**Topic 1: Network Access**

1.   What is “WiFi”?

a facility allowing computers, smartphones, or other devices to connect to the Internet or communicate with one another wirelessly within a particular area.

a.    Provide specific details about hardware and software.

Some hardware and software details in wifi are Wifi Adapter, Wifi Router, Modem

b.   Provide specific details about frequencies and different versions of WiFi

The different types of wifi are the protocols.

Protocol Frequency Channel Width MIMO Maximum data rate  
(theoretical)  
802.11ac wave  5 GHz 80, 80+80, 160 MHz Multi User (MU-MIMO) 1.73 Gbps1  
802.11ac wave5 GHz 80 MHz Single User (SU-MIMO) 866.7 Mbps1  
802.11n 2.4 or 5 GHz 20, 40MHz Single User (SU-MIMO) 450 Mbps2  
802.11g 2.4 GHz 20 MHz N/A 54 Mbps  
802.11a 5 GHz 20 MHz N/A 54 Mbps  
802.11b 2.4 GHz 20 MHz N/A 11 Mbps  
Legacy 802.11 2.4 GHz 20 MHz N/A 2 Mbps

2.   What is “Bluetooth”?

a standard for the short-range wireless interconnection of mobile phones, computers, and other electronic devices.

a.    Provide specific details about hardware and software.

Bluetooth is a software which is available in most devices. It uses radio waves to send and receive signals instead of traditional wires and cables. However there are bluetooth devices that allow you to do the same. It's just like wifi. Some computers have it and some need additional device to perform the same function.

b.   How is “Bluetooth” different from “WiFi”?

Wi-Fi provides  internet connectivity to any device having the facility.Wi-Fi requires an internet service provider and a modem. Bluetooth is a wireless connecting platform which can share photos, documents and more without requiring a internet connection.

3.   What is “Ethernet”?

a system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems.

a.    Provide specific details about hardware and software.

In the ethernet cable there is a coaxial which is the same wire you use the connect your tv to a cable box and there is also a twisted pair which is looks exactly like a telephone wire.

b.   How is “Ethernet” different from “WiFi” and “Bluetooth”?

Wi-Fi is the technology that lets PCs, laptops, mobile devices and more to connect to the internet at high speed without needing wires. Ethernet is the way of connecting computers in a local area or LAN. Ethernet is wired but faster than WiFi. The idea is that multiple computers have access to it and can send data at any time. Bluetooth is sharing folders, photos and more without using internet and it is commonly used in mobile and computers devices.

4.   What is “Dial-Up”?

access a computer system or service remotely via a telephone line.

a.    Provide specific details about hardware and software.

b.   Provide specific details about the history of “Dial-Up”.

5.   WiFi Hub / Home Router

a.    Provide specific details about hardware and software.

b.   Provide specific details about how it is related to the above technologies.

c.    Provide specific details about speed and capacity.

6.   Wireless Printers / Other Devices

a.    Explain how wireless printers work.

Some computers use bluetooth, others have infrared, some computers have built in ethernet ports and some have wireless adapters. The printers could also be connected through the network. If the printer is connected through wifi then the device and printer will have the same IP address making it easy to print. If the printer has an ethernet port then you could connect it near the wireless wifi and it will automatically connect to the network.

b.   Provide examples of other wireless devices (besides phones, laptops, etc.)

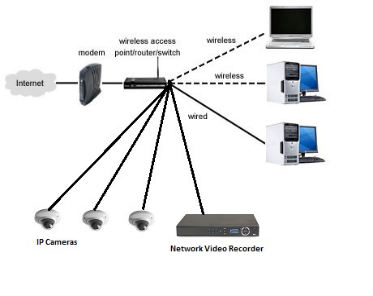
Garage door openers, wireless radios, wireless routers, wireless network cards, wireless chargers.

c.    List the pros and cons of wired versus wireless devices.

Wired devices are faster and have better security. Wired devices cost more to install and create more of a mess. Wireless devices create less clutter and you can use more devices in different places because you don’t have to set up the wires again.

7.   Typical Home Network

a.    Provide a diagram of a typical home network



b.   List each device and how it makes use of the above technologies

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**Topic 3: Webservers & Applications**

1. Client Server Model
   1. What is the client server model?

* A communication framework distributed for network processes among service requesters, clients, and service providers.
  1. When you use your phone to send text messages, is it the client or the server?
* It is the server it is being sent on but client used to send it.
  1. Do you always need client software when accessing applications on the internet?
* Not always, sometimes you can use a web browser to access applications, however client software does exist for most applications that are server based or on the internet.
  1. Where are the service applications located in the internet?
* Many of them operate on private servers in places run by the service provider, whereas the application client software are easily accessible and downloadable from the website of the provider and in many cases, from other sources on the internet as well.

1. Internet Server Hardware
   1. What are the main hardware features of an internet server?

* Web server computers l More memory, larger hard disk drives, and faster processors
* Blade servers l Placing small server computers on a single computer board
* Virtual server (virtual host) l Maintain more than one server on one machine
* One approach to support large scale servers- centralised architecture: few very large, powerful, but expensive computers/servers
* Alternative approach- distributed/decentralised architecture: lots of cheap servers/computers
* (Basically more advanced computers built to focus on hosting services to allow multiple users at the same time).
  1. How is an internet server similar to and different from a desktop PC?
* It is similar because they perform similar tasks and involve much of the same hardware and software, however a desktop PC is used a personal computer whereas an internet server is used to host a service to many people at the same time.
  1. Compare an internet server(s) for a large company like Ebay to the internet server(s) for a small company.
* Big companies have large rooms fully dedicated to hold server computers, whereas smaller services can just use a single desktop computer to host a service.

1. Internet Server Software
   1. What are the main software features of an internet server?

The operating system of an internet server is not easy to pick. There are specific operating systems for what the server would be mainly used for. Server software is primarily built to interact with a server’s hardware infrastructure that includes the processor, memory, storage, input, output and other communication ports.

* 1. How is internet server software similar to and different from a desktop PC software?
* Internet server software are similar to desktop PC software because they both allow for ease of access to services to users, but desktop PC software allow the user to use many different softwares (OS), and server software allow many users to access one service/software.
  1. Compare an internet server(s) for a large company like Ebay to the internet server(s) for a small company.

In a small company the server would be a low end server that is affordable and manageable in a small business. Small business servers are for about a dozen employees and a small business server is often used to manage multiple network services which are email, threat management, file sharing, and data backups.

In a large company they would have many servers to do only one task. These separate servers can be print servers, and data servers which would only do the task that they were assigned.

1. HTTP versus HTTPS
   1. What does HTTP stand for? Why is it used in front of web addresses (e.g. <http://www.google.com>)

* (Hypertext Transfer Protocol) Is a application layer protocol which is basically it is the protocol followed for information sent from a user’s web browser to the website they are visiting, this allows the information to be sent in plain text which means that if it were intercepted, it could easily be taken and understood.
  1. What does HTTPS stand for? How is it different from HTTP?
* (Hypertext Transfer Protocol Secure) Is similar to HTTP except this encrypts information before sending it to the website, making it difficult for interceptors to take the information as it could require complex decrypting.
  1. Discuss some other services such as: FTP, SMTP, etc.
* FTP - File Transfer Protocol, is a language allowing software to communicate across ends of a connection, not as secure as Https but is more often used for business reasons with colleagues, clients, and other companies.
* SMTP - Simple Mail Transfer Protocol, used when email is delivered from email software client to email server or from one email server to another email server.

1. Web Server
   1. What functions does a “Web Server” provide?

* 1.Client’s browser divides URL to different parts such as, address, path name, and protocol.
* 2.DNS translates the domain name into the corresponding IP address
* 3.The browser decided which protocol should be used for the situation (Client).
* 4.The application client/browser sends GET request to web server to retrieve address it has been given, verifies the address, finds the necessary files, runs the appropriate scripts, exchanges cookies if necessary and returns the information back to the browser.
* 5.Browser converts the data to HTML and displays the results to the user, if it is not found, an error message is sent to the client and the browser.
  1. What special hardware and software is required by a “Web Server”?
* The web server would need two 1.6 Ghz CPU, 3.5 GB ram and a hard disk drive of at least 40 GB. The software needed is internet information services (IIS) 6,7, 7.5, and 8. I would also need  windows PowerShell 2, 3, and 4. The operating system would depend on the Internet Information Service that is being used.
  1. What different types of web servers are used by companies on the internet?
* Internet Information Services (IIS) - Microsoft
* Sun Java System Web Server - Sun Microsystems

1. Database Server
   1. What functions does a “Database Server” provide?

* Operate large quantities of data by inputting, storing, retrieving, and managing that data.
* Provide one set of software programs to all users with access to all the data.
  1. What special hardware and software is required by a “Database Server”?
* The Following should  be taken into account when looking for suitable hardware and while creating or buying software:
* High-traffic or low-traffic webshop
* Number of visitors per day/month
* Maximum number of simultaneous visitors
* Maximum number of order lines in the shopping basket
* Number of simultaneous orders
* Size and complexity of the products catalog (number of products, product categories, attributes)
* Number of articles in the webshop
* Number of search queries
* Size of the database
* The hardware needed for many low end Database Servers is four 1.6 GHz CPUs, 7 GB of RAM, and at least 40 Gb of free space in a hard disk drive. The software needed is:

|  |  |
| --- | --- |
| **Component** | **Notes** |
| Microsoft SQL Server 2012 Service Pack 1  -or-  Microsoft SQL Server 2012 | * Enterprise, Business Intelligence, Standard, Web, Express |
| Microsoft SQL Management Studio 2012 | * Enterprise, Business Intelligence, Standard, Web, Express |
| Microsoft SQL Server 2008 R2  -or-  Microsoft SQL Server 2008 with Service Pack 1 or later  -or-  Microsoft SQL Server 2005 with Service Pack 2 or later | * Express, Workgroup, Web, Standard, Enterprise and Datacenter editions are supported * Web edition is recommended * Express edition can only be used if the database size is under 4GB |
| Microsoft SQL Management Studio 2008 R2  -or-  Microsoft SQL Management Studio 2008  -or-  Microsoft SQL Management Studio 2005 | * Express, Workgroup, Web, Standard, Enterprise and Datacenter editions are supported |

* 1. What different types of web servers are used by companies on the internet?
* Refer to Question #5, C.
  1. How are Database Servers related to Web Servers and other Transaction Servers?
* They are related because they all involve manipulating some amount of data, for database servers, they must manipulate significantly more data than the other 2 types of servers as it holds more types of information compared to web servers not having to hold as diverse information in the context of types of data.
* They are also different because they manipulate the data differently because database servers manipulate data for one user to be able to access efficiently, whereas transaction servers allow realtime data to be exchanged and manipulated with 2+ parties, and web servers allow multiple people or even users on their own to manipulate/access data.
* (All involve user information)

1. Email Server
   1. What functions does a “Email Server” provide?

Allows Users to:

* Send emails to other email addresses
* Receive sent emails to user’s address
* Send and receive emails from most other email servers
* Receive promotional emails (Advertisements) sent in mass bunches, spam, etc. without needing explicit consent by the user.
  1. What special hardware and software is required by a “Email Server”?
* **Mail Host** - Machine designated as main mail machine on the network, where other systems on the site forward mail that cannot be delivered is sent.
* Mailboxes are single files that contain emails for a user, A **mail server** is any system that maintains mailboxes within it.
* A **Mail Gateway** is a machine that handles connections between networks that run different communications protocols or communications between different networks that use the same protocol
* **Mail User Agent** program that acts as the interface between the user and mail transfer agent.
* **Mail Transfer Agent** responsible for the routing of mail messages
* A **Local Delivery Agent** is a program that implements a mail delivery protocol
* The **Mail Address** contains the name of the recipient and the system to which the mail message is delivered.
* **SMTP** is the standard mail protocol that is used on the Internet.
  1. What different types of email servers are used by companies on the internet?
* Web-Based Email - Most common type of server used by Google and Yahoo, etc.
* POP3 (Post Office Protocol 3) Email Servers - Used by Internet Service Providers, to provide users with email accounts with their services.
* IMAP (Internet Message Access Protocol) - alternative to POP3, often used by business email accounts because it allows users to preview, delete and organize emails before they transfer them from the email server to their computers. Also leaves copy of email on server until user decides to delete them.
* SMTP (Simple Mail Transfer Protocol) - Work alongside other mail servers and are in charge of handling the email that users send out from their email clients.

1. Other Transaction Server (e.g. Voice over IP / Skype , Banking, PayPal, StubHub, etc.)
   1. What is a “Transaction Server”?   
      How is it different from a “Web Server”?

* A Transaction Server is a specialized type of server that manages the processes of software based transactions. It manages transactions on an application and/or database on a network or on the internet.
* This is different from a web server because this is specially tailored for transaction process management whereas web servers are more general purpose for the websites and the like that they are used for.
  1. Discuss some transaction services such as those listed above?
* Video game microtransactions
* Netflix/Crunchyroll, etc. subscriptions
* Buying applications/software online

1. Online Game
   1. Discuss the network services you would use when playing a tropical online game.

* DNS (Domain Name System) - Used by game owners to track users and be able to IP ban them if they violate terms of service
* [Authentication servers](https://en.wikipedia.org/wiki/Authentication_server) - identify, authenticate, and provide users with account profiles by taking in and authenticating Email addresses and can log usage data on those accounts
* File Server - For many files concerning things like maps, user/character data, etc.
* Time Service - For games that display the current time in the client
* World Wide Web - Allows online games to be played directly on the web browser itself on a WWW domain.
* Instant Messaging - For games (Most that exist now) to allow users to communicate with other users through text. Sends these messages through the server at the game developer’s building.
  1. List some of the  ways the client software uses different network services.
* Voice Over IP - In-Client service that allows you to communicate with other user’s through speech.
* Video On Demand - Allows videos imbedded by developers to be played directly on the client.

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