Chapter 4
The Central Processing Unit: What Goes on Inside the Computer

A. IDENTIFY THE COMPONENTS OF THE CENTRAL PROCESSING UNIT AND HOW THEY WORK TOGETHER AND INTERACT WITH MEMORY
1. Arithmetic/Logic Unit (ALU) – performs calculations
2. Control Unit (CU) – directs the computer system to perform a calculation, access memory, do a read/write operation
3. Registers – temporarily holds
   a. data brought from memory while waiting to be used by the ALU
   b. intermediate results to be sent to memory

B. DESCRIBE HOW PROGRAM INSTRUCTIONS ARE EXECUTED BY THE COMPUTER
1. CU gets an instruction and places it in memory
2. CU decodes the instruction
3. CU notifies the appropriate part of hardware to take action
4. Control is transferred to the appropriate part of hardware
5. Task is performed
6. Control is returned to the CU

C. EXPLAIN HOW DATA IS REPRESENTED IN THE COMPUTER
1. Circuit with current = ON
2. Circuit without current = OFF
3. Represent on/off circuits using binary numbers – ON=1, OFF=0
4. Data
   a. Bit – binary digit: one circuit that is either on or off (1 or 0)
   b. Byte – eight bits that together represent alphanumeric data according to a predefined coding scheme
      i. ASCII
      ii. EBCDIC
      iii. Unicode
   c. Word – the number of bits that the CPU can process at a time; size of one register in the CPU

D. DESCRIBE HOW THE COMPUTER FINDS INSTRUCTIONS AND DATA
1. Each memory location has unique address

E. DESCRIBE THE COMPONENTS OF A MICROCOMPUTER SYSTEM UNIT'S MOTHERBOARD
1. CPU
2. Memory
3. Connections

F. LIST THE MEASURES OF COMPUTER PROCESSING SPEED AND EXPLAIN THE APPROACHES THAT INCREASE SPEED
1. Microprocessor speed
   a. MHz/GHz – machine cycles
   b. MIPS – instructions
   c. Megaflop – floating-point operations
2. Cache
3. Flash memory
4. Processor type
   a. RISC
   b. CISC
5. Parallel Processing
   a. serial
   b. pipelining
6. Other factors
   a. number of processors
   b. register size in CPU – word size
   c. speed and size of bus lines
   d. amount and type of RAM

Review the Lecture Notes -- in the Chapter pay close attention to:
- The Central Processing Unit
- The Central Processing Unit: The Control Unit
- The Central Processing Unit: The Arithmetic/Logic Unit
- The Central Processing Unit: Registers, Memory
- Memory
- System Unit: Memory Components
- How the CPU Executes Program Instructions
- RISC Technology: Less is More

Chapter 5
Input and Output: The User Connection

1. Describe the user relationship with computer input and output
   a. Users use input devices to provide data to the computer
   b. Output devices provide information for the user
   c. Users interact with the input and output devices constantly

2. Explain how data is input into a computer system and differentiate among various input equipment
   a. Data is entered via an input device and converted into electronic form
   b. Most common input devices
      i. keyboard – enter data by typing on the keys
      ii. pointing device – position a pointer on the screen
         1. mouse
         2. trackball
         3. touchpad
         4. pointing stick
         5. joystick
      iii. graphics tablet/digitizing tablet
      iv. touch screens
      v. pen-based computing
      vi. source data automation
vii. magnetic-ink character recognition (MICR)
viii. optical scanner
ix. optical mark recognition (OMR)
x. optical character recognition (OCR)
xi. bar code reader
xii. speech recognition devices
xiii. digital cameras
xiv. video input

3. DESCRIBE HOW A MONITOR WORKS AND THE CHARACTERISTICS THAT DETERMINE QUALITY
   a. Cathode ray tube (CRT) uses raster scanning
      i. how it works
         1. sweeps electron beams across the back of the screen
         2. phosphorus coating glows when hit by electrons
      ii. quality
         1. monochrome vs. color
         2. refresh/scan rate
         3. interlaced versus non-interlaced
         4. dot pitch
         5. graphics card
         6. resolution
         7. size of monitor
   b. Flat-panel screen/liquid crystal display (LCD)
      i. how it works – transistors
      ii. quality – active-matrix versus passive-matrix
   c. Smart displays
      i. based on flat panel technology
      ii. contain their own processor and a wireless transmitter-receiver
      iii. allow the user to control a desktop system from anywhere in the house

4. LIST AND DESCRIBE THE DIFFERENT METHODS OF COMPUTER OUTPUT
   a. Monitor – soft copy
   b. Printer – hard copy
   c. Voice output – speech synthesis
   d. Music and sound output – Musical Instrument Digital Interface (MIDI)
   e. Graphics
      i. business graphics
      ii. video graphics
      iii. Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM)

5. DIFFERENTIATE AMONG DIFFERENT KINDS OF PRINTERS
   a. Dot-matrix
      i. impact
      ii. pins striking a ribbon against paper
   b. Line printers
      i. impact
      ii. prints entire line at a time
   c. Laser
      i. non-impact
      ii. light beam helps transfer images to paper
      iii. high quality
      iv. black and white or color
   d. Ink-jet
i. non-impact  
ii. sprays ink at paper  
iii. good quality  
iv. black and white or color  

6. EXPLAIN THE FUNCTION OF A COMPUTER TERMINAL AND DESCRIBE THE TYPES OF TERMINALS  
   a. Permits input and output functions  
   b. Dumb terminal  
      i. keyboard and monitor  
      ii. connects to host for processing  
   c. Intelligent terminal  
      i. keyboard, monitor, memory, and processor  
      ii. connects with host  
   d. Point-of-sale terminal (POS)  
      i. input and output devices  
      ii. captures retail data  

7. COMPUTER GRAPHICS  
   a. Business graphics  
   b. Video graphics  

8. DESCRIBE THE ETHICAL CONSIDERATIONS INVOLVED IN HANDLING COMPUTER DATA  
   a. When is it ethical to alter computer data?  
   b. When is it ethical to erase computers data?  

Review the Lecture Notes -- in the Chapter pay close attention to:  
- Keyboard  
- Pointing Devices  
- Scanner  
- Source Data Automation: Collecting Data Where It starts  
- Computer Screen Technology  
- Flat Panel Screens  
- Printers  
- Terminals: Combining Input and Output  
- Digital Cameras  

Chapter 7  
Networking: Computer Connections  

1. DESCRIBE THE BASIC COMPONENTS OF A NETWORK  
   a. Sending device  
   b. Communications link  
   c. Receiving device  
   d. Modem
EXPLAIN THE METHODS OF DATA TRANSMISSION, INCLUDING TYPES OF SIGNALS, MODULATION, AND CHOICES AMONG TRANSMISSION MODES

a. Transmission Methods
   i. digital transmission – pulses over digital lines
   ii. analog transmission – signals sent as waves over standard telephone lines

b. Devices
   i. modem – modulate/demodulate
      1. modulation – computer digital signals converted to analog
      2. sent over analog phone line
      3. demodulation – analog signal converted back to digital for use in computer
      4. modem speeds up to 56,000 bps (56k)
   ii. ISDN
      1. transmits digital data
      2. speeds of 128,000 bps
      3. connect and talk at same time
      4. availability
         • need adapter
         • need upgraded phone service
         • not available in all areas
   iii. DSL
      1. electronic signals
      2. uses conventional telephone lines
      3. converts digital to analog signals
      4. uses multiple frequencies to simulate many modems transmitting at once
      5. no industry standard
      6. phone line shared between computer and voice
   iv. Cable modems
      1. uses coaxial cables
      2. does not interfere with cable TV reception
      3. up to 10 million bps
      4. always on
      5. shared capacity – more users less speed
      6. security problem
   v. Cellular modems
      1. slow speed

c. Transmission types
   i. sending and receiving devices must work together to communicate
   ii. asynchronous transmission
      1. start/stop transmission
      2. low-speed communications
   iii. synchronous transmission
      1. blocks of data transmitted at a time
      2. more complex
      3. more expensive
      4. faster transmission
   iv. duplex setting
      1. direction of data flow
      2. simplex – one direction
      3. half-duplex – either direction, but one way at a time
      4. full-duplex – both directions at once
3. Differentiate among the various kinds of communications links and appreciate the need for protocols
   a. Bandwidth
   b. Media
      i. wire pair (twisted pair)
         1. inexpensive
         2. already in use in telephone systems
      ii. shielded twisted pair
         1. protective sheath
         2. reduces noise
         3. increases speed
      iii. coaxial cable
         1. higher bandwidth
         2. less susceptible to noise
         3. used in cable TV systems
      iv. fiber optics
         1. transmits using light
         2. higher bandwidth
         3. less expensive
         4. immune to electrical noise
         5. more security
      v. microwave transmission
         1. line-of-site
         2. high speed
         3. cost effective
         4. easy to implement
         5. weather can cause interference
      vi. satellite transmission
         1. microwave transmission with a satellite acting as a relay
         2. long distance
      vii. combination
         1. transmission types are used in combination to transmit information from one computer to another
   c. Protocols
      i. set of rules governing the exchange of data
      ii. communications
         1. was message received properly
         2. transmission speed
         3. duplex setting
      iii. standards
         1. assists with coordination of communications
         2. TCP/IP
            • Transmission Control Protocol/Internet Protocol
            • Internet standard
            • all computers in world speak same language

4. DESCRIBE VARIOUS NETWORK CONFIGURATIONS
   a. Topology – physical layout
      i. star
         1. central hub
         2. hub prevents collisions
         3. node failure – no effect on overall network
4. hub failure – network fails
   ii. ring
      1. messages travel around circular connection in one direction
      2. no danger from collisions
      3. node failure – network fails
   iii. bus
      1. single pathway
      2. collisions result in resend
      3. node failure – no effect on overall network

5. LIST THE COMPONENTS, TYPES, AND PROTOCOLS OF A LOCAL AREA NETWORK
   a. Components
      i. PCs
      ii. network cable
      iii. NIC (network interface card)
   b. Connecting LANs
      i. bridge – connects similar protocols
      ii. router – directs traffic to best path
      iii. IP switches – replacing routers
      iv. gateway – connects LANs with varying protocols
   c. Organization of resources
      i. client/server
      ii. file server
      iii. peer-to-peer
      iv. protocols
      v. Ethernet
         1. CSMA/CD
         2. bus or star topology
      vi. token ring
         1. ring topology
         2. token passing

6. APPRECIATE THE COMPLEXITY OF NETWORKING
   a. Different modems transmit at different speeds
   b. Communications media – cables versus dial-up
   c. Limits based upon geographical area to cover
   d. Topology – physical layout of components
   e. Protocol – rules governing communication
   f. Technology – peer-to-peer versus client/server

7. DESCRIBE SOME EXAMPLES OF NETWORKING
   a. E-mail
   b. Facsimile (Fax)
   c. Groupware
   d. Teleconferencing and video conferencing
   e. Electronic data interchange (EDI)
   f. Electronic fund transfers
   g. ATM
   h. Telecommuting
   i. Online services
   j. The Internet
Review the Lecture Notes -- in the Chapter pay close attention to:

- Digital and Analog Transmission
- Getting Started
- Modems
- Asynchronous and Synchronous Transmission
- Data Communications
- Communications Media
- Local Area Network Components
- Protocols
- Network Topologies

Chapter 9
Social and Ethical Issues in Computing: Doing the Right Thing

A. LIST AND DESCRIBE THE WORKPLACE ISSUES OF ERGONOMICS, EMPLOYEE MONITORING, AND ENVIRONMENTAL CONCERNS
1. Digital divide
   a. separates computing haves from the haves-nots
   b. people with computers and Internet access take advantage of personal and economic opportunities
   c. thousands of initiatives to improve access to digital world in disadvantaged regions
2. Workplace issues
   a. healthy computing
   b. ergonomic equipment
   c. ergonomic behavior
   d. employee monitoring
   e. environmental concerns
      i. power consumption
      ii. computer supplies
      iii. PC disposal

B. DESCRIBE THE INTERNATIONAL AND NATIONAL LEGAL ISSUES RESULTING FROM WIDESPREAD USE OF THE INTERNET
1. International jurisdictional issues
   a. the application of national laws to a world-wide medium like the Internet
   b. cultural differences causing legal conflicts
   c. need to establish international agreements for conflict resolution
2. National jurisdictional issues
   a. movie industry
   b. sales taxes on Internet transactions
   c. Internet Nondiscrimination Act

C. LIST DIFFERENT METHODS THAT ARE ALREADY AVAILABLE FOR PROTECTING CHILDREN ON THE INTERNET
1. Parental methods
   a. blocking software
b. child monitoring

2. Laws
   a. Communications Decency Act
   b. Children’s Online Privacy Protection Act (COPPA)
   c. Children’s Internet Protection Act (CIPA)
   d. Neighborhood Children’s Internet Protection Act (NCIPA)

D. EXPLAIN THE SIGNIFICANCE OF ETHICS IN COMPUTING
   1. Professional ethics
      a. ACM Code of Ethics and Professional Conduct
   2. Programmer responsibility
      a. correcting all the major and minor bugs that have been discovered
   3. Ethical use of computers
      a. opt-in and opt-out policies

E. DESCRIBE THE THREE CATEGORIES OF INTELLECTUAL PROPERTY RIGHTS AND
   EXPLAIN THE ISSUES THAT ARISE FROM THE PREDOMINANCE OF DIGITAL
   REPRESENTATION IN EACH CATEGORY
   1. Intellectual property (IP)
      a. U.S. Copyright Act
   2. Copyrights
      a. digital content
         i. Digital Millennium Copyright Act (DMCA)
      b. software
         i. No Electronic Theft (NET) Act
         ii. copyleft
      c. digital images
      d. plagiarism
   3. Patents

Review the Lecture Notes -- in the Chapter pay close attention to:
- The Digital Divide
- Ergonomic Equipment
- Home Page Snoops
- Protecting Children on the Internet
- Professional Ethics
- Ethical Use of Computers
- Intellectual Property Rights in a Digital World
- Copyrights
- Patents

HTML Primer and Lecture Notes

1. Identify the hardware and software required to write, test, and execute a Web page
   a. Writing vehicle – text editor, HTML editor, or authoring program
   b. Browser
c. Server
d. Connection to the Internet

2. Describe how HTML tags are used to format Web pages
   a. Provide the structure and format for a Web page
   b. Used in pairs
   c. Interpreted by the browser

3. Discuss the benefits of using Web page authoring software
   a. WYSIWYG
   b. Non-technical user can create Web pages
   c. No need to learn tags

Review the Lecture Notes -- in the HTML Primer pay close attention to:

- Lesson 2
- Lesson 3