

BVCC General Meeting

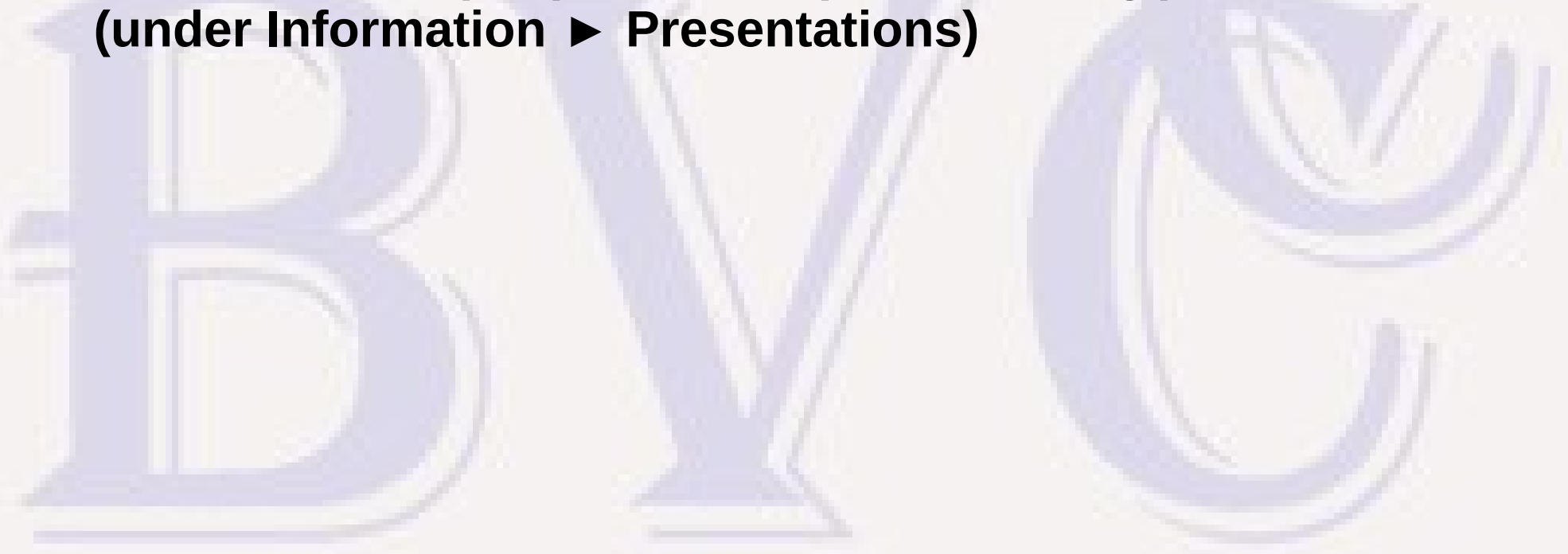
April 8, 2024

"Why Do I Need To Backup"



Why Do I Need To Backup

- **These meeting presentation slides will be added to the BVCC website (<https://bvcomputerclub.org>) (under Information ► Presentations)**



Why Do I Need To Backup

- **March 31 was "World Backup Day" (April 1 cyber "pranks")**
- **Material is derived from APCUG presentations:**
 - **March 13, "Why Do I Need To Back Up, with Judy Taylour**
 - **March 27, "The Computer Backup, Your Lifeline in Case of a Digital Emergency", with Uwe Dotzauer**
 - **March 27, "Taking Control of Backing Up Your Mac", with Joe Kissell**

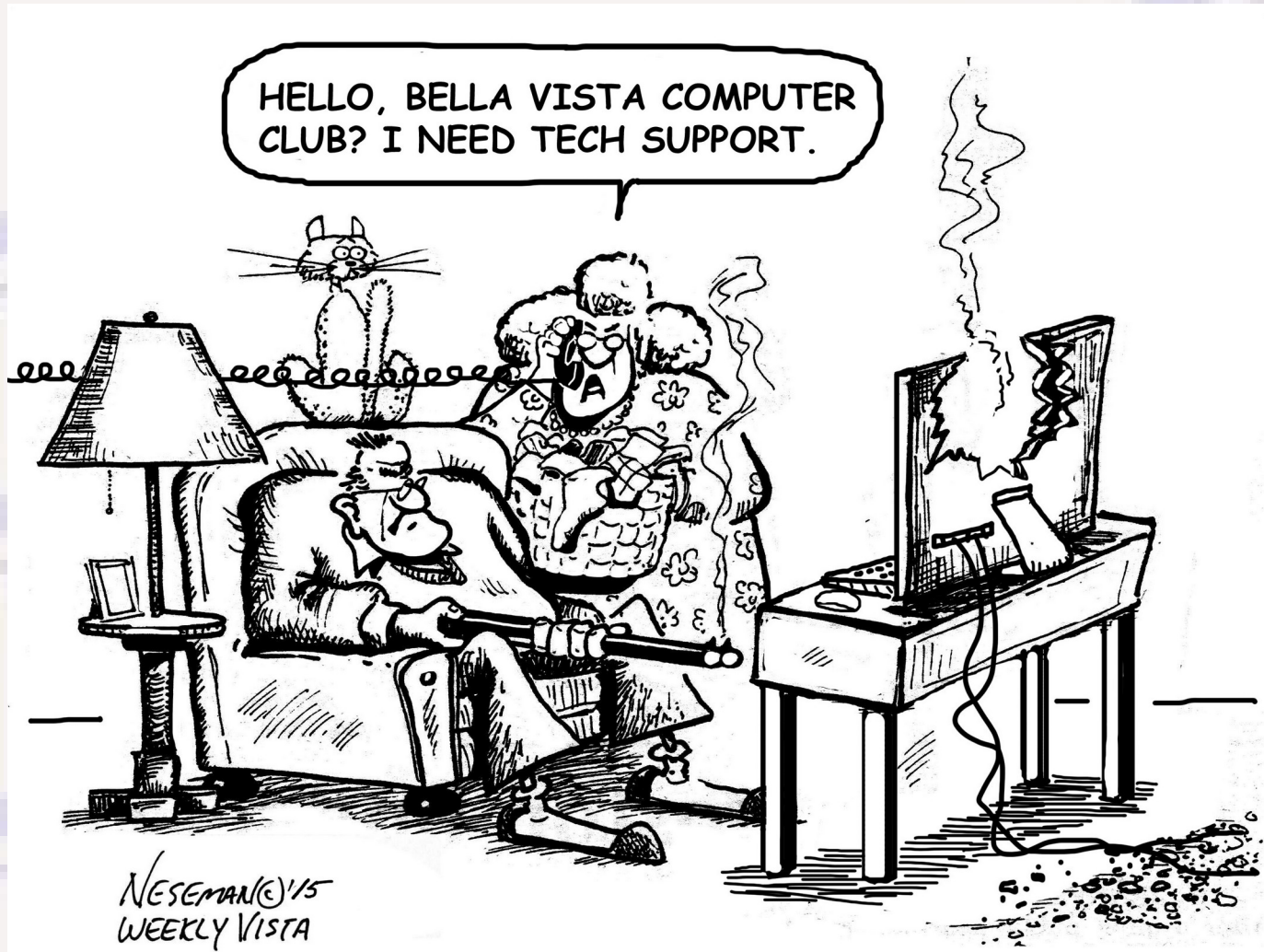
Why Do I Need To Backup

- **How much irreplaceable digital data do you have?**
 - **Financial data**
 - **Legal documents**
 - **Family photographs and videos**
 - **Family history**
 - **Online account credentials**
 - **Contacts, email, and correspondence archives**
 - **Other digital records, personal and purchased**

Who/What Do You Trust With Your Digital Data?

- **Can't Trust hardware**
 - **Hard drives, solid-state drives, and other computer components can and do fail randomly in ways that can destroy your data**
 - **hardware can be destroyed by physical damage: fire, flood, power surges, rough handling**
 - **hardware can be stolen**

Why Do I Need To Backup



Head Crash on Mechanical HD

- **Caused by mechanical shock or a sudden change in disk rotation speed when the read/write heads are floating over the disk platter surface rather than parked off the disks**



- **Unlike the old diskette drives, the read/write heads are never supposed to contact the disk recording surface. They float very close to the surface on the air currents surrounding the rotating disks.**
- **If physical contact occurs, particles are scraped off the disk surface and contaminate the disk, causing additional head crashes and surface damage until much of the disk data becomes unreadable.**

Who/What Do You Trust With Your Digital Data?

- **Can't Trust software**

- **Operating System and applications can contain subtle errors or bugs in their design or implementation**
 - **More often than not, the application or Operating System either freezes or terminates with some error message with no long-term damage. But,...**
 - **Could allow stored data to become corrupted if an unexpected sequence of events occurs**
 - **Could allow a user to alter something he shouldn't be allowed to change, with adverse results to data.**
 - **Can have security bugs that allow malware to steal or destroy data**

Who/What Do You Trust With Your Digital Data?

- **Can't Trust Cloud Storage**

- **Your Internet service could fail, or something in the path to your cloud storage service could fail, denying access to your data.**
- **Your cloud storage service could be attacked or have technical issues making the service unavailable for an extended time – in the worst case with some loss of your data**
- **Your cloud storage service could decide to terminate its business for financial or other reasons, possibly without providing any options for retaining access to your data.**

Who/What Do You Trust With Your Digital Data?

- **Can't Trust your cat, kids, etc.**
 - **Cat or kids playing with keyboard or mouse can accidentally alter, delete important data when computer is in an unlocked state.**

Who/What Do You Trust With Your Digital Data?

- **Can't Trust other people on the Internet or unprotected WiFi**
 - **Malware via email, visited websites, passive attacks searching for software vulnerabilities in your router or computer software**
 - **can either access or alter your data**

Who/What Do You Trust With Your Digital Data?

- **Can't totally trust yourself**
 - **Oops! What did I press? I didn't mean to do that! Etc.**
 - **S___ happens**
 - **Pepsi Syndrome**

You ARE Exposed to Data Loss

- **It's not a matter of IF, but WHEN and HOW MUCH is lost**
- **If you use computers long enough a data loss is inevitable**
- **Need some way to recover lost data that you can't afford to lose**



So How Do You Protect Your Data?

- **Regular Backups!**

- **Digital data stored in only one place is always at risk**
- **Any backup is better than none, but 3-2-1 rule is better:**
 - **3 different backups**
 - **On at least 2 different media (HD, SSD, NFS, cloud)**
 - **With at least 1 kept offsite (cloud, family member's house, bank box)**
- **How frequently? How much data are you willing to lose?**
 - **Where possible, retain physical documents or transaction records at least until the next secure backup**
 - **Make Immediate backup copy of especially critical documents**

Backup Media

- **Different partition on main HD or SSD (Risky)**
- **CD or DVD**
- **Memory sticks**
- **External USB hard drive or SSD**
- **Network File Server**
- **Cloud Storage**

Media For Backups

- **Different partition on main HD or SSD – Not Advised**
 - May give some protection against user errors, maybe even some software bugs and malware, but...
 - **Single hardware failure on that drive can wipe out data & backup**
 - Head crash on HD may cause entire drive to fail in a few hours
 - Typical SSD failure may make entire SSD unreadable
 - **Malware or software bugs can potentially destroy both copies**

Media For Backups

- **CD or DVD – too small except for small subset of files**
 - **Limited to 4.7GB (or more expensive dual-layer DVD-9, 8.5GB)**
 - **Ability to create read-only backups is useful in some cases**
 - **Media deteriorates with time & easily destroyed by heat and physical abuse**

Media For Backups

- **USB memory sticks**
 - **Now 1TB and larger, so capacity not so much an issue as speed.**
 - **Typically limited in speed to a max of 10 - 25 Mbps, which translates to around 11 GB per hour.**
 - **OK for backup/recovery of individual files or subsets of files**
 - **Too slow for backup/recovery of large amounts of data**

Media For Backups

- **USB 3.0 External HD or SSD (BEST SOLUTION FOR MOST)**
 - USB 3.0 now not that much more expensive and 5 - 10 x faster than USB 2.0
 - USB 3.0 theoretical speed of 4.8 Gbps (600 MBps) around 80% of typical internal HD data bus – sustained transfer speeds may be much less
 - SSD for max performance.
 - SSDs will advertise sustained transfer speed – faster costs more & some of the fastest drives may require \geq USB 3.1 or USB-C

Media For Backups

- **Network File Server (NFS) on your local LAN**
 - A more expensive solution unless you already have a NFS
 - May be more convenient, but backup speed will be limited by your LAN throughput and the speed of the storage devices used by your NFS
 - Most household LANs at best would be 1-2 Gbps, so will be significantly slower than the best USB 3.0 external SSD drives

Media For Backups

- **Cloud Storage**

- **TB's of cloud storage space not that expensive**
- **Works best for individual file recovery and for incremental backup of files as they change (Dropbox, MS One Drive, Google Drive, etc.)**
- **Slower than USB 3.0 external drives for image backups, even with Cox Gigblast service. Compared with USB 3.0 (4.8 Gbps) your 1.0 Gbps download speed may much slower than USB 3.0 throughput, and upload is an abysmal 0.035 Gbps. Backup time might be tolerable, but having to download an image backup to recover would be painfully slow (less than 16GB per hour)**

Media For Backups

- **Cloud Storage**

- **Some synchronize one or more local directories with files on the cloud service (Dropbox, MS OneDrive)**
 - **Need to regard files in those mirrored directories as ONE copy of the file, not as a local copy and a cloud backup**
 - **You are protected against local or remote hardware failures and can share the files across multiple devices; but an intentional, accidental, or malicious change in one place changes the file in all places.**
 - **Some cloud storage services will retain multiple versions of a file and allow recovery of older versions if you realize the file has been damaged. Older versions may have a relatively short retention (1-2 months?). Versioning can protect against some errors, but is less versatile than backups you control.**

Types of Backups

- **What Data?**
 - Image Backups
 - Selected Directories and Files
- **How unchanged data is handled**
 - Full Backup
 - Incremental Backup
 - Differential Backup

Types of Backups – Image Backups

- **Image backup backs up entire physical disks or entire disk partitions**
 - **Everything is guaranteed to be covered. The Operating System, all installed applications, and all user data and customization can be recovered to their state at time of the backup.**
 - **Gives quickest possibly recovery of a completely functional system.**
 - **Target drive for complete recovery must be as least a large as the used space on the original drive.**
 - **It might be easy to recover specific files (Macrium Reflect), or some utilities used for image backup could require restoring the backup to a spare hard drive first before individual files could be recovered**

Types of Backups – Selected Directories & Files

- **Plan: just backup identifiable user-related files for a smaller-faster backup**
- **Problem:**
 - **May miss important files without realizing it – Windows does a poor job of separating user customization of Operating System and installed applications from other system stuff**
 - **Complete system restore more complex and much more difficult to get system customized like it was before**
 - **May have lost install materials for some add-on applications**

Full vs Incremental Backups

- **Full** – all files within the scope of backup are copied
- **Incremental** – only copies those files that have changed since previous backup
 - Incremental Backup file typically small and backup is quicker
 - Restore is more complex – requires all Incremental backups since the last Full backup plus that Full backup
 - Allows restoring all files to their state at the time of any of the backups. Total backup space required is much less than with only Full backups – can keep more backup/restore points on the same backup media
 - Must periodically make another Full backup so an older Full backup and its dependent incremental backups can be deleted to free up space on media

Full vs Differential Backups

- **Full** – all files within the scope of backup are copied
- **Differential** – only copies those files that have changed since the last full backup
 - Differential Backup file starts small but grows as time passes from last full backup
 - Restore is simpler than with incremental backups – requires only one differential backup plus the full backup from which the differential backup is based.
 - Allows restoring all files to their state at the time of any of the backups. Total backup space required is less than with only Full backups, but more than Full backups plus incremental backups.
 - Must periodically make another Full backup so an older Full backup and its dependent differential backups can be deleted to free up space on media, and to reduce the size of new differential backups

How to Perform Backups

- **Sometimes manual methods using free native tools is possible, but having a utility of some kind to simplify the process encourages more frequent backups and reduces the likelihood of errors.**
- **For full image backups to allow quick recovery of a dead system, you must have stand-alone, bootable recovery tools that can restore the complete system when it is dead. Utilities that support full-image backups include that support. (you must create a bootable media that contains the standalone recovery tool before you need it!)**

Recommended Backup Utilities

- **We used to recommend Macrium Reflect Free, but as of 2024 the free version can no longer be installed and installation license is \$40/yr for one computer or \$80/yr for 4 computers.**
 - Still is a good product, if you can afford it
 - The non-free version does support incremental backups
- **We have a class on April 24 on how to make backups with Macrium Reflect**

Recommended Image Backup Tools*

- **Macrium Reflect (no longer free, \$40(1) or \$80(4) per year)**
- **Todo Backup**
- **AEOMEI Backupper Standard (Freeware version)**
- **MiniTool ShadowMaker Free**

*Source:

<https://www.computerworld.com/article/1619804/how-to-make-image-backup-windows-10-windows-11.html> (Note: The Computerworld review of Todo Backup confuses Incremental and Differential Backups)

Questions

BYSS