How the web works questions

1. What are the advantages of packet switching in comparison to circuit switching?

The packets don't necessarily take the same path in packet switching while circuit switching they do. This is an advantage for security; if there is a hacker listening for packets they won't really be able to receive all of them due to the random paths they take with packet switching.

Packet switching is also more efficient since a link can be used by many users. Circuit switching on the other hand uses a dedicated link for only one person.

2. What are the five essential elements of the early web that are still the core features of the modern web?

Usability - I think the early web tried to be usable, but didn't really accomplish it due to lack of technology and an even further lack of good design principles. In today's web, design is at the head of usability for users.

Accessibility - As technology has progressed accessibility has been tailored to. Creating sites with user experience (UX) in mind is key to the modern principles for web access. The web is the biggest platform of information and nobody should be denied access for any reason.

Scaleability - The web has and should be ever growing in scale, access, and speed.

Search Capabilities - From the early browsers to modern, the idea has always been to search for a desired topic and receive accurate search results. Obviously over time the accuracy of search engines has increased dramatically and should continue to do so.

Content - This is more for the academically inclined, but the web should be chalk full of information for the pursuit of knowledge.

3. Describe the relative advantages and disadvantages of web- based applications in comparison to traditional desktop applications.

Web based applications are generally slower because all the media is not stored locally on the device. The advantage to the application being stored off device is it doesn't take up any local storage on the device. Another advantage to web based applications is there are very little to no updates. Web based applications are most often than not cross platform instead of native, meaning they will work with different manufacturer's devices.

4. What is an intranet?

"a local or restricted communications network, especially a private network created using World Wide Web software." - Google dictionary

A good example of this would be different parts of Dixie State's website such as Canvas or Banner. It uses internet technologies i.e. http, tcp, ip, etc. but is private to students, staff, faculty etc.

5. What is a dynamic web page? How does it differ from a static page?

A dynamic web page can change depending on user input, credentials, settings, mouse hover, mouse clicks, scroll ups and downs, and tons of other user actions. Static web pages never change; they always show the same content no matter what. Super boring.

Dynamic web pages are also responsive, where they change dependent on the device they are viewed on. They way they change can vary, but the main idea is to keep the user interface as intuitive as possible.

6. What does Web 2.0 refer to?

"the second stage of development of the World Wide Web, characterized especially by the change from static web pages to dynamic or user-generated content and the growth of social media" - Google dictionary

After the dot com 'bubble burst' in 2001 two companies, O'Reilly and MediaLive International, had a conference to discuss and brainstorm where the web would go in the future. Two men from those conferences, Tim O'Reilly and Dale Dougherty, are credited with the term 'Web 2.0' to describe the new view and path of the internet. Web 2.0 doesn't really refer to any one web technology, but is used to describe the current trends the web is taking.

7. Describe the four layers in the four-layer network model.

The four layers (from bottom to top) are:

Link - Ethernet protocol frames data handed down from internet layer. Ethernet is primarily used for local area networks. This layer is also where the ethernet packet is turned into electrical 1's and 0's (by the Network Interface Card or NIC) and sent on media (usually CAT-5e or CAT-6 cable).

Internet - Internet protocol (IP) received data from the transport layer and creates a packet with an IP header, which primarily includes destination IP address and source IP address. IP addresses are used for routing, which is generally off of the local area network.

Transport - Transport Control Protocol (TCP) and User Datagram Protocol (UDP) both create datagrams for transport to the destination. The destination is usually from host to host and also usually off of the LAN. In essence, TCP makes sure all the datagrams arrive at the host and resends anything the host requires and UDP could care less and just sends data no matter what.

Application - This is where the data usually begins. Protocols such as HTTP operate at this layer. The application layer makes a lot of use out of the underlying layers such as TCP to complete tasks.

8. What is the Internet Protocol (IP)? Why is it important for web developers?

IP is a protocol used for routing between networks and is best described in the TCP/IP model, layer 2. It's most common use is the internet, but it can be used in private networks such as specific intranets.

9. What is the client-server model of communications? How does it differ from peer-to-peer?

The client used the server for almost everything; IP address, authentication, DNS, user profiles, configuration, etc. The client is pretty dumb and uses the server for almost all of it's configuration and network setup. The server usually hosts different applications that are available to the client. This keeps the client data storage to a minimum and a one stop for software updates. Peer-to-peer is the pretty much the opposite; the peer is it's own entity. It fetches it's own IP address, stores it's own applications, performed authentication locally, etc. Most personal computers are used in this fashion.

10. Discuss the relationship between server farms, data centers, and Internet exchange points. Be sure to provide a definition for each.

Server Farm - A server farm or server cluster is a collection of computer servers - usually maintained by an organization to supply server functionality far beyond the capability of a single machine.

Data Center - a large group of networked computer servers typically used by organizations for the remote storage, processing, or distribution of large amounts of data.

Internet Exchange Points - An Internet exchange point (IX or IXP) is a physical infrastructure through which Internet service providers (ISPs) and Content Delivery Networks (CDNs) exchange Internet traffic between their networks (autonomous systems).

Seems like server farms and data centers could be used in the same ways since they are mainly a bunch of servers networked together to ultimately do some task. Internet exchange points would most likely use data centers and server farms to process internet traffic.

12. Describe the main steps in the domain name registration process.

The first step is to find out if the desired domain name is available from an Internet Corporation of Assigned Names and Numbers (ICANN) certified registrar or reseller. Once it is approved the reseller will notify the registrar and the registrar will hand the domain name to the registry operators. Registry operators will manage the domain name along with others in an authoritative master database (registry).

13. What are the two main benefits of DNS?

You don't have to remember IP addresses, we can remember URLs such as www.google.com. Using DNS servers gives a LAN one place to get an IP address from instead of all the computers having to know all the IP addresses.

14. How many levels can a domain name have? What are generic top-level domains?

"In theory this subdivision can go down to 127 levels deep, and each DNS label can contain up to 63 characters, as long as the whole domain name does not exceed a total length of 255 characters. But in practice most domain registries limit at 253 characters." -Google

Generic top-level domains would be: .com, .mil, .edu, .org, .net, and .gov.

15. Describe the main steps in the domain name address resolution process.

If the client didn't have the domain name in it's local table it would send a query with a Fully Qualified Domain Name (FQDN) to whatever DNS server it was assigned (usually a Google DNS server). That DNS server will scan it's tables to find a matching IP address for the FQDN. If it cannot it will send a query to it's own DNS server. This process will continue until the FQDN is found and an IP address was sent to the client.

16. How many requests are involved in displaying a single web page?

There would be one request if it was a single index.html with no included script files or stylesheets. Usually there is a menagerie of files included in an index.html which all would have their own get request from the browser.

17. How many distinct domains can be hosted at a single IP address?

Come to find out as many as you want with a thing called shared hosting. The browser includes the domain name in the request so one IP can host as many domain names it can as long as they are unique. This description from StackOverflow was really well written:

> “In name-based virtual hosting, also called shared IP hosting, the virtual hosts serve multiple hostnames on a single machine with a single IP address. This is possible because when a web browser requests a resource from a web server using HTTP/1.1 it includes the requested hostname as part of the request. The server uses this information to determine which web site to show the user. When you register/purchase your domain name on a particular "registrars name server", your DNS settings are kept on their server, and in most cases point your domain to the Name Server of your hosting provider. This Name Server is where the IP number (currently associated with your domain name) resides.”

18. What is the LAMP stack? What are some of its common variants?

Linux Apache MySql PHP. There is also W(windows)AMP. All of these technologies can be supplemented with something else. For example, MySql could be replaced with PostgreSql or MongoDb.