Computer Science — Project–Backing Up Your Data

ASSIGNMENT OVERVIEW

The purpose of this assignment is for you to establish your backup strategy, and to demonstrate your ability to recover from catastrophic data loss.

This assignment is worth 50 points and is due on the *crashwhite.polytechnic.org* server at 23:59:59 on the date given in class.

BACKGROUND

There's no question that computer data should be backed up so that in the event of catastrophe, lost data can be easily recovered.

Not all data needs to be backed up, perhaps. But just about everyone now has come to rely on data being available, whether on a desktop machine, a laptop, a tablet like an iPad, or a smartphone. If you have data that's important to you—course work, music files, photos—you want to have it backed up. In this class, the progress you make and the grade you earn is based on data that you'll be generating. You *will* experience data loss during the year in this class, so it only makes sense to put your backup strategy into place *before* that happens.

> "Accidental loss of data" is not an acceptable excuse for missing assignments or not turning in work. *You are responsible for the data you generate and keeping backups of that data as needed.* This assignment is designed to help you establish a backup routine for your data.

One common backup strategy used by people is the "3-2-1 Backup Strategy": you should have 3 copies of your data, on at least 2 different media, with 1 of them being an *offsite* backup located someplace else besides where you typically are. An example of implementing this strategy would be having:

1. a "working" copy of your data on your laptop (you've already got that!)
2. a local backup of your computer on an external hard drive or flash drive, and
3. an offsite backup of your computer on Backblaze or some other service.

RESOURCES

1. Your computer, *and*
2. An external hard drive and OS-based backup software (strongly recommended), OR a USB flash drive (provided as part of this course), *and*
3. A commercial cloud-based backup plan (strongly recommended), OR a manually-managed off-site copy of course files (via free Dropbox account or `rsync`)

DELIVERABLES

`screenCapture-localBackup.jpg` and
`screenCapture-cloudBackup.jpg`

These two screen captures, in JPG or PNG format, are to be copied to your directory in `/home/studentID/forInstructor/` at *crashwhite.polytechnic.org* by 23:59:59 on the due date given in class.

ASSIGNMENT NOTES

Complete all of the steps numbered I-IV below. Note that there are two alternatives for I and II, and you only need to complete one of the two.

I. Implement a local backup strategy.

If you're going to backup your entire computer—and you *should*—you need an external hard drive as described below. The alternative is to use the flash drive provided for this class back up a smaller number of files manually.

A. *Use an External Hard Drive*

The benefit of using an external hard drive is that all of your important files will get backed up, not just the ones for this class.

1. **Get an external hard drive of sufficient capacity to store at least one full backup of your hard drive.**
   Ideally, for incremental backups, the drive you purchase should 2-3 times the capacity of your computer hard drive. If you have a 512 GB hard drive, you need at least a 750 GB hard drive, and preferably a 1- or 2- TB external drive for backups. Good places to order a hard drive online are Amazon.com and NewEgg.com, or you can pay a little more to buy locally from Best Buy or the Apple Store. Also, think about what connector cables you might need, and whether or not they come supplied with the drive. (USB 2.0? USB 3.0? USB-C?)

2. **Identify what Operating System backup capabilities your computer has.**
   - **a.** Apple's OS X will launch *Time Machine* when you plug in a new drive or activate it from the Applications folder.
   - **b.** Ubuntu's *System Settings* includes *Backup*, in which you can provide specifics on what you want to have backed up, and on what external hard drive.
   - **c.** Window's *Control Panel* has a *Backup and Restore* feature that will allow you to set up an external hard drive for regular backups.

3. **Plug in the hard drive and begin the backup process.**
   It will take at least a few hours, possibly longer, for the first backup to be made. To be safe, begin the backup process on a weekend so you'll have plenty of time for the process to complete uninterrupted.

4. **Remember to plug in your device at least every other night or so.**
   Having a backup drive doesn't help you if you're not using it!

OR...

B. *Use a USB Flash Drive*

You've received a small USB flash drive that you can use for transferring files from one machine to another, storing backups, etc. If you choose not to implement the whole-computer external hard drive backup strategy described above, then you'll need to use this drive to make daily copies of your work in this class by dragging a copy of files and folders as needed onto this drive.

There are a number of disadvantages to this system which previous students have discovered for themselves. You have to keep track of a small piece of hardware that is easily misplaced.

You'll need to make sure that you don't accidentally pull the drive out of your computer while files are being written to it—always perform an "eject" and wait until the computer has indicated that the drive can be safely removed. You'll need to remember to drag a copy of your files over every night or so. Perhaps most importantly, not all of your data is being backed up—you have a copy of only as much as will fit on the drive. That's not much comfort when the college essay that you've been working on disappears from your computer.

II. Implement a cloud-based backup strategy.

You also need an off-site copy of your data that you can access from "the cloud." This will be the backup to your backup. Again, you have two options.

A. *Subscribe to a commercial cloud-based backup service*

Most of these services cost $5-$10/month, and allow you to back up your `Documents` folder at a minimum, and perhaps even your entire hard drive.

1. **Investigate your options.** There are a wide variety of options to choose from, varying in coverage, price, convenience, speed, and your technical skill level. The most robust and convenient options include Carbonite, and Backblaze. There are other options as well, but any one of these will be the best option for the vast majority of people.

2. **Begin your backup process.** Because the software you're using wants to be as unobtrusive as possible, in most cases it's not going to take much of your bandwidth/CPU—it's going to slowly upload your drive, a little at a time, and the process can take *weeks*, so get started now!

OR...

B. *Keep the folder of materials for this class in a* Dropbox *or* Google Drive *folder.*

Dropbox offers free storage of up to 5GB of data, which is more than enough to store the files that you'll be using in this class. Or, you can use your school Google account to keep copies of your files.

1. **Choose which cloud storage strategy you want to use.**

2. **Create a folder on your computer called `APCompSci` (for example) and place that in your cloud backup directory.**
   You'll store all your stuff for your class in this folder, where Dropbox or Google will automatically update it to their servers any time you're connected to the Internet. Again, this cloud-based backup strategy is certainly inexpensive, but it lacks many features that are standard with the commercial backup plans.

OR...

C. *Create your own backup plan*

By using `rsync`, `cron`, and some other creative techniques you can certainly develop your own scripts—that's how the server for this course is backed up, in fact. These are beyond the scope of this activity, however—it's better at this point to get something working that's simple and usable, and you can investigate other options at your leisure.

III. Present your documentation to the instructor.

A. *Local Backup Documentation*

Make a screen capture of your local backup process in action, saving either to an external hard drive or USB flash drive. This screen capture file should be titled `screenCapture-localBackup.jpg` and uploaded to your `forInstructor` folder on the course server.

B. *Cloud Backup Documentation*

Make a screen capture of your cloud-based backup process in action, saving either to Dropbox, Backblaze, Carbonite, or some other service. This screen capture file should be titled `screenCapture-cloudBackup.jpg` and uploaded to your `forInstructor` folder on the course server.

IV. Test your backup strategy.

Once you know that your backup strategies are both operational, delete an unimportant file or folder, and try to recover it from both backup sources.

QUESTIONS FOR YOU TO CONSIDER (NOT HAND IN)

1. Engineers of all kinds are always having to deal with balancing resources and working within constraints. Backing up your data is a great example of this challenge:

   a. Some backup strategies are inexpensive and easy but don't do as good a job.
   b. Others are inexpensive and good, but hard to implement.
   c. Some strategies are easy and do a great job, but cost more money.

   Of these three, which one do you prefer when it comes to making backups?

2. Have you ever lost data to an error on your part (accidentally deleting a file, etc)?

3. Have you ever lost data to a software crash (Microsoft Word failing, etc.)?

4. Have you ever lost data to a hardware crash (hard drive failing, etc.)?

5. Up to this point in your life, what is your strategy for recovering from data loss?
   a. I just lose the data
   b. I get a copy from somebody else who has it
   c. I don't experience data loss—all my documents are "in the cloud" (Google Drive, etc.)
   d. I have backup plans—I replace data from a backup.
   e. Other (identify what your strategy is)