CHAPTER 3 Answers Test your Knowledge

Types of information systems
1. **Explain the main characteristics of the following types of information systems:**
   - a) **transaction processing system**
   - b) **office automation system**
   - c) **management information system**
   - d) **design support system**
   - e) **expert system**
2. **Explain how 'what if' questions can be used to determine the best product price when a number of variables affect the price, such as profit per item, number of items sold and the cost of making the item**

   A transaction processing system processes data produced by the normal daily operations of an organisation. Online systems process the data as it is entered, while batch systems collect the data and process it all together at one time.

   An office automation system performs routine tasks such as printing documents, scheduling, communicating with other departments and performing calculations.

   A management information system manipulates the data produced in a transaction processing system to create reports for managers that include timely and accurate information.

   A decision support system manipulates information from internal and external sources that can assist managers in making decisions.

   An expert system uses a set of facts and rules gained from the knowledge of an expert to help make a decision based on available data.

   The affect of varying each parameter (profit per item, number of items sold, cost of making each time) while holding the others constant can be used to determine what effect that parameter has on the price. 'What if' questions allow each parameter to be changed individually and together to see the final impact without corrupting the original data.

3. **How is a knowledge bas established?**

   A knowledge base is created by capturing the set of facts and rules used by an expert in making a particular decision.

Networks

1. **Define the term 'network'**

   A network connects computers and other devices together so that they can share data, information and resources.

2. **What does groupware on a network allow people to do?**

   Groupware allows users on a network to work together on the same project. Each member of the group can view the same document and see immediately the changes made by a colleague.

3. **What are the four main advantages in using a network?**

The advantages of using a network are in resource sharing, accessing remote services, facilitating communications and sharing data and information.

4. **What compelling reason would an organization use to justify resource sharing?**
Resource sharing allows users to access a resource on the network only when they need it, thus not requiring each workstation to have its own connected resource which saves the organisation money.

5. **Other than printing, what other resources can be shared on a network?**
Resources other than a printer that can be shared on a network include scanners, Internet connection, software, CD-ROM/DVD, fax machines and network storage and directory services.

6. **Describe the benefit to an organization in providing a remote service for customers over the Internet.**
Remote ordering services remove the risk of employees producing transcription errors since the customer directly enters their order. The employees time is not required to enter the order, again saving money.

7. **How does file sharing on a network avoid problems associated with data duplication?**
Sharing files on a network avoid problems associated with data duplication since there only needs to be one version of the file that each user accesses when needed. Any updates or changes made to that file (such as a change to a client's address) will be saved to the single file that everyone else accesses. If each user had their own version of the file it would create data errors since any change made would have to be made to every version and it would be easy for one user to use out-dated data.

Types of Networks

1. **What are the key differences between WANs and LANs?**
A wide area network is not geographically contained to a small area. It uses transmission media owned by someone else who is not part of the organisation. A local area network operates within close geographical proximity and uses transmission media within the organisation.

2. **Why are network points called nodes rather than being called computers?**
Not only computers are connected to a network. A node refers to any computer or device (such as a server, printer, hub) that is connected to the network.

3. **Explain the difference between a client and a server on a network.**
A client is a computer or device that requests data or files over a network. A server sends the data or files over the network to any client who requests them.

4. **Describe the roles of the following on a network:**
    a) **database server**
    b) **domain name server**
    c) **proxy server**

d) primary domain controller

A database server holds a large database that authorised users can access over the network.

A domain name server provides IP addresses.

A proxy server copies all recently accessed Web pages and files, and re-supplies those to any network user if requested rather than going out on the internet again to get that page.

A primary domain controller authenticates usernames and passwords and thus controls access to the network.

5. **On a small network, would a peer-to-peer network be worthwhile?**
   A peer-to-peer network is cheaper and easier to operate than a client/server network. For a small network, the inconvenience of slowness in accessing files over a peer-to-peer network probably is outweighed by the cost savings.

6. **Napster was a good example of a peer-to-peer network. It was slower than webservers that use a client/server model. What are the problems with peer-to-peer networks?**
   When a workstation on a peer-to-peer network is serving a file to another workstation it becomes noticeably slower to respond to the user. Another problem includes locating where on the network a file may be stored.

7. **What is a hub?**
   A hub receives signals from each computer or device on a star network and sends them simultaneously to all of the other computers and devices on the network.

8. **Explain why many larger organizations prefer a star topology over ring and bus topologies.**
   An advantage for organisations of a star network is that if any cabling to one workstation is damaged, only that workstation is out of action. A new workstation can also be added without affecting the whole network. If the bus in a bus network, or the cabling in a ring network are damaged, many if not all computers will be out of action until the cable is repaired. This down-time can be very costly and frustrating to an organisation.

9. **What advantage does a tree network offer?**
   A tree network uses the technologies of both bus and star topologies. The workstations are connected in work groups in star networks, with each star connected by a bus system. This has the advantage of being able to add or remove workstations at will without impacting on other uses and provides high-speed bus cabling to servers.

10. **What is an intranet?**
    An intranet is an internal network in an organisation that uses Internet and Web protocols to securely share information and policies with employees. Intranets restrict access to company information and facilities to employees.

Network Communication Standards

1. **Why do manufacturers built products based on network standards?**

Network standards are established to define the rules by which devices can communicate with each other. It ensures that devices produced by different manufacturers can be connected.

2. **List four functions included in a network protocol**
   A network protocol determines the type of error checking used, the data compression method, how the sending device will indicate that it has finished sending a message, and how the receiving device will indicate that it has received a message.

3. **Identify the four components of all Ethernet frames.**
   An Ethernet frame contains the destination node address, sending node address, data and the parity check information.

4. **Describe how data flows over an Ethernet network from the source to the intended destination.**
   The data sent from a source is contained in an Ethernet frame that also includes the destination node address. The frame is transmitted from the source computer (through the network interface card) to a hub. The hub then directs the frame down all cables connected to it. Computers and other devices along a cable read the destination address. If the computer is not the designated destination it ignores the frame and passes it along the cable to the next computer. When the destination computer receives the frame it reads the data and performs a parity check to ensure that the whole message was received. If the data has been correctly transmitted, the destination device sends a message back to the original source confirming acceptance. If an error has occurred in the transmission, the destination device sends a re-send request.

5. **How does a collision occur on a network? How does Ethernet avoid repeated collisions of the same transmission?**
   A collision occurs when two devices try and send an Ethernet frame at the same time. When a collision has occurred, each of the sending computers waits a random time before re-sending the transmission.

6. **Describe how a token is used in a token ring network.**
   The token continuously travels in one direction around the ring network. When a device wishes to transmit data over the network, it must wait for the token to arrive. If the token indicates that it is busy the device must wait until the next time the token comes around. If the token is not busy, the device attaches the data and destination address to the token and sets the token to busy. Other devices on the ring examine the token as it passes. The destination device recognizes that the message is for it and reads the message. The token then returns to the sending device which removes the message and alters the token status to available.

7. **TCP/IP uses smaller packets than other protocols. Why is there an advantage on the Internet?**
   Many different pathways can be used to transmit data and files over the internet from a source to a destination. Small packets provide more alternatives to sending the data or files since not all the packets must travel the same pathway. This

allows the load to be balanced over several paths and thus travel faster to the destination.

8. **What standard does a Wi-Fi network use?**
    Wi-Fi networks use the 802.11 standard.

Network Hardware and Software

1. **List a number of tasks undertaken by a network operating system.**
    Network server software controls file access, manages print queues, keeps track of users through their UserIDs and passwords, authenticate access to network servers and maintain a log of network usage and problems.

2. **What is the role of a network interface card?**
    A network interface card is used to link a computer or resource to a network. It coordinates the transmission and receipt of data, instructions and information to and from the computer over the network. A NIC also amplifies the digital signal produced by a computer so it can travel long distance over a network.

3. **Describe the process of roaming a Wi-Fi network.**
    Roaming is the ability to move around a network, passing from one wireless access point to another without losing connection.

4. **Why would café establish a hot spot on their premises?**
    Cafes would offer a hot spot to attract customers to their premises. A customer with a notebook computer can wirelessly connect to the hot spot and access the internet or electronic mail.

5. **Why would networks use switches rather than ordinary hubs?**
    A switch stores the address of every device connected to it so it is able to use logic to send a message directly to the designated recipient. A hub would send the message to all devices connected to it, thus wasting network resources.

6. **What are routers used for?**
    A router is a device that connects several LANs together.

7. **How does a modem enable a computer to communicate with a network over a standard telephone line?**
    A modem converts the digital signal produced by a computer into an analog signal that can be transmitted over a standard telephone line.

8. **How does a DSL modem differ from a dial-up modem?**
    A DSL line transmits a digital signal (rather than an analog signal) over standard copper telephone wires. A DSL modem, therefore, does not convert the computer's digital signal into an analog signal.

Transmission Media

1. Why do new networks use CAT 5 standard cable rather than CAT 3?

CAT 5 cabling is standard in many new networks since it can carry 100Mbps rather than the 10Mbps carried by Cat 3 cables.

2. **What are some of the disadvantages of using CAT 5 cable? Why is the CAT 5 cable used in so many installations?**
    CAT 5 cabling can only transmit reliably over distances up to about 85 metres. Cat 5 is still commonly used because the distance limitation is not important in many situations and the cost of the cable per metre is cheaper than alternatives that operate over larger distances.

3. **Why is fibre-optic cable often used to connect major hubs inside buildings as well as between buildings?**
    Fibre optic cable uses light pulses that are not susceptible to electromagnetic interference and so can reliably carry data over large distances.

4. **What advantages does wireless networking have over a network that only uses physical transmission media?**
    Wireless networks can be used in situations where it is difficult to install cables or where users may need the freedom of being able to move around.

5. **What limitation applies to microwave transmissions?**
    Microwave transmissions require a clear passage without any obstacles. Any buildings or hills between the transmitter and the receiver will block the signal.

6. **Why is radio wireless networking preferable to infra-red wireless networking?**
    Infrared transmissions are only effective over relatively short distances and require line-of-sight access. Radio wireless networking can transmit over larger distances and do not require line-of-sight access.

Network Security

1. **Why does a wireless network pose greater security threats than a wired network?**
    A wireless network cannot be contained within the physical boundaries of an organisation, and so are more vulnerable than wired networks that can be contained within locked premises.

2. **Recommend a password strategy that an organisation could implement to avoid unauthorised access to their network.**
    Passwords should be at least eight digits long, include non-alphabetical characters, not be easily guessed and should be changed every month.

3. **What are the main purposes of firewalls and how are these purposes achieved?**
    A firewall is hardware and/or software that restricts access to data and information on a network. It is placed between the network's servers and the outside communication channel. The firewall examines the IP address of computers that request information from an internal server, blocking access to certain domain

names, banning certain protocols from accessing particular servers and certain words and phrases included in packets of information from passing through.

4. **What added security feature should wireless networks employ?**
Wireless networks should protect data by encrypting transmissions. Wired equivalent privacy is a security protocol that provides secure wireless transmissions using encryption.

Design of a network

1. **What should be included in the logical design of a network?**
The logical design of a network includes the network protocols, applications to be used, number and type of servers, network speed, security issues and cost.

2. **In a LAN of 10 machines and one server, would it be better to use a hub or a switch? Why?**
(a) A LAN of one server and ten computers would operate efficiently with a hub. If the price of switches continues to fall so that the price differential is small, a switch might become an appropriate choice.
(b) With more than ten computers and three servers a switch is the best option. It will provide more efficient (faster) network transmission.

4. **What is a network diagram?**
A network diagram is a schematic representation that shows the physical devices and communications lines present in a network.

5. **Why is a network diagram not based on the building plans of the organisation?**
The physical buildings are not important in a network diagram. They would complicate the diagram and make them difficult to read.