

# Computer & Information Systems (22:198:604)

## Fall 2008

### Homework 2 Solution

#### 1. Chapter 3. Review Question 2 (Page 66)

*Comment on the statement, "The CPU is the brain of the computer."*

The CPU selects instructions, processes the instructions, performs arithmetic and logical operations, and stores results of operations in memory. Because it performs all these tasks and basically 'directs' the overall functioning of the computer, it is sometimes thought of as the computer's 'brain.'

#### 2. Chapter 3. Review Question 11 (Page 66)

*How does Moore's Law influence the way that you should learn about computer hardware?*

Moore's Law suggests that computer hardware will continue its historical pattern on the price/performance curve (increasing performance and decreasing cost). Consequently, we know that the computer hardware we learn about today will quickly be outdated.

#### 3. Chapter 3. Review Question 15 (Page 66)

*Explain why file swapping is necessary.*

File swapping is needed to make use of the limited available main memory in the computer. If the user needs to open a new program or a new file and there is not enough unused memory available, the operating system will remove something that it considered unnecessary to make room for the new program or data. This enables the computer to appear to have much more memory capacity than it really has.

#### 4. Chapter 3. Applying Your Knowledge 25 (Page 25)

*Figure 3-12 shows three computer systems from 2003. Visit [dell.com](http://dell.com), [hewlett-packard.com](http://hewlett-packard.com), and [lenovo.com](http://lenovo.com). On each site, find desktop computers that cost around \$2,000, the 2003 cost of the Dell 8250.*

- a. Compare the capabilities of the computers you find with the computers specified in Figure 3-12. Consider the CPU, memory, magnetic disk, optical disks, and monitor.*

	Dell XPS-600	HP d4100y	IBM (now Lenovo) ThinkCentre M51
CPU	Pentium 4 630 with HT Technology (3.0 GHz, 800 front side bus)	Pentium D (dual core processor) 840 (3.2GHz, 800 front side bus)	Pentium 4 655 with HT Technology (3.4 GHz, 1 MB L2 Cache, 800 front side bus)
Memory	2 GB Dual Channel DDR2 SDRAM at 667 MHz	2 GB Dual Channel DDR2 SDRAM at 533 MHz	2 GB DDR SDRAM
Hard drive	160 MB Serial ATA 7200 RPM	250 GB SATA 7200 RPM	160 MB Serial ATA 7200 RPM
Optical disk	Dual drives: 16× DVD-ROM 48× CD-RW	Dual drives: Double layer 16× DVD +/- RW 48× CD-RW	16× DVD-ROM / 48× CD-RW combo drive
Monitor	19" flat panel analog display	19" flat panel analog display	19" flat panel analog display
Price	\$2,029 (as of 10/15/05)	\$2,014 (as of 10/15/05)	\$2,085 (as of 10/15/05)

b. *What buying strategy does your answer to part a suggest?*

It is amazing how much more can be purchased for the same \$2,000. Since the capability of the hardware has increased quite a bit, the buyer needs to evaluate his/her needs very carefully. Unless the applications used demand the latest and greatest hardware, buyers can typically find a “sweet spot” in the computer market that is one or two notches below the top, but still a very powerful system for a reasonable price.

c. *Some organizations have a policy for replacing or upgrading computers based on a 2- to 5-year cycle. What buying strategy would you use if your company used a 2-year cycle? What strategy would you use if your company used a 5-year cycle?*

On a two-year buying cycle, I would definitely not buy at the top of the technology curve. I would recommend buying near the middle range of price/performance, which should target very capable machines with stable technology at value prices. Replacing these machines in two years will enable us to increase the hardware capability without paying a premium to be at the cutting edge of technology.

On a five-year buying cycle, the computers will definitely be outmoded at the end of the five-year cycle. Therefore, in this situation, I would recommend buying machines very near the top of the technology curve. We need to get as much technology as we can since it will have to last for a considerable period of time (at least in computer hardware terms). I might stay away from the cutting edge technology and aim a notch below that, just to reduce potential maintenance problems with the newest technologies. I would also want to be sure to purchase at least three-year warranties on these machines; longer warranties if available.

#### **5. Chapter 4. Review Question 1 (Page 104)**

*What is the purpose of a database?*

The purpose of a database is to keep track of things involving more than one theme.

#### **6. Chapter 4. Review Question 3 (Page 104)**

*Identify the components of a database.*

Databases are comprised of tables containing the data describing a single object, topic, or theme. Within a table, there are fields (or columns of the table), each of which describes a single characteristic or attribute of the object being described by the table. A row of the table (called a record) contains the collection of specific field values that describe a single occurrence of the object being described by the table. There are relationships between tables when there is a logical business rule that connects them (such as classes and students).

#### **7. Chapter 4. Review Question 5 (Page 104)**

*How does metadata make a database more useful?*

The metadata in a database provides a description of the contents of the database. The metadata helps ensure that anyone using or involved with the database knows what is in the database.

#### **8. Chapter 4. Review Question 6 (Page 104)**

*What are the functions of the DBMS?*

A database management system (DBMS) is a software program containing the following functions: creation of a database, processing of a database, and administration of a database.

#### **9. Chapter 4. Review Question 17 (Page 105)**

*Summarize DBA responsibilities for the following categories.*

*a. During database development*

The DBA should take steps to ensure that the developing database serves the needs of the entire organizational community. This can be done in several ways. First, a steering committee of key users can be created that provides oversight for the database. This structure can represent the interests of users from throughout the organization. Second, the DBA can ensure that users are involved in determining the requirements for the database and that their comments are taken seriously by the developers. The DBA should also ensure that the users validate the data model prior to implementation. Finally, users should verify and validate all aspects of the applications developed.

b. *For operations*

The DBA should ensure that policies are established for the processing of the database. The security outlined by the processing policies must be implemented correctly and match the processing policies. The DBA should also track and manage database processing problems and guide the solution process.

c. *For database backup and recovery*

The DBA must ensure that backup procedures and policies are established and that they are rigorously followed. Training must be implemented so that users and operations personnel understand their roles in backup and recovery processes. DBAs should initiate testing of the backup and recovery procedures. In the event of failure, the DBA manages the recovery process.

d. *For database adaptation*

The DBA should establish a procedure in which requests for changes to the database can be submitted, evaluated, and prioritized to best meet the needs of the organization.

## 10. Chapter 5. Review Question 2 (Page 146)

*Name the five layers of the TCP/IP-OSI layered protocol. Briefly describe the function of each layer.*

- Application layer—this layer interacts with the application whenever the user chooses to transfer files, read messages or perform other network-related activities.
- Transport layer—this layer looks to see if data is coming from more than one application and integrates each application's data into a single stream for the physical network. Error checking and recovery of data is also provided.
- Network layer—this layer determines the way that the data will be sent to the recipient device by handling logical protocols, routing, and addressing.
- Data link layer—this layer assigns the appropriate physical protocol to the data and defines the type of network and the packet sequencing.
- Physical layer—this layer is the level of the actual hardware, defining the physical characteristics of the network such as connections, voltage levels, and timing.

## 11. Chapter 5. Review Question 7 (Page 147)

*What purposes does an ISP serve?*

- Provides its customers an IP address
- Serves as a gateway to the Internet for its customers
- Pays for the Internet by collecting access and other fees from its customers

## 12. Chapter 5. Review Question 13 (Page 147)

*What is the function of the domain name system?*

IP addresses are not well suited for human usage. The purpose of the domain name system is to convert user-friendly names into their IP addresses.

## 13. Chapter 5. Applying Your Knowledge 16 (Page 147)

*Consider the situation of a company that has two offices at physically separated sites. Suppose each office has a group of 15 computers.*

- a. If the two offices are retail art galleries, what is likely to be the most common interoffice communication? Given your answer, what type of WAN do you think is most appropriate?*

The two art gallery sites probably communicate mostly via email regarding inventory and sales prospects. There may be an occasional need to attach a graphical image of an art object to an email. The DSL modem to ISP configuration seems most appropriate for this situation, using existing phone lines but retaining voice communication over those lines.

- b. Suppose the two offices are manufacturing sites that communicate via email and that regularly exchange large drawings and plans. What are the advantages and disadvantages of each of the four WAN types for these offices? Under what circumstances would you recommend a leased-line WAN?*

- Modem connection to an ISP—Although relatively inexpensive, probably not suitable for a setting involving frequent transfers of large files between locations.
- Network of point-to-point lines—Provides excellent communication capability between locations and lowers the per bit cost of transmitted data between sites when there is extensive communication traffic. This is expensive to set up and maintain. This option is preferred when there is a large volume of communication traffic occurring regularly between site and the organization can employ its own specialists to set up and maintain the WAN.
- Public Switched Data Network—Can obtain whatever communication capacity is needed through lease arrangements. Need only pay for usage; less setup and management expense compared to a network of leased lines.
- Virtual private network—Uses the Internet to create a secure, private connection via a “tunnel.” Costs are reduced since the Internet is the communication medium, yet security is retained.

- c. Suppose the two offices are the same as described in part b, but that in addition, each has salespeople on the road who need to connect to the office computers. How would your answer to part b change?*

With mobile users, the VPN option becomes quite attractive. It is easy to create secure connections between sites and for the mobile users with this option.

d. *Would you change your answer to part c if both offices are located in the same building? Why or why not?*

If both offices are located in the same building, the company no longer needs a WAN for its interoffice communication, but can build a LAN within the building. Mobile users could access the company network via a dial-up connection or a VPN, depending on the need for security.

e. *What additional factors would you need to consider if one of the offices in part c was in Los Angeles and the other was located in Singapore?*

The company would need to ensure that the quality of transmission of large files using the Internet was sufficient. If it is not, it might need to use another option such as point to point or PSDN.