NOTES ON INTRODUCTION TO COMPUTERS
Basic Concepts
Computer, Hardware, Internet, Web, Email

- What is a computer?
    - electronic device, operating under the control of instructions stored in its own memory, that accepts input, processes data, produces output, and stores the results for future reference
    - collection of hardware components functioning together
- What does a computer do?
    - 4 basic operations = input, process (instructions), output, storage
    - data (unprocessed/raw items) → information (useful)
    - user/end users
- How does a computer know what to do?
    - instructions = computer program = software
- Know how to convert Binary → Decimal
- Know how to convert Decimal → Binary
- Know how to convert Decimal → Binary → Octal
- Know how to convert Octal → Decimal
- Know how to convert Decimal → Binary → Hexadecimal
- Know how to convert Hexadecimal → Decimal
- Data representation
    - the process of transforming this diverse data into a form that computers can use for processing
    - ASCII (American Standard Code for Information Interchange)
        - requires 7 bits for each character
        - provides codes for 128 character, including uppercase letters, lowercase letters, punctuation symbols, and numerals
    - Extended ASCII
        - uses 8 bits to represent each character
        - provides for 256 characters
    - EBCDIC (Extended Binary-Coded Decimal Interchange Code)
        - used only by older, IBM mainframe computers
- Components of a computer = input devices, processor, memory, output devices, storage devices, communications devices
    - input devices – allow you to enter data, programs, commands, and respond to messages
        - keyboard, mouse, digital camera, scanner, joystick
        - mouse = pointing device
        - keyboard commonly has 101 – 105 keys which allow users to type letters, numbers, spaces, symbols, punctuation marks; also contains special keys such as ALT, CTRL, function keys, etc.
    - processor = CPU (central processing unit) = interprets and carries out basic instructions that operate computer
        - CU (control unit) = interprets instructions

- ALU (arithmetic logic unit) = performs logical and arithmetic (subtraction, addition, division, multiplication) processes
- o memory = RAM = electronic components that temporarily store instructions waiting to be executed by the processor, data needed by those instructions, and the results
  - typically between 128MB and 2GB of RAM
  - 1 byte = 8 bits
  - bit stands for binary digit
  - kilobyte KB, megabyte MB, gigabyte GB
- o output devices
  - monitor, printer (impact vs. nonimpact)
  - types of monitors = LCD (liquid crystal display) and CRT (cathode ray tube)
    - differences between types of monitors
      - o size
      - o price
- o storage devices (secondary storage device) = store instructions, data, and information when they are not being used in memory
  - magnetic disk, optical discs, tape, miniature mobile storage media
  - portable storage media
  - how to compare storage technology
    - versatility
    - durability
    - speed
      - o access time = average time it takes a computer to locate data on the storage medium and read it
      - o random access (direct access) = the ability of a device to "jump" directly to the requested data
      - o sequential access = reading through the data from the beginning of the tape
    - capacity
  - 3 types of magnetic disks (require formatting)
    - floppy disks 1.44 MB
    - Zip disks 100 MB – 750 MB
    - hard disks (hard drive) = storage device that contains one or more inflexible, circular patterns that magnetically store data, instructions, and information
      - o platters, tracks, sectors
      - o 10 GB – 200 GB
  - optical discs = flat, round, portable disc made of metal, plastic, and lacquer that is written and read by laser
    - CD-ROM, CD-R, CD-RW, DVD-ROM, DVD+R, DVD-RW
  - tape = sequential access
  - miniature mobile storage media

- - flash memory cards – solid-state media containing no moving parts
    - USB drives – also known as jumpdrives, pen drive, flash drive
    - smart card – size of an ATM card; stores info on a microprocessor embedded in the card
  - o communications devices
    - enables computer to send and receive data, instructions, and information
    - transmission media = telephone lines, cable, cellular radio networks, satellite
    - Which types of media are wireless?
- Display devices
  - o output device that delivers text, graphics, video
  - o monitor houses a display device
  - o types of monitors
    - LCD (liquid crystal display): requires less space, more expensive
    - CRT (cathode ray tube): television-like, pixels (stands for picture element)
- System unit
  - o case that contains electronic components of the computer used to process data
  - o houses processor, memory, storage devices
  - o contains motherboard (main circuit) which allows electronic components to be attached, including expansion slots, memory, processor
  - o expansion slot = a long, narrow socket on the system board into which you can plug an expansion card
  - o expansion card = a small circuit board that gives a computer the capability to control a storage device, an input device, or an output device
- Computer categories
  - o Different types of computers are better suited for certain tasks
  - o Types
    - Personal computer
    - Desktop
    - Notebook
    - Tablet PC
    - Handheld computer
    - Workstation
    - Videogame console
    - Mainframe computer
    - Supercomputer
- Computer software
  - o system software = programs to control the operations of computer equipment

- operating system = govern how computer performs loading, storing, and executing an application program and how to transfer data; delegates resources
- GUI
- icons
  - application software = programs that tell a computer how to produce information
    - List some types of application software
    - Word processing software
      - create, edit, format, print documents
      - List several features of word processing software
    - Electronic spreadsheet software
      - add, subtract, and perform user-defined calculations
      - graphical capabilities
    - Database software
      - enter, retrieve, update data
    - Presentation software
      - create slides for use in a presentation
- Networks and the Internet
  - network = collection of computers and devices connected via communications media and devices such as cables, telephone lines, modems, etc.
  - networks allow sharing of resources such as printers, software programs, data, and information
  - LAN
  - WAN
  - ISDN (Integrated Services Digital Network)
    - speeds of 64Kbps or 128Kbps
  - DSL (Digital Subscriber Line)
    - speeds around twice to 125times faster than 56Kbps dial-up connections
  - Internet
    - worldwide collection of networks that links together more than 200 million host computers by means of communications devices
    - Internet uses?
    - Internet backbone: main routes of the Internet
    - ISP (internet service provider) = supplies connections to Internet for a monthly fee
    - OSP (online service provider) = provides access to Internet, as well as news, weather, financial data, etc.; ex. AOL, MSN
  - WWW (World Wide Web)
    - segments of the Internet which contain billions of documents called Web pages
    - Web page = document that contains text, graphics, sound, and/or video, and has built-in connections, or hyperlinks, to other Web documents

- Web site = related collection of Web pages
- Web browser = software used to access Web pages
- Uniform Resource Locator (URL) = unique address
- Hypertext transfer protocol (http://) = communications standard used to transfer pages on the Web
- search engine = a Web site that provides a variety of tools to help you find information
- passwords/security
- How to purchase a personal computer?
  - Be able to list 3 important things to consider when purchasing a computer
- What kind of instructions does a computer execute?
  - machine code = electrical signals that specify 1s and 0s
  - 2 parts to each instruction
    - op code = command word for an operation, such as add, compare, or jump
    - operands = the data, or the address of the data, for the operation
  - Instruction cycle
    - Fetch instruction
    - Interpret instruction
    - Execute instruction
    - Increment point to the next instruction
- Programmers and Programming Languages
  - What is a programmer?
  - programming language = provide the tools a programmer uses to create software and produce a length list of instructions
  - high-level languages = C, C++, Java, Ada, COBOL, Visual Basic, …
  - compiler = translates all the instructions in a program as a single batch, and the resulting machine language instructions, called object code
  - interpreter = converts one instruction at a time while the program is running
    - reads the first instruction, converts it into machine language, then sends it to the microprocessor
    - after the instruction is executed, the interpreter converts the next instruction, and so on
- File Basics
  - file = a named collection of data that exists on a storage medium, such as a disk, CD, DVD, or tape
  - directory = a list of files
  - root directory = main directory
  - subdirectory