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**Chapter 2 Solutions**

**Review Questions**

- 1. In one or two paragraphs, describe how the Internet changed from a government research project into a technology for business users.**

*Answer:* In the early 1960s, the U.S. Department of Defense began examining ways to connect computers to each other and to weapons installations distributed all over the world. Employing many of the best communications technology researchers, the Defense Department funded research at leading universities and institutes. The goal of this research was to design a worldwide network that could remain operational, even if parts of the network were destroyed by enemy military action or sabotage. In 1969, Defense Department researchers in the Advanced Research Projects Agency (ARPA) used this direct connection network model to connect four computers—one each at the University of California at Los Angeles, SRI International, the University of California at Santa Barbara, and the University of Utah—into a network called the ARPANET. The ARPANET was the earliest of the networks that eventually combined to become what we now call the Internet.

E-mail was born in 1972 when Ray Tomlinson, a researcher who used the network, wrote a program that could send and receive messages over the network. This new method of communicating became widely used very quickly. As personal computers became more powerful, affordable, and available during the 1980s, companies increasingly used them to construct their own internal networks. Although these networks included e-mail software that employees could use to send messages to each other, businesses wanted their employees to be able to communicate with people outside their corporate networks.

- 2. In two paragraphs, outline how the ideas of Vannevar Bush and Ted Nelson became key elements of the World Wide Web.**

*Answer:* In 1945, Vannevar Bush, who was director of the U.S. Office of Scientific Research and Development, wrote an article in *The Atlantic Monthly* about ways that scientists could apply the skills they learned during World War II to peacetime activities. Bush speculated that engineers would eventually build a machine that he called the Memex, a memory extension device that would store all of a person's books, records, letters, and research results on microfilm. Bush's Memex would include mechanical aids, such as microfilm readers and indexes, that would help users quickly and flexibly consult their collected knowledge.

In the 1960s, Ted Nelson described a similar system in which text on one page links to text on other pages. Nelson called his page-linking system hypertext. Douglas Engelbart, who also invented the computer mouse, created the first experimental hypertext system on one of the large computers of the 1960s. In 1987, Nelson published *Literary Machines*, a book in which he outlined project Xanadu, a global system for online hypertext publishing and commerce.

In 1989, Tim Berners-Lee was trying to improve the laboratory research document handling procedures for his employer, CERN: European Laboratory for Particle Physics. Berners-Lee proposed a hypertext development project intended to provide this data-sharing functionality. Over the next two years, Berners-Lee developed the code for a hypertext server program and made it available on the Internet.

**3. In about 100 words, describe the function of the Internet Corporation for Assigned Names and Numbers. Include a discussion of the differences between gTLDs and sTLDs in your answer.**

*Answer:* Since 1998, the Internet Corporation for Assigned Names and Numbers (ICANN) has had the responsibility of managing domain names and coordinating them with the IP address registrars. ICANN is also responsible for setting standards for the router computers that make up the Internet. Since taking over these responsibilities, ICANN has added a number of new TLDs. Some of these are generic top-level domains (gTLDs), which are available to specified categories of users. Note that ICANN is itself responsible for the maintenance of gTLDs. Other new domains are sponsored top-level domains (sTLDs), which are TLDs for which an organization other than ICANN is responsible.

**4. The Web uses a client/server architecture. In about 100 words, describe the client and server elements of this architecture, including specific examples of software and hardware that are used to form the Web.**

*Answer:* The Web is software that runs on computers that are connected to each other through the Internet. Web client computers run software called Web client software or Web browser software. Examples of popular Web browser software include Google Chrome, Microsoft Internet Explorer, and Mozilla Firefox.

Web browser software sends requests for Web page files to other computers, which are called Web servers and a Web server computer runs software called Web server software. The Web server software receives requests from many different Web clients and responds by sending files back to those Web client computers. Each Web client computer's Web client software then renders those files into a Web page. Thus, the purpose of a Web server is to respond to requests for Web pages from Web clients. This combination of client computers running Web client software and server computers running Web server software is an example of a client/server architecture.

**5. In about 100 words, explain the difference between an extranet and an intranet. In your answer, describe when you might use a VPN in either.**

*Answer:* The term intranet describes an Internet that does not extend beyond the organization that created it. In the past, most intranets were constructed by interconnecting a number of private networks; however, organizations today can create secure intranets using VPN technologies. If security is not an issue, they can even build intranets using public networks. Similarly, an extranet was originally defined as an intranet that had been extended to include specific entities outside the boundaries of the organization, such as business partners, customers, or suppliers. Extranets were used to save money and increase efficiency by replacing traditional communication tools such as fax, telephone, and overnight express document carriers.

**6. In about 100 words, explain how markup tags work in HTML, and describe the function of the HTML anchor tag. Explain the importance of the anchor tag in the evolution of electronic commerce activity on the Web.**

*Answer:* A text markup language specifies a set of tags that are inserted into the text. These markup tags, or tags, provide formatting instructions that Web client software can understand. The Web client software uses those instructions as it renders the text and page elements contained in other files into the Web page that appears on the screen of the client computer.

The most important tag in HTML is the Anchor Hypertext Reference tag, which is the tag that provides a link to another Web page (or another location in the same Web page). In HTML, hyperlinks are created using the HTML anchor tag.

**7. In about 200 words, define “markup languages.” Include overviews of HTML and XML in your definition. As part of your answer, provide examples of at least two situations in which an organization would use XML and two situations in which an organization would use HTML.**

*Answer:* The page structure and text of a Web page are stored in a text file that is formatted, or marked up, using a text markup language. A text markup language specifies a set of tags that are inserted into the text. These markup tags, or tags, provide formatting instructions that Web client software can understand.

Hypertext Markup Language (HTML) was derived from the more generic meta language SGML. HTML defines the structure and content of Web pages using markup symbols called tags. Over time, HTML has evolved to include a large number of tags that accommodate graphics, Cascading Style Sheets, and other Web page elements.

Although Extensible Markup Language (XML) is also derived from SGML, it differs from HTML in two important respects. First, XML is not a markup language with defined tags. It is a framework within which individuals, companies, and other organizations can create their own sets of tags. Second, XML tags do not specify how text appears on a Web page; the tags convey the meaning (the semantics) of the information included within them.

- 8. In about 100 words, describe the differences between symmetric and asymmetric connections. Include a discussion of why one might be preferable to the other in a specific situation.**

*Answer:* Symmetric connections provide the same bandwidth in both directions. Asymmetric connections provide different bandwidths for each direction.

- 9. In about 100 words, describe how ontologies and resource description frameworks could help software agents provide useful services on the Semantic Web.**

*Answer:* For software agents to perform their functions, Web standards must include XML, a resource description framework, and an ontology. While XML tags can describe the semantics of data elements, a resource description framework (RDF) is a set of standards for XML syntax. It would function as a dictionary for all XML tags used on the Web.

An ontology is a set of standards that defines, in detail, the relationships among RDF standards and specific XML tags within a particular knowledge domain. Ontologies and the RDF would provide the intelligence about the knowledge domain so that software agents could make decisions as humans would.

## Exercises

- 1. In 2003, ICANN and the major domain name registries began offering a five-day grace period for new domain registrations. The idea was to give registrants time to correct typographical errors and misspellings in the names they registered. If a registrant found an error in that five-day period, they could cancel their registration and, presumably, re-register a corrected domain name. This policy led to a problem called “domain tasting” that required considerable effort and cooperation to resolve nearly six years after the policy was implemented. Using your library or your favorite search engine, learn more about domain tasting. Prepare a report of about 300 words that defines domain tasting, outlines its negative effects on Web users, and describes how the problem of domain tasting was resolved.**

*Answer:* The Internet Corporation for Assigned Names and Numbers is responsible for managing and doling out Internet domain names. It is not an easy job. And making it harder was a scheme used by some registrars known as domain tasting. Someone would buy up lots of domain names, try them out, and then get rid of the unprofitable ones, all without losing any money. As long as the registrar dumped the domains within the five-day grace period, known as the Add Grace Period (AGP), a full refund was given.

Designed by ICANN to help registrars who made errors in their domain names, the grace period refund was quickly abused by Web sites that populated their domains with lots of ad links that redirected visitors to other sites. It also led to the unavailability of popular names that were scooped up by domain tasters.

In June 2008, ICANN decided to act. The organization stopped refunding the 20-cent annual fee for each registered deleted domain name beyond a certain limit.

But since 20 cents per domain wasn't much of a penalty, ICANN got tougher. The organization began charging registrars \$6.75 (the cost of a current .org domain) or higher for each deleted domain beyond a certain limit during the grace period. ICANN has reported that the new policy resulted in a 99.7 percent decrease in domain deletions from June 2008 to April 2009.

*Source:* [http://news.cnet.com/8301-13578\\_3-10309051-38.html](http://news.cnet.com/8301-13578_3-10309051-38.html)

- 2. Bridgewater Engineering Company (BECO), a privately held machine shop, makes heavy-duty machinery for factory assembly lines. It sells its presses, grinders, and milling equipment using a few inside salespeople and telephones. It buys its raw materials and supplies from a variety of steel mills and small-parts fabricators located around the world. BECO's president, Tom Dalton, has hired you as a consultant and would like your advice regarding how best to share information with the company's suppliers. Tom would like to connect his network of computers into their ordering systems so he can order supplies quickly when he needs them. He is interested in learning more about how he can use the Internet to set up such connections. Use the Web and the book's accompanying Web Links to locate information about extranets and VPNs. Write a report that briefly describes how companies use extranets to link their systems with those of their suppliers, and then write an evaluation of at least two companies (using information you have gathered in your Web searches) that could help develop an extranet that would work for Tom. Close the report with an overview of how BECO could use VPN technologies in this type of extranet. The three parts of your report should total about 500 words.**

*Answer:* Responses will vary significantly in this exercise. Any recommendation for systems development should include the infrastructure required to support a supply-chain management extranet, as well as the costs and the anticipated benefits. The infrastructure for a private network requires a TCP/IP network, Web authoring software, and a firewall server. The benefits include lower communication costs, and more timely and accessible information, as well as convenient use.

- 3. Tanya Trago is the IT manager for Greenway Enterprises, a large landscaping company with hundreds of home and commercial customers. She is interested in finding ways to reduce the costs of maintaining the company's tree trimming and lawn maintenance equipment. Greenway runs its own repair and maintenance facility because it operates a large number of mowers, cranes, backhoes, and similar machinery. The facility purchases replacement parts and repair supplies for all of this equipment. Tanya is interested in creating a database to track these parts and supplies. She would also like to integrate that database with information provided by the vendors that sell those parts and supplies to Greenway. Several of these vendors use XML tags to describe their inventory, but no common standard tag system has been adopted in the industry. Use the Web Links, the Web, and your library to conduct research on the use of XML in the landscaping equipment and machinery industry, summarize your findings, and prepare a report of about 300 words in which you give Tanya advice on the advantages and disadvantages of using XML tags as descriptors in this situation.**

*Answer:* Responses will vary. Some advantages worth considering include:

- XML includes data-management capabilities that HTML cannot provide
- Information coded in XML is easy to read and understand
- New tags can be created as needed
- Multiple data types can be included

- 4. As you learned in this chapter, XML allows users to define their own markup tags. You also learned that this flexibility can lead to problems when IT professionals who have developed tag sets for their own organizations share information with other organizations that are using other tag sets. One way organizations can avoid this problem is to agree to follow common standards. A common standard for financial information is XBRL. Accountants and financial analysts around the world have agreed to use XBRL to format financial statements and other reports. In about 300 words, outline the advantages that companies and financial analysts can obtain by using the XBRL standard. You can research this subject in your school library or online using your favorite search engine and the links provided for this exercise in the Web Links.**

*Answer:* Answers will vary, but some advantages that companies and financial analysts can obtain by using the XBRL standard include: the ability to share information easily with other organizations; costs saved by not having to develop a new standard; and community support of organizations using the same standard.

- 5. Frieda Bannister is the IT manager for the state of Iowa's Department of Transportation (DOT). She is interested in finding ways to reduce the costs of operating the DOT's vehicle repair facilities. These facilities purchase replacement parts and repair supplies for all of the state's cars, trucks, construction machinery, and road maintenance equipment. Frieda has read about XML and thinks that it might help the DOT send orders to its many suppliers throughout the country more efficiently. Use the Online Companion links, the Web, and your library to conduct research on the use of XML in state, local, and federal government operations. Provide Frieda with a report of about 500 words that includes sections that discuss what XML is and explain why XML shows promise for the ordering application Frieda envisions. Your report should also identify other DOT business processes or activities that might benefit from using XML. The report should also include a summary of the main disadvantages of using XML today for integrating business transactions. End the report with a brief statement regarding how the W3C Semantic Web project results might help the DOT operate more efficiently in the future.**

*Answer:* Responses should include the following points:

- XML uses markup tags to describe the meaning or semantics of the text.
  - XML records are embedded in HTML documents.
  - With XML, tags can be created that identify all the record details for the ordering application that Frieda envisions.
  - The extensibility of XML is also its weakness. Sharing data across organizations means that the organizations must use the same tag names. For example, Frieda's organization might create a tag called "PurchaseOrderNumber," and one of her suppliers might call the same item "OrderNum".
  - The W3C Semantic Web will allow XML tags to be read by software agents, which will result in better, less-timely searching on the Web for information. This would allow the DOT to research pricing, availability, etc. of parts from suppliers.
- 6. You are the assistant to Yin Chan, the service manager of Quick Fix Repair Systems. Quick Fix offers repair and maintenance services to homeowners throughout the tri-state area. Quick Fix service technicians can each do minor plumbing, electrical, and carpentry work. Yin wants to equip each service technician with the technology they need to report their time and materials usage on each job. Today, the service technicians carry a notebook computer for recording this information at job sites.**



Many of them also carry a smart phone to stay in touch with the office, order parts that they do not have with them, and keep track of their schedule. Yin would like to ensure that service technicians have access to the Quick Fix main computers while they are on the job site so they can check supplies inventory and access Quick Fix service guides that help them make repairs in the most effective ways possible. Yin asks you to investigate various options for giving her service technicians wireless remote access to the Quick Fix main computers. She wants you to consider options that use the technicians' notebook computers or that use their smart phones. Prepare a report for Yin in which you discuss the advantages and disadvantages of having the technicians use notebook computers and smart phones for access to the Quick Fix main computers. The smart phones are connected through a corporate wireless phone plan that provides unlimited data transfers each month; you are to briefly review at least three options for connecting the notebook computers, writing no more than two paragraphs for each option. Then choose the best option and write a one-page evaluation of your choice's strengths and weaknesses. Use the Web Links and your favorite Web search engines to do your research.

*Answer:* Responses might include the following advantages and disadvantages:

Advantages

- Mobility/portability
- Flexible anywhere/anytime access to home office server
- Increase in productivity

Disadvantages

- Risk of eavesdropping and unauthorized use
- Wireless networking results in higher per unit costs
- Potential for radio interference due to weather, other wireless devices, or obstructions like walls

## Cases

### Case 1: C1. Internet Access in Hyderabad

1. Responses will vary. The most obvious implication of low Internet access is the creation of a digital divide. That is, the citizens of Hyderabad will not have access to information, goods, and services that are accessible through this technology and will therefore not be able to compete effectively in the world economy.
2. Trends in the growth of Internet-capable phones are as follows:
  - *Indian smartphone users spend more time on the Internet than traditional voice calls and DMS's*

- *On average. Indian smartphone users spend 2 hours and 30 minutes with smartphones and 72% of that time goes into gaming, entertainment, and Internet. Traditional voice calls and text messaging take a mere 28% of the time.*
  - *The younger Indians prefer to spend most of their time browsing the Internet on their smartphones with little time spent for SMS. Casual browsing of the phone like searching for contacts and setting alarms take 30 mins of the time for 15-24 year olds.*
  - *31+ year old Indians with smartphone have slightly different preferences. They spend less time browsing and texting when compared to 15-24 year olds, 31+ year olds spend more time on contact search and alarms.*
3. Responses will vary. The government of Hyderabad could consider developing:
- POTS
  - Wireless 3G network
  - Cable
  - Satellite
  - Fixed point wireless
  - Wireless 4G network

## **Case 2: Portable Fun Instruments**

1. Features of each delivery system are in constant development. Students should use resources such as those listed below to investigate each content delivery system:

DoCoMo: [www.nttdocomo.com](http://www.nttdocomo.com)

BREW: [brew.qualcomm.com](http://brew.qualcomm.com)

Apple: [www.apple.com](http://www.apple.com)

2. Answers will vary based on system features found at the above sites at the time of research. Student may point out that BREW is used internationally, and so may be a good fit for PFI's global game development strategy. NTTDoCoMo however, only offers widespread service in certain countries in Asia and Europe.