Basics Lesson Twelve – Backing Up Your Data and the Computer

- Why should we back up our data and/or computer?
  - Malware has become so prevalent, it is no longer IF you get infected, but WHEN you get infected.
  - The best protection against malware damage is a frequent backup.
    - If malware causes an irreversible problem, you can recover from your backup.
  - Computers though usually extremely durable CAN and DO break down.
    - Hard drive failure
    - Windows corruption
    - Physical damage (drop, lightning, hurricane, water spill, etc.)
    - Simple aging and obsolescence.
  - Multiple staggered backups on separate media provide the most protection.
  - The most recommended Backup rule is the 3:2:1 backup recommendation.
    - **3** - Maintain 3 backups.
    - **2** - Back up to at least 2 different media devices.
      - Such as two separate external drives.
      - Or an external drive and DVDs.
      - Or an external drive, and back up data only to Flash (thumb) drive, etc.
    - **1** - Have 1 backup offsite (Elsewhere), such as in the **cloud**.
      - So disaster to the computer or device cannot also include destruction or loss of all the backups.
  - **At least one local backup should not be constantly attached**, thus avoiding susceptibility to zero-day infection or encryption-based malware.
  - Drive image software, such as Windows System image or Acronis True image backups (TIB format) **previously** avoided encryption.
    - **But now** some ransomware **DELETES TIB and BAK files.**
  - Further protection means at least one backup is stored "off-site".

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- Two types of Backup (and backup software)
  - Data only backups (Personal **Files and Folders**, Email and perhaps some settings).
    - These are the most common forms of backup.
    - Stores backups as copies of the files and folders.
    - In order to restore of the system, you must first restore (install) Windows and ALL the Programs manually, using original discs or factory images.
      - Then you must reinstall all Windows and Program updates.
      - Finally, you can Copy back the data to all its various folders.
        - This step may be automated by backup software.
    - The biggest **advantage**, such backups require considerably less storage space.
      - Thus you can use much smaller storage devices
      - Or require less online storage.
      - Both advantages translate to less expense.
    - The **disadvantage**, this requires usually considerable effort and manual involvement to complete any restoration process.
      - Thus time to full recovery may requires several hours to days.
    - It is a good tool for individual file (or folder) recovery.
  - Disk imaging
    - With disc imaging software, the entire hard drive or a particular drive letter is stored compressed in its entirety.
      - It represents a snapshot of the entire computer, Windows, data and programs all intact.
    - **Disadvantage**, it requires considerably more storage space.
      - Thus larger external drives, more discs, or greater online storage.
        - Which translates to more expense.
        - However, as storage space both online and in the form of external hard disk drives decreases in price, this is becoming less of an issue.
    - Primary **advantage**, recovery of the system restores operating system (Windows), programs, and all data as a single unmanned process.
    - This translates to a much faster disaster recovery to functionality.
    - Individual file or folder recovery is still available with little effort.

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- **Devices** for Back up storage:
  - o DVD or Double-density DVD backups require constant manual attention inserting the multiple discs required.
    - Software however allows them to handle both data and drive image backups by breaking data or image into individual discs.
    - Each DVD holds only 4 GB or 8 GB respectively.
    - Thus must be present to switch DVDs repeatedly when instructed.
    - DVD writing is relatively **slow**.
    - Depending on the quality of DVD media used, longevity and dependability of viability of data is affected.
    - Media is not reusable (technically).
  - o The Flash drive is of limited size, thus are:
    - Good primarily only for data backups.
    - 128 GB and 256 GB flash drives are available.
      - These would allow drive imaging, but are relatively expensive.
      - And they are easily misplaced.
    - Local repeated individual program data backups are more its forte.
  - o The external hard drive is by far the most reliable backup media.
    - Most common device for backup.
    - Extremely inexpensive per GB.
    - Good for both data and drive image backups.
  - o Back up to the Cloud.
    - Require signing up or subscribing.
    - Most cloud sites offer small amount of storage (2-5 GB) free.
      - Dropbox
      - Google drive
      - OneDrive
      - iCloud (used mostly for Apple devices) but Windows users can also subscribe.
    - More space requires paid subscription.
      - Prices vary.
    - Subscription to Office 365 includes 1 TB of storage.
    - Most back up sites provide backup programs to use only with their programs.
      - Such as Carbonite and Mozy
    - Most backup programs offer cloud storage.
      - Some cloud storage included in the price of software subscription.
      - Such as Acronis or Norton

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- **What is the CLOUD?**
    - The **Cloud** is simply another term being used for the Internet.
        - "Cloud computing" for instance refers to the use of programs provided on the web rather than your own computer.
            - The program is not downloaded. You are working entirely from a webpage.
            - Using your Internet provider's web page to do email is in fact, and has always been "cloud computing," it just hasn't been thought of that way until people started creating actual documents or projects using these web-provided tools.
            - Microsoft Office online, Google docs, photo editing sites, or similar, are all considered cloud computing.
        - Much cloud software is offered as annual or monthly subscriptions versus outright purchase, and can be used right on the software creator's web site. Often included with this web access, is also software downloaded and installed on the physical computer for working when NOT online.
            - Such as Office 365, Adobe Creative Cloud programs.
        - Most free online (cloud) software or apps are solely on the cloud.
        - Regardless, you CAN save a project to your own computer. It just may not work, and usually cannot be edited offline.
        - An analogy would be the answering service offered by your phone company (online) versus you having your own personal answering machine in your home or place of business.
    - The cloud when referred to as storage, is simply put a folder managed by you, but on the Internet rather than your personal device or computer. It is referred to as "**Cloud Storage**."
        - It is used by your computer as any other folder. The software installed integrates the online folder with your personal computer.
        - However, because of Internet connection speed being much slower than the processing speed of even the most inexpensive computers, using cloud storage for backup or storing files, is more sluggish, particularly for saving or copying larger files or folders such as drive images.
        - Advantages:
            - Files can be made available to other individuals, some, or all.
            - Called "sharing" for collaboration or entertainment.
            - Also it makes these files available to you if more than one device.
            - Files and Folders are safe from local loss, and protected.

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- One Device option not listed earlier for backup, and is available essentially for Desktop owners ONLY, is to Install a second internal hard drive.
  - Primarily only an option for desktop computers.
  - Advantages to a second "installed" hard drive:
    - The cheapest per GB solution
    - Very convenient
  - Disadvantages however to a second "installed" hard drive:
    - Not removable to avoid encryption malware.
    - If computer undergoes physical damage, the backup hard drive may also be damaged.
  - This is best for redundancy in backup, to make recovery of hard drive failure more effortless, rather than as the primary backup.
- Windows offers backup tools; usually found in the Control Panel.
  - Or type backup in the Start menu search (or Cortana, if Windows 10).
    - Start screen if Windows 8.1
  - Windows 8 and 10, has **File History**.
    - File History backs up Data., including multiple versions of repeatedly saved files.
      - These versions make recovering a "saved over" version possible.
    - File History unfortunately does NOT automatically create a full drive image.
      - Thus it represents a Data/File and Folder backup, not full recovery.
    - To create a disk image in Windows 8 and 10, it must be done manually, not automated.
      - Under File History, use the System Image Backup link (lower left).
      - Then Create System Image.
      - You can also use a Windows 7 style Backup and Restore if desired by going to Control Panel and choosing (in Icon view) Backup and Restore (Windows 7).
      - Just know there is no guarantee Windows will continue that form of backup in the future.
  - Windows Vista and 7 offers Backup and Restore, found in the Control Panel.
    - By default, this Backup and Restore is NOT turned on.
    - First turn it on and set a schedule for time, how often, and where the files are to be stored (saved).
    - Windows 7 backs up data and also performs an occasional drive image.
    - But this backup does not store multiple versions of files, only the file as is when the drive "snapshot" has been taken.
  - Windows XP did not install backup tools by default, you had to go to the original Windows installation disc and specifically look for them.

- File and Folder type backup software is available in both online subscription-based varieties such as Carbonite and Mozy, as well as downloadable programs designed to work with local or online storage.
    - And there are numerous both free and paid for services, depending on the size of the backup.
    - Available with an Internet search.
    - How they work, and what they back up, and how close to disaster recovery they get depends entirely on the program.
    - Many File and Folder backup services and software claim capable of disaster recovery, but the only way to verify that is to attempt recovery from a disaster.
- Acronis True Image is a popular and paid for retail form of drive imaging software.
    - There are free programs out there on the Internet, but more complicated to use.
    - Acronis True Image drive imaging software, designed for disaster recovery, as well as individual file and folder restoration if required, is one of the oldest most reliable programs.
    - Acronis has simplified their interface from 2014 and earlier.
    - Setting up Acronis:
        - Merely open Acronis and choose Backup (top icon, if not already open) to create a backup task.
            - Or to create additional backup tasks, click on the Plus sign at the bottom.
        - The backup task name is in the upper left pane, just type to change it.
        - It is automatically set to back up Entire PC.
            - Entire PC chooses always the primary hard drive and all its partitions (drive letters) needed to recover a hard drive failure (boot back into Windows with all the programs, apps, data, and settings intact.
                - Click on the Entire PC box to "change" (or view) the source, or limit its extent, and then choose Disks… or Files and Folders to be selective.
        - Acronis picks the drive it thinks you want to use as a destination for the backup files.
            - To modify, choose a specific folder, or change to a different backup drive, click on Destination and choose the storage device and folder to be used.
            - Choose one of the displayed destinations, or choose Browse.
            - This is what the file will be labeled initially.
        - This by default sets up a backup which repeats weekly.
            - It does incremental backups from then on.
            - Change how often by choosing Options on the main screen of the backup.

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- Using Acronis Options:
    - Select the backup task (if more than one) and then the Options button (at the bottom).
    - Here it shows "weekly", the time and the day it is to occur.
        - Click the day desired.
            - If different from the one Acronis chose, click on a different day, or days.
            - Remember to click on the current day listed to turn off the backup on that day if desired.
    - Change the time of day using the arrows.
        - The up arrow is later; the down arrow is earlier.
    - Now look at the Backup scheme (next tab).
        - It is initially listed as Incremental scheme.
            - Use the drop-down arrow to change it, if desired.
            - Notice the **Which scheme to choose** link for help choosing.
    - Next see the Backup method.
        - It also reads Incremental.
            - Again change it, if desired, using the drop-down menu.
            - Notice the **Difference between methods** link for help choosing.
    - Notice just below Backup method is a radio button in Create a full version after every 5 incremental versions.
        - This can consume your external hard drive and eventually lead to failure due to drive being full.
        - Choose **Turn on automatic cleanup**.
    - Automatic cleanup offers to remove earlier backups.
        - Deleting version chains older than 7 days is the default.
        - Change how many it saves, basing that change on size of the destination drive.
        - Also note the **Do not delete the first version of the backup** check box, if you wish to keep one original backup.
            - Such as a pristine backup while everything was working optimally.
            - Before you added other programs, Apps or devices
    - Once done viewing or changing options, click OK.
        - True image 2015 required a clicking a Save button.
        - You can choose Back up now, or the drop-down to delay the task.

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- Difference between backup methods Incremental, Differential, and Full:
  - Incremental
    - After an initial Full backup, incremental backups record only the changes occurring since the previous backup whether full or incremental.
    - To recover with this method, you need both the initial Full backup file plus ALL incremental backup files.
      - Incremental files are smaller, but
        - You may have numerous (by default, five) incremental files, but if designated only as incremental without creating a new full backup periodically, you could have months or years of incremental files, ALL needed to be intact for full recovery.
      - Should a single one of those files become corrupted the entire recovery fails.
    - Advantage:
      - Incremental backups are faster.
      - Incremental files allow recovering individual lost files based on date of incremental file creation.
  - Differential
    - Again, after an initial Full backup, ALL changes which have occurred since the original Full backup are recorded.
    - Thus there is always only one Full, and one differential file.
      - And both are needed for a successful recovery.
    - Advantage:
      - Only one Differential file is needed for recovery.
      - Less likelihood of corruption.
    - Disadvantage:
      - Backup takes longer when days away from Full backup.
      - Cannot go to a single day's file backup to recover a specific version.
  - Full
    - Each time the backup occurs it creates a Full backup.
    - Full backups require the most time to complete.
    - Advantage:
      - Only a single file is needed for recovery.
      - Storing two full backups has greater chances of avoiding corruption and failed recovery.

- Acronis has a few other Options of less importance.
  - Notifications
    - Set email notifications of the process.
    - Be informed if the backup fails or is interrupted for instance.
  - Exclusions
    - Unless you know a lot about them, do not change from the default.
  - Verifications
    - Acronis goes back through the backup and verifies it is intact.
  - Advanced
    - Allows you to require a password to open.
    - Manually decide how whether a backup file should be split into smaller portions.
      - Acronis automatically decides by default.
- Acronis offers other important Tools.
  - Clone Disk
    - Use if you purchase new larger disk, you can create a clone of the system as it currently is, so you can swap drives with ease.
    - Be aware, you cannot clone to a smaller disk. If this is needed you must first "shrink" the primary partition to below the size of the new disk.
  - Rescue Media builder
    - Create a bootable CD, DVD or USB drive to recover.
    - If you have the original installation disc, this functions as a bootable disc.
    - If you have no DVD drive, you need to create a bootable Flash drive (USB).
  - More tools
    - Drive Cleanser
      - Securely wipes the hard drive.
    - System Cleanup
      - Wipes traces of Windows activity and wipes all disk free space
        - May have had files copied to these areas and then deleted but not erased.

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Regardless of the backup process, you may need to know how to manually back certain items up.

- Some possibly needed file locations
  - Windows Live Mail 2012
    - Mail and accounts location by default (unless changed by user):
      - *C:\Users\username\AppData\Local\Microsoft\Windows Live Mail*
      - Save the entire Windows Live Mail folder.
      - Restoring simply needs replacing this copied file with the newly created folder during reinstalling Windows Live Mail, and then re-providing passwords for account(s) first time mail is retrieved.
    - Contacts and Categories (groups) list is stored:
      - First requires showing hidden system files in File Explorer's View ribbon, Options button and then View tab.
      - *C:\Users\username\AppData\Local\Microsoft\Windows Live\Contacts\Default\ 15.5\DBStore* as an **contacts.ebd** file.
      - Replacing this after reinstall returns all contacts and groups.
      - See more detailed Step-by-step instructions on our website.
    - Message rule backup:
      - Open the Registry Editor and go to the *Hkey Current_User\Software\Microsoft\Windows Live Mail\Rules\Mail*
      - Then export that Mail key by either right-clicking on mail,
        - Or clicking Mail and then going to File menu | Export.
  - AOL
    - Personal filing cabinet is stored in the organize folder at:
      - C:\ProgramData\AOL\C_AOL Desktop 9.x.x\organize.
        - 9.x.x refers to the version you are currently using.
        - Find out by right-clicking the AOL icon and see what the "Target" folder is listed as.
      - Save the organize folder and then replace it when (preferably the same version) AOL Desktop is reinstalled.