Review Questions on Computer Basics

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1. Distinguish between and define (see glossary in Maxfield and Brown's *Bebop Bytes Back* for the definition of terms not found in Andrews' *A Guide to Managing and Maintaining Your PC*):
   a. Hardware (H/W)
   b. Software (S/W)
   c. Firmware (F/W)
   d. Wetware (W/W)
   e. Vaporware (V/W)

2. Be able to define or describe:
   a. I/O device
   b. I/O controller
   c. peripheral device
   d. serial and parallel ports (explain the difference)
   e. adapter card, expansion card, interface card
   f. video adapter, video card
   g. pixel
   h. keyboard
   i. mouse
   j. printer
   k. BIOS
   l. device driver
   m. systemboard, motherboard
   n. video cable
   o. drive cable
   p. ribbon cable
   q. expansion slot (ISA, EISA, MCA, VL bus, PCI, local bus; what does each of the acronyms stand for?)
   r. ZIF socket (what does "ZIF" stand for?)
   s. SIMM (what does "SIMM" stand for?)
   t. system realtime clock
   u. jumper
   v. chipset
   w. cache memory
   x. power supply cable
   y. RAM and ROM

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      z. CPU, microprocessor
      aa. coprocessor
      bb. primary storage and secondary storage (give examples of each, and know which is which)
      cc. volatile vs. nonvolatile memory (know which is which)
      dd. CMOS configuration chip
      ee. traces
      ff. bus
      gg. power supply

3. Be able to identify all of the items shown in Figures 1-2, 1-3, 1-4, and 1-5 in Andrews' *A Guide to Managing and Maintaining Your PC*.

4. What are the principal functions of an Operating System?

5. Distinguish between, and give examples of the use of:
   a. a command-driven interface
   b. a menu-driven interface
   c. a GUI

6. Define:
   a. Multitasking
   b. Multithreading
   c. Operating environment (e.g., a GUI environment; a single- or multitasking environment)

7. OPTIONAL: Name seven operating systems that are commonly used in desktop computers, and describe the advantages and disadvantages of each.

8. What are the principal operations that occur when an IBM-compatible Personal Computer (PC) boots up?

9. In what ways can configuration information be represented on a computer?

10. Be able to identify all of the components in Andrews' *A Guide to Managing and Maintaining Your PC,* Figure 2-5.

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11. What computer resource assignments are subject to the possibility of conflict?

12. How many IRQ numbers does a single device need?

13. How many DMA channels does a single device need?

14. Explain the difference between BIOS and a device driver.

15. Understand and be able to explain how an interrupt works (refer to Andrews' *A Guide to Managing and Maintaining Your PC,* Figure 2-15). (NOTE: a much more detailed coverage of interrupts will be given in Maxfield and Brown's *Bebop Bytes Back.*)

16. What features and characteristics of the PC are determined by the Systemboard:

17. How many pins are there in a memory module, and what is the width of the data path?

18. What are the two principal types or levels of cache memory, and how big are they typically?

19. Define a bus:

20. List the four kinds of electrical lines that may exist in a bus, and give the directionality of each:

21. What are the critical characteristics of a bus?

22. Be able to identify each of the bus connectors in Andrews' *A Guide to Managing and Maintaining Your PC,* Fig. 3-15.

23. Be able to identify the critical characteristics of the buses typically found in PCs: ISA, MCA, EISA, VL, PCI, and Pentium/Pentium II local bus

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24. With regard to a 3-1/2" High-Density floppy diskette:
    (a) How many tracks are there on each side of the diskette, and how many tracks total?
    (b) How many sectors per track?
    (c) How many Bytes per sector?
    (d) Calculate the exact storage capacity of such a diskette in Bytes (show your calculation; memorization is **not** called for).
    (e) How rapidly does the diskette rotate while it is being read from or written to?
    (f) What is the size of a single cluster on this diskette?
    (g) What is the size of a File Allocation Unit for this diskette?

25. Where is the Master Boot Record located on a floppy diskette, i.e., which track number(s), which sector number(s), top or bottom of disk (DOS or any variant of MS-Windows)? Also, describe in words where this is located.

26. What is a fragmented file?

27. Describe/Recognize how the File Allocation Table (FAT) for a DOS-compatible diskette (DOS/Windows-95/Windows-NT) is organized.

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Answers to Selected Questions:

2. Be able to define or describe:
   a. I/O device
   b. I/O controller
   c. peripheral device
   d. serial and parallel ports (explain the difference)
   e. adapter card, expansion card, interface card
   f. video adapter, video card
   g. pixel
   h. keyboard
   i. mouse
   j. printer
   k. BIOS
   l. device driver
   m. systemboard, motherboard
   n. video cable
   o. drive cable
   p. ribbon cable
   q. expansion slot (ISA, EISA, MCA, VL bus, PCI, local bus; what does each of the acronyms stand for?)
   r. ZIF socket (what does "ZIF" stand for?)
   s. SIMM (what does "SIMM" stand for?)
   t. system realtime clock
   u. jumper
   v. chipset
   w. cache memory
   x. power supply cable
   y. RAM and ROM
   z. CPU, microprocessor
   aa. coprocessor
   bb. primary storage and secondary storage (give examples of each, and know which is which)
   cc. volatile vs. nonvolatile memory (know which is which)
   dd. CMOS configuration chip
   ee. traces
   ff. bus
   gg. power supply

   Answers:
         Examples of primary storage: RAM and ROM
         Examples of secondary storage: hard disk, floppy disk, tape cassette, CD-ROM

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4.   What are the principal functions of an Operating System?

> *Answer:* (NOTE: This issue is examined here from the limited perspective of Andrews' *A Guide to Managing and Maintaining Your PC*. You can expect this issue to be addressed in far more detail in an Operating Systems course.)
> a.   management of BIOS and device drivers, and in general of the interface between hardware and applications software
> b.   management of files on secondary storage
> c.   management of RAM
> d.   diagnosis of software and hardware problems, and generation/display of error messages
> e.   utility functions (e.g., formatting of disks; deletion, copying, and moving of files; maintenance of the settings for system date and time)
> f.   networking and communications services

7.   OPTIONAL: Name seven operating systems that are commonly used in desktop computers, and describe the advantages and disadvantages of each.

> *Answer:*
> a.   Microsoft's MS-DOS, IBM's PC-DOS, and Novell's DR-DOS (these three are considered as one, because of their basic similarity; see Table 1-2 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> b.   Microsoft's Windows 3.x with DOS (Table 1-3 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> c.   Microsoft's Windows-95 (Table 1-4 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> d.   Microsoft's Windows-NT (Table 1-5 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> e.   IBM's OS/2 Warp (Table 1-6 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> f.   Apple's Mac O/S (Table 1-7 in Andrews' *A Guide to Managing and Maintaining Your PC*)
> g.   various flavors of UNIX, such as SCO UNIX, BSD, LINUX, etc. (all considered as one, because of their conceptual similarity; see Table 1-8 in Andrews' *A Guide to Managing and Maintaining Your PC*)

8.   What are the principal operations that occur when an IBM-compatible Personal Computer (PC) boots up?

> *Answer:*
> a.   ROM-BIOS Startup Program does POST, then reads configuration and setup information.

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b. ROM-BIOS Startup Program reads configuration and setup information, checks the hardware(CPU, video card and other adapter cards, various disk drives and other peripherals), and assigns memory addresses and other system resources to each.

c. ROM-BIOS startup program finds the Operating System and starts loading it.

d. O/S takes over, finishes configuring the system and tests it.

e. O/S completes loading itself, including the installation of device drivers for floppy disk drives, hard disk drives, CD-ROM, mouse, scanners, and other peripheral devices.

f. O/S sets up MMI (HMI?) and gives control to the user.

9. In what ways can configuration information be represented on a computer?

Answer:
a. DIP switch settings (what does "DIP" stand for?)
b. jumper settings
c. CMOS setup or configuration chip with on-board long-term battery power
d. Flash ROM (EEPROM)

11. What computer resource assignments are subject to the possibility of conflict?

Answer:
a. IRQ number (what does "IRQ" stand for?)
b. memory address allocations:
   • ROM-BIOS
   • device drivers
   • I/O addresses

c. DMA channels (what does "DMA" stand for?)

12. How many IRQ numbers does a single device need?

Answer: Depending on the device, it could be either zero, one, or more than one.

13. How many DMA channels does a single device need?

Answer: Depending on the device, it could be either zero or one.

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16. What features and characteristics of the PC are determined by the Systemboard:

    Answer:
    a. CPU: type, and possible speeds
    b. supporting chipset and its capabilities
    c. L2 cache memory (SRAM): type and size
    d. types of buses present, and number of expansion slots for adapter cards for each bus:
        (i)   old PC/PC-XT/ISA
        (ii)   PC-AT/newer ISA
        (iii)   MCA
        (iv)   EISA
        (v)   VLB (VESA Local Bus)
        (vi)   PIC
        (vii)   AGP
        (viii) various proprietary and local-bus slots
    e. Memory (DRAM):
        (i)   parity or non-parity
        (ii)   type: FPM, EDO, SDRAM
        (iii)   SIMMS and/or DIMMS: and width of local bus
        (iv)   maximum amount of memory usable on the system
        (v)   permissible memory increments, and conditions (e.g., one module can be added, or must add two modules at a time)
    f. ports and connectors: serial (COM), parallel (LPT), keyboard, mouse
    g. facilities for connecting disk drives and other peripherals: IDE and SCSI controllers
    h. integrated video on systemboard?
    i. size of case

17. How many pins are there in a memory module, and what is the width of the data path?

    Answer:
    (a) SIMM (Single In-Line Memory Modulc): either 30 or 73pins, with 16- or 32-bit data paths
    (b) DIMM (Dual In-Line Memory Modulc): 168 pins, with a 64-bit data path

18. What are the two principal types or levels of cache memory, and how big are they typically?

    Answer:
    (a) Level 1 (L1), primary, or internal cache: 1k,B 2kB, 4kB, 15kB, 32kB
    (b) Level 2 (L2), secondary, or external cache: 128kB, 256kB, 512kB, 1 MB

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19. Define a bus:

   Answer: A bus is <u>both</u>:
   (a) a set of functionally related electrical communications lines intended for the conveyane of information between different components of a computer; <u>and</u>
   (b) a set of rules governing how the electrical lines are to be used: including physical and electronics standards, as well as a communications protocol

20. List the four kinds of electrical lines that may exist in a bus, and give the directionality of each:

   Answer:
   (a) Electrical power lines (power bus): unidirectional
   (b) Data lines (data bus): bidirectional
   (c) Address lines (address bus): can be **either** uni- **or** bidirectional
   (d) Control lines (control bus): can be **either** uni- **or** bidirectional

21. What are the critical characteristics of a bus?

   Answer:
   (a) Bus width: # of data lines
   (b) Bus address space: # of address lines
   (c) Bus type: master/slave **or** bus-master
   (d) Bus speed in MHz: reciprocal of bus time
   (e) Bus throughput in MB/sec (or Mbits/sec): width*speed/8 (= MB/sec) or width*speed (=Mbits/sec)

23. Be able to identify the critical characteristics of the buses typically found in PCs: ISA, MCA, EISA, VL, PCI, and Pentium/Pentium II local bus

   Answer:
   (a) ISA: 8 or 16 bits bus width, 8.33 MHz bus speed, 8.33 or 16.66 (nominally 8 or 16) MB/sec bus throughput
   (b) MCA: 32 bits bus width, 8.33 to 10 MHz bus speed, 33 or 40 MB/sec bus throughput
   (c) EISA: 32 bits bus width, 8.33 MHz bus speed, 33 MB/sec bus throughput
   (d) VL: 32 bits bus width, 33 MHz bus speed, 132 MB/sec bus throughput
   (e) PCI: 32 or 64 bits bus width, 33 or 60-66 MHz bus speed, 132/264/528 MB/sec bus throughput
   (f) Pentium/Pentium II local bus: 32 or 64 bits bus width, 66 MHz bus speed, 264/528 MB/sec bus throughput

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24. With regard to a 3-1/2" High-Density floppy diskette:
    (a) How many tracks are there on each side of the diskette, and how many tracks total?
    (b) How many sectors per track?
    (c) How many Bytes per sector?
    (d) Calculate the exact storage capacity of such a diskette in Bytes (show your calculation; memorization is **not** called for).
    (e) How rapidly does the diskette rotate while it is being read from or written to?
    (f) What is the size of a single cluster on this diskette?
    (g) What is the size of a File Allocation Unit for this diskette?

    Answers:
    (a) 80 tracks/side * 2 sides = 160 tracks total
    (b) 18 sectors/track
    (c) 512 Bytes/sector
    (d) 160 tracks * 18 sectors/track * 512 Bytes/sector = 1,474,560 Bytes total
    (e) 360 RPM
    (f) Cluster size = one sector = 512 Bytes
    (g) The File Allocation Unit is the same as a cluster, which in this case has a size of 512 Bytes

25. Where is the Master Boot Record located on a floppy diskette, i.e., which track number(s), which sector number(s), top or bottom of disk (DOS or any variant of MS-Windows)? Also, describe in words where this is located.

    Answer: Track 0, sector 1 on bottom of disk (outermost track on bottom of disk).

27. Describe/Recognize how the File Allocation Table (FAT) for a DOS-compatible diskette (DOS/Windows-95/Windows-NT) is organized.

    Answer: See Andrews' Figure 4-4 and accompanying text on page 148.

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