Lecture notes, modules 1 - 9

Fundamentals of Information Technology (Concordia University)

GRAND REVIEW FOR BTM200 FINAL EXAM

Abbreviations:

SATA: Serial Advanced Technology

SaaS: Software as a Service is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the internet. SaaS can are also referred to as Web-based applications.

ARPANET: Advanced Research Projects Agency Network

LSN: Large scale networking

SSD: Solid state drive is a hard drive based on flash memory. Unlike most disk, SSD does not have any spinning platters or motors, so they are more efficient, run with no noise, emit very little heat, and require very little power.

KBPS: Kilobyte/kilobit per second, a data rate unit determining data transfer speed.

CPU: Central Processing Unit is sometimes referred to as the “brains” of the computer because it controls all the functions performed by the computer’s other components and processes all the commands issued to it by software instructions.

LCD: Liquid crystal display (LCD) is the most common type of monitor, it is also called a flat-panel monitor, is light and energy efficient.

BIOS: Basic input/output system

ROM: Read only memory holds all the instructions the computer needs to start up when the computer is powered on.

APIs: Application Programming interfaces is a set of routines, protocols, and tools for building software applications. An API expresses a software component in terms of its operations, inputs, outputs, and underlying types.

ALU: Arithmetic logic unit is responsible for performing arithmetic calculations and makes logic and comparison decisions, such as comparing items to determine if one is greater than, less than, equal to, or not equal to another.

HTTP: Hypertext Transfer Protocol, the data transfer protocol used on the World Wide Web.

FTP: File transfer protocol

HTML: Hypertext Markup Language is the standard markup language used to create web pages. Along with CSS and JavaScript, HTML is a cornerstone technology, used by most websites to create visually engaging webpages, user interfaces for web applications, and user interfaces for many mobile applications.

RSS: Really Simple Syndication, uses a family of standard web feed formats to publish frequently updated information: blog entries, news headlines, audio, and video.

MS-DOS: Microsoft Disk operating system

SSID: Service Set Identifier is a case sensitive, 32 alphanumeric character unique identifier attached to the header of packets (bundles of data) sent over a wireless local-area network (WLAN) that acts as a password when a mobile device tries to connect to the basic service set (BSS) – a component of the IEEE 802.11 WLAN architecture

URL: Uniform Resource Locator, the web address (commonly informally referred to as a web address, although the term is not defined identically) is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it.

RAM: Random Access Memory is a form of computer data storage. A random-access memory device allows data items to be accessed (read or written) in almost the same amount of time irrespective of the physical location of data inside the memory.

GUI: Graphical user interface is a type of interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, as opposed to text-based interfaces, typed command labels or text navigation.

CAD: Computer-aided design

ESRB: Entertainment Software Rating Board

Chapter 2: looking at computers and understanding the parts

What is a computer?: (Computers are data processing devices)

A computer is a data processing device that performs four major functions:

- It gathers data, or allows users to input data
- It processes that data into information
- It outputs data and information
- It stores data and information

What is the difference between data and information?

"in computer terms, data is a representation of a fact, a figure, or an idea. Alone these pieces of data probably mean little. Information is data that has been organized or presented in a meaningful fashion.

How do computers interact with data and information?

Computers are excellent at processing (manipulating, calculating, or organizing) data into information.

- The minimum set of recommended standards for a program is known as the system requirements.
- Software that is freely distributed but comes with conditions is called a freeware

How do computers process data into information?

To process data into information, computers need to work in a language they understand. This language, called binary language, consists of just two digits: 0 and 1. Each 0 and 1 is a binary digit, or bit. Everything a computer does is broken down into a series of 0s and 1s.

Eight binary digits (or bits) combine to create one byte. Bits and bytes not only are used as the language that tells the computer what to do but also are what the computer uses to represent the data and information that it inputs and outputs.

How does your computer process bits and bytes?

The computer uses a combination of hardware and software to process data into information and enables you to complete tasks such as writing a letter or playing a game.

Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte, Exabyte, Zettabyte.

Computer Hardware

Hardware is any part of the computer you can touch. Hardware components consist of the system unit and peripheral devices, such as monitors and printers that are connected to the computer

Together, the system unit and peripheral devices perform four main functions:

They enable the computer to input data, process that data, and output and store the data and information.

Flash Storage

A flash drive, sometimes referred to as:

- Jump drive
- USB drive
- Thumb drive

Several manufactures now also include slots on the front of the system unit in which you can insert a portable Flash memory card such as a MemoryStick or CompactFlash card.

A solid state drive SSD does not have any spinning platters or motors, so they are more efficient, run with no noise, emit very little heat and require very little power.

Computer Software

Software is the set of computer programs that enables the hardware to perform different tasks. There are two broad categories of software: Application software and system software.

- Application software is the set of programs you use on a computer to help you carry out tasks.
- System software is the set of programs that enables your computer's hardware devices and application software to work together. The most common type of system software is the operating system (OS).

Are there other types of computers besides desktop and notebook computers?

Desktop and notebook computers are the computers that you will most likely encounter.

Types of computers

- Basic computer designs
  - Portable
    - Notebook computers
    - Netbooks
    - Tablet PCs
  - Sationary
    - Desktop computers
- Mainframe: Supports hundreds of users simultaneously
- Supercomputer: Performs complex calculations rapidly
- Embedded: Self-contained computer performing dedicated functions.

  Embedded computers are self-contained computer devices that have their own programming and typically do not receive input from you or interact with other systems.

Input devices

An input device enables you to enter data (text, images and sounds) and instructions (user responses and commands) into the computer.

The most common input devices are the keyboard and the mouse.

- Keyboards are used to enter typed data and commands, whereas the mouse is used to enter user responses and commands.
- Other input devices
  - Microphone
  - Scanner
  - Digital camera
  - Stylus

Keyboards

The QWERTY layout is standard on most PCs. Enhanced keyboard features include number, function, and navigation keys.

- The Control (Ctrl) key on the keyboard is used in combination with other keys to perform shortcuts and special tasks.
- There are also different specialty keyboards such as the virtual laser keyboard and configurable keyboard.

RAM is considered volatile storage, which means it is temporary

The text version of a Web site's Internet address is called the URL (Uniform Resource Locator)

The S-video and the DVI ports on a computer facilitate connecting the computer to multimedia devices such as TVs and DVD players.

Each device attached to your computer comes with a special program called a device driver that facilitates communication between the device and the OS.

If you want to save a file that will be opened by people who use a wide variety of software, any of the following formats would be safe (.rtf, .txt, .pdf) except docx

Kernel memory is RAM memory used by the operating system

Example of a WAN

- A computer at a bank's main branch connected with a LAN at the bank's branch office across town
- A computer at a military base in Georgia connected with a computer at a military base in Florida
- A LAN at the main university campus connected with a LAN at the university extension site

Choosing a Printer

- Speed (ppm): A printer's speed determines how many pages it can print per minute (called pages per minute, or ppm). Printing speeds range from 8 to 30 ppm for both laser and inkjet printers.
- Resolution (dpi): A printer's resolution (or printed image clarity) is measured in dots per inch (dpi). The higher the dpi, the greater the level of detail and quality of the image. For general-purpose printing, 300 dpi is sufficient; for printing photos, 1,200 dpi is better.
- Color output: Some printers come with a single ink cartridge for all colors; others have two ink cartridges, one for black and one for color. The best setup is to have individual ink cartridges for each color, so you can replace only the specific color cartridge that is empty.
- Use and cost: If you will be printing mostly black-and-white, text-based documents or will be sharing your printer with others, a black-and-white laser printer is best because of its printing speed and overall economies for volume printing. If you're planning to print color photos and graphics, an inkjet printer or color laser printer is a must, even though the cost per page will be higher.

- Cost of consumables: You should investigate carefully the cost of consumables (printer cartridges and paper) for any printer you are considering purchasing.

Mice

- Optical mouse
    - Needs no mouse pad
    - Does not need cleaning
- Trackball
- Wireless mouse
- Integrated pointing device
    - Touchpad
    - Trackpoint

Other Input Devices

- Game Controllers
- Touch screens
- Digital pens

Image Input

- Digital Cameras, camcorders, and cell phones
    - Pictures
    - Video
- Scanners
- Webcams
    - Live video

Sound Input

-Microphones are used for

- Podcasts
- Videoconferencing
- Internet phone calls Speech recognition
- Speech recognition

Input Devices for the Physically Challenged (Slide 16)

Chapter 3: Using the Internet: Making the Most of the web's Resources

The Internet: The largest computer network in the world.

Why was the Internet created?

The concept of the internet was developed while the United States was in the midst of the Cold War with the Soviet Union. The Internet was created to respond to these two concerns: establishing a secure form of military communications and creating a means by which all computers could communicate.

- Developed for Secure military communications
- Evolved from Advanced Research Projects Agency Network
- Funded by the U.S. government in the 1960s
- Enabled computers at leading universities and research organizations to communicate with each other

So are the web and the internet the same thing?

The web is only one component of the Internet, the means we use to access information over the internet (hence the www at the beginning of Web addresses).

The web and the internet are distinguished by

- Common communication protocols
- Navigation links

1989: Web invented by Tim Berners-Lee.

1993: Mosaic browser released.

1994: Netscape Navigator marked beginning of the web's major growth.

1997: Internet access was global.

Why did e-mail catch on so quickly?

E-mail (short for electronic mail) is a written message that is sent and received over the Internet. The messages can be formatted and enhanced with graphics and may also include other files as attachments.

Internet Communications

Forms of Internet-based communication include:

- Email
- Instant messaging
- Group communication
- Social networking
- Web logs and video logs
- Wikis
- Podcasts

    - Webcasts

E-mails are not private. In fact, the information in e-mail is no more private than a postcard. E-mails can be easily viewed by others, either by being printed out or forwarded, so you never know who eventually could read your e-mail.

Email (Electronic mail)

- Asynchronous communication
- Types of email accounts
    - Client-based (requires client email software)
    - Web-based (does not require software)
- Not Private
    - Can be printed or forwarded
    - Can be monitored by employers

Email Etiquette

- Be concise and to the point
- Use spell-check
- Avoid texting abbreviations
- Include meaningful subject line
- Use smiles (emoticons) sparingly to convey emotion
- Include signature line with contact information
- Do not type in all capital letters, which is interpreted as shouting

Instant Messaging

- Instant messaging (IM) uses real-time text-based conversations, similar to chat rooms.
- Users set up a list of contacts, often called a buddy list.
- Contacts must be online to participate.
- IM software detects the presence of members who are online.

Group Communication

- Chat rooms
- Newsgroups
- Blogs and vlogs
- Wikis
- Podcasts and webcasts
- Social networks

Chat Rooms and Newsgroups

- Chat rooms
    - Real-time, text-based conversations
    - Can focus on specific topics or interests or be general interest
    - Username can allow anonymous interaction
- Newsgroups

- Online discussion forums
- Members post and reply to messages
- Create or respond to “Threads”

What is social networking? Social networking is a means by which people use the Internet to communicate and share information among their immediate friends, and meet and connect with others through common interests, experiences, and friends.

Netiquette

- Introducing yourself when entering a chat room
- Specifically address the person to whom you are talking
- Refrain from swearing, name-calling, and using explicit or prejudiced language
- Do not post the same text repeatedly with the intent to disrupt the chat, a behaviour called flooding.

What is a blog” A weblog, or blog, is a personal log or journal posted on the Web. The beauty of Blogs is that they are simple to create, manage, and read.

It is easy to write and maintain a blog and the web has the necessary tools for you to start: Blogger.com and wordpress.com are a few of them.

The popularity of blogs has brought about a new problem: Spam blogs (splogs), which are artificially created blog sites filled with fake articles or stolen text (a tactic know as blog scraping).

Wikis

What are wikis? Unlike traditional web content, which the viewer of the site cannot change, a wiki is a type of web site that allows user to change its content by adding, removing, or editing the content. Wikis provide an excellent source for collaborative writing, both in and out of the classroom.

Podcast

A podcast is a clip of audio or video content that is broadcast over the Internet using compressed audio and video files such as MP3s and MP4s. o listen to a podcast on your computer, you’ll need a media player such as iTunes or Windows Media Player.

What is RSS? (Really Simple Syndication)

Really Simple Syndication (RSS) is an XML-based format that facilitates the delivery of frequent content updates on Webpages. Using RSS, Web content can be formatted in such a way that aggregators can find it and download only the new content to your computer.

Search engines have three parts:

- The spider, which constantly collects data on the web following links in Web sites and reading Web pages.
- Indexer program—it organizes the data into a large database.
- Search engine software—this software searches the indexed data, pulling out relevant information according to your search.

Web 2.0

- Web interactions among people, software, and data
- Social web where the user is also a participant
- New applications that combine the functions of multiple applications

Webcasts

- Webcasts: Broadcasts of audio or video content over the internet
    - Often live
    - Delivered to your computer
    - Use streaming media

Twitter

- Social networking and micro-blogging service that enables you to exchange short text messages in real time with your friends or "followers"
- Twitter messages, called tweets, are limited to 140 characters
- Businesses are using Twtter to respond to customer queries, or to broadcast new services or products.

Web Entertainment

- Multimedia is anything that involves one or more forms of media in addition to text.
    - All kinds of multimedia are available on the Web and involve forms of media and text.
        - Graphics
        - Audio
        - Video
    - Streaming audio and video can deliver on-demand pictures and sounds.
- Games
    - Multiplayer online games (MMORPGs)
    - Interact with other players
    - To view and hear some multimedia files—for example, podcasts, videos on YouTube, and audio files—you might need a special software program called a plug-in (or player).

E-Commerce

E-commerce grows in importance every day, with billions of dollar worth of transactions

- In business-to-consumer (B2C) transactions, such as amazon.com, the end buyer purchases goods or services over the Internet.
- In business-to-business (B2B) transactions, businesses sell to one another.
- In consumer-to-consumer (C2C) transactions, like ebay.com, consumer sell to one another.

Secure Websites

- Online transactions can be safer than traditional retail shopping.
    - Another indication that a website is secure is the appearance of a small icon of a closer padlock (IE) or key (Netscape) on the status bar at the bottom of the screen.
- Additionally, the beginning of the URL changes from http:// to https://, the s standing for "secure."

Online Shopping Guidelines

- Shopping at well-known, reputable sites helps ensure a safe shopping experience. If you are not familiar with a site, check it out with the Better Business Bureau, and also make sure that the company has a phone number and street address before ordering from it.
- Avoid making online transactions when using public computers.
- Pay by credit card, not debit card. Debit cards do not have the same level of protection as credit cards under U.S. federal consumer credit card protection laws.
- Check and print out the return policy.

Web Browsers

- A Web browser is software installed on your computer system that allows you to locate, view and navigate the Web.
- Graphical
- Enable web navigation
- Popular browser includes:
    - Microsoft Internet Explorer
    - Mozilla Firefox
    - Apple Safari
    - Google Chrome

Browser Features

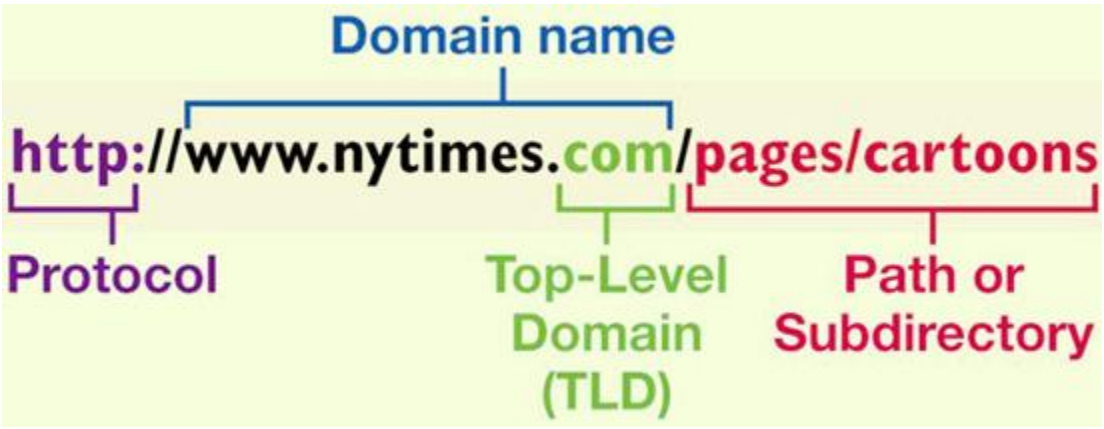
- Quick tabs show thumbnail images of all open web pages in open tabs.
- With tabbed browsing, web pages are loaded in "tabs" within the same browser window. Rather than having to switch between web pages on several open windows, you can flip between the tabs in one window.
- The browser also includes a built-in search box in which you can designate your preferred default search engine. Tools for printing page formatting and security settings are allocated to a special toolbar.

What features do browsers offer?

Most browsers' toolbars provide tabbed browsing and Quick Tabs for convenient navigation and Web page management tools.

URLs

- A URL is a website's address. It is composed of several parts that help identify the web document it stands for.
    - Uniform Resource Locator
    - Unique Web site address
- The first part of the URL indicates the set of rules (or the protocol) used to retrieve the specified document. HTTP is most common. Another popular protocol is FTP.
- The protocol is generally followed by a colon, two forward slashes, www (indicating World Wide Web), and then the domain name. The domain name is also referred to as the host name. At times, a forward slash and additional text follow the domain name. The information after the slash indicates a particular file or path (or subdirectory) within the website.



Top-level Domains

http://www.econcordia.com/courses/information_technology/lesson2_sm/images/Unsponsored_TLDs.j

.biz	Businesses
.com	Originally for commercial sites but can be used by anyone now
.edu	Degree-granting institutions
.gov	United States government
.info	Information service providers
.mil	United States military
.name	Individuals
.net	Originally for networking organizations but no longer restricted
.org	Organizations (often nonprofits)

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Evaluating Web Sites

Aircards, sometimes referred to as cellular modems, are devices that fit either into a USB port or a special slot on the side of a notebook called an Express card slot.

Hyperlinks

- Once you've reached a website, you can jump from one web page to another within the website or to another website
- When programming HTML, the web page author can code any work or image to be a hyperlink.

How can I make sure a Web site is appropriate to use for research?

1. Authority: Who is the author of the article or the sponsor of the site? If the author is well know of the site is published by a reputable news source (such as the New York Times), then you can feel more confident using it as a source than if you are unable to locate such information.
2. Bias: Is the site biased? The purpose of many Web sites is to sell products or services or to persuade rather than inform.

3. Relevance: Is the Information in the site current? Material can last a long time on the Web. Some research projects (such as historical accounts) depend on older records.
4. Audience: For what audience is the site intended? Ensure that the content, tone, and style of the site match your needs.
5. Links: Are the links available and appropriate? Check out the links provided on the site to determine whether they are still working and appropriate for you needs.

Hyperlinks

- Once you've reached a website, you can jump from one web page to another within the website or to another website altogether by clicking on specially coded text called hyperlinks.
- When programming HTML, the web page author can code any work or image to be a hyperlink.
- Generally, text that operates as a hyperlink appears in a different color (often blue) and/or is underlined.
- When you pass your cursor over a hyperlink, the pointer turns from an arrow into a hand. To retrace your steps, some sites also provide a breadcrumb list – a list of pages within a website that you have visited that usually appears at the top of a page.

How does the data get sent to the correct computer? Each time you connect to the Internet, your computer assigned a unique identification number. This number called an Internet Protocol address (or IP address), is a set of four numbers separated by periods and commonly referred to as a dotted quad or dotted decimal. IP address are the means by which all computers connected to the Internet identify each other.

Favorites and Bookmarks

- Allow you to return to web pages
    - IE and Safari = Favorites
    - Firefox and Chrome = Bookmarks
- Stay up to date
    - Live bookmarks (Firefox)
- Organize and share

Search Engines

- User types word or Phrase into search box.
- Results are indexed and sent to the client.
- Different engines produce different hit lists.

Improve Search Results

- Place quotation marks around phrases
- Search within a specific web site
- Enter wild card symbols
- Use the advanced search form

Connecting to the Internet

To take advantage of the resources the Internet offers, you need a means to connect your computer to it. Originally, the only means to connect to the Internet was with a dial-up connection.

What is broadband? Broadband, often referred to as “high-speed Internet,” refers to a type of connection that offers a faster means to connect to the Internet.

What can you borrow from the web?

- Avoid
    - Plagiarism: Representing someone else’s ideas or words as your own
    - Copyright violation: Using another person’s material for your own economic gain
- Properly credit information you quote or paraphrase
- Obtain written permission from copyright holder

Ergonomics refers to how you arrange your computer and equipment to minimize your risk of injury or discomfort.

Internet Clients and Servers

- The Internet is a client/server network.
- Thus, a computer connected to the Internet acts in one of two ways:
    - Client computer
        - Users connected to the internet
        - Requests data and web pages
    - Server computer
        - Stores web pages and data
        - Returns the requested data to the client
- Internet backbone
- IP addresses are the means by which all computers connected to the internet identify each other.

Connecting to the Internet

- To take advantage of the resources the Internet offers, you need a means to connect to your computer to it. Home users have several connection options.
- Originally, the only means to connect to the Internet was with a dial-up connection. With dial-up connections, you connect to the Internet using a standard telephone line.
- However, other connection options, collectively called broadband connections, offer faster means to connect to the Internet. Broadband connections include:
    - DSL (Digital subscriber line)
        - Uses telephone lines
        - Faster than dial-up

        - Does not tie up phone line
        - Requires special DSL modem
        - Not available in all areas
    - Cable
        - Uses coaxial cable and cable modem
        - Fast connection speed
        - Speed depends on numbers of users
        - Not available in all areas
    - Fiber-optic service
    - Satellite
        - Uses satellite dish and coaxial cable
        - Slower than cable or DSL
        - Expensive
    - Wireless Access
        - Increases mobility and productivity
        - Requires a Wi-Fi hotspot
        - If device is not wireless-ready, wireless adaptors are available
        - Aircards provide wireless access through mobile devices when a Wi-Fi hotspot is not available

Dial-Up Connections

- Use standard telephone line
- Lowest cost
- Slowest connection speed (56 kbps) kilobit per second
- Modern computers have internal modems built into the system unit

DSL is the slowest Internet connection, averaging a download speed of 1.5 Mbps with the Maximum download speed of 7 Mbps. Cable are the average used internet connection option with the average download speed of 5 Mbps and max of 30 Mbps. Fibre optic on the other hand is the fast option, averaging a download speed of 20 Mbps and Max of 50, it is of high cost, however, as technology continues it becomes lower.

Future of the Internet

- Large scale networking (LSN)
    - Research and development of cutting-edge networking and wireless technologies
- Internet2
    - Project sponsored by universities, government, and industry to develop new internet technologies
    - Internet2 backbone supports transmission speeds of up to 8.8 gigabits per second.
- Internet entrenched in daily life
- Web-based services for personal and professional interactions
- Internet-enabled appliances and systems

Chapter 4: Application software: Programs that let you work and play

Software

- The term software refers to a set of instructions that tells the computer what to do. These instruction sets, also called programs, provide the means for us to interact with and use the computer.
- Your computer uses two basic types of software:
    - System software
    - Application software

System Software vs. Application Software

System Software

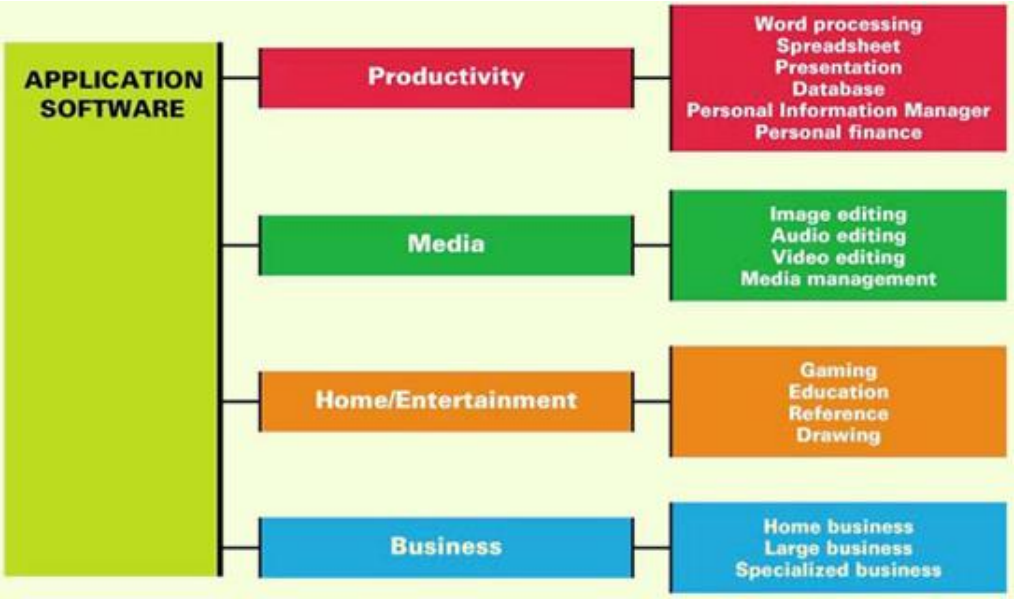
System Software includes software such as Windows and Mac OS X, which help run the computer and coordinate instructions between application software and the computer's hardware devices.

- Coordinates instructions between software and hardware
- Includes:
    - Operating system
    - Utility programs

Application Software

It is the software you use to do tasks at home, school, and work. You can do a multitude of things with application software, such as writing letters, editing photos, and taking and online course, etc.

- Programs used to complete tasks
- Includes:
    - Productivity software
    - Specialty software
    - Entertainment software
    - Educational and reference software
    - Personal



Productivity Software

Productivity software includes programs that enable you to perform various tasks required at home, school, and business. This category includes work processing, spreadsheet, presentation, data-base, and personal information manager (PIM) programs.

- Programs that enable you to perform various tasks generally required in home, school and business.
- This category includes:
    - Word-processing programs
        - Used to create and edit documents
        - Features include:
            - Quick and easy editing
            - Formatting options
            - Graphics
            - Templates
            - Wizards
        - Examples: (Corel WordPerfect, Microsoft Word, OpenOffice Writer)
    - Spreadsheet programs
        - Used to perform calculations and numerical analyses
        - Features include:
            - Worksheets with cells
            - Values, formulas and functions
            - Automatic recalculation
        - The basic element in a spreadsheet program is the worksheet, columns and rows of which form boxes called cells. There are several types of data you can enter into a cell:
            - Labels are descriptive text that identifies the components of the worksheet

        - Values are numeric data entered either directly or as a result of a calculation.
        - Formulas are equations that you build yourself.
        - Functions are formulas that are preprogrammed into the spreadsheet software.
    - The primary benefit of spreadsheet software is its ability to recalculate all functions and formulas in the spreadsheet automatically when assumptions are changed. Examples of spreadsheet software: Microsoft Excel and OpenOffice Calc
  - Presentation programs
  - Database programs
  - Personal Information Manager (PIM) programs

Presentation Software

- Used to create slide shows
- Features include:
  - Templates and layouts
  - Animations
  - Transitions
- Can use animation effects to control how and when text and other objects enter and exit each slide. Similarly, slide transitions add different effects as you move from one slide to the next during the presentation. Examples of Presentation software: Microsoft PowerPoint, OpenOffice Impress, Zoho Show.

Database Software

- Used as a complex electronic filing system.
- Features include:
  - Ability to group, sort and retrieve data and generate reports
  - Organized into fields, records and tables
- Examples of Database software are, Microsoft Access, Oracle, and MySQL

What is a software Suite? A software suite is a group of software programs that have been bundled as a package.

A macro is a small program that groups a series of commands so they will run as a single command. Marcos are best used to automate a routine task or a complex series of commands that must be run frequently.

- Software suites provide users with a cheaper method of obtaining all of the software they want to buy in one bundle.
- Project management is a software responsible for back office operations such as billing and inventory?

Open source software is program code that is publicly available and has few restrictions. Unlike available and has few restrictions. Unlike proprietary software, which is neither free nor open source, the code can be copied, distributed, or changed without the stringent copyright protections or software products you purchase.

Evernote allows you to take notes via the Web, your phone, or your computer and ten sync your notes between the Web, your phone and any computer.

Research Areas to consider

- Open source software (Linux, OpenOffice.org suite, and Mozilla.org)
- Proprietary software (Microsoft Windows and Office, Apple Mac OS and iWork)
- Copyright licensing
- Open source development

Note-taking Software

- Microsoft OneNote
    - Allows students who have Tablet PCs to write their notes directly onto the tablet, using it as an electronic notebook
    - Can be used with a notebook or desktop computer, typing the information onto the sheets, and then the pieces of text can be easily moved around the page
    - Has co-authoring and version tracking capabilities

Personal Information Manager (PIM) Software

- Used to replace the management tools found on a traditional desk, such as a calendar, address book, notepad and to-do list
- Features include:
    - Calendar, address book, notepad, to-do list
    - Some contain email management features
- Examples of PIM are Microsoft Outlook and Lotus Organizer

Productivity Software Tools

Whether you are working on a word-processing document, spreadsheet, database or slide presentation, there are several tools you can use to increase your efficiency:

- Wizards are step-by-step guides that walk you through the necessary steps to complete a complicated task.
- Templates are predesigned forms included with software. Templates provide the basic structure for a particular kind of document, spreadsheet, or presentation.
- Macros are small programs that group a series of commands to run as a single command. Marcos are best used to automate a routine task or a complex series of commands that must be run frequently.

Integrated Software Applications vs. Software suites

Integrated Software Application

- Single program that incorporates many software programs
- Complex features are not included
- Less expensive
- Example: Microsoft Works

Software Suite

- Collection of stand-alone software programs packaged together
- Share common menus and toolbars
- Integrate well
- Developers: Microsoft, Corel, and Lotus

Most people buy software suites because doing so is cheaper than buying each program individually and also because the programs are bundled in a software suite come from the same company, they work well together.

Personal Financial Software

- Used for tax preparation and financial planning.
- Tax-preparation software: enables you to prepare your taxes on your own rather than hiring a professional. Each program offers a complete set of tax forms and instructions as well as expert advice on how to complete each form.
- Financial planning software helps you manage your daily finances. These programs include electronic checkbook registers and automatic bill payment tools. With these features, you can print checks from your computer or pay your regular monthly payments with automatically scheduled online payments or printed checks.

Digital Image-Editing Software

- Used to edit photographs and other images
- Examples of Digital Image-Editing Software are Adobe Photoshop, Corel PaintShop Pro, Google Picasa

Digital Audio Software

- Used to edit audio files in formats such as MP3, WAV, WMA, and AIFF
- Most popular is MP3: Compresses audio file size
- Hundreds of applications allow you to rip, play, and organize MP3s
- Features include recording, editing, adding special effects, and format conversion

Digital Video-Editing Software

- Used to create and edit Windows Media Player, Apple QuickTime, or RealPlayer video files
- Examples:
    - Adobe Premiere Pro
    - Microsoft Live Movie Maker
    - Apple iMovie HD

Media Management Software

- Software to organize media files
    - Sort, filter and search by artist, album or category
- Manage tracks and generate playlists
- Burn songs to CDs and print liner notes

Software Fun for Home

- Computer games require appropriate:
    - Processing power
    - Memory (RAM)
    - Hard disk capacity
    - Sound card
    - Video card
    - Speakers

Game Rating System

- The Entertainment Software Rating Board (ESRB) provides rating symbols:
    - Everyone (E), Teens (T), Mature (M), Adult Only (AO). Generally ESRB rating symbols acts as content descriptors

Business Software for home and office

- Programs for home business
    - Accounting software
        - Helps small-business owners efficiently manage their finances

        - Provides tools for tracking accounts receivable and accounts payable
        - Includes templates for invoices, statements, and financial reports
    - Desktop publishing (DTP) software
        - Used to arrange text and graphics for publications
    - Web Page authoring software
        - Used to create a Web page
        - Knowledge of HTML

What software do businesses use for planning and management?

- Customer relationship management (CRM) software, it software stores sales and client contact information in one central database. Sales professionals use CRM programs to get in touch with and follow up with their clients.
- Enterprise resource planning (ERP) system lets a business consolidate multiple systems into one and improve coordination of these business areas across multiple departments.

Large-Business Software

- Used across a variety of industries
- Includes:
    - Business and marketing plan software
    - Project management software
    - Customer relationship management (CRM) software
    - Enterprise resource planning (ERP) systems
    - Ecommerce solutions

Mapping Software

- Provides nationwide street maps and directions. It also supplies geographic data for decision making
- Available versions:
    - Online
    - PC
    - Smartphone
    - GPS devices

Specialized Business Software

- Vertical market software: Tailored to the needs of a particular industry
- Examples:
    - Estimating software
    - Property management software
    - Scheduling and dispatching software
- Proprietary software can be custom developed for a company.

Computer-Aided Design (CAD) Software

- Used to create 3-D automated designs, technical drawings and model visualizations
- Industrial use includes: Architecture, Automotive, Aerospace and Medical engineering industries

Getting Help with Software

- Types of help:
    - For general help or information about the production, many websites offer (FAQs) frequently asked questions, which include answers to the most common questions.
    - There is a Help menu on the menu bar of most applications where you can choose to search an index or content outline to find out the nature of almost any feature.

Software Licenses

- A software license is an agreement between you, the user, and the software company. You accept this agreement before installing the software on your machine. It is a legal contract that outlines the acceptable uses of the program and any actions that violate the agreement.
- Check license for:
    - Ultimate owner of software
    - Number of installations allowed per license
    - Per computer, per user, or per family? And Warranties

Acquiring Software

- Software can be purchased through retail stores, online or by mail order.
- Virtually every new computer comes with some form of application software installed, although the applications depend on the hardware manufacturer and the computer model.

Freeware and Shareware

- Freeware is any copyrighted software you can use for free.
- Open source software is free to use on the condition that any changes you make to improve the source code also must be distributed for free.

A template is a predesigned form. Templates are included in many productivity applications. They provide the basic structure for a particular kind of document, spreadsheet, or presentation.

Software Versions

- Numbers are used to represent major and minor upgrades.
    - Major upgrade: Version 2.0
    - Minor upgrade: Version 2.1
- Years (Microsoft Office 2010) and letters (WordPerfect Office X3) are also used.
- When an upgrade is released, consider if it is cost-effective to purchase it.

Some software developers offer beta versions of their software free of charge. A beta version is an application that is still under development. Many beta versions are available for a limited trial period, and are used to help the developers correct any errors before they launch the software on the market.

System Requirements

- Minimum Standards for the operating system, processor, RAM, and hard drive capacity
- Specifications for video card, monitor, CD drive, and other peripherals
- Need sufficient storage, memory capacity, and processing capabilities

Installing/Uninstalling Software

- Installing software from CD or DVD
    - Installing wizard
    - Choose full or custom
- Downloading software from the web
    - Unzip files
    - Launch setup program
- Uninstalling software
    - Software uninstall utility

Chapter 5: Using System Software: The Operating System, Utility Programs, and File Management

What does an operating system do? The operating system (OS) is a group of programs that controls how your computer system functions. The OS manages the computer's hardware, including the processor (also called the central processing unit, or CPU), memory, storage devices, as well as peripheral devices, such as the monitor and printer.

Every computer, from the smallest notebook to the largest supercomputer, has an operating system. Even cell phones, game consoles, automobiles, and some appliances have operating systems.

System Software: The OS

The operating system (OS) is the main program that:

- Controls how your computer system functions and manages the computer's hardware, processor, memory and peripheral devices
- It provides means for software to work with the CPU
- Is responsible for management, scheduling and interaction of tasks.
- Provides user interface such as the desktop, icons, and menus.

System software is the set of software programs that helps run the computer and coordinates instructions between application software and hardware devices.

The OS controls how your computer system functions.

System software: Utilities

System software also includes utility programs. These are programs that perform computer housekeeping tasks.

- Backup, security, diagnostic and recovery

Operating System Categories

- Operating systems can be classified into four categories
    - Real-time (RTOS): Embedded systems
        - Found in measurement instruments
    - Multiuser: Network operating system
        - Example: Microsoft windows Server OS
    - Single-user, multitask
    - Single-user, sing-task
        - MS-DOS

Most Oss today use a graphical user interface (GUI). Unlike the command and menu-driven interfaces used earlier, GUIs display graphics and use the point-and-click technology of the mouse and cursor, marking the OS more user friendly.

Task Manager, previously known as Windows Task Manager is a task manager, system monitor and startup manager included with Microsoft Windows Systems. It provides limited information about computer performance and running applications, processes and CPU usage, commit charge and memory information, network activity and statistics, logged-in users, and system services.

Real-Time Operating Systems

- Machinery that performs a repetitive series of specific tasks in an exact amount of time requires a real-time operating system.
- This type of operating system is a program with a specific purpose.
- Uses include:
    - Automobiles
    - Printers
    - Medical devices
    - Appliances
    - Robotic equipment

Multiuser Operating Systems

- Also known as network operating systems
- Enables more than one user to access the computer system at one time by efficiently juggling all the requests from multiple users.
- A network operating system is installed on the server and manages all user requests, ensuring that they do not interfere with each other.
- Systems include:
    - Linux
    - UNIX
        - UNIX is a multiuser, multitask operating system used as a network operating system, primarily with main-frames, although it is also often found on PCs.
    - Windows server 2008
    - Mac OS X
    - IBM I
    - z/OS

Mainframes and Supercomputers

- Other computer utilizing multiuser operating systems
    - Mainframes
        - Handle requests from hundreds or thousands of users simultaneously
    - Supercomputers
        - Used by scientists and engineers

Smartphones

- Do more than let the user make and answer phone calls

- Have productivity features, in addition to features found on personal media players and cameras, and the ability to connect to the web.
- Examples: BlackBerry devices, Apple iPhone, Android and Palm Pre

Windows Disk Defragmenter regroups related pieces of files on the hard drive, thereby allowing the OS to work more efficiently.

Desktop and Notebook Operating Systems

- The combination of operating system and processor is referred to as a computer's platform. For example:
    - Microsoft Windows OS/ Intel and AMD processors
    - Apple Macintosh OS/Motorola, IBM, and Intel processors
- Application software is platform specific.

Microsoft Windows

- Multiuser, multitasking OS
- Windows 7 is the newest version
- Features increased functionality, User-friendliness, Improved internet capabilities and enhanced privacy and security.

Mac OS

- First commercially available OS with point-and-click technology (GUI)
- It is excellent in graphics display, processing capabilities, system reliability, file backup utilities
- However, there are fewer software applications available for the Mac platform than for the Windows platform.
- Macs tend to be more expensive than Windows-based PCs.

Linux

- Open source operating system
- Based on UNIX
- Stable system
- May be downloaded free from the internet
- Can be tweaked to meet any OS needs
- Runs on PCs, netbooks, iPods, and gaming systems

What the OS Does

- Provides a user interface
- Manages the CPU
- Manages memory and storage
- Manages hardware and peripheral devices
- Coordinates application software with the CPU

The User Interface

- Enables you to interact with the computer
- Types of interfaces:
    - Command-driven interface: meaning that the user had to type very specific commands were not always easy to understand; therefore the interface proved to be too complicated for the average user.
    - Menu-driven interface: the user chooses a command from menus displayed on the screen. Menu-driven interfaces eliminated the need to know every command because you could select most of the commonly used commands from a menu. However, they were still not easy enough for most people to use.
    - Graphical user interface (GUI): displays graphics and uses the point-and-click technology of the mouse and cursor, making operating systems much more user friendly.

Processor Management

- Controls the timing of events the processor works on:
    - Multitasking
    - Interrupts
    - Interrupts handler
    - Interrupt table
    - Stack

OS Architecture

- Systems with more than 4 GB of RAM feature a 64-bit version of Windows (Windows Vista or Windows 7).
- If you purchase a 64-bit system, you will need to make sure that all your hardware and software programs are updated will with the 64-big version of your OS.
- Previous versions of Windows used 32-bit systems.

Random Access Memory (RAM)

- RAM has limited capacity
- Running multiple programs at one time requires more RAM.
- Most editions of Windows 7 require more than 1 GB of RAM for the OS alone.
- The translucent Aero user interface requires at least 2 GB of RAM and a video card with at least 256MB of RAM.

Virtual Memory

- Instructions and data are stored on the hard drive when RAM is full.
    - Swap file
    - Paging
    - Thrashing

You can determine the location of a file by its file extension.

The term that defines excessive swapping of files between RAM and virtual memory is thrashing

Disk Defragmenter is a utility that eliminates the inefficiencies of the computer hard drive.

Hardware and Peripheral Device Management

- Device drivers
    - Each device attached to your computer comes with a special program, called a device driver that facilitates the communication between the device and the OS.
    - The device driver translates the specialized commands of the device to commands that the OS can understand, and vice versa. Thus, devices will not function without the proper device driver because the OS would not know how to communicate with them.
- Plug and Play
    - Today, most devices come with the driver preinstalled in Windows. Devices are included in Windows are called Plug and Play (PnP).

Software Application Coordination

- For software programs to work with a CPU, they must contain code that the CPU recognizes. Rather than having the same blocks of code for similar procedures in each software application, the OS includes the blocks of code that software applications need. These blocks of code are called application programming interfaces (APIs).
- To create programs that can communicate with the operating system, software programmers need only refer to the API code blocks in their individual application programs rather than including the entire code in the application itself. Not only do APIs avoid redundancies in software code, but they also make it easier for software developers to respond to changes in the OS.

The type of processor help determine which OS a computer uses.

- Microsoft DirectX, for example, is a group of multimedia APIs built into the Windows operating system that improves graphics and sounds when you're playing games or watching video on your PC.

Starting the Computer

- For a computer to go from a dead stop to ready-for-use, a start-up process is required. This is often referred to as booting up the computer, or the boot-process
- The boot process consists of four basic steps:
    1. The basic input/output system (BIOS) is activated by powering on the CPU.
    2. The BIOS checks that all attached devices are in place (called a power-on self-test, or POST).
    3. The operating system is loaded into RAM.
    4. Configuration and customization settings are checked.

Handling Errors in the Boot Process.

Sometimes Windows does not boot properly and you end up with a screen with the words Safe Mode in the corners.

- Safe mode is a special diagnostic mode designed for troubleshooting errors.
- While in Safe Mode, only the essential devices of the system (such as the mouse, keyboard and monitor) function.
- If, after you boot, you end up in Safe Mode, try rebooting the machine before doing anything else.
- If you still end up in Safe Mode and if you have recently installed new software or a new hardware device, try uninstalling it.

The desktop is the First interaction you have with the OS and the first image you see on your monitor. As its name implies, your computer's desktop puts at your fingertips all of the elements necessary for a productive work session that typically are found on or near the top of a traditional desk, such as files and folders.

The Recycle Bin is a location for deleted files and folders from the C: drive only.

A gadget is an easy-to-use miniprogram that gives you information at a glance or quick access to frequently used tools including weather information =, calendar items, calculators, games, photo albums, and system tools.

Mac vs. Windows

- Similar functionality

- Streamlined user interface
- Window-like work areas on the desktop

File Management

- The operating system provides an organization structure for the computer's contents.
- The OS allows you to organize the contents of your computer in a hierarchical structure of directories that includes: Drives, Folders, Subfolders and files
- Windows & introduces the concept of libraries, which are collections that gather files from different locations and display them as if they were all saved in a single folder, regardless of where they are physically stored.

Filename Extensions

- Following the filename and after the dot (.) comes an extension, or file type. This extension identifies what family of files the file belongs to or which application should be used to read the file.
- All Word, Excel, and PowerPoint files created in the 2007 and 2010 version have an "x" at the end of the traditional three-letter extension.

Naming Files

- Filename: Name assigned plus filename extension.
- File and folder name length is up to 255 characters.
- Characters not legal in Windows filenames: " / \ * ? < > I :
- Character not legal in Mac filenames:
- Mac file names are case sensitive and do not need file extensions.

File Path

- You can tell the location of a file by its file path. The file path starts with the drive in which the file is located and includes all folders, subfolders (if any), the filename and the extension.
    - For example, if you were saving a picture of Emily Brontë for a term paper for an English Comp course, the file path might be C:\My Documents\Spring 2009\English Comp\Term Paper\Illustrations\EBronte.jpg

Working with Files

- File management actions:
    - Open: Open a file by clicking the file in its storage location. The operating system then determines which application needs to be loaded to open the requested file and opens the file within the correct application automatically.
    - Copy: When you copy a file, a duplicate file is created and the original file remains in its original location.
    - Move: When you move a file, the original file is deleted from its original location.
    - Rename
    - Delete
- The Recycle Bin is a folder on the desktop in Windows where files deleted from the hard drive reside until you permanently purge them from your system. Files in the Recycle Bin can be easily restored to their original location.
- Mac systems have something similar to the Recycle Bin, called Trash.
- Files deleted from other drives, such as a floppy drive, DVD, flash drive, or network drive, do not go to the Recycle Bin, but are deleted from the system immediately.

Utility Programs

Utility programs are small applications that perform special functions.

- Some utility programs (such as disk defragmenter utilities) manage system resources.
- Some (such as screen savers) help make your time and work on the computer more pleasant.
- Others (such as file compression utilities) improve efficiency.

Display Utilities

- Right clicking on an open area of the desktop opens the Display Properties dialog box. This dialog box the Control Panel using the Display icon.
- From here, you can change the appearance of:
    - Desktop
    - Background
    - Screed savers
    - Window colours

Add or Remove Programs

- When you install a new program, the program runs a wizard that walks you through the installation process. If a wizard does not initialize automatically, you should go to the Add to Remove Programs folder in the Control Panel. This prompts the OS to look for the setup program of the new software and starts the installation wizard

- Most programs include support files that are not located in the main program folder. By selecting the Add or Remove Programs icon in the Control Panel and choosing a particular program, you delete the main program file and all supporting files as well.
    - Program should NOT simply be deleted.

File Compression Utilities

- A file compression utility is a program that takes out redundancies in a file to reduce the file size.
- File compression is helpful because it makes a large file more compact, making it easier and faster to send over the Internet upload to a Web page, or save onto a disk.
- Windows has built-in compression (or zip) file support.
- There are also several stand-alone freeware and shareware programs, such as:
    - WinZip (for Windows)
    - StuffIt (for Windows or Mac)
- Most compression programs look for repeated patterns of letters and replace them with a shorter placeholder.

System Maintenance Utilities

- A set of maintenance utilities is built into Windows primarily for system efficiency.
- Disk Cleanup
    - Removes unnecessary files from your hard drive.
    - Choose the files to be deleted:
        - Downloaded program files
        - Temporary internet files
        - Offline web pages
        - Recycle Bin
- System Restore
    - Windows has a utility called System Restore that lets you restore your system settings back to a specific date when everything was working properly.

System Backup

    - Backup
        - Creates a copy of a hard drive to another storage device, such as a CD or an external hard drive.
    - Task Scheduler
        - Schedule tasks to run automatically at predetermined times, with no interaction necessary on your part.

Accessibility Utilities

- Windows Vista and 7 have created an Ease of Access Center, a centralized location for assistive technology and tools that adjust accessibility settings.
- Centralized location for assistive technology:
    - High contrast
    - Magnifier
    - On-screen keyboard
    - Windows speech recognition

Chapter 6: Understanding and Assessing Hardware: Evaluating Your System

- A rule of thumb often cited in the computer industry, called Moore's Law, describes the pace at which CPUs improve.
- When deciding whether to upgrade or buy new, consider:
    - Moore's law
    - Cost of upgrading vs. buying
    - Time to install software and files
    - Needs and wants

Desktop or Notebook

Desktop

- Hard to move around
- Less expensive
- Harder to steal
- Easier to expand and upgrade
- Difficult to transport
- Larger Monitors

Notebook

- Portable
- More expensive
- Easily stolen
- Difficult to upgrade
- Easy external expansion
- Prone to damage

How Does the CPU Work?

- The CPU or processor is the “brains” of the computer. It processes instructions, performs calculations, manages the flow of information through the computer system, and is responsible for processing the data you input information.
- The CPU is located on the motherboard.
- The CPU is composed of two units: the control unit and the arithmetic logic unit (ALU).
    - The control unit coordinates the activities of all the other computer components.
    - The ALU is responsible for performing arithmetic calculations and makes logic and comparison decisions, such as comparing items to determine if one is greater than, less than, equal to, or not equal to another.
- Every time the CPU performs a program instruction, it goes through the same series of steps, called a machine cycle:

1.) First, it fetches the required piece of data or instruction from RAM.
2.) Next, it decodes the instruction into something the computer can understand.
3.) It then executes the instruction.
4.) Last, it stores the result to RAM before fetching the next instruction.

Differentiating CPUs

- Processing power:
    - Core: A complete processing section from a CPU embedded into the same physical chip
    - Clock speed: How quickly the processor works
    - Cache: The amount of immediate access memory the CPU has
    - Front side bus: Connects the processor to system memory

Evaluating the CPU

- Identify your current CPU
- Determine whether it is meeting your needs
    - Go to Task Manager to review CPU usage
- Consider how quickly data moves to or from the CPU

Evaluating RAM

- Random access memory (RAM) is your computer’s temporary storage space.
- Memory modules (or memory cards), the small circuit boards that hold a series of RAM chips, fit into special slots on the motherboard.
    - Most memory modules in today’s systems are called dual inline memory modules (DIMMs)
- Several types of RAM are available.
    - DDR2
    - DDR3

- SRAM
- DRAM
- SDRAM

How Much RAM do you need?

- Physical memory vs. kernel memory
  - The amount of RAM actually sitting on memory modules in your computer is your computer's is your computer's physical memory.
  - The memory that your operating system uses is referred to as kernel memory.
- To determine how much RAM your computer needs, look at the memory requirements for each program and add them up.
- RAM is needed for system software, productivity software, and entertainment and graphics programs.

Application	RAM Recommended
Windows 7	2,000 MB (or 2 GB)
Microsoft Office Professional 2010	512 MB
Internet Explorer 8	512 MB
iTunes	512 MB to 1,000 MB (1 GB)
Adobe Photoshop Elements	1,000 MB (1 GB)
Total RAM required to run all programs simultaneously	4,536 MB to 5,024 MB (or 4.5 GB to 5.0 GB)

Adding RAM

- Adding RAM can have a big positive effect on system performance.
- Things to consider:
  - Type of RAM module
  - Amount of RAM
    - Maximum limit
    - Number of slots
    - Operating system
- RAM is a form of temporary storage – anything residing in RAM is not permanently saved. Therefore, it's critical to have the means to store data and software applications permanently.
- Several storage options exist, including:
  - Hard drive
  - USB flash drive

    - Optical drive
    - External hard drive
- When you turn off your computer, the data stored to these devices is saved. These devices are therefore referred to as non-volatile storage devices.

The Hard Drive

- Storage capacity is up to 2 terabytes (TB)
- Access time is measured in milliseconds.
- Data transfer rate is measured in megabits or megabytes per second.

How a Hard Disk Works

- A hard disk drive is composed of several coated platters stacked on a spindle.
- When data is saved to a hard disk, a pattern of magnetized spots is created on the iron oxide coating each platter.
    - Each of these spots represents a 1.
    - The spaces not spotted represent a 0.
    - These 0s and 1s are bits (or binary digits), the smallest pieces of data that computers can understand.
- Sitting between each platter are special arms that contain read/write heads. The read/write heads move from the outer edge of the spinning platters to the center to read and write the magnetic data to and from the hard disk.
- When data stored on the hard disk is retrieved (or read), your computer translates these patterns of magnetized spots into the data you have saved.

Evaluating Storage

- Identify your hard drive's total capacity
- Determine your storage capacity needs
- Consider data transfer rates
    - Internal
    - External

Optical Storage

- Optical media: Store data as tiny pits burned into a disc by a laser
    - Prerecorded
        - CD-ROM, DVD-ROM, BD-ROM
    - Recordable
        - CD-R, DVD-R, BD-R
    - Rewritable

        - CD-RW, DVD-RW, BD-RE
- Consider replacing CD/DVD drive with BD burner

Evaluating Video

- How video is displayed depends on two components:
    - Video card (adapter)
    - Monitor
- It's important that your system have the correct monitor and video card to meet your needs.
- If you use your computer system to display files that have complex graphics, such as videos on DVD or from your camcorder, or if you play graphics-rich games with a lot of fast action, you may want to consider upgrading your video subsystem.

Evaluating Video

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Video Cards

- A video card (or video adapter) is an expansion card installed inside your system unit to translate binary data into the images you view on your monitor.
- Modern video cards include ports allowing you to connect to different video equipment as well as their own RAM, called video memory.
- Video cards also come with their own processors. Calls to the CPU for graphics processing are redirected to the processor on the video card, significantly speeding up graphics processing.
- The video card also controls the number of colors your monitor can display. The number of bits the video card uses to represent each pixel on the monitor (referred to as the bit depth) determines the color quality of the image displayed. The more bits, the better the color detail of the image.
    - A 4-bit video card displays 16 colors, the minimum number of colors your system works with (referred to as Standard VGA).
    - Most video cards today are 24-bit cards, displaying over 16 million colors. This mode is called true color mode (SVGA)

Graphics Processing Unit

- Performs the same work as a CPU
- Specialized to handle:
    - 3D graphics
    - Image and video processing
- CPUs perform better with a GPU handling graphics computation.

Evaluating Video Card

- Identify the amount of video memory on your video card
- Determine your video needs
- Consider how many monitors you want to use

Evaluating Audio

- Sound cards attach to the motherboard and enable your computer to produce sounds.
    - Attach to motherboard
    - Process digital data into sounds
    - 3D sound cards
    - Surround sound
    - Allow you to connect audio devices

Evaluating System Reliability

Before you buy a new system thinking yours is unreliable, make sure the problem is not one you can fix. Proper upkeep and maintenance may postpone an expensive system upgrade or replacement.

- Performance:
    - Is slow
    - Freezes
    - Crashes
- Upkeep and maintenance:
    - System tools
    - Control Panel

Upkeep and Maintenance

There are several procedures you can follow to ensure that your system performs reliably:

1.) Clean out your Startup folder. Some programs install themselves into your Startup folder and are automatically run each time the computer reboots. This unnecessary load causes extra stress on RAM. Make sure you delete only those programs you know for sure are unnecessary.
2.) Clear out unnecessary files. Temporary Internet files can accumulate quickly on your hard drive. Running the Disk Cleanup utility is a quick and easy way to ensure these files do not take up hard drive space. Likewise, delete unnecessary files from your hard drive regularly.
3.) Run spyware and adware programs. These can detect and remove various pests and should be used in addition to your regular antivirus package.
4.) Run the Disk Defragmenter utility on your hard drive. When your hard drive becomes fragmented, its storage capacity is negatively affected. When you defrag your hard drive, files are reorganized, making the hard drive work more efficiently.

Update Software and Hardware Drivers

- Software
    - Having the latest version of software products makes your system much more reliable
    - You should upgrade or update your operating system, browser software and application software as often as new patches (or fixes) are reported for resolving errors. Sometimes these errors are performance related; sometimes they're tied to maintaining better security for your system.
    - You can configure Windows to automatically check for downloads and install any available for itself and for Internet Explorer. In addition, products such as McAfee's Oil Change enable you to sort through numerous websites and quickly find the bug fixes for most application software.
- Hardware
    - Download updated drivers

Last Resort

When all else fails, you have two options:

1. Upgrade your operating system to the latest version. There are substantial increases in reliability with each major release of a new operating system. However, upgrading the operating system may require hardware upgrades, such as additional RAM, an updated graphics processor, and even a larger hard drive. The Microsoft Windows 7 Upgrade Advisor will perform a scan of your system to determine what upgrades might be required before converting to Windows 7.
2. Reinstall the operating system. To do so, you'll need to back up all of your data files before the installation and be prepared to reinstall your software after the installation. Make sure you have all of the original discs for the software installed on your system, along with the product keys, serial numbers, or other activation codes son that you can reinstall the software.

Chapter 7: Networking: Connecting Computing Devices

Networking Fundamentals

- Computer network: two or more connected computers
- Node: Any device connected to a network
- Benefits of computer networking
    - Facilitates resource sharing
        - High-speed internet connections
        - Peripheral devices such as printers
        - Files
- Disadvantages of computer networking
    - Network administration
        - Installing new computers and devices
        - Monitoring the network's performance
        - Updating and installing new software
        - Configuring network security

Cache memory is a form of random access memory that is more accessible to the CPU than regular RAM. Because of its ready access to the CPU for processing much faster than bringing the data in from RAM.

Network Architectures

- Architecture: Design of the network
- Peer-to-peer network
    - Local administration
    - Each node can communicate directly with every other node.
- Client/server
    - A client is a computer on which users accomplish specific tasks (such as construct spreadsheets) and make specific requests (such as printing a file).
    - The server is the computer that provides information or resources to the client computers on the network.
    - Central administration
    - Clients: Used to accomplish tasks
    - Server: Administers network funtions

Networks Based on Distance

- LAN: Local area network
- HAN: Home area network
- WAN: Wide area network
- MAN: Metropolitan area network

Wired connections can sometimes provide greater throughput than current high-speed wireless networks.

- Wireless signals are more susceptible to interference from magnetic and electrical sources.
- Other wireless networks (such as your neighbor's network) can interfere with the signals on your network.
- Certain building materials (such as concrete and cinderblock) and metal (a refrigerator) can decrease throughput.
- Throughput varies depending on the distance from your networking equipment.

Network navigation devices facilitate and control the flow of data through a network. Data is sent over transmission media in bundles. Each bundle is called a packet.

For computers to communicate, these packets of data must be able to flow between network nodes.

What network navigation devices will I use on my home network?

The two most common navigation devices are routers and switches.

- A router transfers packets of data between two or more networks.
- A switch is a "traffic cop" on a network. Switches receive data packets and send them to their intended nodes on the same network (not between different networks).

Moore's Law, describes the pace at which CPUs (central processing units)—the small chips that can be thought of as the "brains" of the computer—improve.

Named for Gordon Moore, the cofounder of the CPU chip manufacturer Intel, this rule predicts that the number of transistors inside a CPU will increase so fast that CPU capacity will double every 18 months. (The number of transistors on a CPU chip helps determine how fast it can process data.)

Many computer users decide to buy a new system because they are experiencing problems with their computer. However, before you buy a new system because you think yours may be unreliable, make sure the problem is not one you can fix.

Network Components

- Transmission media
    - Wireless networks connect nodes with radio waves.
    - Wired networks use cables to connect nodes.
        - Twisted-pair cable
        - Coaxial cable
        - Fibre-optic cable

Data Transfer

- Data transfer rate
    - Bandwidth (the range of frequencies within a given band, in particular that used for transmitting a signal)
    - Speed of data transmission
- Throughput
    - Actual speed of data transfer achieved
    - Always less than or equal to the data transfer rate

Network Adapters

- Devices connected to, or installed in, network nodes
- Enable nodes to communicate with each other and access the network

Wireless Signals

- Might have decreased throughput:
    - Interference from magnetic and electrical sources
    - Interference with other wireless networks
    - Building materials and metal
    - Distance from networking equipment
    - Coded signals

Network Navigation Devices

- Control the flow of data through a network
- Data sent in bundles called packets
- Routers
    - Transfer packets between two or more networks
- Switches
    - Send packets to intended nodes on same network

Network Software

- Home networks
    - P2P supporting operating system
    - Windows
    - OS X
    - Linux
- Client/server networks
    - Network operating system (NOS) software

    - Windows Server 2008 R2
    - SUSE Linux Enterprise Server

Home Ethernet networks

- Use Ethernet protocol as standard for network communication
- Wireless 802.11
- Wired 802.3
- Routers and network adapters
    - Translate electronic data into radio waves
    - Broadcast radio waves to other nodes
    - Receive signals from other nodes

Throughput Speeds

- Can be measured using utilities like Net Meter
- Wired connections provide best throughput.
- Wi-Gig will be faster than current wired or wireless standards.
    - Will not be available for several years

Network Cabling

- Unshielded twisted-pair (UTP) cable
    - Most popular cable for Ethernet networks
    - Composed of four pairs of wires that are twisted around each other to reduce electrical interferences
- RJ-45 connectors: used on cable ends
- Cat 6 cable: best UTP for home networks
- Signal degrades after 100 m (328 ft)

Home Ethernet Network Equipment

- Router (broadband router)
- Broadband is a high-capacity transmission technique using a wide range of frequencies, which enables a large number of messages to be communicated simultaneously.
    - Includes integrated switches
    - Most have wireless capability
    - Can contain broadband modem
- Wireless devices need wireless network interface cards (NICs)
- Network-ready devices can connect directly to router.

NAS Devices

- Network attached storage (NAS) devices
    - Store and manage data
- Home network server
    - More sophisticated NAS device
    - Performs only a limited set of functions performed on client/server networks

Digital Entertainment Devices

- Connect to network to access and share digital content
- Use gaming devices to play multiplayer games with players all over the world
- Network-ready TVs and home theater systems
- Blu-ray players
- DVRs

Specialized Devices

- Internet appliances
    - Used to access internet
    - Apple iPad
- Digital picture frames
- Security monitoring cameras

Securing Wireless Networks

- Piggybacking
    - Connecting to a wireless network other than your own without permission of the user
    - Can be unintentional
- Most wireless adapters are set up to access the strongest wireless signal detected.
- Hackers can intercept packets of information broadcast on a wireless network.
- Precautions to secure a wireless network:
    - Change your network name (SSID)
    - Disable SSID broadcast
    - Change the default password on your router
    - Turn on security protocols
    - Implement media access control
    - Limit your signal range
    - Apply firmware upgrades

Configuring a Home Network

- Windows 7 automates setting up networks

- Before running the automated wizards:
    - Make sure there are network adapters on each node
    - For any wired connections, plug all the cables into the router, nodes, and so on
    - Make sure your broadband modem is connected to your routed and that the modem is connected to the internet
- Turn on your equipment in the following order (allowing the modem and the router about one minute each to power up and configure(:
    1. Broadband modem
    2. Router
    3. All computers and peripherals (printers, scanners, etc.)

Connecting Macs Wirelessly

- Set up router security (as in Windows)
- Logging onto network requires SSID and passphrase
- Choose network, enter password, and join
- Networks with SSID broadcast turned off will not appear as an available network
- Click “Other” and enter the network name and password

Wireless Node Configuration

- Hook up devices like DVRs or gaming consoles
    - Wired connection
        - Plug cable into device and router
    - Wireless connection
        - Follow steps in device’s setup menu
        - SSID name and security passphrase required if network is secured

Test Internet Connection Speed

- Internet sites allow you to test speed of downloading and uploading files.
    - Speedtest.net and Broadband.gov

Troubleshooting Network Problems

- Throughput decreases as device moves farther away from router
- To increase throughput:
    - Move the router within the room or to another room
    - Move the device closer to the router
    - Amplify your wireless signal by adding a wireless range extender

Chapter 9: Securing your system: Protecting your digital data and devices

Computer Threats: Cybercrimes

- Cybercrimes are criminal acts conducted by cybercriminals through
- Computer users need to protect themselves from becoming victims of cybercriminals.
- Types of cybercrime
    - Fraud-related
        - Non-delivery of ordered items
        - Credit and debit card fraud
        - Advanced fee scams
    - Non-fraud-related
        - Computer intrusions
        - Unsolicited email
        - Child pornography

Computer Threats: Viruses

- Virus: A program that attaches itself to another program and spreads itself to other computers
- Viruses are hidden within the code of a host program.
- Any computing device can be infected with a virus.
- What viruses do:
    - Replicate themselves
        - Slow down networks
    - Secondary objectives
        - Display annoying messages
        - Delete flies on the hard drive
        - Change computer settings
- Types of viruses
    - Boot-sector viruses: Replicate themselves in the boot sector of the hard drive
    - Logic bombs: Activate when certain conditions are met
    - Time bombs: Triggered by the passage of time or on a certain date
    - Worms: Travel between systems through networks
    - Script viruses: Hidden on Web pages as mini-programs
    - Macro viruses: attached to documents
    - E-mail viruses: Use email address books to distribute themselves
    - Encryption viruses: Compress files using a complex encryption key

How Does a Computer Catch a Virus?

- Viruses copy themselves and infect a file on your computer.
- They are spread by:
    - Sharing disks or flash drives
    - Opening an email attachment
    - Downloading infected audio or video files

Virus Classifications

- Polymorphic viruses: Periodically rewrite themselves to avoid detection
    - A polymorphic virus changes its own code (or periodically rewrites itself) to avoid detection. Most polymorphic viruses infect a particular type of file (.EXE files, for example).
- Multipartite viruses: Infect multiple file types
    - A multipartite virus is designed to infect multiple file types in an effort to fool the antivirus software that is looking for it.
- Stealth viruses: Erase their code from the hard drive and reside in the active memory
    - Stealth viruses temporarily erase their code from the files where they reside and then hide in the active memory of the computer.

Antivirus Software

- Programs designed to detect viruses.
    - Scan files looking for virus signatures (unique code)
    - Provide options for deleting or fixing infected files
    - Inoculate files against further infection
- Needs to be updated frequently

Quarantining, a procedure that stops the execution of a detected virus signature or susp

Inoculation: in inoculation, the antivirus software records key attributes about files on your computer (such as file size and date created) and keeps these statistics in a safe place on your hard drive.

Dealing with an Infected Computer

1. Boot computer with anti-virus installation disc
2. Run directly from DVD/CD
3. Allow software to delete or quarantine infected files
4. Research viruses found to ensure further manual steps are not needed

Other Ways to protect your system

- Keep your antivirus and operating system (OS) software up to date
- Load security patches as soon as they are available
- Enable automatic updates

Hackers

- Anyone who unlawfully accesses a computer system
- Types of hackers

    - White hat (computer hackers intending to improve security)
    - Black hat (is a hacker who "violates computer security for little reason beyond maliciousness or for personal gain. Black hat hackers from the stereotypical, illegal hacking groups often portrayed in popular culture, and are "the epitome of all that the public fears in a computer criminal."
    - Script kiddies is an unskilled individual who uses scripts or programs developed by others to attack computer systems and networks, and deface websites.

What Hackers Steal

- Hackers try to steal data stored on hard drives:
    - Credit card numbers
    - Bank account numbers
- Also can steal information through packet sniffing or a key-logger
- Use information to purchase items illegally or to commit identity theft

How Computers Are Attacked

- Trojan horse
- Backdoor program
    - Zombies
- Denial of service attacks (DoS)
- Distributed denial of service attacks (DDoS)

How Hackers Gain Access

- Direct access
    - Hacking software
- Indirect access
    - Internet connection
    - Logical ports

Firewalls

- Software programs or hardware designed to close logical ports to invaders
    - Most current operating systems include reliable firewalls.
    - Security suite often include firewalls
    - Network routers can contain a hardware firewall.
- Firewalls are critical if you have an always-on broadband connection.
- Test your computer's vulnerability

Bluetooth Attacks

- Blue-snarfing
    - Exploits flaw in access software to steal information contained on the device
- Blue-bugging
    - Hacker takes control of the device
- Make your device invisible

Passwords

- Create a strong passwork:
    - At least 14 characters, including numbers, symbols, and upper-and lower-case letters
    - Not a single word or a word from a dictionary
    - Not easily associated with you (birthday, name of pet, nickname)
    - Use different passwords for different sites
    - Do not tell anyone or write down password
    - Change password regularly (every month)

Wireless Networks on the Road

- Beware
    - “Evil twins”
    - Free internet access in paid locations
- Protect yourself
    - Check with authorized personnel for official name of hotspot
    - Do not use free access from unknown sources

Password Managers

- Remember all your different passwords
- Built into:
    - Operating systems
    - Web browsers
    - Some security packages

Anonymous Web Surfing

- Public computers
    - Shared computers risk subsequent user viewing your data
    - Might already have viruses or hacking tools installed
- Portable privacy devices
- Linux OS on a flash drive

Biometric Authentication Devices

- A biometric authentication device is a device for people who want to advertise their products, track our Web browsing behaviors, or even con people into revealing personal information.
- Read unique personal characteristics:
    - Fingerprint
    - Iris patterns
    - Voice patterns
    - Face patterns

Malware

- A Malware is a software that has a malicious intent Software that has a malicious intent
    - Grayware (non-destructive)
        - Adware: it is a software that displays sponsored advertisements in a section of your browser window or as a pop-up ad box.
        - Spyware is an unwanted piggyback program that usually downloads with other software you want to install from the Internet. It runs in the background of your system. Without your knowledge, spyware transmits information about you, such as your Internet surfing habits, to the owner of the program so that the information can be used for marketing purpose.
    - Viruses (destructive)
- Antispyware software
    - Included in many internet security suites
    - Stand-alone spyware removal available

Spam or Spim

- Spam: Unwanted or junk email
    - To avoid SPAM:
        - Create free web-based email account i.e., Gmail for filling out online forms or making online purchases
        - Use a spam filter
        - Do not try to “unsubscribe” from spam emails
        - Use an Email forwarding service
- Spim: Unsolicited instant massages

Cookies

- A website assigns an ID number to your computer, stored in a cookie file
- Each time you log in to the site, it notes the visit and keeps track of it in a database.
- Provide info about browsing habits

- Identify user perferences
- Pose some privacy risks, but low security threat

Protecting Your Personal Information

- Protect information from identity thieves:
    - Social Insurance Number
    - Phone number
    - Street address
- Check privacy settings on social networking sites:
    - Keep your information as private as possible.

Back Up Your Data

- Backup
    - A copy of a file that can be used to replace the original
- Types of files to back up
    - Program
    - Data
- Backup routine
    - Frequency
    - Changed files
- Software programs for easy backup
    - Schedule automatic backups
    - Can back up files, folders, or entire drives
    - Back up to external hard drive, USB device, or DVD
- Entire system backup software
    - Takes an image of the entire system
    - Stores on a separate hard drive
    - In case of failure, a new drive is inserted
- Store backups offsite
- Online backups
    - Store backup files on Internet servers
    - Some services free
        - Windows Live Sky Drive
        - ADrive
    - Fees for some services
- Network attached storage (NAS) devices

Social Engineering

- Uses social skills to generate human interaction to entice individuals to reveal sensitive information
- It is any technique that uses social skills to generate human interaction that entices individuals to reveal sensitive information.
    - Usually does not use a computer or face-to-face interaction
    - Pretexting

Phishing and Pharming

- Phishing
    - Uses email to lure uses to fake websites
    - Tricks user into revealing private data
- Pharming
    - Malicious code changes web browser's ability to find web addresses

Hoaxes

- An attempt to make someone believe something that is untrue
    - Target large audiences
    - Practical joke, agents of social change, or time wasters
    - Mostly email

Protect Physical Assets

- Environmental factors
    - Avoid
        - Sudden movement
        - Excessive heat or cold
        - Dust
        - Food and liquids
    - Use padded case for notebooks

Spreadsheet Analysis: Using Microsoft Excel (2010)

Cell References

- Excel offers three types of cell references for use when a formula is copied:

Absolute A1

Relative A1

Mixed $A1 or A$1

- $ indicates that the row number or column letter will not be modified during a copy.
- **Relative Cell References**
  - When the formula shown in the formula bar is copied, relative address A8 is modified.
- **Absolute Cell References**
  - When the formula shown in the formula bar is copied, absolute address B5 is fixed.
- **Mixed Cell References**
  - In **mixed reference** $A1, the column is fixed, but the row may be altered during a copy.
  - In **mixed reference** A$1, the row is fixed, but the column may be altered during a copy.

Access or Excel?

It is better to use Excel if you:

- Are more comfortable with its ease of use
- Only need one worksheet to handle all of your data
- Have mostly numeric data
- Require subtotals and totals for worksheet
- Want to use "what if" scenarios on data
- Need to create complex charts and/or graphs

It is better to use Access when you:

- Need multiple related tables to store data
- Have a large amount of data
- Need to connect to — and retrieve data from — external databases (such as Microsoft SQL Server)
- Need to group, sort, and total data based on criteria
- Need multiple users to have access to the application simultaneously
- Need built-in tools to help organize data
  - Ability to create relationships between tables

Relational Databases

- **Access:** a Relational Database Management System (RDBMS)
  - Allows the user to create relationships between tables
- **Relationships:** the set of rules on how tables will be related
  - Good database table design is based on normalization

Using the Relationships Window

- Relationships should be created after the tables are created, but before any sample data is entered.
- Relationships between tables are represented by join lines in the Relationships window.
- Most common method of connecting two tables is using a primary key from the primary table to the foreign key in the related table.

Types of memory stored in your system:

- RAM
- Cache
- CPU register

A database query is a piece of code (a query) that is sent to a database in order to get information back from the database. It is used as the way of retriving the information from database

A database "query" is basically a "question" that you ask the database. The results of the query is the information that is returned by the database management system. Queries are usually constructed using SQL (structured query language) which resembles a high-level programming language.

Blu-ray drives are gaining in popularity for viewing and burning high-density media. When you turn off your computer, the data stored in these devices remains. These devices are referred to as non-volatile storage devices.

Module 1

Understanding Computer Parts

- bit > byte > kilobyte > megabyte > gigabyte > terabyte > petabyte > exabyte > zettabyte
- 8 bits = 1 byte - ~1,000 bytes = 1KB - ~1,000,000 bytes = 1 MB - ~1,000,000,000 bytes = 1 GB - ~1,000,000,000,000 bytes = 1 TB
- major functions of a computer:

•gathers data (allows users to input data) •processes data into information •outputs data or information •stores data and information

- Hardware

•any physical part of the computer (the ones we can touch) •system unit + peripheral devices

•some devices help the computer communicate with other computers (like network routers)

•all of these perform the four basic functions of a computer

- Software

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•set of programs that enables the hardware to perform different tasks •application software: enables carrying out tasks like creating spreadsheets or editing photos

•system software: enables the hardware to communicate with the application software (operating system)

- Computer Types

•portable: notebooks, netbooks, tablets •stationary: desktop computers •mainframe: supports hundreds or thousands of users simultaneously •supercomputer: performs complex calculations rapidly •embedded: self-contained computer performing dedicated functions

- Input Devices

•enables the user to enter data (text, images) and commands into the computer

•keyboard: typed data and commands - QWERTY standard on mosts PCs

- features can include numbers, function and navigation keys - notebook keys normally have alternate functions when used with F (function) keys

- virtual laser keyboard - configurable keyboard

•mouse: responses and commands - optical mouse (no mousepad or cleaning, uses optical light to sense user's movements)