small PDF file, and it took a little while to open, apparently because it had to be downloaded first. The delay was not enough to be annoying. Afterwards, its cloud symbol indicated that it was now present on the MacBook Pro's startup drive. This is how file handling is supposed to work when using iCloud Desktop and Documents Folder storage. It feels good.

The total available memory on the MacBook Pro after completion of the syncing process was approximately 406 GB. I believe this is more than was available before the syncing process started, but I neglected to make a note of the starting size and I am not sure. If there was more memory available, this was presumably because Optimized Storage was turned on, but I do not have a good understanding of how syncing decides when some files should not be kept on the startup drive.

The total available memory on the Mac Pro after completion of the process was only about 58 GB, substantially less than I recall was available before the syncing process completed. This number is uncomfortably low -- less than 15% of the total memory capacity of the Mac Pro's startup drive. It triggers warnings from the TechTool Protection software installed on my Mac Pro. Some of the files had cloud symbols indicating that they were not downloaded to the Mac Pro, even though Optimized Storage is turned off, presumably for this reason. This suggests that I might want to turn Optimized Storage on here, too, if I become comfortable having some older data stored only on iCloud Drive.

Still, I was not done. The vast majority of the files that were synced were present on iCloud Drive and on both Macs in the form of duplicate files in the two device-specific folders. This is because nearly identical sets of Mac Pro and MacBook Pro files and folders were uploaded to iCloud Drive into separate Documents subfolders, and then in many cases to be downloaded both to the Mac Pro and the MacBook Pro as duplicate files in the same separate document subfolders. I saw that both subfolders in both Macs' startup drives contained copies of the Desktop and Documents folders. No automatic merger had taken place. As a result, both Macs' startup drives were wasting substantial space on duplicate files.

5. Cleanup

To fix this plainly unacceptable situation, I now had to start manually pruning the iCloud Drive subfolders. How best to go about doing this is not documented by Apple, and I could find no helpful discussion online. As with all that came before, I had to proceed by analysis and intuition.

After the manual process is completed, it should never have to be repeated. From that point on, all folders and files added to, or edited in, the Desktop and Documents folders in iCloud Drive should automatically propagate to the Documents folders on both Macs.

The best approach seemed to be to make changes in iCloud Drive. That's where Apple wants us to work, and the results of changes there should propagate automatically in real time to each Macs' startup drive. I decided to start with the Documents folder, because that is where the bulk of the work lay and the alias files in the Desktop folder presented specialized puzzles that aren't urgent. I decided to move one copy of each folder in the iCloud Drive Documents folder out of its device-specific parent folder into the top level of the iCloud Drive Documents folder and to discard the matching duplicate folder in the other device-specific subfolder. For example, I could move the "**TO-DO" folder (with its contents) out of the "Documents - BillCheesemanMP" subfolder into the top-level "Documents" folder in iCloud Drive, and then delete the "**TO-DO" folder (and its contents) from the "Documents - BillCheesemanMBP" folder in iCloud Drive. I knew that I would have to take care to capture the most recently modified of any two identical files within these two folders, because I had done some work with some of the files on both Macs since starting this lengthy process. I decided the easiest approach would be to favor the Mac Pro files and folders by default, because it is my primary computer, discarding the MacBook Pro files and folders -- except for those relatively few folders where I do my primary work on the MacBook Pro. Eventually, when the top level of the iCloud Drive was set up the way I wanted it, I planned to delete the two device-specific subfolders, "Documents - BillCheesemanMP" and "Documents - BillCheesemanMBP," which by this point would both be empty. I understood that these changes should sync back to both Macs automatically while I was working, so I could test the results piecemeal right from the beginning. When finished, I would have achieved significant memory savings by eliminating duplicates in iCloud Drive and on both Macs, and I would be able to make full use of the continuity feature of macOS that allows editing of all files in the Documents folder on any device. It should also allow me to change the way I populate the desktop on both Macs.

This will be a tedious and detailed process, but that is not due to any fault in the iCloud Desktop and Documents Folder Storage feature. It is a direct result of my long-ago decision to maintain nearly identical file structures on both Macs. As discussed above, merging them is inherently difficult, and I think Apple was justified in leaving it to the user. Each user will have to decide whether the payoff is worth the effort. There is probably a way to automate it in terms of saving the newest version of every file; for example, by processing the device-specific subfolders in ChronoSync. But I decided not to take that step, because I want to accomplish something else at the same time.

For myself, I will treat cleanup as an opportunity, not a task. My Documents folders are full of old, even obsolete documents, going back as much as 16 years, that I should have gotten rid of long ago. Other documents are prime candidates for offloading to an external archives disk just in case I might need them someday. These tasks were never, until now, a sufficient priority for me to actually undertake them. I will take the time to do them right now, motivated by the desire to get this new Sierra feature working as soon as possible. It will achieve still more memory savings, and it will improve the usability of my computers.

I took the first step, moving and deleting the "*TO-DO" folders as described above, just now. It worked instantly, showing the expected results in iCloud Drive and on both Macs. I am confident that this success will continue. I will therefore publish this article to my website now, to make any help it may provide available to other users as soon as possible.

6. Open Issues

During the course of this story, I referred to several questions that need answering. I will turn to them later and perhaps publish them in a sequel. They include the following:

- Handling alias files

How should alias files be handled, especially on the desktop? Since alias files point to a specific item located on only one device, it would be not just useless but potentially disruptive to place a copy on another device. The original item pointed to by the alias file might exist on only one of the devices, and even if it exists on both they might lie outside the Desktop or Documents folder and have a different path on each device. Might the alias file on one device open the original item on the other device?

I just performed a quick test by double-clicking a couple of alias files on one device whose original items were on the other device. It resulted in an error alert saying that the alias file "can't be opened because the original item can't be found." This will make for a most unpleasant experience, perhaps forcing me to abandon the use of alias files on the desktop.

- Using alternative non-syncable Desktop and Documents folders

Is it possible to create a visible alternative to the hidden Desktop and Documents folders that do not sync to other devices?

This is certainly possible with respect to the Documents folder. Just create a new folder on the startup drive and name it something other than "Documents." The Movies, Music and Pictures folders do not sync, and a folder named "Documents PRIVATE" presumably will not, either. Perhaps Apple should provide such a folder automatically to promote a common naming convention.

But what about the Desktop folder? Because of the alias file issue described above, it would be very nice to have an alternate folder, perhaps named "Desktop PRIVATE", which is visible for editing and whose contents appear out in the open on that device's desktop but do not sync to any other device's desktop. Apple, please consider this.

- Editing the startup drive's hidden Desktop and Documents folders

As noted, Apple has presumably gone to such great lengths to hide the Desktop and Documents folders on the startup drives in order to force us to use iCloud Drive. But the startup drive folders remain accessible using the techniques described above. Are changes that you make directly to the startup drive folders synchronized?

I just performed a quick test by creating a small document on the Mac Pro's desktop and using Path Finder to move it to the hidden (in Finder) Documents folder on the Mac Pro's startup drive. It immediately appeared in the iCloud Drive Documents folder and (using Path Finder to see it) in the MacBook Pro's startup drive Documents folder. Using Path Finder, I then deleted it from the MacBook Pro's startup drive Documents folder, and it immediately disappeared from the iCloud Drive Documents folder and (using Path Finder to see it) from the Mac Pro's startup drive Documents folder. The syncing process apparently works even when initiated from a startup drive instead of iCloud Drive.

- Using files and folders in the Desktop and Documents folders that are not eligible for syncing

As noted above, Mac Help tells us that a cloud symbol with a slash through it marks a file or folder as ineligible for syncing. On my Mac Pro, the "Microsoft User Data" folder and its contents are so marked in the iCloud Drive folder. The folder and its contents are on the Mac Pro's startup drive, of course, but in fact they do not appear in the Mac Pro-specific subfolder in the MacBook Pro's startup drive or its view of iCloud Drive after synchronization.

The MacBook Pro has its own "Microsoft User Data" folder with different contents on its startup drive, and that folder and its contents appear in its view of iCloud Drive but not in the Mac Pro's view of iCloud Drive or its startup drive.

Are there any unanticipated consequences of this discrepancy? I have not thought of any, but I have not yet performed any tests, either.

- Handling applications with user-settable document paths

As noted above, a mysterious "SecuritySpy" folder appeared at the top level of iCloud Drive and the startup drives on both Macs. The SecuritySpy application is installed on both Macs, and it specifies a user-defined path to a "SecuritySpy" folder in the Documents folder to store recorded movies. Was this top-level folder created by the SecuritySpy application when, during or after synchronization, it could no longer find the folder because the currently specified path omits the new device-specific subfolder? The original startup drive's SecuritySpy folder was placed in the device-specific subfolder during the syncing process, as expected, but will it work?

In general, many applications use user-specified or built-in default paths to the Documents folder or subfolders in it to store important files. Will they stop working after synchronization? Will they start working again after manually cleaning up the Documents folder and removing the device-specific subfolders? Is it necessary to audit all of the applications in use and to re-set the document paths?

I have not yet tested any of this.

- Using AppleScript, Automator and the like

AppleScript and similar technologies often access files and folders based on their paths. This raises the same questions as applications with user-settable paths. Will the scripts stop working after synchronization? Will they start working again after manual cleanup? Must the scripts be rewritten with revised paths?