- Web distribution of software as a service will become increasingly prevalent. For example, Microsoft is planning for a future where Microsoft Office will be a Web application.

- M-commerce applications: The introduction of wireless devices such as the iPhone 3G, Blackberry Storm, and TMobile G1 3G cell phone that have the combined capabilities for voice, data, images, audio, and video, will encourage the continued development of many sophisticated mobile commerce applications in the near future.

Chapter 4

1. Name the six main pieces of the e-commerce site puzzle.

The six main pieces of the e-commerce site puzzle are the organizational capabilities and human resources you will need to build and manage the site, the hardware, the software, the telecommunications infrastructure you will need to meet the demands of your customers, and the site design you will need to implement your business objectives.

2. Define the systems development life cycle and discuss the various steps involved in creating an e-commerce site.

The systems development life cycle is a methodology for understanding the business objectives of any system so that an appropriate solution can be designed. The five major steps in the SDLC for an e-commerce site are: systems analysis, systems design, building the system, testing the system, and implementation. In the systems analysis step, the business objectives for the site are identified. The list of the necessary capabilities for the site is translated into lists of the types of information systems and the elements of information that will be needed to achieve them. Next, the main components in the system and their relationships to one another must be identified. The system design includes a data flow diagram and the physical components that will need to be purchased. After the system has been built and programmed, the program modules must be tested one at a time and then the site must be tested as a whole, examining every conceivable path a user might try to utilize while on the site. Implementation of an e-commerce site includes the continuing maintenance that will be needed over the life of the site to keep it functional, including correcting mistakes and continuing to improve, update, and modify links and other site features.

3. Discuss the differences between a simple logical and simple physical Web site design.

A simple logical design for a Web site describes the flow of information at the site including the processing functions that must be performed and the databases that will provide information. It also includes a description of the security and emergency backup procedures and the controls that will be used in the system. A simple physical design, on the other hand, translates the logical design into the physical components that will be needed such as the servers, software, and size of the telecommunications link, backup servers, and security system.

4. Why is system testing important? Name the three types of testing and their relation to one another.

System testing is important because there can be up to thousands of different pathways within a typical e-commerce Web site and you must make sure that customers can find what they want easily and quickly and, most importantly, that they can complete a purchase without a hitch. The three types of testing that must be completed are unit testing, which involves checking each program module; system testing, which includes testing the site as a whole in the way a "typical" user might navigate and make requests for functionality; and acceptance testing, which requires the firm's key personnel and managers to use the system to verify that the business objectives as originally conceived are being met.

5. Compare the costs for system development and system maintenance. Which is more expensive, and why?

The costs for system maintenance for an e-commerce Web site, can run anywhere from 50 percent to 100 percent, per year, of the original systems development costs. For small sites the annual maintenance cost can parallel the development costs, with larger sites achieving some economies of scale. Maintenance is more expensive because e-commerce sites are always in a process of change, improvement, and correction. E-commerce sites are in fact, never finished. They are always in the process of being built and rebuilt.

6. Why is a Web site so costly to maintain? Discuss the main factors that impact cost?

Web sites are so costly to maintain because code must be debugged, hyperlinks must be tested and repaired continually; emergencies must be handled; and reports, data files, and links to backend databases must be maintained and updated as necessary. General administrative tasks of the site require attention including updating the products and prices. Changes and enhancements to the system are also continually being made so that the site is always adapting to changing market conditions. All of this requires a Web team that includes programmers, designers, and business managers from the marketing, sales support, and production departments. This will ensure timely response to customer feedback and that the site is adequately monitored for correct prices and links with updated page display.

7. What are the main differences between single-tier and multi-tier site architectures?

Single-tier site architecture simply consists of a server machine running the basic Web server software. Multi-tier site architecture, on the other hand, provides much more functionality by linking a Web server layer that can include multiple Web servers to a middle tier that includes many Web application servers, which provide a wide variety of transaction processing tasks. This middle layer is also linked to a backend layer that includes existing databases, human resources systems, corporate applications, financial data, and enterprise systems. A multi-tiered site typically employs several or more physical computers each running some of the software applications and sharing the workload across many computers.

8. Name five basic functionalities a Web server should provide.

The basic functionalities a Web server should provide are:

a. processing HTTP requests (requests for HTML pages)
b. providing security services to verify the username and password or process the certificates and private/public key information required for credit card processing (Secure Sockets Layer or SSL)

c. processing FTP requests (transfers of very large files from server to server)
d. providing search engine services
e. capturing data such as logs of visits, time, duration, and referral sources
f. providing e-mail services including the ability to send, receive, and store e-mail
g. providing site management tools to calculate and display key site statistics such as unique visitors, page requests, and the origin of requests, as well as to check the links on the site

9. What are the three main factors to consider when choosing the best platform for your Web site?

In choosing the best platform to use for your Web site, the three main factors to consider are the anticipated number of simultaneous users who will likely visit your site, the customer user profile with their expected requests and behavior while at the site, and the nature of the content on your site. The more visitors you have, the greater the demand will be on your system. If the users will be viewing dynamic pages and large multimedia files, far more capacity will be required.

10**.** Why is Web server bandwidth an important issue for e-commerce sites?

The three factors discussed in Question 9 will help to determine the telecommunications link you will need for your site. Web server bandwidth is another important consideration because the larger the bandwidth available, the more customers that can hit your site simultaneously. Most ISPs or other site-hosting providers are obligated to provide enough bandwidth so that your site can meet peak demands. By the end of 2008, about 75 million American households had broadband cable or DSL access to the Internet and this will present additional demands for more dynamic content and additional site capacity.

11**.** Compare and contrast the various scaling methods. Explain why scalability is a key business issue for Web sites.

In order to meet the demands for service at your site, you can scale your hardware vertically, scale your hardware horizontally, or improve the processing architecture at your site. You scale vertically by upgrading the servers from a single processor to multiple processors. You can add up to 20 processors to a machine and also increase chip speeds. The drawbacks to this method are that it can become expensive to purchase new machines with every growth cycle, and that your entire site becomes dependent on just a small number of very powerful computers.

If you horizontally scale your site instead, you add multiple single processor servers to the site and balance the load among many servers. You can also create dedicated servers that only handle certain tasks such as HTTP requests or ASP pages, whereas others handle just database applications. This method requires the use of special load balancing software to direct the incoming requests to the appropriate server. This is a less expensive method because you can often use older PCs that otherwise might be discarded. Furthermore, if one machine fails, there is a good probability that another one of the many other machines can pick up the load.

The third alternative, improving the processing architecture, is a combination of both vertical and horizontal scaling and system design changes. The main concept is that the workload is split into Input/Output intensive activities and CPU intensive activities. The servers can then be fine tuned to handle simple requests for Web pages, or more CPU-intensive activities such as order taking. Scalability is a key business issue for Web sites because firms must be able to increase the size of

their sites as demand loads increase and they must be able to do so efficiently and cost effectively.

12. What are the eight most important factors impacting Web site design, and how do they affect a site's operation?

The eight most important factors impacting Web site design are:

a. Functionality: The site must have pages that load quickly, perform correctly, and send the user to the requested information about the product offerings.
b. Informational: The site must have links that the customer can find easily in order to obtain information about the company and the products it offers.
c. Ease of use: The site must have a simple foolproof navigation scheme.
d. Redundant navigation: The site must have alternative paths to reach the same content.
e. Ease of purchase: There should be no more than one or two clicks required for the purchasing procedure.
f. Multibrowser functionality: The site should work with the popular browsers.
g. Simple graphics: The site should not use distracting graphics and/or sounds that the user cannot control.
h. Legible text: The site should avoid the use of backgrounds that distort text or make it difficult to read.

Failure to pay attention to these factors will adversely affect the operation of a site because users will find the site frustrating to navigate and view, they will have difficulty obtaining information about the products, and they will determine that making a purchase will be far too complicated

13. What are Java and JavaScript? What role do they play in Web site design?

Java is a programming language that allows programmers to create interactivity and active content on the client machine. It saves load on the server because the Java programs or applets are downloaded to the client and executed on the client's computer. A Java Virtual Machine (VM) is now included in all browsers that will send a request to the server to download and execute the program and allocate page space to display the results. Java can be used to display interesting graphics and create interactive environments such as calculators or calendars. However, different vendors have produced different versions of the language and today many firms will not allow Java applets through their security firewalls. Many Java applets crash or perform poorly, wasting system resources for sometimes not very important functions that do not add much to the page design. Hence, they are not widely in use today by corporate Web sites.

Conversely, JavaScript is a programming language that is used to control the objects on an HTML page and handle interactions with the browser. It is commonly used to control verification and validation of user input, such as confirming that a valid phone number or e-mail address has been entered. It is much more acceptable to corporations because it is more stable and is restricted to the operation of requested HTML pages.

14. Name and describe three tools used to treat customers individually. Why are they significant to e-commerce?

The primary method for treating customers individually through personalization and customization is the placement of cookie files on the user's client machine. Cookies can be used to store information about the customer such as their customer ID, a campaign ID, and their prior purchases from the site. When a user returns to a site, the prior viewing and purchasing behavior can be accessed from a database, and the customer can be greeted by name and related products can be recommended. Other tools that enable personalization and customization include tools for interactivity and active content, such as CGI scripts, Active Server Pages, and Java Server Pages. Personalization and customization are significant to e-commerce because they can potentially make it nearly as powerful as a traditional marketplace and perhaps even more powerful than direct mail or shopping at an anonymous suburban shopping mall. Speaking directly to a customer and tailoring a product to that customer are potentially powerful marketing tools that could help to increase sales and revenues.

15. What are some of the policies e-commerce businesses must develop before launching a site and why?

Some of the policies that an e-commerce business site must develop prior to launching are a privacy policy, accessibility rules, and financial reporting policies. The privacy policy is a public statement detailing to customers how the personal information that is gathered at the site will be treated. Accessibility rules are a set of design objectives that ensure disabled users can effectively access a site.

Chapter 5

1. Why is it less risky to steal online? Explain some of the ways criminals deceive consumers and merchants.

The potential for anonymity on the Internet can allow criminals to assume identities that look legitimate and at the same time, shield them from law enforcement agencies. Using these assumed identities, criminals can place fraudulent orders with online merchants, intercept e-mail, steal customer information, and shut down e-commerce sites using software viruses.

2. Explain why an e-commerce site might not want to report being the target of cybercriminals.

E-commerce sites are often hesitant to report that they have been the target of cybercriminals because companies fear losing the trust of consumers. The actual amount of crime is difficult to estimate because of these fears. Companies fear that if they reveal the full extent of the theft of proprietary information and financial fraud legitimate customers will lose confidence in the e-marketing channel and will take their business back offline.

3. Give an example of security breaches as they relate to each of the six dimensions of e-commerce security. For instance, what would be a privacy incident?

- Integrity: This is the ability to ensure that information being displayed on a Web site or being transmitted/received over the Internet has not been altered in any way by an unauthorized party. One type of integrity security breach would be an unauthorized person intercepting and redirecting a bank wire transfer into a different account.
- Nonrepudiation: the ability to ensure that e-commerce participants do not deny their online actions. An example of a repudiation incident would be a customer ordering