NOTES ON INTRODUCTION TO COMPUTERS

Basic Concepts
Computer, Hardware, Internet, Web, Email

• What is a computer?
  o 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
  o collection of hardware components functioning together
• What does a computer do?
  o 4 basic operations = input, process (instructions), output, storage
  o data (unprocessed/raw items) \( \rightarrow \) information (useful)
  o user/end users
• How does a computer know what to do?
  o instructions = computer program = software
• Know how to convert Binary \( \rightarrow \) Decimal
• Know how to convert Decimal \( \rightarrow \) Binary
• Know how to convert Decimal \( \rightarrow \) Binary \( \rightarrow \) Octal
• Know how to convert Octal \( \rightarrow \) Decimal
• Know how to convert Decimal \( \rightarrow \) Binary \( \rightarrow \) Hexadecimal
• Know how to convert Hexadecimal \( \rightarrow \) Decimal
• Data representation
  o the process of transforming this diverse data into a form that computers
    can use for processing
  o 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
  o Extended ASCII
    ▪ uses 8 bits to represent each character
    ▪ provides for 256 characters
  o 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
  o 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.
  o 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
        ▪ size
        ▪ 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
        ▪ access time = average time it takes a computer to locate data on the storage medium and read it
        ▪ random access (direct access) = the ability of a device to “jump” directly to the requested data
        ▪ 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
        ▪ platters, tracks, sectors
        ▪ 10 GB – 200 GB
    ▪ optical discs = flat, round, portable disc made of metal, plastic, and lacquer that is written and read by laser
    ▪ 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