

Digital Storage Management

Objectives

- File Size
- Storage Devices
- Files vs. Folders
- What is a computer file?
- Cloud Backups
- Backups
- What is encryption?
- What is compression?
- Locking and Protected Files
- File Settings
- Downloading Safely
- File Extensions Explained
- Anti-Virus & Anti-malware
- How viruses and malware effect files
- What to do after data loss
- Copy Cut Paste

What is a computer file?

- Is data, info, settings, or commands used by a computer program.
- Data is written as a combination of eight 1s and 0s known as a bit.
- A collection of bits is known as a bytes.

Computer Bit



Computer Byte



ComputerHope.com

| | | | | | |
|---|-----------|---|-----------|---|-----------|
| 3 | 0011 0011 | R | 0101 0010 | P | 0111 0000 |
| 4 | 0011 0100 | S | 0101 0011 | q | 0111 0001 |
| 5 | 0011 0101 | T | 0101 0100 | r | 0111 0010 |
| 6 | 0011 0110 | U | 0101 0101 | s | 0111 0011 |
| 7 | 0011 0111 | V | 0101 0110 | t | 0111 0100 |
| 8 | 0011 1000 | W | 0101 0111 | u | 0111 0101 |
| 9 | 0011 1001 | X | 0101 1000 | v | 0111 0110 |
| A | 0100 0001 | Y | 0101 1001 | w | 0111 0111 |
| B | 0100 0010 | Z | 0101 1010 | x | 0111 1000 |
| C | 0100 0011 | a | 0110 0001 | y | 0111 1001 |
| D | 0100 0100 | b | 0110 0010 | z | 0111 1010 |
| E | 0100 0101 | c | 0110 0011 | . | 0010 1110 |
| F | 0100 0110 | d | 0110 0100 | , | 0010 0111 |
| G | 0100 0111 | e | 0110 0101 | : | 0011 1010 |
| H | 0100 1000 | f | 0110 0110 | ; | 0011 1011 |
| I | 0100 1001 | g | 0110 0111 | ? | 0011 1111 |
| J | 0100 1010 | h | 0110 1000 | ! | 0010 0001 |
| K | 0100 1011 | I | 0110 1001 | ' | 0010 1100 |
| L | 0100 1100 | J | 0110 1010 | " | 0010 0010 |
| M | 0100 1101 | K | 0110 1011 | | |
| N | 0100 1110 | L | 0110 1100 | | |
| O | 0100 1111 | M | 0110 1101 | | |
| P | 0101 0000 | N | 0110 1110 | | |
| Q | 0101 0001 | O | 0110 1111 | | |
| R | 0101 0010 | P | 0111 0000 | | |
| S | 0101 0011 | Q | 0111 0001 | | |
| T | 0101 0100 | R | 0111 0010 | | |
| U | 0101 0101 | S | 0111 0011 | | |
| V | 0101 0110 | T | 0111 0100 | | |
| W | 0101 0111 | U | 0111 0101 | | |
| X | 0101 1000 | V | 0111 0110 | | |
| Y | 0101 1001 | W | 0111 0111 | | |
| Z | 0101 1010 | X | 0111 1000 | | |
| a | 0110 0001 | Y | 0111 1001 | | |
| b | 0110 0010 | Z | 0111 1010 | | |
| c | 0110 0011 | | | | |
| d | 0110 0100 | | | | |
| e | 0110 0101 | | | | |
| f | 0110 0110 | | | | |
| g | 0110 0111 | | | | |
| h | 0110 1000 | | | | |
| i | 0110 1001 | | | | |
| j | 0110 1010 | | | | |
| k | 0110 1011 | | | | |
| l | 0110 1100 | | | | |
| m | 0110 1101 | | | | |
| n | 0110 1110 | | | | |
| o | 0110 1111 | | | | |

Understanding File Sizes

1 byte contains 8 bits
8 bits = 1 byte

1024 bytes = 1 KB KB = Kilobyte

1024 KB = 1 MB MB = Megabyte

1024 MB = 1 GB GB = Gigabyte

1024 GB = 1 TB TB = Terabyte

1024 TB = 1 PB PB = Petabyte

B = Bytes b = bits

MB vs Mb

File sizes based on items

Song = 4 MB (depends on quality)
1 MB per minute

Video Streaming = 200MB to 3GB
1 GB per hour
3 GB per hour for HD

Pictures = 10MB to 1.4GB (posters)
Depends on number of pixels
based on the photo's resolution.
(DPI) Dots Per Inch

Documents = 29 MB for 300 pages
Depends on how many pages
and content. Usually 10 MB

| Capacity | Digital Photos (JPG)* | Digital Photos (RAW)* | Songs (MP3)* | Songs (Uncompressed)* | Digital Video (DV)* | DVD-Quality Video* | HD Video* |
|----------------------|-----------------------|-----------------------|--------------|-----------------------|---------------------|--------------------|-----------|
| 16GB | 3,200 | 330 | 4,000 | 400 | 1 | 6 | 1 |
| 32GB | 6,400 | 660 | 8,000 | 800 | 2 | 12 | 3 |
| 64GB | 12,000 | 1,330 | 16,000 | 1,600 | 4 | 24 | 7 |
| 128GB | 25,000 | 2,660 | 32,000 | 3,200 | 9 | 49 | 15 |
| 256GB | 51,000 | 5,330 | 64,000 | 6,400 | 19 | 98 | 30 |
| 500GB | 100,000 | 10,000 | 125,000 | 12,500 | 38 | 190 | 60 |
| 1TB (1,000GB) | 200,000 | 20,000 | 250,000 | 25,000 | 76 | 380 | 120 |
| 1.5TB | 300,000 | 31,000 | 375,000 | 37,000 | 110 | 570 | 180 |
| 2TB | 400,000 | 41,000 | 500,000 | 50,000 | 150 | 770 | 240 |
| 4TB | 800,000 | 83,000 | 1,000,000 | 100,000 | 300 | 1540 | 480 |
| 6TB | 1,200,000 | 125,000 | 1,500,000 | 150,000 | 460 | 2300 | 720 |
| 8TB | 1,600,000 | 166,000 | 2,000,000 | 200,000 | 610 | 3080 | 960 |
| 12TB | 2,400,000 | 250,000 | 3,000,000 | 300,000 | 920 | 4620 | 1440 |

Digital Storage Devices

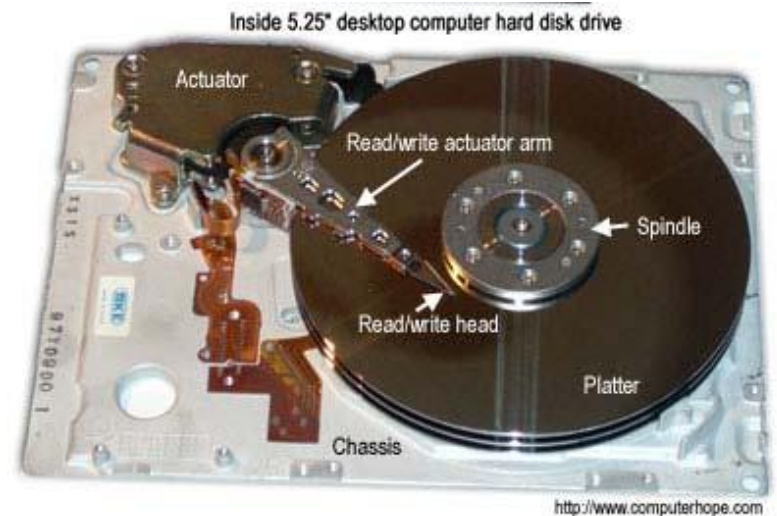


Hard disk drive

(abbreviated **hard drive**, **HD**, or **HDD**)

Permanently stores and retrieves data on a computer. A hard drive consists of one or more platters to which data is written using a magnetic head that writes data on to the discs. All inside of an air-sealed casing.

From 16GB to 12TB



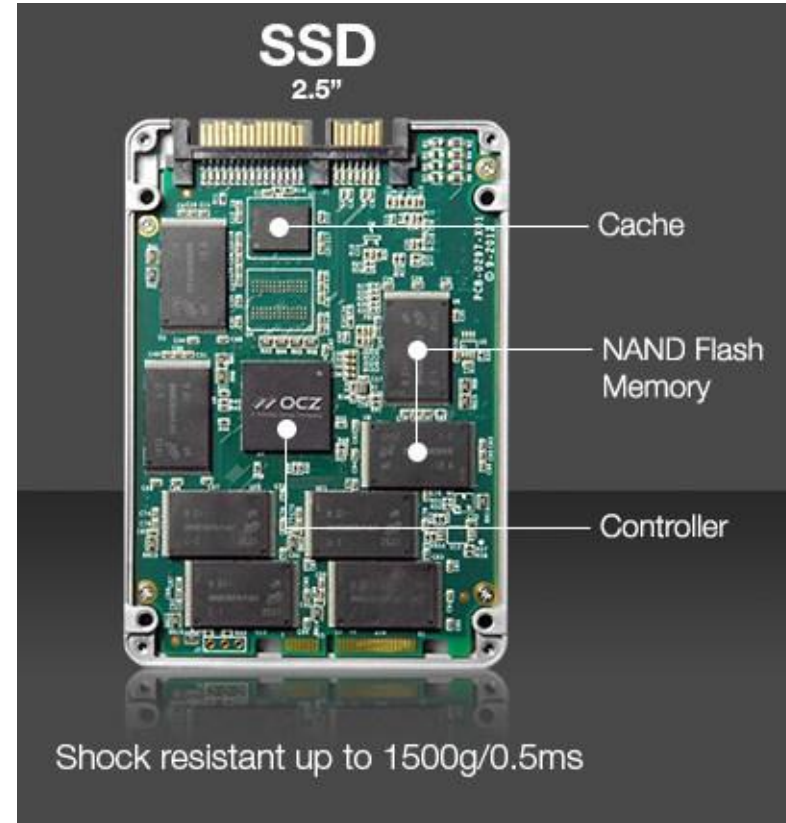
Solid-state drive

(aka **SSD** or **solid-state disk**)

Unlike a hard drive SSD has no moving parts which gives it advantages such as

- faster access time,
- noiseless operation
- higher reliability
- lower power consumption

From 250GB to 2TB, 4TB \$500



Flash Memory

Memory that retains data in the absence of a power supply. Does not require power to retain the data or program code stored.

SD Card (Secure Digital Card)

Over 400 brands of electronic equipment including digital camera, and cell phones. Considered the industry standard due to the wide use.

SD 32 mm x 23 mm x 2.1 mm

Mini SD 21.5 mm x 20 mm x 1.4 mm

MicroSD 15mm x 11mm x 1,0 mm



USB flash drive, (Universal Serial Bus)


- data stick
- thumb drive
- jump drive

Connects to a computer via USB port.
Easy way to store and transfer info
between computers and range

- 2 GB to 1 TB
- No movable parts
- Uses memory chip set
- Various designs and shapes





USB 2.0 Type C 
6.6Ft/2M ● ● ●



USB TYPE A

USB TYPE B



USB MINI A

USB MINI B



USB MICRO A

USB MICRO B



| Type | Data Rate |
|-----------------------|---------------|
| USB 1.1 (Low Speed) | 1.5 Mbits/sec |
| USB 1.1 (Full Speed) | 12 Mbits/sec |
| USB 2.0 (High Speed) | 480 Mbits/sec |
| USB 3.0 (Super Speed) | 5 Gbits/sec |



Lightning USB

- USB 2.0
- Reversible
- Item specific products

Firewire aka
IEEE 1394

Used for

- Scanners,
- Digital
- Camcorders



6 Pin: To port on
computer











4 Pin: To camcorder or
other device



File Extensions

File extensions are used to identify what programs are associated with file types— in other words, what app opens when you double-click the file.

| Name | Date | Type | Size | Tags |
|--|-------------------|-----------------------------------|--------|------|
|  Company Fun Facts.txt | 2/6/2019 5:12 PM | Text Document | 6 KB | |
|  Company Plan.pptx | 2/6/2019 5:05 PM | Microsoft PowerPoint Presentation | 0 KB | |
|  Employee Lunch Schedule .xlsx | 9/15/2006 8:00 PM | Microsoft Excel Worksheet | 7 KB | |
|  Lost Dog Handout.pub | 2/6/2019 5:04 PM | Microsoft Publisher Document | 59 KB | |
|  Ninite_Updater.exe | 2/6/2019 5:08 PM | Application | 416 KB | |
|  Profits_up.jpg | 2/6/2019 5:07 PM | JPG File | 92 KB | |
|  Tax Work 1980.docx | 2/6/2019 5:11 PM | Microsoft Word Document | 12 KB | |
|  Tech Database.accdb | 2/6/2019 5:06 PM | Microsoft Access Database | 484 KB | |

File Extensions

- *.EXE - Executable - A program file (don't delete — uninstall!)
- *.MP3 - MPEG Audio - Music or sound file
- *.PDF - Portable Document Format - Adobe Acrobat document
- *.WAV - Windows Sound - Music or sound file
- *.ZIP - Compressed Folder - Zip file archive (delete carefully!)
- *.JPEG - Joint Photographic Experts Group - Compression for digital images
- *.EPUB - Electronic Publication - Supported by many e-readers and software
- *.DOC or . DOCX - Microsoft Word Document - Works with other Microsoft Office programs

virus

.js
.vbs
.msi
.reg



1. Be aware of dangerous email attachments

- a. Watch for dangerous document extensions. email attachments are .js, .vbs, .msi, and .reg.
- b. Know the common safe extensions. In general, it is ok to trust .pdf, .pptx, .docx, .xlsx, .jpg, and .png

2. Downloading files from websites

- a. Files that carry viruses are dangerous. The main file types to avoid are files with extensions such as .exe, .scr, .bat, .com or .pif
- b. Hackers trick people easily with double extension files.
- c. File ends in .exe.gif or .bat.scr, do not download it! These double extensions are often a virus or torrent.

3. Pay attention to what you do

- a. Do not click on unknown links:
 - i. Social Media
 - ii. E-mail
 - iii. Careless web browsing

4. Use legal downloading programs

- a. Downloading files that you haven't paid for without legal permission is illegal.
- b. Using P2P software is popular for piracy and virus attacks
 - i. Limewire, Kazaa, Bearshare, BitTorrent, Ares
 - ii. P2P you are giving up all info in your computer that is allowed.

5. Do your research before downloading from any unknown source.

Why is a File Extension Potentially Dangerous?

These file extensions are potentially dangerous because they can contain code or execute commands.

.EXE – An executable program file. Most of the applications running on Windows are .exe files.

.PIF – A program information file for MS-DOS programs. While .PIF files aren't supposed to contain executable code, Windows will treat .PIFs the same as .EXE files if they contain executable code.

.APPLICATION – An application installer deployed with Microsoft's ClickOnce technology.

.GADGET – A gadget file for the Windows desktop gadget technology introduced in Windows Vista.

.MSI – A Microsoft installer file. These install other applications on your computer, although applications can also be installed by .exe files.

.MSP – A Windows installer patch file. Used to patch applications deployed with .MSI files.

.COM – The original type of program used by MS-DOS.

.SCR – A Windows screen saver. Windows screensavers can contain executable code.

THERE ARE MORE THAT ARE NOT LISTED HERE



WHY DO PEOPLE CREATE COMPUTER VIRUSES?



Why Viruses Exist

1. Gather your information
2. Force/Trick user to pay for tech support.
3. Track keystrokes for password and credit card info.
4. **Ransomware:** Make the PC unusable and force the user to pay money to make it usable again.



Encryption:

When data is scrambled and designed to be unreadable. Only by using an **encryption key** will decipher the scrambled data to be readable again.

Symmetric Encryption:

Locks data with a single private key

Asymmetric Encryption:

Uses a combination of multiple keys that are both public and private.



Computer Backup

Different types of computer backups

1. Individual Files
2. Complete Computer
3. Online Cloud

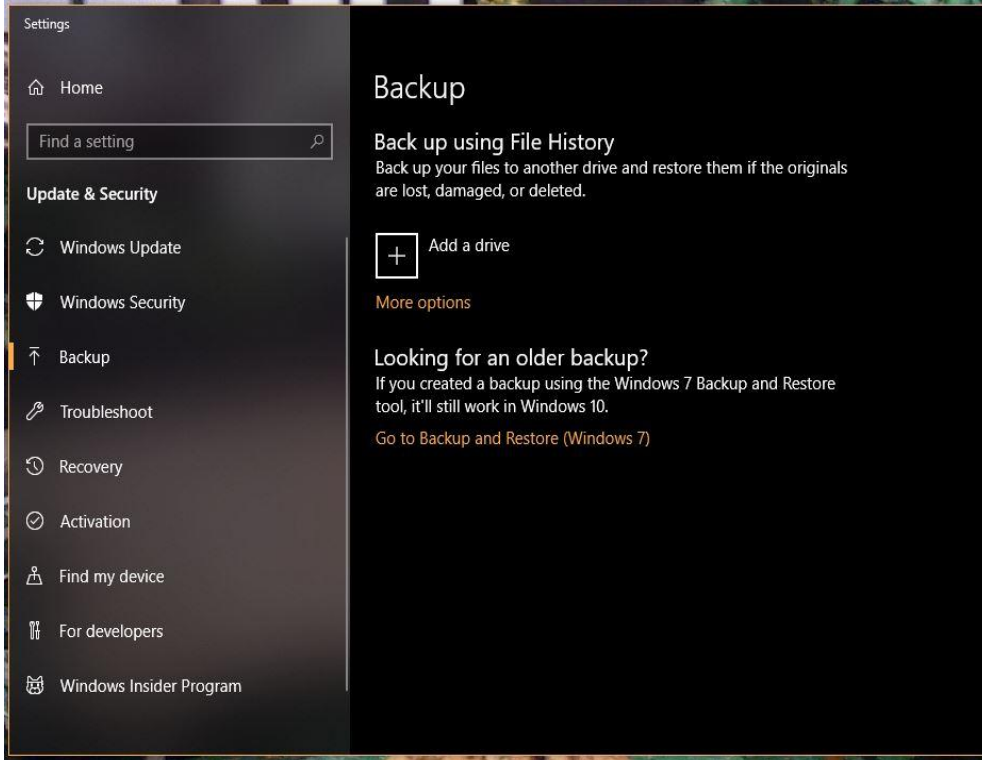
Why backup?

- Storage devices
 - Get lost or broken
 - Viruses lock or encrypt files
 - Files get accidentally deleted
 - Peace of mind



Check your computer or mobile device for it's default or preferred backup method.

<https://edu.gcfglobal.org/en/techsavvy/backing-up-your-files/1/>



COMPUTERS

WHAT IS

THE CLOUD?

