1 File Management, Virus Protection, and Backup

2 File Basics

- Every file has a name, and might also have a filename extension
- You must provide a valid filename that adheres to rules or ***file-naming conventions***

3 File Basics

4 File Basics

- Certain characters have significance to an operating system and you may not be able to use them in a filename
  - DOS and Windows use the :
  - C: (representing hard drive), A: (representing floppy drive)
- ***Reserved words*** are words that are used as commands or special identifiers and can not be used as file names unless some other words or characters are added to them

5 File Basics

- ***Filename extension*** further describes the file contents
- Separated by the filename with a dot
  - Readme.txt, Newsletter.doc
  - Related to the ***file format***, the arrangement of data in a file, and the coding scheme used to represent the data
- Most software programs have a ***native file format*** that is used to store files
- They display any files that have the filename extension for its native file format

6 File Basics

7 File Basics

- You first specify where file will be stored
  - A: for floppy disk drive
  - C: for hard drive
  - D through Z for additional storage
- CD, Zip and DVD drive letters are not standardized

8 File Basics

- An operating system maintains a list of files called a ***directory*** for each disk, CD-ROM or DVD
- ***Root directory***
  - main directory of a disk
  - provides a useful list of files
- ***Folders*** - smaller lists within directories
- A folder is separated from a drive letter and a filename by a backslash (\)

9 File Basics

- A ***file specification*** (path) is the drive letter, folder, filename, and extension that identifies a file

C:\Music\Reggae\Marley One Love.mp3

10 File Basics

11 File Basics

- A file contains data, stored as a group of bits
- The more bits, the larger the file
- ***File Size*** is usually measured in bytes, kilobytes, or megabytes

12 File Basics

- Your computer keeps track of the date that a file was created or last modified
- The ***file date*** is useful if you have created several versions of a file and want to make sure that you know which version is the most recent

13 ## File Management, Virus Protection, and Backup

14 File Management

- Applications provide a way for opening and saving files from/to specific folders on a designated storage device
- An application may also provide additional file management capabilities, such as deleting and renaming files

15 File Management

16 File Management

17 File Management

- You can use it to rename a file, delete a file, or create a folder

18 File Management

- ***File manager utility*** software
  - provided by your computer operating system
  - helps you locate, rename, move, copy and delete files

19 File Management

- A ***metaphor*** helps you visualize and mentally organize the files on your disks and other storage devices
- These metaphors are sometimes referred to as ***logical storage models***

20 File Management

- Storage metaphor is like a filing cabinet
- Another is the tree storage metaphor

21 File Management

- For practicality, storage metaphors are translated into more mundane screen displays

22 File Management

- ***Windows Explorer*** is an example of a file management utility

23 File Management

- ***Rename*** – change the name of a file or folder
- ***Copy*** – copy a file from your hard disk to a floppy disk
- ***Move*** – move a file from one folder to another
- ***Delete*** – delete a file when you no longer need it

24 File Management

25 File Management

- Select the files
  - Hold down Ctrl key, and click each file
  - Click first, then hold shift key and click on last file
- Select the operation to be carried out (rename, copy, delete, or move)

26 File Management

- The ***physical storage model*** describes what actually happens on the disks and in the circuits
- A storage medium must be formatted
- ***Formatting*** creates the equivalent of electronic storage bins by dividing a disk into ***tracks***, and then further dividing each track into ***sectors***

27 File Management

28 File Management

- ***Formatting utilities*** are supplied by operating system or by companies that manufacture the drives

29 File Management

- The OS uses a file system to keep track of the names and locations of files that reside on a storage medium
  - Mac OS – Hierarchical File System (HFS)
  - Linux – Ext2fs
  - Windows NT, 2000, XP – NTFS
  - Windows 95, 98, ME - FAT32
  - Windows 3.1 - FAT16

30 File Management

- To speed up the process, sectors are grouped into ***clusters***
- ***File allocation table*** (FAT) - an operating system file that maintains a list of files and their physical location on the disk.
  - like a table of contents
  - a damaged FAT results in losing data

31 File Management

32 File Management

- The OS simply changes the status of the file's clusters to "empty" and removes the filename from the FAT. It doesn't remove the data, just the references to it
- Special file shredder software can be used to overwrite "empty" sectors with

random 1s and 0s
- Helpful if you want to make sure that your personal data no longer remains on the hard disk

33 File Management
- Deleted files are moved to the Recycle Bin folder
- Helps to protect against accidental erasures

34 File Management
- As computer files are added/deleted, parts of files tend to become scattered all over the disk
- These ***fragmented*** files are stored in noncontiguous clusters
  - Slows drive performance
- ***Defragmentation utility*** – rearranges the files on a disk so that they are stored in contiguous clusters.

35 File Management

36 File Management, Virus Protection, and Backup

37 Computer Viruses
- A ***computer virus*** is a program that attaches itself to a file, reproduces itself, and spreads to other files
- A virus can perform a ***trigger event***:
  - corrupt and/or destroy data
  - display an irritating message
- Key characteristic is their ability to "lurk" in a computer for days or months quietly replicating themselves

38 Computer Viruses
- ***File virus*** - a virus that attaches itself to an application program
  - Chernobyl - designed to lurk in computer until April 26
- A ***boot sector virus*** infects the system files that your computer uses every time you turn it on
  - A ***macro virus*** infects a set of instructions called a "macro".
  - ***Macro*** - a miniature program that usually contains legitimate instructions to automate document and worksheet production

39 Computer Viruses
- A modern day ***Trojan horse*** is a computer program that appears to perform one function while actually doing something else
  - Not a virus, but may carry a virus
  - Does not replicate itself
- Another type of Trojan horse looks like a log-in screen
- PictureNote.Trojan – arrives as e-mail named picture.exe and then tries to steal login and e-mail passwords

40 Computer Viruses
- A software ***worm*** is a program designed to enter a computer system through security

holes
  - usually through a network
  - does not need to be attached to a document to reproduce
- "Love Bug" – arrives as e-mail attachment and overwrites most music, graphic, document, spreadsheet and web files on your disks
- ***Denial of Service attacks***

41 Computer Viruses

42 Computer Viruses

- Viruses are spread through e-mails as well
- Macro viruses are usually found in MS Word and MS Excel files (.doc and .xls)
- To keep safe, you can disable macros on files you do not trust

43 Computer Viruses

- Your computer displays a vulgar, embarrassing or annoying message
- Your computer develops unusual visual or sound effects
- You have difficulty saving files: files mysteriously disappear
- Your computer reboots suddenly
- Your computer works very slowly
- Your executable files unaccountably increase in size
- Your computer starts sending out lots of e-mail messages on its own

44 Computer Viruses

- ***Antivirus software*** is a set of utility programs that looks for and eradicates a wide spectrum of problems such as viruses, Trojan horses, and worms

45 Computer Viruses

- Hackers have created viruses that can insert themselves into unused portions of a program.
- To counterattack the work of hackers, antivirus software designers created software with a ***checksum*** - a number calculated by combining binary values of all bytes in a file
  - compares checksum each time you run a program

46 Computer Viruses

- Antivirus software also checks for a ***virus signature*** – a unique series of bytes used to identify a known virus
- Write-protecting a floppy disk will not prevent virus infection because you need to remove write protection each time you save a file to disk

47 Computer Viruses

- "All the time"
- Most antivirus software allows you to specify what to check and when to check it
- Norton Antivirus
- McAfee Antivirus

48 Computer Viruses

- New viruses and variations of old viruses are unleashed just about everyday
- Check website of antivirus software publisher for periodic updates
- Some software updates itself automatically

49 Computer Viruses

- Antivirus software is pretty reliable, but viruses try to get around detection
  - ***Multi-partite viruses***
  - ***Polymorphic viruses***
  - ***Stealth viruses***
  - ***Retro viruses***
- Antivirus software is not 100% reliable, but protection is worth the risk

50 Computer Viruses

- Some viruses don't really exists
- A ***virus hoax*** arrives as an e-mail message containing dire warnings about a supposedly new virus that is on the loose
  - Recommends a strategy
  - Recommends forwarding the email
  - Says no one has a fix for it yet
- Most cases it is a fake

51 Computer Viruses

- Bogus virus e-mail message usually contain a long list of people in the To: and CC: boxes and have been forwarded to a lot of people
- List some "authority"
- Most recommend reformatting
- Fake viruses are often characterized as doing bizarre deeds
- You can validate the hoax by going to a reliable website that lists hoaxes and viruses

52 Computer Viruses

53 File Management, Virus Protection, and Backup

54 Data Backup

- Data ***backup***, a copy of a file or the contents of a disk drive, provide the best all-round security for your data
- A backup is usually stored on a different storage medium from the original files
- The exact steps that you follow depend on your backup equipment, your backup software, and your personal backup plan

55 Data Backup

56 Data Backup

- You ***restore*** data from a backup to the original storage medium or its replacement

57 Data Backup

58 Data Backup

- Not necessarily, you could just back up most important files such as your data files
- Best is to select a strategy
  - Store data files in specific location
  - Also backup:
    - ***Internet connection information***
    - ***E-mail folders***
    - ***E-mail address book***
    - ***Favorite URLs***
    - ***Downloads***

59 Data Backup

- It is always open, so some backup software won't back it up
- If can, make a backup
- Update backup every time you install new software or hardware

60 Data Backup

- Use and update frequently antivirus software
- Scan and remove viruses before making backup

61 Data Backup

- Backup your data depending upon how much data you can afford to use
- Under normal use, once-a-week should be good enough

62 Data Backup

- One backup is good, but in case your backup gets corrupted, you should maintain a rotating set of backups

63 Data Backup

- ***Full backup*** - copy of all files on a disk; safe but can take a long time
  - computer cannot be used during backup
  - backup device requires equal capacity
- ***Differential backup*** - copy of all files that have changed since the last full backup
  - takes less time but more complex
  - requires one full backup and then you will make differential backups at regular intervals

64 Data Backup

- ***Incremental backup*** - copy of all files that have changed since the last backup
  - not necessarily since the last full backup, but since any previous backup
  - takes the least time but is most complex to restore
  - requires good recordkeeping
    - label correctly

65 Data Backup

66 Data Backup

- Test your backups periodically

67 Data Backup

- A ***boot disk*** is a floppy disk or CD that contains the OS files needed to boot your computer without using hard drive
- Most manufacturers include a ***recovery CD*** for restoring your system to original setup
- ***Windows Startup Disk*** – it loads OS, and the CD-ROM drivers necessary for your computer to access files on the CD-ROM
- Antivirus software creates ***rescue disk*** with boot info and antivirus software

68 Data Backup

- Yes, it is a good idea to have a boot disk

69 Data Backup

- Store backups in a safe place
- Store backups in a different location

70 Data Backup

- Several web sites offer fee-based backup storage space
- When needed, you simply download backup files from the Web onto your hard disk

71 Data Backup

- If connected, you can store your files onto the network
- Get permission first
- Encrypt your files (remember network is shared)
- Use password-protected areas only

72 Data Backup

- Tape backup
  - used in business
  - gaining popularity among individuals as the price of tape drives decreases
  - data is copied to magnetic tape
  - tape drive can be internal or external
  - stored digital format
  - can be printed

73 Data Backup

- Floppy disks are inexpensive, contain 1.44 MB space, and are good for several documents
- Zip disk's 100 MB and 250 MB capacity is sufficient for documents and digital graphics

74 Data Backup

- Writable optical technologies provide good storage capacity and blank disks are fairly inexpensive

75 Data Backup

- Good backup option
- Disadvantage: susceptible to same dangers of first drive

76 Data Backup

77 Data Backup

- Software depends on your backup plan
  - Can use your file management utility to do simple file copying; backup software are available

78 Data Backup

- Many personal computer OSs provide a ***Copy Disk Utility***
- Makes copies of floppy disks only

79 Data Backup

80 Data Backup

- Backup software is provided with many backup devices, particularly tape drives
- Useful features include
  - Ability to restore all of your programs and data files without manually reinstalling Windows or any other applications
  - An option to schedule unattended backups
  - Support for a variety of backup devices