

Data Synchronization

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What is Synchronization?

- Data synchronization (“syncing” for short) is the copying of data from one computer to another so the computers share the same data
- Things that may be copied/replicated are new data, updated data, data deletion, and the renaming of files and other data objects
- The two computers may be referred to as the “source” and the “target” (see next slide)
- Usually faster, more efficient, and less error-prone when performed by software on a recurring schedule

Why Synchronize?

- Ubiquity: You need access to your data regardless of where you are or which computing device you are using
- Consistency: You need for your data to be up-to-date whenever and wherever you access it
- You use multiple devices in any given day—desktop computers, laptops, tablets, smartphones, etc.
- Backing up your data

Two Types of Synchronization

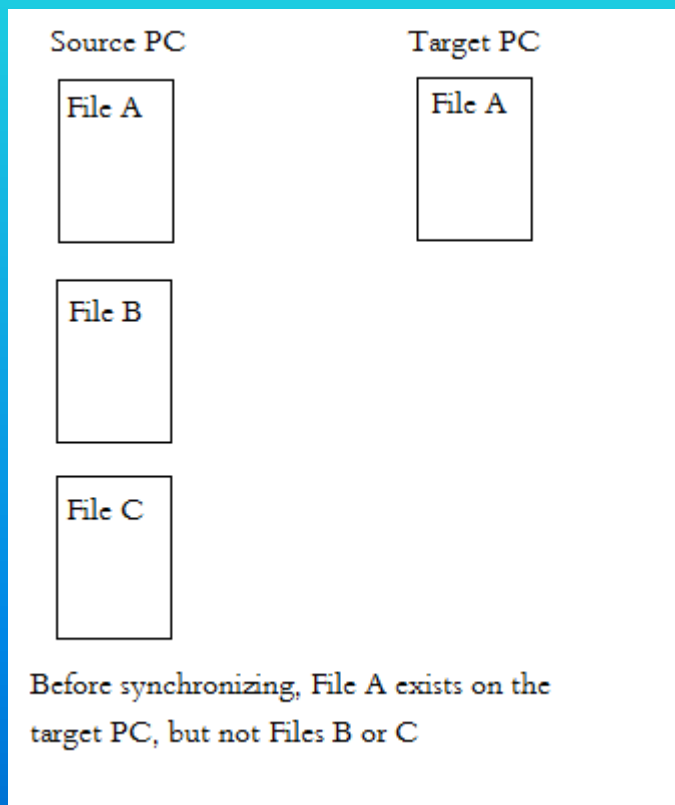
- **One-way synchronization** “mirrors” data, copying it from the source to the target, but not the reverse
- **Two-way synchronization** copies data from one computer to the other and vice versa; both serve as the source for each other

How Synchronization is Performed

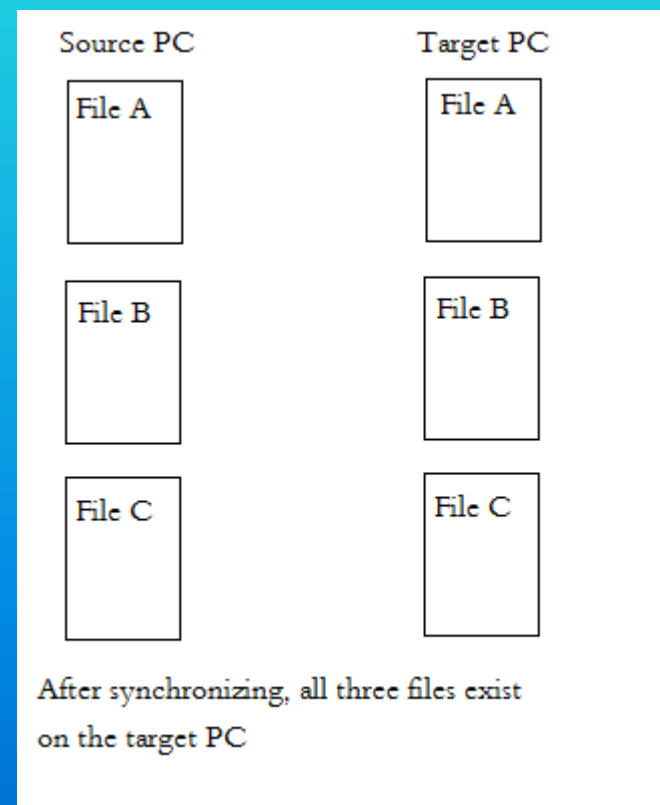
- The implementation details will vary according to the particular service/software, but some basic principles apply
- First, the data to be synchronized is compared between the two computers
- Second, any differences in the data are noted, such as a file that exists on only computer, or is an older version of what exists on the other
- Third, the data is copied with the goal of ensuring the data on one computer is the same as what is on the other

Simple Example: One-way (Mirroring)

Before synchronization

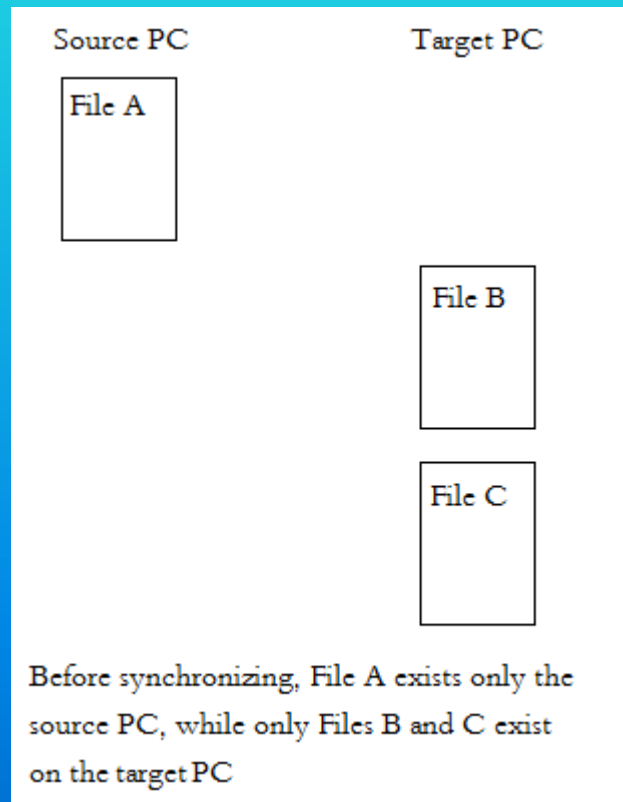


After synchronization

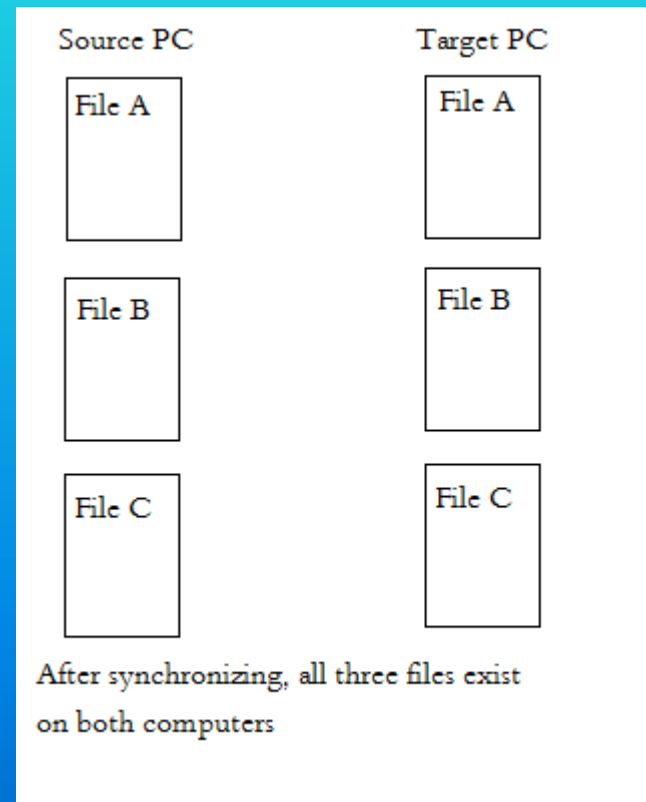


Simple Example: Two-way Synchronization

Before synchronization



After synchronization



Two-way Example: Whispersync for Amazon Kindle

- A user may have multiple Kindle devices and/or computers for reading Kindle books
- Whispersync synchronizes your bookmarks, notes, and furthest page read across your devices
- The process is enabled by default and takes place silently without the your interaction
- Amazon's server acts as the intermediary for the data transfer

Two-way Example: Google Bookmarks

- Google Bookmarks allows you to save and access the very same set of Internet bookmarks on multiple computers
- No need to go back to another computer on which you bookmarked a useful site, nor to try to remember what the site was named
- Includes organizational aides such as adding searchable labels and notes to your bookmarks
- Get started by creating a Google account

Two-way Example: Microsoft SyncToy

- May be used in multiple modes
 - Synchronize: new and updated files are copied both ways; renames and deletes are replicated
 - Echo: new and updated files are copied one direction; renames and deletes are replicated
 - Contribute: new and updated files are copied one direction; renames are replicated, but not deletes
- Advanced options allow you to exclude certain folders and file types
- The third option is useful if you wish to keep a historical archive of old files that you have deleted from the target PC
- Faster and more efficient than manual drag-and-drop in Windows Vista and later
- I use the first option most often, as when I need to keep updated copies of the CUGG web files on my laptop and a flash drive

Two-way Example: Dropbox

- Install the Dropbox app on your computer, smartphone, and tablet
- Create an account
- Add files to the Dropbox folder on your computer
- Once the app is installed on each device, it will watch for changes and sync them with your other devices

One-way Example: Apple iCloud

- Music, movies, and TV shows purchased on any Apple device are accessible on other Apple devices
- The content is synced down to the devices from Apple's servers
- Unlike Amazon's Whispersync, data is not copied back (upstream) from the devices, so the syncing is one-way