Chapter 2 – Understanding your computer

- Computer: gathers data, processes data into information, outputs and stores data and information

- Data: a representation of a fact, a figure, or an idea (number, word, picture, sound)

- Information: data that has been organized or presented in a meaningful fashion

- Processing: manipulating, calculating or organizing data into information

- Binary language: language of computers, consists of only 0 and 1

    - Binary digit: each 1 and 0
    - Byte: 8 binary digits
    - What the computer uses to represent the data and information that it inputs and outputs
    - Kilobyte (KB): 1000 bytes
    - Megabyte (MB): 1 million bytes
    - Gigabyte (GB): 1 billion bytes
    - Terabyte: 1 trillion bytes
    - Petabyte, Exabyte, zettabyte
- Hardware: any part of the computer you can touch
- Software: set of computer programs that enables the hardware to perform different tasks
    - Application software: set of programs used to write a paper for example
    - System software: set of programs that enables your computer's hardware devices and application software to work together
        - Operating system (OS): the program that controls the way in which your computer system functions – manages the hardware of the computer system
- Notebook computer or laptop: portable computer that is powered by batteries – keyboard, monitor and other devices integrated into a single compact case
- Netbook – small notebook computer 7 to 10 inches wide with a longer battery life
- Tablet PC: similar to notebook but has a touch sensitive screen that can swivel and fold flat

- Desktop computer: single use location – main components plus peripheral devices
    - Peripheral device: component such as a monitor or keyboard connected to the computer
    - All in one computer such as the apple iMac
- Mainframe: large, expensive computer that supports hundreds of users simultaneously - good at executing different computer programs at the same time
- Supercomputer: specially designed computer that can perform complex calculations extremely rapidly – execute few programs as quickly as possible
- Embedded computer: specially designed computer chip that resides in another device such as a thermostat – don't receive input or interact with other systems

INPUT DEVICES

- Input device: enables you to enter data and instructions into the computer (keyboard, mouse) – stylus, pen with no ink

- QWERTY keyboard: standard English-language keyboard layout – slows typists down
- Dvorak keyboard – alternative keyboard – puts most commonly used letters in the English language on "home keys" – reduces travel distance, increasing typing speed
- Alternatives: flexible keyboards, virtual laser keyboard, DX1
- Wireless keyboards use a form of wireless technology that uses radio frequency – 6 to 30 feet away some as far as 100

- Optical mouse, trackball mouse (ball on top or on the side), touch pad (laptop), trackpoint device (laptop little joystick), wireless mice (use batteries and send data via radio frequency or bluetooth), Apple Magic mouse (like macbook trackpad), MoGo mouse
- Microsoft and Logitech offer features such as magnifier (magnification box that you can drag around the screen) and customizable buttons on mice, web search (highlight then click on search button), file storage (wireless USB receiver to store files)
- Other input devices, joysticks, game pads, steering wheels (most are wireless)

- Touch screens: display screen that responds to commands initiated by a touch with a finger or a stylus (Apple ipod ipad, Nintendo DS)

- Alternative to tablet PCs ▭ digital pen like the Dane-Elec Digital Pen which captures your writing and then wirelessly transits and stores in in the flash drive, when the flash drive is connected to a computer, translates your writing into digital text

- Image input: digital cameras, camcorders, cell phones ▭ used in remote settings and later download to computer through cable or wirelessly, scanners, webcam

- Sound input: microphone captures sound waves and transfers them to digital format on your computer, built-in mics in notebooks

    - Desktop microphones (attached base), unidirectional microphones pick up sound from only one direction (best for podcasts with one voice), omnidirectional microphones (all directions at once, good to pick up more than one voice, good when you need to keep your hands free), clip-on-microphones also called lavalier microphones, close-talk microphones (usually attached to a headset

- Input devices for people with disabilities: voice recognition for the visually impaired, keyboards with larger keys, keyboards on the monitor that you click, Maltron keyboard when you can only use one hand, special trackballs only needing one finger for people with motor issues, head-mounted devices (uses a camera, mouse clicks controlled by a switch manipulated by hands or feet or mouth)

OUTPUT DEVICES

- Output device: enables you to send processed data out of your computer in the form of text, pictures, sounds or video
- Monitor, printer, speakers and earphones
- Monitors
    - Liquid crystal display (LCD): also called flat-panel monitor, light, energy efficient, some use light-emitting diode technology – more energy efficient and better color accuracy and thinner

    - Cathode ray tube monitor (CRT) have been replaced by LCD because they are legacy technology (methods from an earlier time)
    - Grids made up of millions of dots called pixel (each pixel is made up of 3 subpixels of red, blue and green). Some new TVs also have yellow.
    - LCD monitors have 2 or more sheets of material filled with a liquid crystal solution and a panel at the back of the monitor generates light waves – electric current passes through liquid solution – crystals move around and block or let shine the fluo light which causes image to form on the screen
    - Aspect ratio is the width to height proportion of a monitor, resolution is the clearness or sharpness of the image (the higher the better – usually set by the screen size and aspect ratio) choose the monitor with the highest resolution available for the screen size, contrast ratio is the measure of difference in light intensity between the brightest white and the darkest black (400:1 – 1,000:1 is preferable), viewing angle tells how far you can move to the side before the image quality degrades to unacceptable levels (150 degrees is recommended for 17+ inches), brightness (300cd/ m2 or > is recommended), response time is the time it takes for a pixel to change color (lower the better)
    - Look for monitors with built-in features such as speakers, webcams and microphones, built in USB port
- Output to a large group of people with a projector, some are small like the 3M MPro 150 fits in a hand
- Printers: inkjet, laser are nonimpact printer (sprays ink or transfers laser beam marks to paper) have replaced impact printer that strike the paper through an inked ribbon (dot-matrix-printer legacy technology)
    - Inkjet printer: standard in homes, affordable, quick, quiet, consider the type and cost of the ink cartridges when buying
    - Laser printer: more often found in offices and classrooms, faster, higher quality, no need for ink laser beams, long run cost may be lower
    - Other types: portable printers run on battery power, wireless printers (Wi-Fi and Bluetooth up too 300 ft.), all-in-one printer (printer, scanner, copier, fax), plotter (good to print precise and continuous lines – maps, architectural plans), thermal printer either melt wax based ink on ordinary paper (thermal wax transfer printing) or by

burning dots onto specially coated paper (direct thermal printing) used in airports
    - What to consider when buying: speed, resolution, color output, use and cost of the printer, cost of consumables
- Sound output: speaker, surround-sound speaker (includes subwoofers – full 360 degree sound), headphones, earbuds

PROCESSING ON THE MOTHERBOARD

- Motherboard: main circuit board that contains the central electronic components of the computer, processor, memory and many circuits
    - Located inside the system unit: metal or plastic case that houses power unit
    - Sets of chips that powers the system, ROM, RAM, cache (short-term memory), slots for expansion cards or adapter cards (sound and video cards), sound card (connection for the speakers and microphone), video card (connection for the monitor) - high end models vs. low-end where sound and video is integrated to the mother board, modem card (connection to the Internet via phone line), network interface card (connect with other computers)
- Memory
    - RAM: random access memory – where programs and data are stored – delivers information to the CPU for processing. Series of small cards plugged into slots on the motherboard. Volatile storage, deletes when you turn off PC. Permanent storage on hard drive or storage device.
    - ROM: read-only memory – non volatile storage, instructions the computer needs to start up when powered on
- Processing
    - CPU: central processing unit – controls all the functions performed by the computer's other components and processes all the commands issued to it by software instructions (45 billion tasks/ second)
        - Speed measured in units of hertz (Hz)
        - Machine cycle – process of CPU getting data from RAM and decoding it, then executes them and stores result in system memory
        - Old machines ran speed in megahertz (MHz – millions of machine cycles/ s.) now its gigahertz (GHz – billions/ s.)
        - Other factors of performance: cores (processing paths – now 2,4, 8 paths), cache memory, front side bus (how fast data goes from CPU and RAM)

STORING DATA AND INFORMATION

- Permanent storing is located in drive bay. There are 2 kinds of drive bay, internal and external.
    - Internal: internal hard drive – holds permanently stored programs and data
    - External: CD, DVD drives, you can attach some others
- Hard drives
    - Hard drive: primary device for permanent storage – today memory of 3.5 terabyte around – located inside the computer, some external hard drive that you can fit in your pocket (1 or 2 TB of memory, used to back up data)
- Optical storage
    - Optical drive can read from and maybe even write to CDS, DVDS, or blue-ray discs – tiny pits are burned into the disc by a high speed laser
    - Capacity: Blue-ray dual layer > Blue ray > DVD dual layer > DVD > CD
- Flash storage (jump drive, USB drive, thumb drive)
    - Stores portable data (as much as 256 GB)
    - Many computers come with slots for flash memory card (let you transfer data between computer and other devices such as smartphones, cameras etc.)

CONNECTING PERIPHARALS TO THE COMPUTER

- Port: place through which a peripheral device attaches to the computer so that data can be exchanged (many located at the back but commonly used ports can be located in the front)
- USB is the most common port type – transfer data quickly (USB 2.0 transfer data at 480 megabits per second)
- Serial ports send data one bit at a time – use to be used to connect modems. Parallel port much faster (500 Kbps – were used to connect printers) – USB much quicker therefore they have become legacy technology
- Other types of ports: Firewire 400 (400 Mbps) and 800 (800 Mbps) – good for hard drives, video cameras, etc.
- Connectivity port can give you access to networks and the internet or to function as a fax machine (looks like large phone jack) – Ethernet port (transfers data at 1 000 Mbps)
- Modem port – 2nd connectivity port, standard phone line connector

- Other ports: back of the computer audio and video ports (hook up monitors – video graphics array which CRT monitors connect and older LCD monitors). Newer ones along with TVs DVD players, projectors connect to digital video interface and S-video ports. Audio ports where you connect headphones, microphones and speakers
- High-definition multimedia interface: compact audio-video interface carries high-def video and uncompressed digital audio in one cable (TV and gaming consoles)
- Desktop should have at least 6 USB ports and notebook 3 – you can install expansion cards in your system to provide additional ports. If no expansion slats on the motherboard, you can add an expansion hub that connects to one port to add new ports. Can also add ports to an empty drive bay.

POWER CONTROLS

- Power supply (inside system unit) transforms the wall voltage to voltage required by computer chips - powering computer from turned off state is called a cold boot
- Powering off helps save energy, keeps computer secure and ensures data is saved – use power off button or shut down button on start menu
- Ppl argue to turn off computer every time: environment, money. Others argue to let it run: stress from heating and cooling down – modern operating systems include power-management settings that shut down power-hungry components such as monitor and hard-drive
- Sleep mode: documents, applications and data remain in RAM
- Hibernate: stores your data in memory and saves it to computer's hard drive – info protected if power failure
- Warm boot: restarting the system when its powered on

SETTING IT ALL UP

- Ergonomics is important
  - Position your monitor correctly (25 inch. From eyes)
  - Purchase an adjustable chair
  - Assume a proper position while typing
  - Take breaks from computer tasks
  - Ensure the lighting is adequate

Chapter 3 – using the Internet

- Internet was developed during the Cold War to establish a secure form of military communications and creating a means by which all computers could communicate
- Internet evolved from Advanced Research Projects Agency Network (ARPANET) – first communication in 1969 – Vinton Cerf and Robert Kahn known as fathers of the internet
- The web is only one component of the internet – other components include FTP, Gopher, Telnet, and BitTorrent
- What differences the web from the rest of the internet is its use of common communication protocol and special links that enable users to navigate from one place to another on the web
- First web browser (software to interact with text and other media on the web) developed in 1989
- 1993: National Center for Super-computing applications releases Mosaic browser for use on the Mac and Windows
- Internet was global by 1997

COMMUNICATING THROUGH THE INTERNET

- Email: fast, convenient, reduces cost (postage, long-distance calls). Not private, can be viewed by others (printing or forwarding), employers have access to e-mail sent from the workplace
    - E-mail clients such as Microsoft Outlook are software programs running on your computer that act like a post office by accessing your internet service provider – can only be used on the computer where its installed. Can download email from many accounts, several features to manage and organize emails (task, sender, priority)
    - Web-based e-mail client – can look at e-mails directly from the web (Yahoo, Gmail)
- Instant messaging can be used as communication between co-workers
    - AOL, FB chat, windows live messenger are proprietary, you can only chat with those who use the same IM service
    - Trillian, Pidgin, Digsby are universal, they allow users of all the popular IMs to chat together
- Group communication: e-mail, IM (one or a few people that you know), Facebook (circle of friends and family), chatrooms, newsgroups (people you want to connect with but don't know personally)
    - Chat room – real time conversation, newsgroup – people create threads, Internet relay chat (IRC) – means of

    - synchronous group communication used in discussion forums
    - Netiquette: etiquette of behavior

THECHNOLOGIES: COLLABORATING AND COMMUNICATING THROUGH THE INTERNET

- Social networking: how people use the Internet to communicate and share information among their immediate friends, meet and connect with others
    - Facilitates business networking (likedin)
- Weblog or blog: personal log or journal posted on the Web – most recent post on the top, searchable, organized, user friendly
- Video log or vlog: personal journal that uses video as the primary content
    - Problems: spam blogs – fake articles or stolen text, have links to other sites associated with the splog's creator
    - Wiki: type of website that allows user to change its content, good for collaborative writing (classrooms, business collaboration)
- Podcast: clip of audio or video content that is broadcast over the Internet using compressed audio and video files (radio shows, audiobooks, magazines). When you subscribe to podcasts, when the content changes, it is brought to you.
- Podcasts possible because of RSS (really simple syndication): XML-based format that facilitates the delivery of frequent content updates on Web pages
    - Web content formatted in a way that aggregators (software programs that go out and get latest updates according to your specifications) can find it and download only the new content to your computer
    - You can create a podcast using basic equipment (microphone and computer, camera for video podcast, editing software)
- Webcast: broadcast of audio or video content over the Internet (usually live or one-time events). Not updated automatically, uses media technology that continuously feeds the audio and video content (easier viewing of audio and video content). Can be used to broadcast meetings.

WEB ENTERTAINMENT: MULTIMEDIA AND BEYOND

- Multimedia on the wed: graphics, audio files, video files

- Streaming audio or video: continuously feeds a file to your browser so you avoid having to wait for the entire file to download completely
- Multiplayer online games, massive multiplayer online role-playing games (MMORPGs)
- Most web graphics appear on browser without any additional software
    - For some podcasts, videos or audio files you may need a special software called a plug-in – you may need to update them in order to minimize risk
- Your browser keeps track of visited web sites (cache) – delete your temporary internet cache periodically, and click refresh if you revisit a site in the same browsing session

CONDUCTING BUSINESS OVER THE INTERNET

- E-commerce or electronic commerce: process of conducting business online, such as through advertising and selling products
    - Click-and-brick business (stores with a physical building and online presence)
    - Business-to-consumer (B2C): transactions between businesses and consumers
    - Business-to-business: businesses buying and selling to other businesses
    - Consumer-to-consumer (C2C): consumers selling to each other through online auction
- Businesses must have some form of security certification to give their customers a level of comfort
    - Make sure http:// changes to https:// for secure socket layer, appearance of a small icon of a closed padlock
    - Shop at well-known, reputable sites
    - Avoid making online transactions when using public computers
    - Pay by credit card, not debit card
    - Check the return policy

ACCESSING THE WEB: WEB BROWSERS

- Web browser: software that allows you to locate, view and navigate the web – today we use graphical browsers (display pictures, text and other forms of multimedia)
- Common browsers: internet explorer, firefox, safari, google chrome

    - Tabbed browsing, quick tabs for convenient navigation and web management tools, built-in search box, inprivate browsing

GETTING AROUND THE WEB: URLs, HYPERLINKS, AND OTHER TOOLS

- You gain access to a website by typing its unique address or uniform resource locator (URL), move around the site through the hyperlinks
- URL:
    - Protocol: first part of the URL – generally followed by ://www and the domain name or host name
    - Individual pages within a website are further identified after the domain name, following another /
- Protocol: most URLs begin with http (hypertext transfer protocol) – allows files to be transferred from a web server on your computer
    - Another common protocol is file transfer protocol (FTP)- used to upload and download files from your computer to a web server
    - FIT files use an FTP file server, HTTP files use a web server
- Domain name: identifies the site's host
    - Top-level domain: the suffix (.com or .edu), which indicates the kind of organization to which the host belongs. Each country has his own.
- After a /additional text, indicates a particular file or path (or subdirectory)
- Hyperlinks: specially coded element that allows you to jump to another web page or web site, images can also be hyperlinks
    - Breadcrumb trail: a list of pages within a web site you've visited
- Favorites or bookmarks feature: marker of the site's URL for easy retrieval
    - Live bookmark feature of Firefox adds technology of RSS feeds to book marking – delivers updates to you as soon as they become available
    - Social bookmarking or tagging: lets you store, organize and manage bookmarks of web pages – keyword that is assigned to a piece of information so that it can be found again by browsing or searching

SEARCHING THE WEB

- Search engine: set of programs that searches the web for keywords and returns a list of web sites on which those keywords are found
    - Subject directory: structured outline of web sites organized by topics and subtopics (ex: librarian's internet index)
    - Metasearch engine: search other search engines rather than individual websites
    - Search engines have 3 parts
        - Spider: constantly collects data on the web, following links in web sited and reading web pages
        - Indexer program: organizes the data into a large database
        - The search engine software: searches the indexed data, pulling out relevant information according to your search
    - Different search engines give different results because: different algorithms, how they rank the search results, differences in proprietary formula, some search the entire web whereas specialty search engines search only sites relevant to the subject
    - Boolean operators: words such as AND, NOT, OR that describe the relationship between keywords in a search
    - Tips:
        - Search for a phrase – use quotations
        - Search within a specific web site
        - Use a wild card (*) ex: Congress voted * on the * bill (mention how Congress voted on various bills
    - Google scholar, Google custom search, Google News
- Evaluating web sites:
    - Authority
    - Bias
    - Relevance – is the material current?
    - Audience – does it match you needs? (content, tone, style)
    - Links – are the links available and appropriate?
    - If the answer to all is yes, website is a good source

THE INTERNET AND HOW IT WORKS

- A computer connected to the internet is either a client (asks for data) of it is a server (receives the request and returns the data to the client)
- Internet is referred to as a client/ server network
- How do computers "talk" to each other?
    1. Type address ␣ client asking for data from x website

2. Your request travels along pathways, the largest and fastest are called Internet backbones
3. Data flows along backbone and then to smaller pathways until it reaches the destination
4. Server returns data using the most expedient pathway system
5. Web browser interprets data and displays it on your monitor

- Internet protocol address (IP address): set of 4 numbers separated by periods (dotted quad or dotted decimal) – means b which all computers connected to the Internet identify each other – websites are given text versions of their IP address

CONNECTING TO THE INTERNET

- Dial-up connection: originally the only means to connect to the Internet (using a standard telephone line) – becoming legacy technology (max transmission of 56 Kbps)
- Broadband (high speed Internet): type of connection that offers a faster means to connect to the internet (256 Kbps)
    - Digital subscriber line (DSL): uses a standard phone line to connect your computer to the internet
    - Cable: uses your television's cable service provider to connect to the internet
    - Fiber-optic service: uses plastic or glass cables to transfer data at the speed of light
    - Satellite broadband: mostly used in rural or mountain areas that cannot get DSL, cable or fiber-optic
- Cable: uses the same coaxial cable used by cable TV (but need to upgrade their networks with two-way data transmission capabilities). Slower at peak times because it is shared between users.
- DSL: no need for an additional phone line, DSL uses remaining 2 lanes in copper wires to receive and send data – much faster than dial-up. Local Phone Company must have DSL technology to offer the service. DSL is limited by distance (max of 3 miles from where signal originates)
- Fiber optic: fiber-optic lines (strands of optically pure glass or plastic thin as a human hair), arranged in bundles (optical cables) and transmit data via light signals over long distances – huge amounts of data super fast – data converted to electrical pulses that computer reads.
- A broadband internet connection requires a modem – either cable of DSL modem which translates the broadband signal into digital data and back again – connected to an expansion card

called a network interface card (NIC) which is located inside your computer – need a router to connect with more than one computer
- Satellite Internet: need a satellite dish – data is transferred between personal satellite dish and the satellite company's receiving dish
- Wireless
    - WiMAX: designed to extend local WiFi networks across greater distances
    - Mobile WiMAX: alternative to cellular transmission of voice and high-speed data
    - To access wifi you need wireless capability built in your device
    - Aircard: devices that fit either into a USB prot or a special slot on the side of a notebook (express card slot) – enables users to have wireless internet access with notebooks (require a service plan)
    - Concerns: public hotspots are unsecured (don't use credit card)
- Dial-up connections: needs a standard phone line and a modem
    - Dial-up modem: device that converts the digital signals the computer understand into analog signals that can travel over phone lines – computer on other end must have a modem to demodulate signal (usually built into system unit)
    - Least costly, slower but fine for casual internet users, ties up your phone line if you don't have a separate line
- How to choose?
    - Depending on area, may not have a choice
    - Speed: data transfer rate (how fast data travels between computers i.e. connection speed) – fiber-optic > DSL and cable > satellite > dial-up
    - Which other services you want bundled into your payment?

THE FUTURE OF THE INTERNET

- More bandwidth and offer increased services, more accessible
- Large scale networking (LSN): aim to fund the research and development of cutting-edge networking and wireless technologies and to increase the speed of networks
- Internet2: research and development consortium of more than 300 universities that seeks to expand the possibilities of the Internet by developing new Internet technologies and

disseminating them as rapidly as possible to the rest of the internet community
- Internet enabled devices – homes virtually running themselves

Chapter 4: application software

- Software: set of instructions that tells the computer what to do – also called a program – provides a means for us to interact with and use the computer
    - Application software: software you use to do tasks at home, school and work
    - System software: help run the computer and coordinate instructions between application software and the computer's hardware devices – includes the operating system and utility programs (help manage system resources)

PRODUCTIVITY SOFTWARE FOR HOME AND OFFICE

- Productivity software: programs the enable you to perform various tasks (word processing, spreadsheet, presentation, database, personal information manager programs
- Word processing software: most widely used in application – Miscrosoft Word and Corel WordPerfect
    - Open source software: program code that is publicly available and has few restrictions – code can be copied, distributed, or changed (ex: openoffice.org or abiword.com) vs. proprietary software which you cannot
    - Web based word processing programs: googledocs, Microsoft office web apps
    - Advantage of word processing software: produce professional result
    - Special tools: translate words or phrases, automatically correct your spelling as you type, automatically summarize key points, add bibliographical references, include illustrations with different picture styles
- Spreadsheet software: enables you to do calculations and numerical analyses easily (ex: excel)
    - In the grid consisting of columns and rows you can enter: text, values, formulas, functions
    - Benefit: ability to recalculate all functions and formulas in the spreadsheet automatically when values for some of the inputs change – can quickly test *what-if-analysis*, create variety of charts, powerful mathematical functions, databases capabilities and can sort, filter and group data

- Presentation software (Powerpoint, zoho show)
- Database software (oracle, MySQL, Microsoft Access) are powerful applications that allow you to store and organize data
    - More robust fully featured database used to manage larger and more complicated groups of data than spreadsheets
    - Organized into fields, records, and tables
- Note taking software help students take notes during lectures and organize and maintain their lecture notes and the recordings they create from lectures
    - Microsoft OneNote: move pieces of text around, tabbed sections, search for a term
    - Online note taking applications (evernote, stickynotes)
- Personal information manager software: strive to replace the management tools found on a traditional desk (calendar, address book, notepad, to-do list) (ex: Microsoft outlook or lotus)
    - Some PIMs contain e-mail management features
    - Can check people's availability is you share a network at home or work with them
    - Many web based e-mail clients such as Yahoo!, Google, AOL have coordinating calendar contacts programs
- Productivity software features – tools to increase efficiency
    - Wizard: systematic guide that walks you through the steps necessary to complete a complicated task
    - Template
    - Macro: small program that groups a series of commands so they will run as a single command
- Integrated software application: a single software program that incorporates the most commonly used tools of many productivity software programs into a single integrated program (ex: Microsoft Works – word processing, spreadsheet, database functionality, templates, calendar, dictionary, map features)
    - Not substitutes for full programs - good if you don't need the more advanced features, less expensive
- Software suites: group of software programs that have been bundled as a package (software, productivity, graphics, virus protection)
    - 3 primary developers: Microsoft, Corel, Apple
    - Most contain word processing, spreadsheet, presentation, PIM software can also include database programs and desktop publishing software
    - Cheaper than buying individually, work well together, share common features
- Personal Financial Software

    - Tax preparation software: (ex: Turbotax) enables you to prepare your state and federal taxes on your own instead of hiring a professional – must obtain a new version every year
    - Financial planning software helps you manage your daily finances: electronic checkbook registers, automatic bill payment tools – print checks, pay monthly payments, analyze spending patterns
        - Web based programs as well (mint, yodlee moneycenter)
        - Coordinate with tax preparation software

MEDIA SOFTWARE FOR HOME

- Multimedia software: image, video, and audio editing software, animation software, other specialty software to produce computer games, animations, and movies
- Digital image editing software: edit photographs and other images – tools for basic modifications (removing red-eye, contrast, etc.), some include painting tools
    - Adobe Photoshop and Corel PaintShop Pro Photo: fully featured image editing applications (layering images, masking images) – used to create enhanced digital images
    - Adobe Photoshop elements and Roxio Photosuite: casual home user
- Digital audio software: novels, newspapers, radio shows, podcasting (free), radio shows, music videos, compose you own music
    - MP3 (MPEG-1 Audio Layer 3): type of audio compression format that reduces the file size of traditional digital audio files so that they will take up less storage capacity – also allows quick and easy distribution over the Internet
    - Most digital audio software programs support one of the following functions – others incorporate many (Itunes)
        - MP3 recording
        - CD ripping
        - CD burning
        - Encoding and decoding
        - Format conversion
    - Audio editing software (ex: audacity, sony sound forge pro): cutting dead air space, cutting a portion, add special sound effects, remove static or hiss
- Digital video editing software
    - Adobe Premiere Pro and Final cut Pro (most expensive) widest range of special effects

    - Microsoft Live Movie Maker and Apple iMovie: simple to create professional-quality movies with little or no training
    - Many of the affordable video editing software packages support most types of video files
    - Portable media players: MP4
- Media management software
    - (ex: Windows Media Player, iTunes) allow you to organize audio and video files so that you can sort, filter, and search your music collection by artist, album or category
    - Several online photo sharing and photo storing sites (ex: Flickr – organize your images and share them with millions of users of just your close friends and family)

SOFTWARE FUN FOR HOME

- Entertainment software: digital games and virtual reality programs
- Gaming software: make sure computer has enough processing power or RAM and appropriate sound cards, video cards, speakers, monitor and CD or DVD drives, also some programs may require special controllers
    - Entertainment software rating board: rating symbols and content descriptors
- Educational software
    - Teach users new skills, preparation software, programs to improve the health and function of our brains, programs that provide tutorials for popular computer applications, simulation programs (commercial and military flight training, machine operation)
    - Course management software (blackboard, moodle) provide traditional classroom tools (calendars, grade books)
- Drawing software: lets you create or edit 2 dimensional, line-based drawings
    - Both creative and technical drawings

BUSINESS SOFTWARE FOR HOME AND OFFICE

- Home business consider: accounting software, desktop publishing and web page creation tools, a number of software packages are designed to organize and help with the daily operations of a typical business
- Home business software

    - Accounting software helps manage finances more efficiently by providing tools for tracking accounts receivable and accounts payable – also inventory management, payroll and billing tools
    - Desktop publishing software: incorporate and arrange graphics and text in your documents in creative ways – format text and graphics
    - Web page authoring software: allows even the novice to design interesting and interactive webpages without knowing HTML
- Large business software
    - Project management software: helps project managers create and modify scheduling charts
    - Customer relationship management software: stores sales and client contact information in one central database
    - Enterprise resource planning system lets a business consolidate multiple systems into one and improve coordination of these business areas across multiple departments
    - Mapping programs are perfect for businesses that require employees to travel frequently – provide street maps and written directions to locations nationwide – online mapping services also available (Google maps, mapquest)
        - Many companies use a geographic information system to assist with managing, analyzing, and displaying data – used by power companies to manage electric grids, water distribution companies, shipping and transportation companies to determine most efficient routes
    - Programs for e-commerce (WebSphere, GoEmerchant) bundled web site creation and hosting services
- Specialized business software
    - Vertical market software: software designed for a specific industry
    - Computer-aided design: 3D modeling to create automated designs, technical drawings, model visualizations (engineers)

GETTING HELP WITH SOFTWARE

- FAQs, online help and support (user's manual, chat with online support team)
- Integrated help: documentation for the product is directly built into the software

- Tutorials may be offered online by developer or you can search the internet

BUYING SOFTWARE

- You purchase a license that gives you the right to use the software – not yours to lend or copy
- Software license: an agreement between you, the user, and the software company – legal contract – some come with licenses for more than one computer
    - Multiuser license: per-seat (limit number of users overall), concurrent licenses (limit the number of users accessing the software at any given time)
- Free software license: grants the recipient the right to modify and redistribute the software (copyleft) – without this you are in violation of copyright laws
- Pre-installed software: every new computer comes with an operating system as well as some form of application software (productivity software, multimedia-enriched computers may offer graphics software or a productivity suite that includes page authoring software, many include image editing or financial planning software)
    - Having so many pre-installed programs on your system can degrade the system performance by allocating memory away from active applications and for notebooks it can reduce battery life (referred to as bloatware)
- Web-based applications
    - Software as a service (SaaS): the application is hosted online by the vendor and made available to the customer over the Internet
    - Microsoft Office Web Apps, Google Docs
    - Advantages: you can access your files as long as you have a web browser, great for collaborations (work with others in real time)
    - Most are free, but some aren't
- Discounted software
    - Students or educators can sometimes purchase software at lower prices
    - Can buy software through online auction – make sure it's a licensed copy
    - You can buy and download software directly from many companies and retail web sites - you should request to be sent the CD or DVD
- Freeware and shareware

    - Freeware: any copyrighted software that you can use for free
    - Postcardware and e-mailware: request that you mail them a postcard or send an e-mail to thank them and with your opinion
    - Open source programs: free to use but if you make any changes to improve the source code you must also distribute it for free
    - Be cautious, people use freeware to distribute viruses
    - Beta version: application that is still under development – many available for a limited trial period free of charge
    - Shareware: distributed for free but with certain conditions – must be registered after a certain period of time, no support available unless its registered – not freeware
        - No expense of marketing and advertising
        - Many have codes in the program to stop it from working completely or alter the output after the trial period
    - Freeware and shareware can possibly crash your computer if not made for your system
    - Beta version is rarely bug free
    - Make sure your virus protection is up to date
- Software versions and system requirements
    - Numbers after software names indicate new versions
    - No need to always replace software – upgrades may not be sufficiently different – do you really need it?
    - Vendors make new versions of software backward compatible (older versions can recognize it) but some are not forward compatible
    - System requirements: minimum recommended standards for the operating system, processor, primary memory (RAM), and hard drive capacity to support a software (all software have them)

INSTALLING, UNINSTALLING, AND STARTING SOFTWARE

- Most programs for PC are installed with an installation wizard (CD)
- If you download from the Internet: everything you need to install and run the program is in one zipped file – will be saved on your computer's hard drive
- Sometimes files don't install automatically – you need to locate the files on the hard drive (usually named setup.exe - .exe are executable files or applications)

- Full installation will copy all the files and programs from the distribution disc to the computer's hard drive
- Custom installation: decide which features you want installed on the hard drive
- Deleting the main file is not ridding your system of all the pieces of the program
    - Some programs place uninstall icon in the main program folder – or click start menu, control panel, programs and features, chose to uninstall
- To start application click all programs list on start menu

Chapter 5: using system software

- System software: set of programs that helps run the computer and coordinates instructions between application software and the computer's hardware devices –consists of 2 primary types of programs:
    - Operating system
    - Utility programs
- Operating system (OS): group of programs that controls how your computer system functions. Manages the hardware (processor, memory, storage devices, peripheral devices, monitor, and printer)
    - Coordinates the hardware, software, user interface, processor, and system memory
    - Many types exist: some don't require any user intervention (appliances, car engines), proprietary systems (specifically for devices they manage)
    - First widely installed OS: Microsoft Disk Operating System (unfriendly), was replaced by Apple's Mac OS and Microsoft's Windows (allowed a single user to multitask)
    - Networking capabilities later added (multiuser, multitask)
- Utility program: small program that performs many of the general house keeping tasks for the computer (maintenance and file compression)

TYPES OF OPERATING SYSTEMS

- Real-time operating system (RTOS): programs written specifically for the needs of the devices and their functions, minimal user interaction (measurement instruments in scientific, defense and aerospace industries, car engines, printers, dryers, furnaces)
- Multiuser operating system (network operating system): enables more than one user to access the computer system at one time

by efficiently handling and prioritizing requests from multiple users
    - Users access the server at the same time (the computer on a network that manages network resources)
    - UNIX: multiuser multitask operating system used as a network operating system (mainly found on main-frames, can also be found on a PC)
    - Main-frame: responsible for storing, managing, and simultaneously processing data from all users – multiuser
    - Supercomputer also use multiuser OS
- Most modern smartphones have modest multitasking capabilities such as checking e-mails while on a phone call
    - Common OS: Symbian (Nokia), Blackberry (RIM), Windows Mobile (Microsoft), iPhone OS X (Apple)
- Gaming systems all require some sort of customized system software specifically developed for the particular device – includes system programs a.k.a. firmware as well as other programs that come with the personal media player or gaming device
- Windows began with MS-DOS and added a user-friendly interface – Windows 95 adds multitasking capabilities – Windows XP provides networking capabilities in its consumer editions – Widows 7 & Windows Vista builds on security - over time has increased user functionality and friendliness, improving Internet capabilities and enhancing file privacy and security
    - Different editions of Windows 7 for different users (home users, business, combination and 32-bit & 64-bit)
- MAC OS: first OS to incorporate a graphical user interface (198)
- OS depends on type of processor a computer has – combination of OS and processor is referred to as a computer's platform
    - PCs and Macs can't run the same software applications but they can be networked (share files and peripherals)
- You can run more than one OS on a single computer due to the large hard drives – need to separate the hard drive into 2 different sections called partitions
- Linux: open source operating system designed for use on personal computers and as a network operating system – open source software can be modified by anyone
    - Can be tweaked quickly to meet any new need
    - Reputation as a stable OS not subject to crashes or failures
    - Android is Linux based
    - Can download open source versions for free from the Internet – several versions must be purchased

WHAT THE OPERATING SYSTEM DOES

- Provides a way for the user to interact with the computer
  - Command-driven interface: you enter commands to communicate with the computer system (too complicated for average user)
  - Menu-driven interface: choose commands from menus displayed on the screen (still not easy enough)
  - Graphical user interface (GUI) is what we use today – point and click technology, more user friendly
    - Linux has many available GUI interface vs. Windows or Mac OS with only one
- Manages the processor
  - Processor needs OS to arrange the execution of all activities in a systematic way so that it appears simultaneous - OS switch among different processor millions of times/ second
  - OS responds to events (ex: a mouse click) and switches back and forth between them
  - Interrupt: signal that tells the OS that something needs immediate attention
    - Every device has its own type of interrupt, associated with an interrupt handler (special numerical code that prioritizes the requests)
    - Preemptive multitasking: OS processes tasks with higher priority before others
  - Spooler: program that helps coordinate all print jobs
- Manages the memory and storage
  - Ensure that there is enough space in RAM for all the pending instructions and data – cleans the items when the processor no longer needs them
  - 4 GB or more of RAM ␣ can get 64-bit version of Windows
  - Computers now have between 2-12 GB of RAM
  - Virtual memory: storage by borrowing hard drive space when computer runs out of RAM – swaps out data in RAM that hasn't been used for a while and moves them to a temporary storage area on the hard drive called the swap file and if its needed later, swaps them back into active RAM (process known as paging)
    - Trashing: condition of excessive paging (only a portion of the hard drive is allocated to virtual memory) – solution: increase RAM
  - OS has a file-management system

- Manages the computer system's hardware and peripheral devices
    - Device driver: special program that comes with each device attached to computer to facilitate communication between the hardware device and the OS – translates the device's commands into commands that the OS understands
        - Today most devices come with the driver already installed in Windows - called Plug and Play (PnP) created with Windows 95
        - If a device is not PnP you insert the driver provided or download the driver from the manufacturer's web site
        - New drivers can crash a computer – Roll Back Driver from Windows removes newly installed drivers and replaces them with the last one that worked
- Provides a consistent means for software applications to work with the CPU
    - The OS includes the blocks of code – each called an application programming interface (API) – that application software needs in order to interact with the OS
        - Software programmers only refer to the API code blocks when they write an application
        - All applications that have incorporated these APIs have similar interface features, many features of the application have the same look – applications sharing these formats can exchange data

THE BOOT PROCESS: STARTING YOUR COMPUTER

- Boot process: start-up process (4 steps):
    1. Basic input/ output system (BIOS) is activated by powering on the CPU
        - BIOS is a program that manages the exchange of data between OS and all the input and output devices attached to the system
        - BIOS stored on ROM which is not erased when powered off
    2. The BIOS checks that all attached devices are in place (power-on-self-test or POST)
        - POST: test on the video card and video memory, a BIOS identification process, and a memory test to ensure that memory chips are working properly
        - BIOS compares results with hardware configurations stored in CMOS – if results are favorable, boot process continues, if new hardware you will be alerted

3. The operating system is loaded into RAM
    - BIOS searches for the drives that contains the system files (main files of the OS) and loads it into RAM from its permanent location on the hard drive
    - Then the kernel or supervisor program (essential component of the OS – manages the processor and all other components) is loaded into RAM – said to be memory resident (stays in RAM the entire time)
    - Parts of the OS that are less critical and are copied over to RAM on an as-needed basis are called nonresident
4. Configuration and customization settings are checked
    a. OS checks the registry (contains all the settings used by the OS and other applications) for the configuration of other system component

- Authentication: verification of your login name and password (ex: network environment such as a college)
- Boot is complete when the system is ready to accept your first command
- Handling errors
    - If you have a new software or hardware, try desinstalling it
    - Safe mode: special diagnostic mode designed for troubleshooting errors – only essential devices (mouse, keyboard, and monitor function)
        - Can use device manager: feature in OS that lets you view and change the properties of all devices attached to your computer
    - If windows detects a problem in the boot process it will add “Last known good configuration” to the windows advanced options menu – if you choose to boot with the last known good configuration the OS starts your computer by using the registry info that was saved during the last shutdown
    - Safe mode and last known good configuration: most widely used methods of booting when you cannot with the current configuration
    - If all fails, try a system restore
    - Sometimes BIOS skips a device (ex: keyboard) and it won’t respond after the booting, if so resolve the problem by rebooting

THE DESKTOP AND WINDOWS FEATURES

- Desktop: first interaction you have with the OS and the first image you see on your monitor – you’ll find:
    - Recycle bin: location for deleted files from the C: drive only

    - Gadget: easy-to-use mini program that gives you information at a glace or quick access to frequently used tools
    - Taskbar: displays open and favorite applications for easy access
- In Windows 7 start menu you'll find:
    - Documents: keep all your documents in one place
    - Computer: easy access to disk drives
    - All programs
- Both windows and mac use windows, menus and icons, both have streamlines mechanisms to access commonly used applications
    - Macs have a Dock and a dashboard with widgets (mini-application that enables quick access to frequently used tools and activities)
    - Latest version of Windows has gadgets that provide similar functionality
- Windows (rectangular panes that display applications)
    - Toolbars: shortcuts to frequently used tabs
    - Scrollbars
    - Ribbon: further organized into task-specific tabs with relevant commands

ORGANIZING YOUR COMPUTER: FILE MANAGEMENT

- File management: provides organizational structure to the computer's content
- Organizes contents in a hierarchical directory structure that includes files, folders, libraries and drives
- Organizing your files:
    - File: collection of related pieces of info stored together for easy reference
    - Folder: collection of files
    - Library: collection that gathers files from different locations and displays them as if they were all saved in a single folder, regardless of where they are actually physically stored
    - Windows organizes computer content in a hierarchical structure comprising drives, folders, subfolders, and files
    - C drive (hard drive) where you permanently store most files
    - A drive: reserved for a floppy drive
    - Additional files represented by D, E, F and so on

    - C drive referred to as the root directory – areas that the OS has filled with files and folders holding special OS files (shouldn't be accessed)
    - Windows explorer: main tool for finding, viewing and managing the contents of your computer
- Viewing and sorting files and folders
    - Title views: displays files and folders as icons in list form
    - Details view: list form, additional file info displayed in columns alongside the name of the file
    - List view: smaller than in titles view
    - Small and medium icons views: icons in list form but icons are either small or medium
    - Large and extra large icons views
    - Windows instant search searches through your hard drive or other storage device to locate files that match criteria you provide
- Naming files
    - File name
    - Extension or file type: what comes after the dot (ex: .doc, .docx, .wpd, .pptx) – added automatically for you
    - Files must be uniquely identified – no 2 files should have the same file name and extension
    - File path: start with drive and includes all folders, subfolders, the file name, and the extension
    - Path separator: backlash (\) between the drive, primary folder, subfolders, and file name – Mac files use a colon (:) – UNIX and Linux use a forward slash(/)
- Working with files
    - Can move, delete files – to permanently delete, empty the recycle bin

UTILITY PROGRAMS

- Utility programs: small applications that perform special functions – some are incorporated into the OS, some are so large and require frequent updating they are offered as Web-based services or stand-alone programs, software suites, some are freeware or shareware
- Display utilities – change the appearance or your desktop
- Programs and features utility
    - When you add a new program, wizard runs. If it doesn't go to the programs and features utility found in the programs folder in the control panel
    - To delete program use the uninstall option, if not you might miss a lot of other files

- File compression utilities: program that takes out redundancies in a file to reduce the file size
    - Windows built-in compression (zip)
    - Most compression programs look for repeated patterns of letters and replace them with a shorter placeholder
    - Placeholders are cataloged and stored temp. in a file called the dictionary
    - Can reduce by 50% + depending on the file – PDF already compressed, some graphics and audio formats have been reduced b permanently discarding data
    - Decompress the file to restore it to its original state
- System maintenance utilities
    - Disk cleanup: windows utility that cleans, removes unnecessary files from your hard drive (accumulated files in bin, temporary files, temporary internet file – you check off which type of files you would like to delete
    - Disk defragmenter regroups related pieces of files on the hard drive, allowing the OS to work more efficiently – Macs don't have this option, but you can use iDefrag which is an external program
    - Error-checking: windows utility that checks for lost files and fragments as well as physical errors on your hard drive (files are lost when you save, resave, move, delete, and copy files) – can recover data but usually deletes the files that are unnecessarily taking up space
    - Sometimes system gets confused leaving references on the file allocation table to files that no longer exist or have been moved
    - Physical errors: mechanism that reads the hard drives data can no longer determine whether the area holds a 1 or 0 (called bad sectors)
    - Use task manager utility if a program has stopped working to check the program or to exit it
- System restore and backup utilities
    - System restore: utility that lets you roll your system settings back to a specific date when everything was working properly (latest versions of windows)
    - System restore point: snapshot of your entire system's setting (made every week), you can also create it manually
    - Every time you start your comp. or install a new application or driver, windows creates a system restore point – good idea to create before making changes to your computer
    - Windows backup and restore utility: create a duplicate copy of all the data on your hard drive and copy it to another

storage device – Mac OS X Snow leopard (time machine automatically backs up your files, time capsules)

- The task scheduler utility
  - Important to run some of these utilities on a routine basis – many ppl forget
  - Windows task scheduler utility: schedules task to run automatically at pre-determined times with no additional action necessary on your part
- Accessibility utilities: windows includes an Ease of Access center (centralized location for assistive technology and tools to adjust accessibility settings)
  - High contrast
  - Magnifier
  - Narrator
  - On-screen keyboard
  - Windows speech recognition

Chapter 6 - understanding and assessing hardware: evaluating your system

- Moore's law: the pace at which CPUs (central processing units – brain of the computer) improve. Predicts that the number of transistors inside a CPU will increase so fast that CPU capacity will double every 18 months (# of transistors helps determine how fast it can process data)
- Other system components also improve – ex: the capacity of the dynamic random access memory increases abt 60%/ year, hard drives by 50%/year

CHOOSING EITHER A DESKTOP OR NOTEBOOK

- If main need is Internet connectivity not processing power, don't mind small screen and small keyboard, netbook is an option, portability
- Notebook you pay more for each component (made smaller), shorter life span (dust, water, temperature fluctuations)
  - If you have a fast transfer port (ex: external SATA), can easily add an external hard drive
  - Expresscard slot: can add a solid state drive
- Desktop offers more expandability options (easier to add ports), large monitors, more reliable

ASSESSING YOUR HARDWARE EVALUATING YOUR SYSTEM

- System evaluation to determine if your computer has the right hardware for what you want to do: look at your computer's subsystems, see what they do
    - CPU subsystem
    - Memory subsystem (RAM)
    - Storage subsystem (hard drive)
    - Video subsystem
    - Audio subsystem
    - Ports

EVALUATING THE CPU SUBSYSTEM

- Consider the type of processor in your system
- Comprised in 2 units: the control unit (coordinates the activities of all the other computer components) and the arithmetic logic unit (responsible for performing all the arithmetic calculations, makes logic and comparison decisions)
- Every time it performs a program instructions it uses the same steps: fetches data from RAM, decodes it, executes it and stores the result into RAM – process is called a machine cycle
- Main distinction between CPU is processing power which is determined by a number of factors
    - Core: complete processing section from a CPU embedded into one physical chip
    - Clock speed: how quickly the processor can work
    - Cache memory: amount of immediate access memory the CPU has
- Hyperthreading: quicker processing of info by enabling a new set of instructions to start executing before the previous set has finished
    - 2 different programs to be processed at one time, but sharing the computing resources of the chip
- Multiple cores on one CPU chip – 2 or more processors on the same chip (2 sets of instructions at the same time)
    - Each program has the full attention of its own processing core
    - Faster in processing, smoother multitasking
- Possible to design a CPU with multiple cores and hyperthreading
- Cache memory
    - Level 1 cache: block of memory built into the CPU chip for the storage of data or commands that have just been used
    - Level 2: slightly farther from the CPU or on a separate chip (longer to access, more storage area)
    - Level 3: slower to reach, larger in size

- Front side bus also impacts overall speed (highway between CPU and RAM)
    - Faster the FSB, faster you get data to the processor – important to determine CPU performance
- Benchmarks: measurements used to compare CPU performance between processors – generated by running programs that push the limits of CPU performance
- CPU for notebooks
    - Intel and AMD make these processors
    - Need better power savings to improve battery life
- Check your CPU by accessing System Properties, find more detailed info on the manufacturer's web site
- CPU usage: percentage of time that your CPU is working
- Measuring CPU and RAM usage is very useful
    - Whether you should upgrade
    - Investigating if your computer's performance seems to drop off for no apparent reason
- Upgrading CPU only affects the processing portion of the system performance, not how quickly data moves to and from the CPU, overall performance depends on many factors such as amount of RAM and hard drive speed

EVALUATING RAM: THE MEMORY SUBSYSTEM

- RAM is volatile storage – remembers everything that the computer needs to process data into info when computer is on
- Hard drive provides the greatest non volatile storage – permanent storage when computer is off
- Way faster for CPU to retrieve data from RAM than from hard drive
- Now we use double data rate 2 (DDR2) memory modules, high-performance systems double data rate 3 memory (DDR3 – operate at lower temp. more reliable)
- Older models dynamic RAM (DRAM), static RAM (SRAM), synchronous DRAM (SDRAM)
- RAM present on memory modules (memory cards) which are small circuit boards that hold a series of RAM chips and fit into slots on the motherboard – memory modules today called dual inline memory modules (DIMMs)
- Amount of RAM on a computer is called physical memory (shown in system properties window, Apple about this mac)
- RAM capacity measured in gigabytes – machines with Windows have at least 2 GB of RAM today

- Windows 7 uses a memory management technique called SuperFetch: monitors the app. You use the most and loads them in RAM so its faster
- Kernel memory: memory that OS uses
- The more programs you use at once, the more RAM you need – buy as much as you can afford but no more than your system will handle (maximum limit of amount of RAM a computer can handle)
- Adding RAM is fairly easy and inexpensive

EVALUATING THE STORAGE SUBSYSTEM

- Storage options for a typical personal computer: hard drive, USB flash drives, optical drives, and external drives – nonvolatile
- Hard drive: largest capacity storage device (2 terabytes), most economical (GB/ $), access time (time for stored data to be available for processing) faster than other permanent storage (milliseconds)
- Solid state drive (SSD): same memory as flash drive but faster than fast drives (0.1 ms vs. 1 ms), no noise, little heat, little power, storage capacity keeps increasing, start seeing more
- Data transfer rate: speed of transfer of data to other computer components (such as RAM) – performance specification for a hard drive
- Hard drive composed of platters (small thin plates of metal stacked on a spindle), magnetized spots created on them when you save data (when aligned in a direction (1), in the other (0)), computer translates patterns into data when you retrieve it
- You need space for all your files + storage space for OS + software applications
- Types of hard drives: integrated drive electronics (IDE) is an older style that uses wide cables to connect h.d. to motherboard – Serial advanced technology attachment (Serial ATA) h.d. are thinner cables and transfer data quicker (god for software developers and graphic designers)
- Latest and fastest hard drive is the solid state drive (SSD) – popular in netbooks, little power, cool and quiet, access time 0.1 ms, can be as large as 1 TB, but much more expensive than mechanical hard drives, some use SSD just to hold the OS
- Adding external hard drive – use a USB 2.0 port (400 Mbps) or some offer an eSATA port (transfer rate of 3 Gbps)
- One big drive or many small drives?
    - 2 smaller drives connected using RAID technology (data is spread across 2 physical drive – RAID 0), twice as fast as

using one drive, if one drive fails you lose all your data (good for performance)
    - RAID 1 (data on one drive is mirrored on 2nd drive), instant backup

OPTICAL STORAGE

- Optical drive: disc drive that uses a laser to store and read data saved on a CD, DVD, or blue-ray disc – store data as tiny pits that are burned into the disc by a high-speed laser
    - Pits on BDs (0.1 microns in diameter) < CDs and DVDs (less than 1 micron)
    - Pits and nonpits (lands) translate into 1s and 0s
    - Laser used to read and write data
- CD-ROM, DVD-ROM, BD-ROM are prerecorded discs, cant save data on them CD drive cant read DVD but DVD can read CD, Blu-ray players can play DVDs and CDs same thing for recording
- DVD formats: DVD-R/RW, DVD+R/RW, DVD-RAM
    - Purchase blank DVD that matches the type of drive you have
    - Most new DVD drives support the +/- RW
- CD and DVD drive speed:
    - Speed is listed recording speed, rewrite speed (except CD-R and DVD-R can’t rewrite), playback speed (ex: 52X32X52X)
    - For CDs, the X represents the transfer of 150 KB of data/ sec.
    - DV drives faster than CD drives, blue ray fastest (1X = 36 MB/ sec.)

EVALUATING THE VIDEO SUBSYSTEM

- How video is displayed depends on your video card and your monitor
- Video card: expansion card that is installed inside your system unit to translate binary data into the images you view – include own RAM called video memory
    - Standards of video memory: graphics double data rate 3 (GDDR3), newer GGDR5
    - Video cards also have their own graphics processing units (GPUs)
- GPU: same kind of work as CPU, specialized in 3D graphics and image and video processing at high efficiency and speed
- Basic video processing on motherboard

- Sophisticated video cards connect through the PCI express bus
- Info on video card: advanced settings of screen resolution dialog box
- How much memory: basic word and web (128 MB – 1 video card), serious gamer (512 MB – 2 or 3 video cards)
- Controls # of colors monitor can display
- Bit depth: # of bits the video card uses to represent each pixel on monitor (defines color quality, the more the better)
    - Most today are 24 bit cards – 16 million colors
- Upgrade if (add a new video card to the slot on motherboard):
    - Monitor takes a while to refresh
    - Added features are important to you
    - Want to use multiple monitors

EVALUATING THE AUDIO SUBSTYSTEM

- Sound card: expansion card that attaches to the motherboard inside your system unit – most systems have separate sound cards, some low end computers have integrated sound cards
- 3D sound card: basic sound card, more omnipresent than stereo sound (can tell if coming from left or right ear) but its not surround sound
- Surround sound: type of audio processing that makes the listener experience sound as if it were coming from all directions
    - Standard from Dolby (Dolby Digital Ex, Dolby Digital Plus), newest standard Dolby TrueHD
    - Dolby takes digital sound from a medium, reproduces it in eight channels, 7 cover the listening field and 1 holds low-frequency sound data
    - Need surround sound speakers, and a sound card that is Dolby digital compatible
- If you want to add a right and left speaker individually or any other audio devices you need more ports provided on an upgraded sound card
    - Then you can connect portable media players, jukeboxes, headphones, CD players

EVALUATING SYSTEM RELIABILITY

- Even normal use of a computer can lead to deteriorating performance and even system failure
- Ensure your system is reliable:
    - Clean out your startup folder: delete only unnecessary programs

    - Clear out unnecessary files
    - Run spyware and adware removal programs
    - Run the disk defragmenter utility on your hard drive
- Disk cleanup, disk defragmenter and the antivirus and spyware can run automatically – you can set up a sequence to run for ex. When you sleep
- If system crashes and rebooting doesn't help, you need to troubleshoot:
    - Check if you have enough RAM
    - Make sure you have properly installed new software or hardware
    - If you see an error code in windows visit the Microsoft knowledge base
- Should upgrade or update your OS, browser software, and application software – makes your system much more reliable
- You can configure windows so it automatically checks for downloads and installs updates,
- If nothing helps? Options:
    - Upgrade your operating system to the latest version – But may need hardware updates (more RAM), updated graphics processor, larger hard drive
    - Reinstall the OS – back up all files, need all of original discs for software

MAKING THE FINAL DECISION

- Does your system meet your needs?
- What would you like your computer to do?
- Deciding between upgrading or buying a new system is better, price both scenarios

SEVEN: NETWORKING, CONNECTING COMPUTING DEVICES

- Network: 2 or more computers that are connected via software and hardware so that they can communicate with each other
- Node: each device connected to a network
- Advantages: resource sharing, share peripheral devices, share files – can access files on any other computer
- Disadvantages: need additional equipment, need to be administered
    - Network administration involves: installing new computers and devices, monitoring the network, updating and installing new software, configuring security

NETWORK ARCHITECTURES

- Network architectures: design of a network – classified by the way they are controlled and distance between their nodes
- Describing networks based on administration: administered or managed locally or centrally
    - Local administration: configuration and maintenance of the network must be done on each computer attached to the network (ex: peer-to-peer network)
    - Central administration: tasks can be performed from one computer and affect the other computers on the network (ex: client/ server network)
- Peer-to-peer network: each node can communicate directly with every other node on the network (up to 10 nodes)
- Client/ server network: contains 2 different types of computers; clients and servers
    - Client: computer on which users accomplish specific tasks and make specific requests
    - Server: computer that provides information or resources to the client computers on the network and central administration
- P2P networks are more often used in home vs. client/server
- Home network server: designed to store media, share media across the network, and back up files on computers connected to the network
    - All computers can access
    - Doesn’t make it a client/server network – all network administration must still be performed locally
- Describing networks based on distance:
    - Local area network (LAN): network in which the nodes are located within a small geographic area (ex: school)
    - Home area network (HAN): network located in a home
    - Wide area network (WAN): made up of LANs connected over long distances (ex: 2 campuses of a school)
    - Metropolitan area network (MAN): network that provides access to a specific geographical area

NETWORK COMPONENTS

- To function networks must include
    - Means to connect the nodes on the network (cables, wireless)

    - Devices that allow the nodes to communicate with each other and send data
    - Software that allows the network to run
- Transmission media: establishes a communications channel between the nodes on a network and can either be wireless (radio waves) or wired (cables)
    - Twisted-pair cable: copper wires that are twisted and surrounded by a plastic jacket
    - Coaxial cable: single copper wire surrounded by layers of plastic
    - Fiber-optic cable: plastic or glass fibers that transmit data at extremely fast speeds
    - Different types of transmission media transmit data at different speeds
- Data transfer rate (bandwidth): maximum speed at which data can be transmitted between 2 nodes on a network (Mbps)
    - Twisted-pair cable, coaxial cable, and wireless media usually provide enough bandwidth for home networks
- Throughput: actual speed of data transfer that is achieved (Mbps)
- Network adapters: devices connected to or installed in network nodes that enable the nodes to communicate with each other and to access the network (today – inside the device - called network interface card)
    - Most NICs built to use wireless media but many also wired media
    - Most notebooks have a port that accommodates cable for a wired connection – why would you want that?
        - Wireless signals more prone to interference from magnetic and electrical source
        - Interference from other wireless networks
        - Building materials that decrease throughput
        - Throughput varies on distance from your network equipment
        - When you want highest throughput you may want to connect using a wire
- Network navigation devices: facilitate and control the flow of data through a network
- Packet: bundle of data
    - Must be able to flow between network nodes for computers to communicate
- Router: transfers packets of data between 2 or more networks (ex: router sends data between home network and internet)

- Switch: receives data packets and sends them to their intended nodes on the same network
- Home network need OS that supports P2P networking (windows, Os X, Linux)
- C/S networks are controlled by centralized servers that have network operating system (NOS) software (handles request for info, internet access, use of peripherals for the rest of the network nodes)
- C/S nodes communicate through server – more efficient but requires more complex NOS software than P2P networks

HOME ETHERNET NETWORKS

- Ethernet network: uses the Ethernet protocol as the means by which the nodes on the network communicate (dev. By institute of electrical and electronic engineers)
    - Extremely efficient at moving data
    - Use wireless and wired transmission media
    - IEEE develops standard specifications for electronic data transmission (802.11 for wireless, 802.3 for wired)
    - Current standard for wireless is 802.11n
    - 802.11 = WiFi – different standard: 802.11a, b, g, n
    - Backward compatibility to networks for devices using older standards
- Transceiver: device that translates the electronic data that needs to be sent along the network into radio waves and then broadcasts these radio waves to other network nodes, also receive them
- Multiple input multiple output (MIMO): devices that use multiple antennas for transmitting and receiving data
    - Multiple data streams, faster transmission
- Throughput of 802.11n devices is around 300 Mbps
- Net Meter shows you your throughput: 50-200 Mbps on wireless network is sufficient, if not consider wired Ethernet connection
- Gigabit Ethernet: most commonly used wired Ethernet standard – 1,000 Mbps throughput is possible
- Wired Ethernet uses cables vs. radio waves
    - Unshielded twisted-pair (UTP) cable – most popular media option, need to use RJ-45 connectors
        - 3 main types: Cat 5E – cheapest 100 Mbps, Cat6 is the best choice, Cat 6a ultrafast 10 gigabit Ethernet but unnecessary
        - Can’t exceed 100 meters

- One Ethernet network can support nodes with both wireless (notebooks, smartphones) and wired connections (TV, blueray)
- Ethernet networks are:
    - Based on a well-established standard
    - Easy set-up
    - Good throughput for home networking needs
    - Are cost effective

HOME ETHERNET EQUIPMENT

- Most manufacturers make devices that are a combination of routers and switches called routers or broadband routers
    - People buy routers with wireless capacities
    - Usually have 3 or 4 Ethernet ports, need more buy a switch plug it into the port it will give you additional ports
- A switch in an Ethernet network acts like a traffic signal (helps data packets find their destinations without running into each other)
- The more devices transmitting data on a router, the smaller portion of the router's bandwidth each device receives
- ISPs offer devices that combine a broadband modem and a wireless router (one monthly fee)
    - You want a router that supports 802.11n
    - Should be connected to your broadband modem by an Ethernet cable
    - Work with windows or OS X – some routers optimized for apple (Apple Airport)
- Set up:
    - Access router from web browser by entering router's IP address
    - You'll need username and password (in documentation)
    - Run the wizard
- Connecting network nodes: computers need wireless network interface cards to communicate with wireless media on 802.11n network
    - Check what network adapter your windows computer has and to see if its working use device manager

CONNECTING OTHER DEVICES TO NETWORKS

- Many peripheral devices (scanners, printers) come with built-in Ethernet adapters, many home entertainment devices as well (network-ready)

- Network ready device: device that can be connected directly to a router instead of to a computer on the network
- Network attached storage devices (NAS): computing devices designed to store and manage your data – centralized data storage and access
    - Software on computers to ensure that data saved on computer is also stored on NAS
    - Time Capsule (Apple) wireless router combined with a hard drive for facilitating backups of all computers connected to the network
    - More sophisticated NAS device is a home network server: provide a specific set of services to computers on a home network (ex: Acer Aspire easyStore server)
        - Automatically back up all computers connected to the network
        - Act as a repository for files to be shared across the network
        - Access gateway to allow any computer on the network to be accessed from a remote location via the internet
- Digital entertainment devices on a network to access and share digital content
    - Purchase more content (movies, videos, music)
    - Play multiplayer games
    - Content downloaded or streamed (ex: Netflix)
    - Network ready TVs and home theaters (wired or not)
- Internet appliance: easy access to the Internet, social networking sites, e-mail, video, news and entertainment – between smart-phones and computers (ex: iPad)
- Digital picture frames, monitoring cameras (indoor and out) connect to network (ex: Logitech Digital video security system)

SECURING WIRELESS NETWORKS

- Firewall: hardware or software solution that helps shield network from intruders
- Piggybacking: connecting to a wireless network without the permission of the owner which can slow you down
- Precautions to secure a wireless network:
    - Change your network name (service set identifier) – hackers know default network names and codes
    - Disable SSID broadcast – more difficult for a hacker to detect your network and hard for neighbors to connect to it

    - Change the default password on your router – hackers know the default passwords and if they access your router they can break into your network
    - Turn on security protocols such as wired equivalent privacy (WEP) or WiFi protected access (WPA), you create a security encryption key
    - Implement media access control – network adapters have a unique # called a media access control address – you restrict access to the network to only certain MAC addresses
    - Limit your signal range – cut your power to low or medium
    - Apply firmware upgrades

CONFIGURING SOFTWARE FOR YOUR HOME NETWORK

- Before running any wizards you should:
    - 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 router and that the modem is connected to the internet
    - Turn on your equipment in the following order
        - Your broadband modem
        - Your router
        - All computers and peripherals
    - Ensure that network discovery is shown as on (allows computer to locate other computers and peripherals
    - Verify options for file and printer sharing and public folder sharing are shown as “on”
    - Network and sharing center- set up a new connection or network
    - Select connect to the internet wizard to use broadband modem to connect to the internet
    - Enter a memorable name and check box to allow others to use internet connection
    - Run the set up a wireless router wizard
- Set up computer with newest version of windows first
- Each computer on a network needs a name so network can identify it and know which computer is requesting services and data can be delivered to correct computer
- Macs: much easier, need to know the SSID and passphrase
    - Networks with SSID broadcast turned off won’t appear when booting the Mac, click other button, enter the SSID

name and security passphrase, click join, click the remember this network

- Wireless node configuration
  - Wired: plug a cable into the device and router
  - Wireless: usually set up steps in setup menu of device
- Websites to test speed of internet connection
- Troubleshooting network problems
  - Max range of wireless devices under the 802.11n standard: 350 ft.
  - Walls, floors, metal objects can cause interference with wireless signals
  - Move the node to get adequate throughput, if not move it closer to router, if not add:
    - Wireless range extender: device that amplifies your wireless signal to get it out of parts of your home that are experiencing poor connectivity

CHAPTER 9 – SECURING YOUR SYSTEM

KEEPING YOUR DATA SAFE

- Cybercrime: any criminal action perpetrated primarily through the use of a computer (cybercriminals)
  - Fraud, computer intrusion, unsolicited e-mail, child pornography
- Virus: computer program that attaches itself to another computer program (host program) and attempts to spread to other computers when files are exchanged
  - Many designed to gather sensitive information such as credit card numbers
- Theft of computer equipment on the rise (larceny)

COMPUTER THREATS: COMPUTER VIRUSES

- Engineered to evade detection – hide within the host program
- Any device can be affected (phone, iPad)
- Main purpose: replicate itself and copy its code into as many other files as possible – objective ranges from playing annoying messages to destroying files or the contents of the hard drive
- Exposition with a file infected with the virus – if you never expose your computer to new files it won't be infected (impossible). Common infection sites:
  - Downloading peer to peer file sharing (music)
  - Shared flash drives

    - E-mail
- Passed from one computer to the next:
    - An individual writes a virus program disguised as a music file of a popular music group's hit song and posts it to a file sharing site
    - Someone downloads the music file – infects his computer
    - Sends someone else the file via e-mail – infects 2nd computer
    - Person B saves MP3 file to flash drive and then copies it to his computer and infects that machine
    - Everyone who copies files from person B's computer or is networked to that computer is at risk
- Types of viruses
    - Boot-sector viruses: replicates itself into a hard drive's master boot record (program that executes whenever a computer boots up, ensuring that the virus will be loaded into memory immediately, even before some virus protection programs can load)
        - Often transmitted by a flash drive left in a USB port
        - Comp. boots up with flash drive connected, tries to launch master boot record from flash drive (trigger for virus to infect)
    - Logic bombs: virus that is triggered when certain logical conditions are met (opening a file or starting a program a certain number of times) & Time bombs: virus triggered by the passage of time or on a certain date
        - Range from annoying messages to complete data loss
    - Worm: attempts to travel between systems through network connections to spread an infection – waits until file is executed on another computer to replicate
        - Much more active in spreading itself
    - Script: miniprogram that is executed without your knowledge (some are legit) malicious ones infect your computer & Macro virus: attaches itself to a document that uses macros (Word, Excel)
    - E-mail viruses: use the address book in the victim's e-mail to distribute the virus
    - Encryption viruses: when they infect your computer, they run a program that searches for common types of data files and compresses them using a complex encryption key that renders your files unusable. Then you receive a message that asks you to send money to an account if you want to receive the program to decrypt you files.
        - Easier to catch perpetrators – trace bank account

- Virus classifications (methods they take to avoid detection)
    - Polymorphic virus: changes its code to avoid detection
    - Multipartite virus: infects multiple file types in an effort to fool the antivirus
    - Stealth viruses: temp. erase their code from the files where they reside and then hide in the active memory of the computer
        - Now antivirus scans also memory

COMPUTER SAFEGUARD: ANTIVIRUS SOFTWARE AND SOFTWARE UPDATES

- Best defense against viruses
- Symantec, Kaspersky, AVG, McAfee – software packages available to protect you from other threats as well
- Run a scan at least once a week
- Virus signature: portion of the virus code that is unique to a particular computer virus (antivirus looks for virus signature in files)
- When detected, virus is placed in secure part of hard drive so it won't spread (quarantining), then choice of deleting or repairing file (can't always – keep backup copies)
- Inoculation: antivirus records key attributes about files on you computer and keeps these statistics in a safe place on your hard drive – compares files while scanning to attributes to detect attempts by virus to modify files
- Catch known antivirus and scan for virus-like activities and virus signatures
    - Can be attacked and antivirus doesn't recognize it
    - Keep software up to date
- If you have a virus: boot up comp. using antivirus installation disc
- Attacks can happen from IM. To keep IM safe:
    - Allow contact only from users on your friend list
    - Never automatically accept transfers of data
    - Avoid using instant messaging programs on public computers
- Drive-by-download: malicious web sites set up to attack your computer by downloading harmful software onto your computer
- Option for updates
    - Install updates automatically
    - Download updates but let me choose whether to install them
    - Check for updates but let me choose whether to download and install them

    - Give me recommended updates
    - Microsoft update – ensures you receive updates for other Microsoft products

COMPUTER THREATS: HACKERS

- Hacker: anyone who unlawfully breaks into a computer system (individual or network)
    - White-hat hacker: someone who breaks into systems just for the challenge of it
    - Black-hat hacker: use knowledge to destroy information or for illegal gain
    - Script kiddies: use tools created by skilled hackers to wreak the same havoc as professional hackers
- Credit card information can reside on your hard drive, hacker can access information online by using a packet sniffer or a keylogger (program that captures all keystrokes made on a computer)
- Packet: small pieces of data that travel together the Internet – identified with an IP address
- Packet sniffer: computer program deployed by hackers that looks at each packet as it travels
    - Some capture all packets, others just some with particular info (cc #s)
    - Wireless networks vulnerable
    - Install a firewall and use data encryption to protect yourself
- With cc # hacker can purchase items or sell # to someone who will
- Identity theft: someone using personal information about you to assume your identity for the purpose of defrauding others
- Trojan horse: program that appears to be something useful or desirable (ex: game) but while it runs does something malicious in the background
    - Often installs backdoor program: allows hackers to take almost total control of your computer without your knowledge – computer is referred to as a zombie
- Denial-of-service (DoS) attack: legit user is denied access to a computer system because hacker is repeatedly making requests of that computer system through a zombie
- Distributed denial-of-service attack: launches DoS attacks from more than one zombie at a time (so you can’t trace it)
- Botnet: large group of software programs that runs autonomously on zombie computers
- DDoS attacks can be financially distressing for owners of web sites

- How hackers gain access: direct or indirect
    - Direct: sitting down at a computer and installing hacking software
    - Indirect: through internet connection
- Logical ports: virtual communications gateways or paths that allow a computer to organize requests for information from other networks or computers
    - Open logical ports invite intruders
    - Take precautions to restrict access to your logical port

RESTRICTING ACCESS TO YOUR DIGITAL ASSETS

- Firewall: program or hardware device designed to protect computers from hackers – personal firewall (home network)
    - Close open logical ports
- Types of firewalls:
    - For maximum protection use software and hardware firewall
    - Many security suites (Norton internet security, McAfee Internet security) also include firewall software
    - If you are using a security suite, you should disable the firewall that came with your OS
    - Hardware firewall devices – many routers include firewall protection (good for novices)
- Websites exist to test your computer's vulnerability
- Bluetooth vulnerability (2):
    - Bluesnarfing: exploiting a flaw in the Bluetooth access software for the purpose of accessing a bluetooth device and stealing the information contained on it
    - Bluebugging (more difficult, more dangerous): hacker takes control of a Bluetooth-enabled device. Can make phone calls, establish internet connection, read messages
- Protecting from Bluetooth attacks:
    - Make your device invisible to unauthorized devices
    - Antivirus available for mobile devices
- Password protection and password management
    - Password + ID: major way to restrict access to computers, networks and online accounts
    - Password cracking programs more sophisticated than ever, important to create a secure password
- Strong password
    - At least 14 characters (numbers, symbols, upper- and lowercase letters)

    - Should not be a single word or any word found in the dictionary
    - Ideally it should be a combination of several words with strategically placed uppercase characters
    - Password should not be easily associated with you
    - Use a different password for each system
    - Never tell anyone your password or write it down
    - Change your password on a regular basis (monthly)
- Online password strength testers exist, so do password generators
- Managing your passwords: remembers passwords for you
    - Most security suites provide password-management tools – master password that fills in remembered passwords for different websites
- Anonymous web surfing
    - Tools set up on public computers, you leave traces
    - Google chrome, firefox, and internet explorer include privacy tools to surf the internet anonymously (no records of web sites you visit, files you download, and temporary files delete right after)
    - Portable privacy devices (ex: Ironkey): plug device into USB port, all sensitive internet files will be stored there which is encrypted
    - Take Linux OS with you on a flash drive and avoid using public computer's OS – reduces risk of infection by malware, attacks on Linux far less likely
- Biometric authentication device: reads a unique personal characteristic such as a fingerprint or the iris pattern in your eye and converts its pattern to a digital code

MANAGING ONLINE ANNOYANCES

- Malware: software that has a malicious intent (3 forms – adware, spyware, viruses)
    - Adware: software that displays sponsored advertisements in a section of your browser window or as a pop-up
        - Pop-up blockers
    - Spyware: unwanted piggy back program that usually downloads with other software you want to install from the internet – transmits info about you to the owner of the program so that the info can be used for marketing purposes
        - Keystroke logger: monitors keystrokes with intent of stealing passwords, login IDs, CC info

        - Many security suites include antispyware software
        - Stand alone programs also
        - Update and run your spyware frequently
- Spam: unwanted or junk email
    - Find your email from a list they purchase or from software that looks for e-mail addresses on the internet
    - Avoid spam:
        - Create a free web based email for purchases and stuff, easier to get rid of
        - Spam filter: check incoming email subject headers and sender's addresses against databases of known spam
        - Before registering to a site, read its privacy policy to see how it uses your email address
        - Don't reply to spam to remove yourself from the spam list
        - Subscribe to an email forwarding service such as emailias
- Cookies: small text files that some web sites automatically store on your computer's hard drive when you visit them – assigns ID to your computer, when you visit website again more efficient and better geared to your interest
    - Information: your browsing habits, product's you've looked at – identify user preference
    - Some sites sell the personal info

PROTECTING YOURSELF FROM YOURSELF

- Info to never reveal online: social security number, phone number, street address – key to stealing identity
- Change privacy settings on FB, set options to only friends
- Backing up data – 3 threats to your data: unauthorized access, tampering, destruction
    - Backups: copies of files that you can use to replace the originals if they are lost or damaged (store away from computer)
- 2 types of files need to be backed up:
    - Program file: used to install software and usually comes on CD or DVD or downloaded from web
    - Data file: file you have created or purchased
- Incremental backup (partial backup): backing up only files that have changed or been created since the last backup was performed

- Image backup (system backup): all system, application, and data files are backed up
- Back up data frequently – you can perform image backups on a less frequent basis (weekly) but data files on a daily basis
    - Store all data files in one folder on hard drive
- Where do backups reside?
    - Online sites: data available everywhere (windows – skydrive, non-windows – Adrive). Storage backup probably wont fit. Fees can be expensive.
    - Local drives: popular for backups of data files and for complete image backups. Best in conjunction with an online backup strategy
    - Network-attached storage devices and home servers: large hard drives that are connected to a network of computers instad of one computer, and they can be used to back up multiple computers simultaneously
- Windows 7 backup and restore utility: schedule file backups, restore files from backups, perform image backups
- Mac OS X: time machine feature detects when an external hard drive is connected to the computer or a NAS device is connected to your network
- Social engineering: any technique that uses social skills to generate human interaction that entices individuals to reveal sensitive information
    - Pretexting: creating a scenario that sounds legit enough that someone will trust you
- Phishing: lures internet users to reveal personal info that could lead to identity theft
- Pharming: malicious code is planted on your computer that alters your browser's ability to find web addresses (ex: enter banks web site but fall on website that looks like your banks and takes all your info)
    - Never directly reply to email asking for info
    - Never click on a link in email to go to a web site
    - Never give info over internet unless you know site is secure
    - Have internet security software installed on your computer, make sure its constantly being updated
    - Never use your cc # when you shop online: use virtual account numbers
- Hoax: attempt to make someone believe something that is untrue

PROTECTING YOUR PHYSICAL COMPUTING ASSETS

- Power surge: excess of normal voltage
- Surge protector: device that protects your computer against power surges
    - Metal-oxide varistors bleed off excess current during minor surges a
    - Major surge: fuse infide the protector blows, stops
- Whole-house surge protector: usually need electrician
- Uninterruptible power supply: device that contains surge protection equipment and a large battery – keeps sending power even during blackout
- Deterring theft
    - Motion alarm on notebook
    - Chaining computer
    - Tracking devices - not visible to thieves
- Bomb software: destroys data on both internal memory and external data if repeated attempts are made to crack passwords