

E-commerce 2014

business. technology. society.

tenth edition

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Chapter 1

The Revolution Is Just Beginning

Pinterest: A Picture Is Worth a Thousand Words

- **Have you used Pinterest or any other content curation sites? What are your main interests?**
- **Have you purchased anything based on a pin or board on Pinterest or any other curation site?**
- **Why do Pinterest links drive more purchasing than Facebook links?**



E-commerce Trends 2013–2014

- Expansion of social, local, and mobile e-commerce
- Mobile platform begins to rival PC platform
- Continued growth of cloud computing
- Explosive growth in “Big Data”
- E-books gain wide acceptance
- Continued growth of user-generated content



The First 30 Seconds

- **First 17 years of e-commerce**
 - ❖ Just the beginning
 - ❖ Rapid growth and change
- **Technologies continue to evolve at exponential rates**
 - ❖ Disruptive business change
 - ❖ New opportunities



What Is E-commerce?

- **Use of Internet and Web to transact business**
- **More formally:**
 - ❖ Digitally enabled commercial transactions between and among organizations and individuals



E-commerce vs. E-business

■ E-business:

- ❖ Digital enabling of transactions and processes within a firm, involving information systems under firm's control
- ❖ Does not include commercial transactions involving an exchange of value across organizational boundaries



Why Study E-commerce?

- E-commerce technology is different, more powerful than previous technologies
- E-commerce brings fundamental changes to commerce
- Traditional commerce:
 - ❖ Consumer as passive targets
 - ❖ Mass-marketing driven
 - ❖ Sales-force driven
 - ❖ Fixed prices
 - ❖ Information asymmetry



Eight Unique Features of E-commerce Technology

1. Ubiquity

Ubiquity is defined as an available just about every where , at all times . While traditional commerce based on marketplace , which is restricted to physical place and time , this is called bricks and mortar. When traditional commerce carried out by electronic means, and removed from temporal and geographic location , this is called marketspace.

Eight Unique Features of E-commerce Technology

- **2. Global reach** when e-commerce technology permits commercial transactions to cross cultural, regional, and national boundaries far more conveniently and cost-effectively than is true in TC. Therefore , the total of internet customer is equal the word's online population. Reach in e-commerce is defined as “The total number of users or customers an e-commerce business can obtain”.
- **3. universal standards**
- e-commerce has unusual feature of e-commerce technologies is that the technical standards of the Internet, and therefore the technical standards for conducting e-commerce, are **universal standards**—they are shared by all nations around the world. In contrast, most traditional commerce technologies differ from one nation to the next (e.g TV, Radio, mobile)
- universal standards **reduce search costs** —the effort required to find the prices of products.

Eight Unique Features of E-commerce Technology

- **4. Richness** refers to the complexity and content of a message.
- Traditional markets, national sales forces, and small retail stores have great richness: they are able to provide personal, face-to-face service using aural and visual cues when making a sale. The Internet has the potential for offering considerably . more information richness than traditional media such as printing presses, radio, and television because it is interactive and can adjust the message to individual users.
- **5. Interactivity** Unlike any of the commercial technologies of the twentieth century, with the possible exception of the telephone, e-commerce technologies allow for **interactivity**, meaning they enable two-way communication between merchant and consumer and among consumers. Traditional television, for instance, cannot ask viewers questions or enter into conversations with them, or request that customer information be entered into a form.

Eight Unique Features of E-commerce Technology

- **6. Information Density** the total amount and quality of information available to all market participants, consumers, and merchants alike.
- *Price transparency* refers to the ease with which consumers can find out the variety of prices in a market; *cost transparency* refers to the ability of consumers to discover the actual costs merchants pay for products.
- **7. Personalization/Customization**
- *Personalization* refers :merchants can target their marketing messages to specific individuals by adjusting the message to a person's name, interests, and past purchases. Today this is achieved in a few milliseconds and followed by an advertisement based on the consumer's profile.
- **Customization** means the changing the delivered product or service based on a user's preferences or prior behavior



Eight Unique Features of E-commerce Technology

- **8. Social Technology** : allowing users to create and share content with a worldwide community.



Web 2.0

- **Web 1.0** :The Internet started out as a simple network to support e-mail and file transfers among remote computers. The Web started out as a way to use the Internet to display simple pages and allow the user to navigate among the pages by linking them together electronically.
- **Web 2.0** : set of applications and technologies that allows users to create, edit, and distribute content; share preferences, bookmarks, and online personas; participate in virtual lives; and build online communities.
 - ❖ Examples: Twitter, YouTube, Instagram, Wikipedia, Tumblr
 - ❖ How many characters does twitter allow users to send messages ?



Types of E-commerce

- *May be classified by market relationship or technology*
- **Business-to-Consumer (B2C)**
- **Business-to-Business (B2B)**
- **Consumer-to-Consumer (C2C)**
- **Social e-commerce**
- **Mobile e-commerce (M-commerce)**
- **Local e-commerce**



Business-to-Business (B2B) E-commerce

- **Business-to-business (B2B) e-commerce**, in which businesses focus on selling to other businesses, is the largest form of e-commerce, with about \$4.7 trillion in transactions in the United States in 2013
- There is an estimated \$12.9 trillion in business-to-business exchanges of all kinds, online and offline, suggesting that B2B e-commerce has significant growth potential. The ultimate size of B2B e-commerce is potentially huge. There are two primary business models used within the B2B arena: Net marketplaces, which include e-distributors, e-procurement companies, exchanges and industry consortia, and private industrial networks.



- **Consumer-to-consumer (C2C) e-commerce** provides a way for consumers to sell to each other, with the help of an online market maker such as eBay or Etsy, or the classifieds site Craigslist. Given that in 2013, eBay is likely to generate around \$75 billion in gross merchandise volume around the world, it is probably safe to estimate that the size of the global C2C market in 2013 is more than \$90 billion.
- **Mobile e-commerce, or m-commerce**, refers to the use of mobile devices to enable online transactions. M-commerce involves the use of cellular and wireless networks to connect laptops, smartphones such as the iPhone, Android, and BlackBerry, and tablet computers such as the iPad to the Internet. Once connected, mobile consumers can conduct transactions, including stock trades, in-store price comparisons, banking, travel reservations, and more.



Class Discussion

- **Local e-commerce**, as its name suggests, is a form of e-commerce that is focused on engaging the consumer based on his or her current geographic location. Local merchants use a variety of online marketing techniques to drive consumers to their stores. Local e-commerce is the third prong of the social, mobile, local e-commerce wave, and is expected to grow in the United States from \$3.6 billion in 2011 to an estimated \$4.4 billion in 2013
e.g of local e-commerce is groupon which offers subscribers daily deals from local businesses in the form of “Groupons,” discount coupons that take effect once enough subscribers have agreed to purchase.

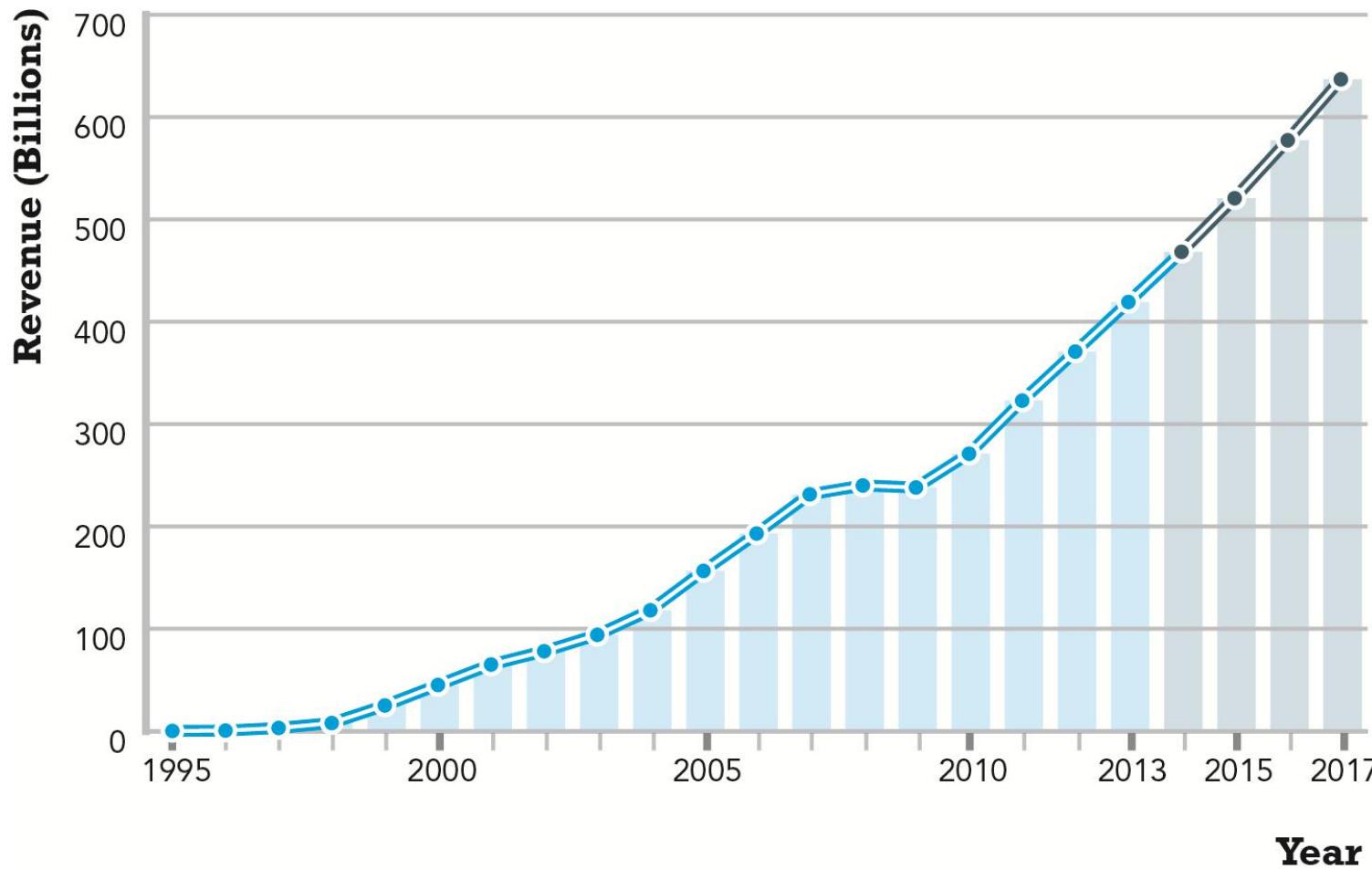


- **Business-to-Consumer (B2C) E-commerce** is The most commonly discussed type of e-commerce is **business-to-consumer (B2C) e-commerce**, in which online businesses attempt to reach individual consumers. B2C commerce includes purchases of retail goods, travel services, and online content. Even though B2C is comparatively small
- **Social e-commerce** is e-commerce that is enabled by social networks and online social relationships. It is sometimes also referred to as Facebook commerce, but in actuality is a much larger phenomenon that extends beyond just Facebook. The growth of social e-commerce is being driven by a number of factors, including the increasing popularity of social sign-on (signing onto Web sites using your Facebook or other social network ID), network notification (the sharing of approval or disapproval of products, services, and content via Facebook's Like button or Twitter tweets), online collaborative shopping tools, and social search (recommendations from online trusted friends).



The Growth of B2C E-commerce

Figure 1.3, Page 20

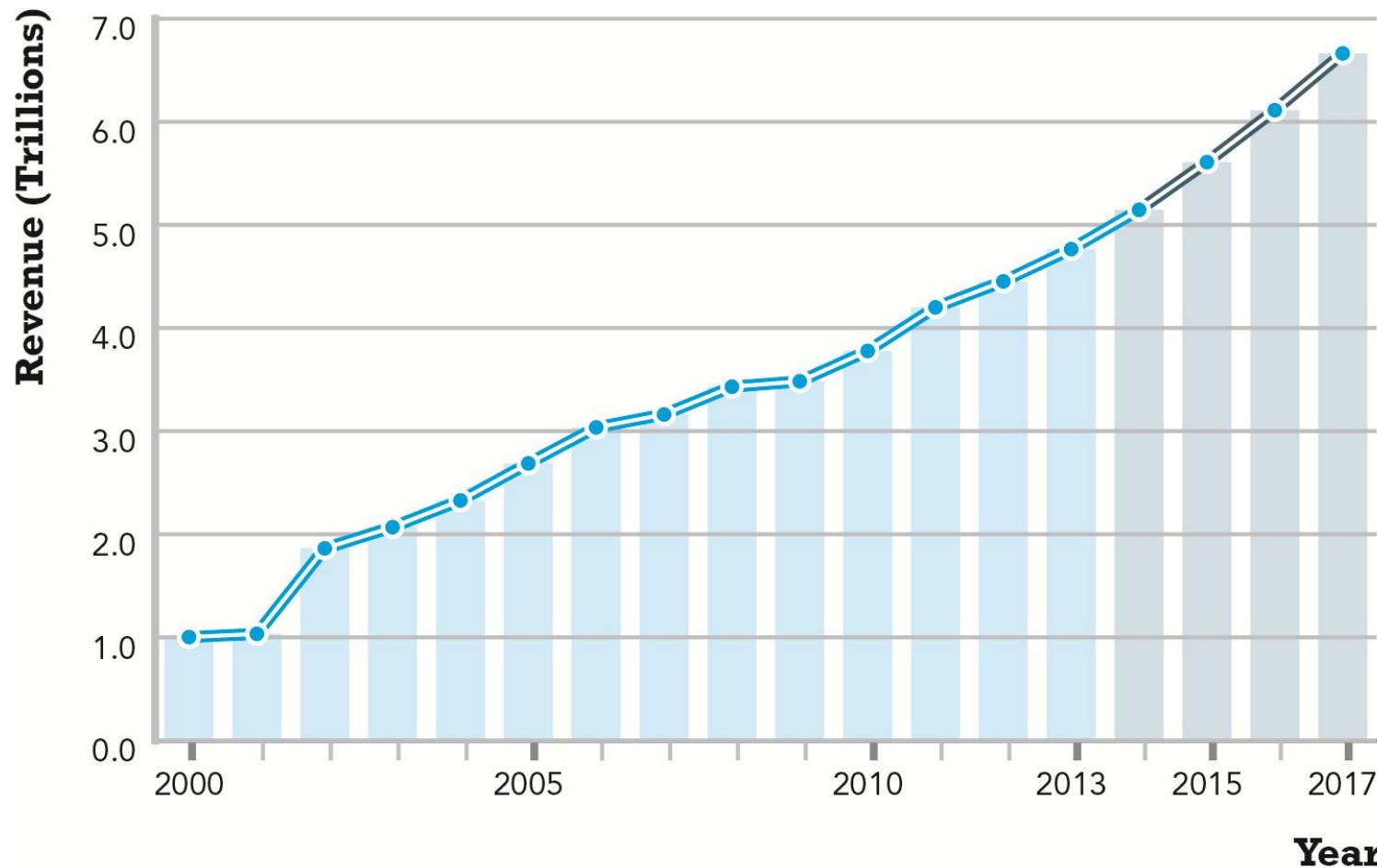


SOURCE: Based on data from eMarketer, Inc., 2013a; authors' estimates.



The Growth of B2B E-commerce

Figure 1.4, Page 21



SOURCE: Based on data from U.S. Census Bureau, 2013; authors' estimates.



The Internet

- Worldwide network of computer networks built on common standards
- Created in late 1960s
- Services include the Web, e-mail, file transfers, and so on
- Can measure growth by number of Internet hosts with domain names



The Web

- **Most popular Internet service**
- **Developed in early 1990s**
- **Provides access to Web pages**
 - ❖ HTML documents that may include text, graphics, animations, music, videos
- **Web content has grown exponentially**
 - ❖ Google reports 30 trillion unique URLs; 120 billion Web pages indexed



The Mobile Platform

- **Most recent development in Internet infrastructure**
- **Enables access to the Internet via wireless networks or cell-phone service**
- **Mobile devices include**
 - ❖ Tablets
 - ❖ Smartphones
 - ❖ Ultra-lightweight laptops

Will Apps Make the Web Irrelevant?

- What are the advantages and disadvantages of apps, compared with Web sites, for mobile users?
- What are the benefits of apps for content owners and creators?
- Will apps eventually make the Web irrelevant? Why or why not?



Origins and Growth of E-commerce

■ Precursors:

- ❖ Baxter Healthcare
- ❖ Electronic Data Interchange (EDI)
- ❖ French Minitel (1980s videotex system)
- ❖ None had functionality of Internet

■ 1995: Beginning of e-commerce

- ❖ First sales of banner advertisements

■ E-commerce fastest growing form of commerce in United States



E-commerce: A Brief History

■ 1995–2000: Invention

- ❖ Key concepts developed
- ❖ Limited bandwidth and media
- ❖ Euphoric visions of
 - Friction-free commerce
 - ❖ Lowered search costs, disintermediation, price transparency, elimination of unfair competitive advantage
 - First-mover advantages
 - ❖ Network profits
- ❖ Dot-com crash of 2000



E-commerce: A Brief History (cont.)

■ 2001–2006: Consolidation

- ❖ Emphasis on business-driven approach
- ❖ Traditional large firms expand presence
- ❖ Start-up financing shrinks up
- ❖ More complex products and services sold
- ❖ Growth of search engine advertising
- ❖ Business Web presences expand to include e-mail, display and search advertising, and limited community feedback features



E-commerce: A Brief History (cont.)

■ 2007–Present: Reinvention

- ❖ Rapid growth of:
 - Online social networks
 - Mobile platform
 - Local commerce
- ❖ Entertainment content develops as source of revenues
- ❖ Transformation of marketing
 - Coordinated marketing on social, mobile, local platforms
 - Analytic technologies



Insight on Business: Class Discussion

TABLE 1.4	EVOLUTION OF E-COMMERCE	
1995–2000 INVENTION	2001–2006 CONSOLIDATION	2007–PRESENT RE-INVENTION
Technology driven	Business driven	Mobile technology enables social, local, and mobile commerce
Revenue growth emphasis	Earnings and profits emphasis	Audience and social network connections emphasis
Venture capital financing	Traditional financing	Smaller VC investments; early small-firm buyouts by large online players
Ungoverned	Stronger regulation and governance	Extensive government surveillance
Entrepreneurial	Large traditional firms	Entrepreneurial social and local firms
Disintermediation	Strengthening intermediaries	Proliferation of small online intermediaries renting business processes of larger firms
Perfect markets	Imperfect markets, brands, and network effects	Continuation of online market imperfections; commodity competition in select markets
Pure online strategies	Mixed "bricks-and-clicks" strategies	Return of pure online strategies in new markets; extension of bricks-and-clicks in traditional retail markets
First-mover advantages	Strategic-follower strength; complementary assets	First-mover advantages return in new markets as traditional Web players catch up
Low-complexity retail products	High-complexity retail products and services	Retail, services, and content

Start-up Boot Camp

- Why do you think investors today are still interested in investing in start-ups?
- What are the benefits of investing in a company that is a graduate of a Y Combinator boot camp?
- Is an incubator the best solution for start-ups to find funding? Why or why not?



Assessing E-commerce

■ Many early visions not fulfilled

- ❖ Friction-free commerce
 - Consumers less price sensitive
 - Considerable price dispersion
- ❖ Perfect competition
 - Information asymmetries persist
- ❖ Intermediaries have not disappeared
- ❖ First mover advantages
 - Fast-followers often overtake first movers



Predictions for the Future

- **Technology will propagate through all commercial activity**
- **Large, traditional companies will continue to play dominant role, consolidating audiences**
 - ❖ Start-up ventures can still attract large audiences in non-dominated arenas
- **Integrated online/offline companies will experience more growth than purely online companies**
- **Additional factors:**
 - ❖ Increased regulation and control
 - ❖ Cost of energy



Understanding E-commerce: Organizing Themes

■ Technology:

- ❖ Development and mastery of digital computing and communications technology

■ Business:

- ❖ New technologies present businesses with new ways of organizing production and transacting business

■ Society:

- ❖ Intellectual property, individual privacy, public welfare policy



The Internet and the Evolution of Corporate Computing

Figure 1.11, Page 41

COMPUTER TECHNOLOGY

Mainframe Computers
1950 – 1975



Minicomputers
1970 – 1980



Personal Computers
1980 – Present



Local Area Networks
Client/Server Computing
1980 – Present



Enterprise-wide Computing
1990 – Present



Internet and Web
Mobile platform
1995 – Present



BUSINESS APPLICATION

Transaction automation
Payroll
Accounts receivable

Business function automation
Marketing
Human resources
Design

Desktop automation
Word processing
Spreadsheets
Databases

Workgroup automation
Document sharing
Project management
Messaging, e-mail

Enterprise-wide automation
Resource planning systems
Integrated finance-manufacturing systems
Human resource planning

Industrial system automation
Supply chain management
Customer relationship management
Channel management systems
Web and cloud services

Facebook and the Age of Privacy

- Why are social network sites interested in collecting user information?
- What types of privacy invasion are described in the case? Which is the most privacy-invading, and why?
- Is e-commerce any different than traditional markets with respect to privacy? Don't merchants always want to know their customer?
- How do you protect your privacy on the Web?



Academic Disciplines Concerned with E-commerce

■ Technical approach

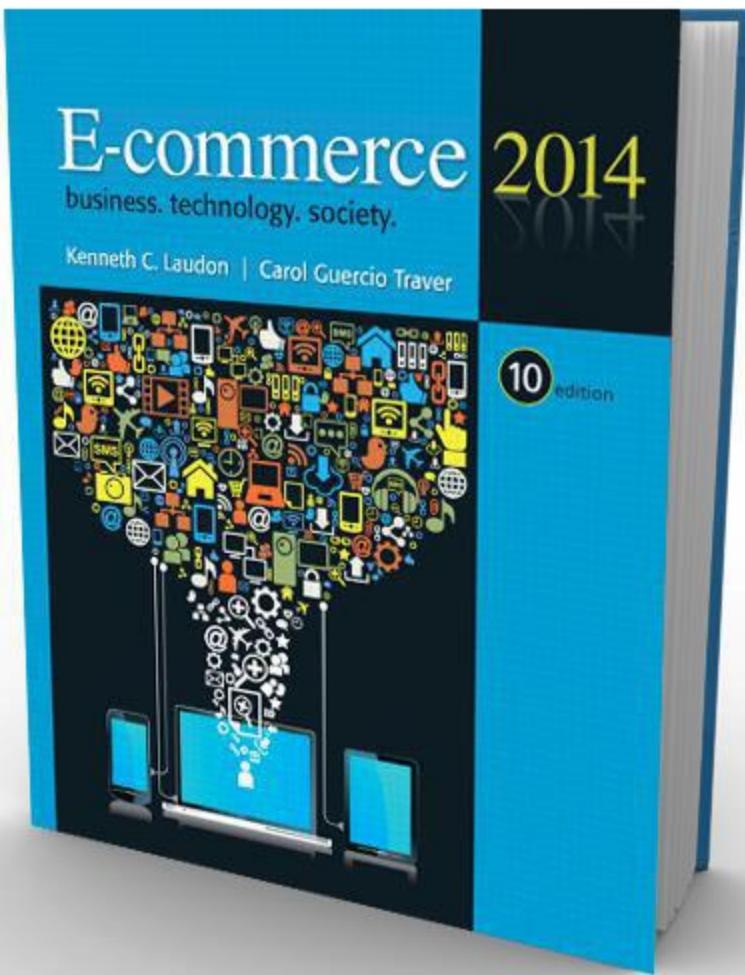
- ❖ Computer science
- ❖ Management science
- ❖ Information systems

■ Behavioral approach

- ❖ Information systems
- ❖ Economics
- ❖ Marketing
- ❖ Management
- ❖ Finance/accounting
- ❖ Sociology



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Chapter 3

E-commerce Infrastructure: The Internet, Web, and Mobile Platform

Google Glass: Augment My Reality

- **Have you used any augmented reality applications? If so, has it been useful; if not, is it a service that seems interesting? Why or why not?**
- **Are there any privacy issues raised by augmented reality applications?**
- **What are the potential benefits of augmented reality applications? Are there any disadvantages?**
- **What revenue models could work for providers of augmented services?**



The Internet: Technology Background

■ Internet

- ❖ Interconnected network of thousands of networks and millions of computers
- ❖ Links businesses, educational institutions, government agencies, and individuals

■ World Wide Web (Web)

- ❖ One of the Internet's most popular services
- ❖ Provides access to billions, possibly trillions, of Web pages



The Evolution of the Internet

1961–Present

■ Innovation Phase, 1964–1974

- ❖ Creation of fundamental building blocks

■ Institutionalization Phase, 1975–1995

- ❖ Large institutions provide funding and legitimization

■ Commercialization Phase, 1995–present

- ❖ Private corporations take over, expand Internet backbone and local service



The Internet: Key Technology Concepts

■ Internet defined as network that:

- ❖ Uses IP addressing
- ❖ Supports TCP/IP
- ❖ Provides services to users, in manner similar to telephone system

■ Three important concepts:

- ❖ Packet switching
- ❖ TCP/IP communications protocol
- ❖ Client/server computing



Packet Switching

- **packet switching** refers to the method of slicing digital messages into packets, sending the packets along different communication paths as they become available, and then reassembling the packets once they arrive at their destination
- **Packets** refers to the discrete units into which digital messages are sliced for transmission over the Internet
- **Uses routers**
 - ❖ Special purpose computers that interconnect the computer networks that make up the Internet and route packets
 - ❖ **Routing algorithms** ensure packets take the best available path toward their destination
- **Packet switching does not require a dedicated circuit, but can make use of any spare capacity that is available on any of several hundred circuits.**
- **Less expensive, wasteful than circuit-switching**



Packet Switching

I want to communicate with you.

Original text message

0010110110001001101110001101

Text message digitized into bits

01100010 10101100 11000011

Digital bits broken into packets

0011001 10101100 11000011

Header information added to each packet indicating destination, and other control information, such as how many bits are in the total message and how many packets

Figure 3.3, Page 117



TCP/IP

■ Transmission Control Protocol (TCP)

- ❖ Establishes connections among sending and receiving Web computers
- ❖ Handles assembly of packets at point of transmission, and reassembly at receiving end

■ Internet Protocol (IP)

- ❖ Provides the Internet's addressing scheme

■ Four TCP/IP layers

- ❖ Network interface layer
- ❖ Internet layer
- ❖ Transport layer
- ❖ Application layer



TCP/IP

- The **Network Interface Layer** is responsible for placing packets on and receiving them from the network medium, which could be a LAN (Ethernet) or Token Ring network, or other network technology.
- The **Internet Layer** is responsible for addressing, packaging, and routing messages on the Internet.
- The **Transport Layer** is responsible for providing communication with the application by acknowledging and sequencing the packets to and from the application.
- The **Application Layer** provides a wide variety of applications with the ability to access the services of the lower layers. Some of the best-known applications are HyperText Transfer Protocol (HTTP), File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP)



The TCP/IP Architecture and Protocol Suite

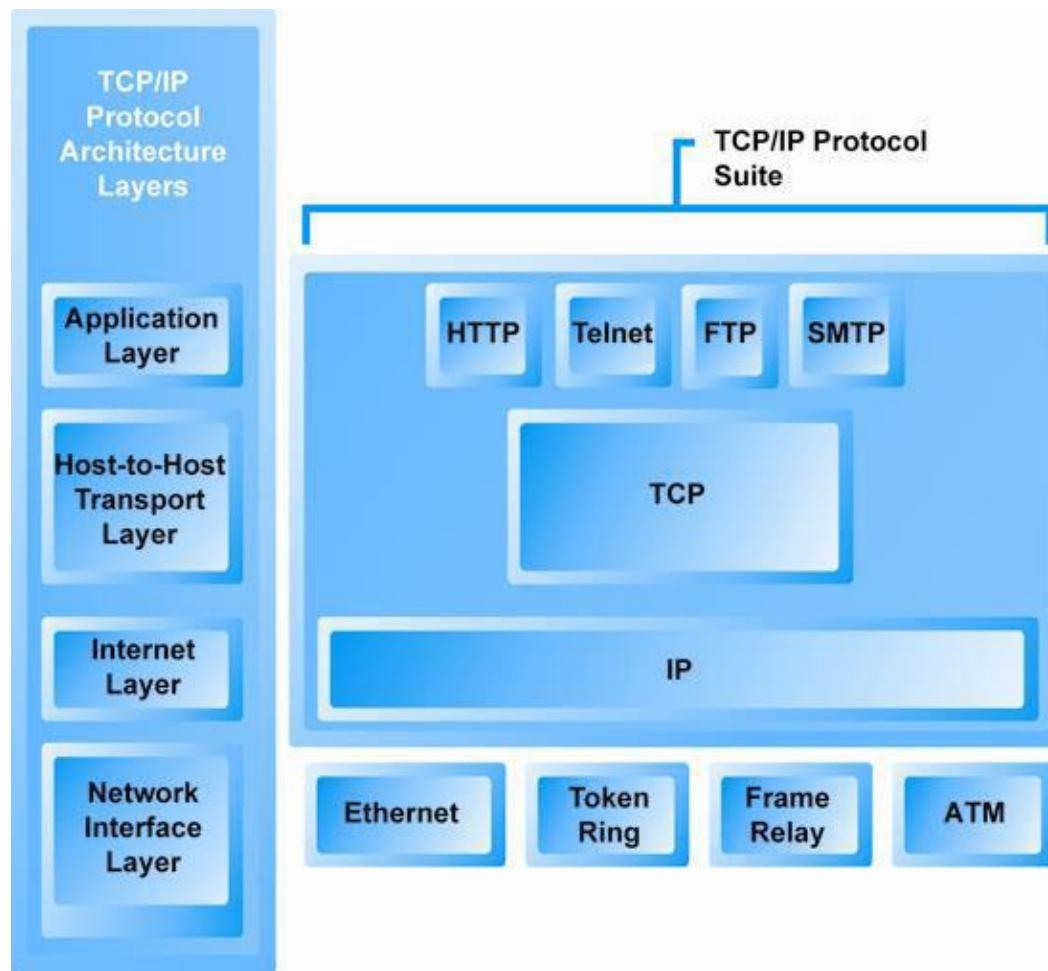


Figure 3.4, Page 119



Internet (IP) Addresses

■ IPv4

- ❖ 32-bit number
- ❖ Four sets of numbers marked off by periods:
201.61.186.227
 - Class C address: Network identified by first three sets, computer identified by last set

■ IPv6

- ❖ 128-bit addresses, able to handle up to 1 quadrillion addresses (IPv4 can handle only 4 billion)



Routing Internet Messages: TCP/IP and Packet Switching

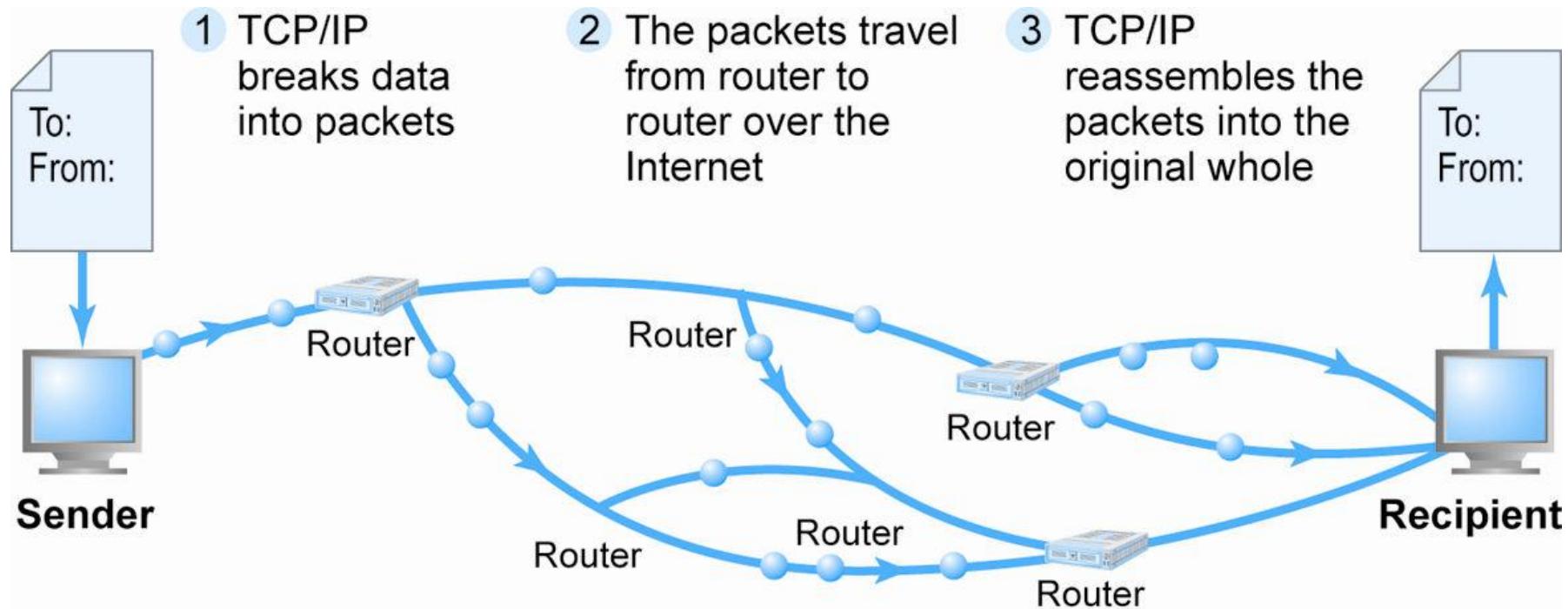


Figure 3.5, Page 120



Domain Names, DNS, and URLs

■ Domain name

- ❖ IP address expressed in natural language

■ Domain name system (DNS)

- ❖ Allows numeric IP addresses to be expressed in natural language

■ Uniform resource locator (URL)

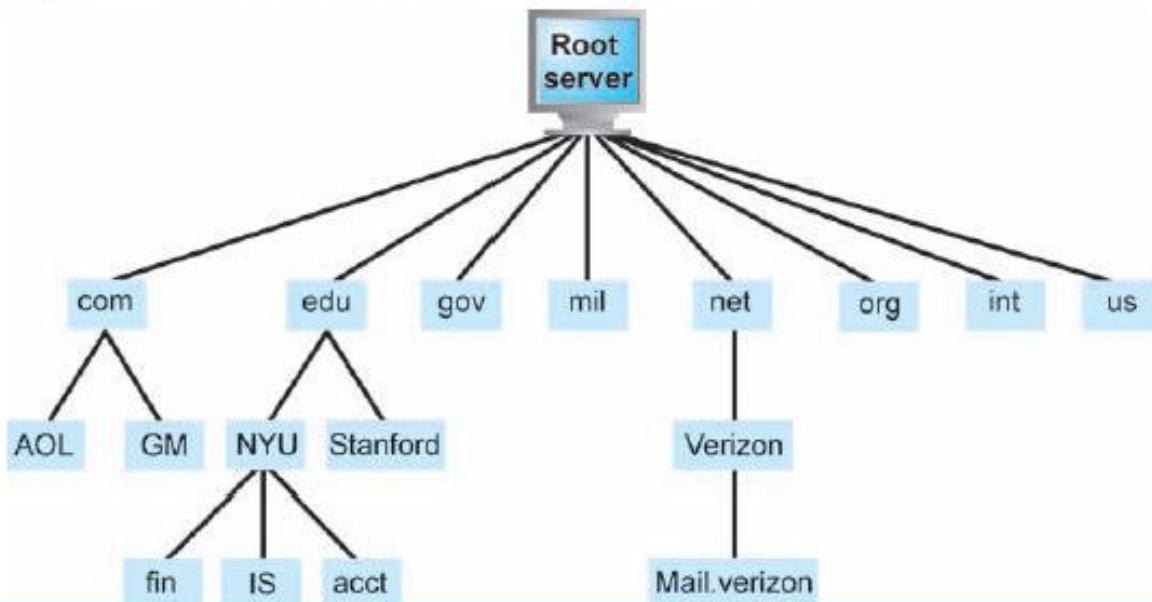
- ❖ Address used by Web browser to identify location of content on the Web
- ❖ For example: <http://www.ammanu.edu.jo>



The Hierarchical Domain Name System

FIGURE 3.6

THE HIERARCHICAL DOMAIN NAME SYSTEM



The Domain Name System is a hierarchical namespace with a root server at the top. Top-level domains appear next and identify the organization type (such as .com, .gov, .org, etc.) or geographic location (such as .uk [Great Britain] or .ca [Canada]). Second-level servers for each top-level domain assign and register second-level domain names for organizations and individuals such as IBM.com, Microsoft.com, and Stanford.edu. Finally, third-level domains identify a particular computer or group of computers within an organization, e.g., www.finance.nyu.edu.

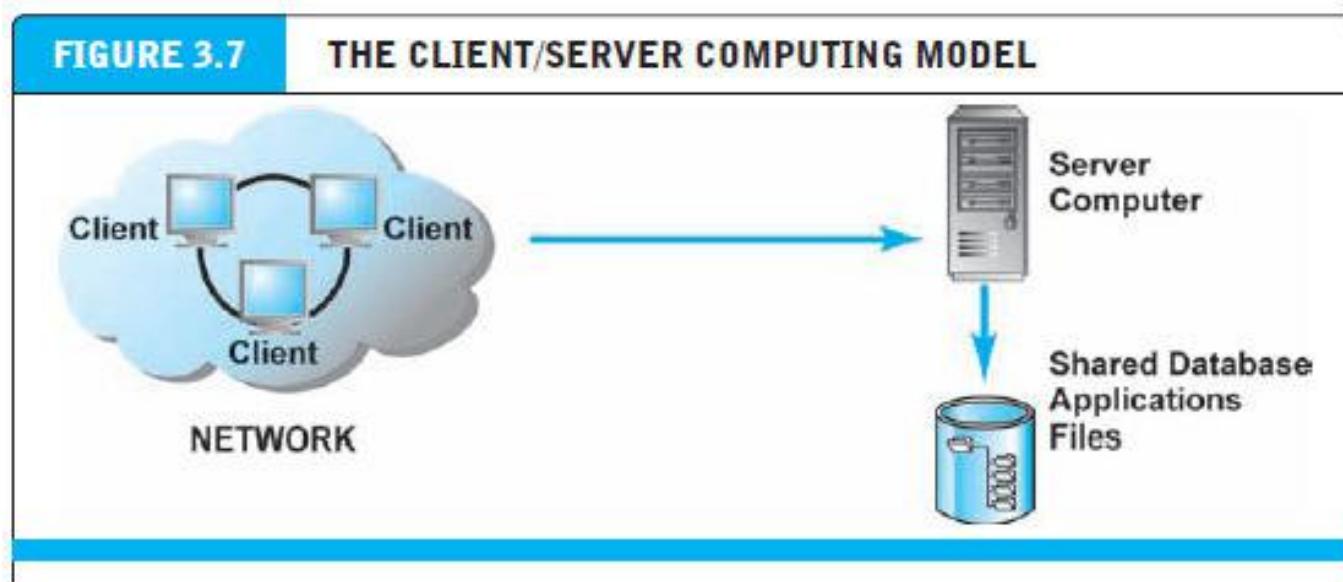


Client/Server Computing

- **client/server** refers to a model of computing in which powerful personal computers are connected in a network together with one or more servers
- **client** is a powerful personal computer that is part of a network
- **server** is a networked computer dedicated to common functions that the client computers on the network Need
- **Servers perform common functions for the clients**
 - ❖ Storing files
 - ❖ Software applications
 - ❖ Access to printers, and so on



Client/Server Computing



In the client/server model of computing, client computers are connected in a network together with one or more servers.



The New Client: The Mobile Platform

- The change in hardware has reached a tipping point. The form factor of PCs has changed from desktops to laptops and tablet computers such as the iPad (and more than 100 other competitors). Tablets are lighter, do not require a complex operating system, and rely on the Internet cloud to provide processing and storage. And, while there are an estimated 1.6 billion PCs in the world, the number of cell phones long ago exceeded the population of PCs. In 2013, there are an estimated 4.3 billion worldwide mobile phone users, with 247 million in the United States, around 1 billion in China, and 525 million in India. The population of mobile phone users is almost three times that of PC owners.
- **In a few years, primary Internet access will be through:**
 - ❖ Tablet Supplementing PCs for mobile situations
 - ❖ Smartphones Disruptive technology:
 - ❖ Shift in processors, operating systems
- **33%, or 1.4 billion, of the world's mobile phone users are smartphone users**



Cloud Computing

- **Firms and individuals obtain computing power and software over Internet**
 - ❖ Example: Google Apps
- **Fastest growing form of computing**
- **Radically reduces costs of:**
 - ❖ Building and operating Web sites
 - ❖ Infrastructure, IT support
 - ❖ Hardware, software



Other Internet Protocols and Utility Programs

■ Internet protocols

- ❖ HTTP
- ❖ E-mail: SMTP, POP3, IMAP
- ❖ FTP, Telnet, SSL/TLS

■ Utility programs

- ❖ Ping
- ❖ Tracert



The Internet Today

■ Internet growth has boomed without disruption because of:

- ❖ Client/server computing model
- ❖ Hourglass, layered architecture
 - Network Technology Substrate
 - Transport Services and Representation Standards
 - Middleware Services
 - Applications

The Hourglass Model of the Internet

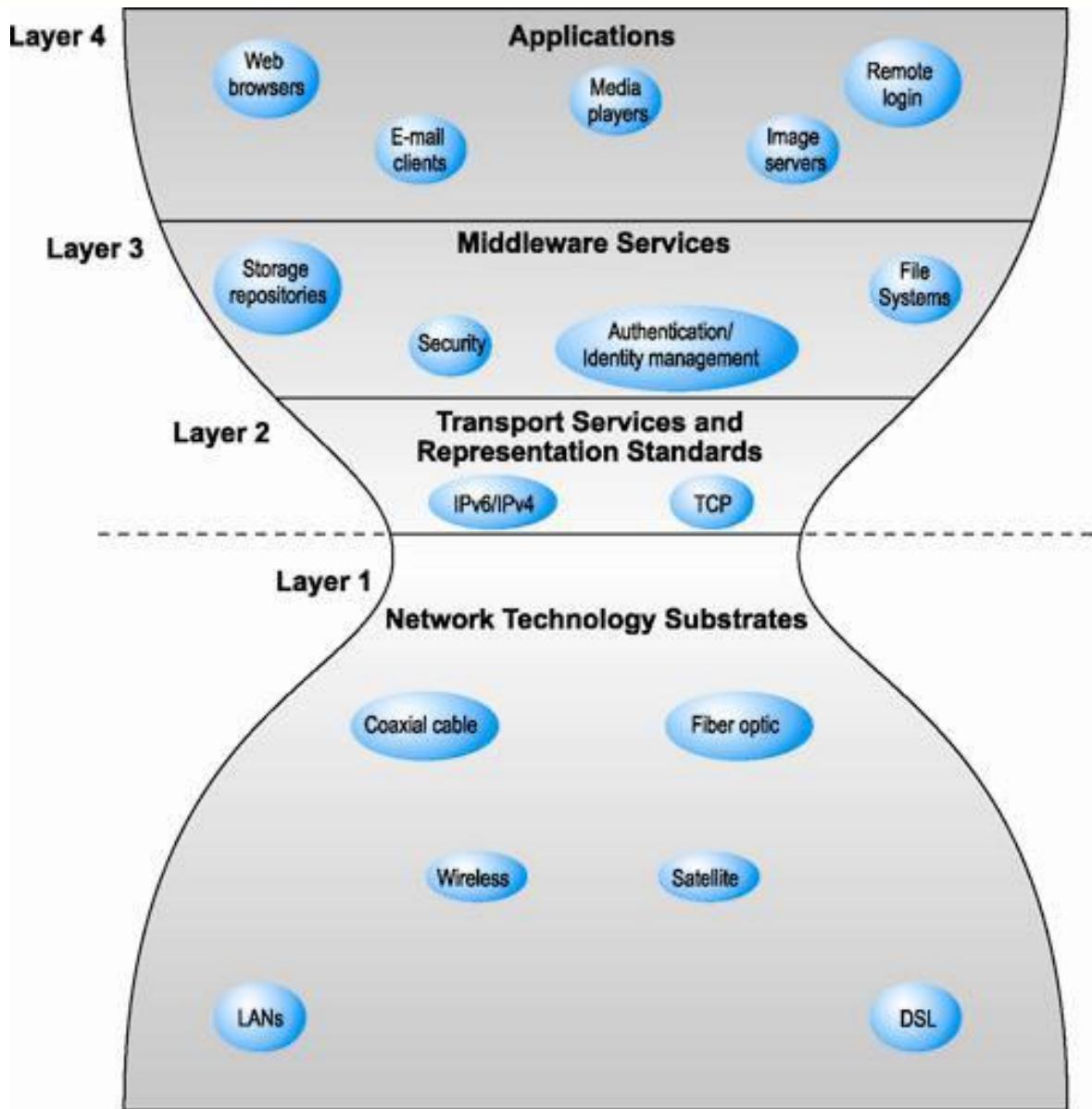


Figure 3.11, Page 128



Internet Network Architecture

■ Backbone

- ❖ High-bandwidth fiber-optic cable networks
- ❖ Private networks owned by a variety of NSPs
- ❖ Bandwidth: 155 Mbps–2.5 Gbps
- ❖ Built-in redundancy

■ IXPs

- ❖ Hubs where backbones intersect with regional and local networks, and backbone owners connect with one another

■ CANs

- ❖ LANs operating within a single organization that leases Internet access directly from regional or national carrier



Internet Network Architecture

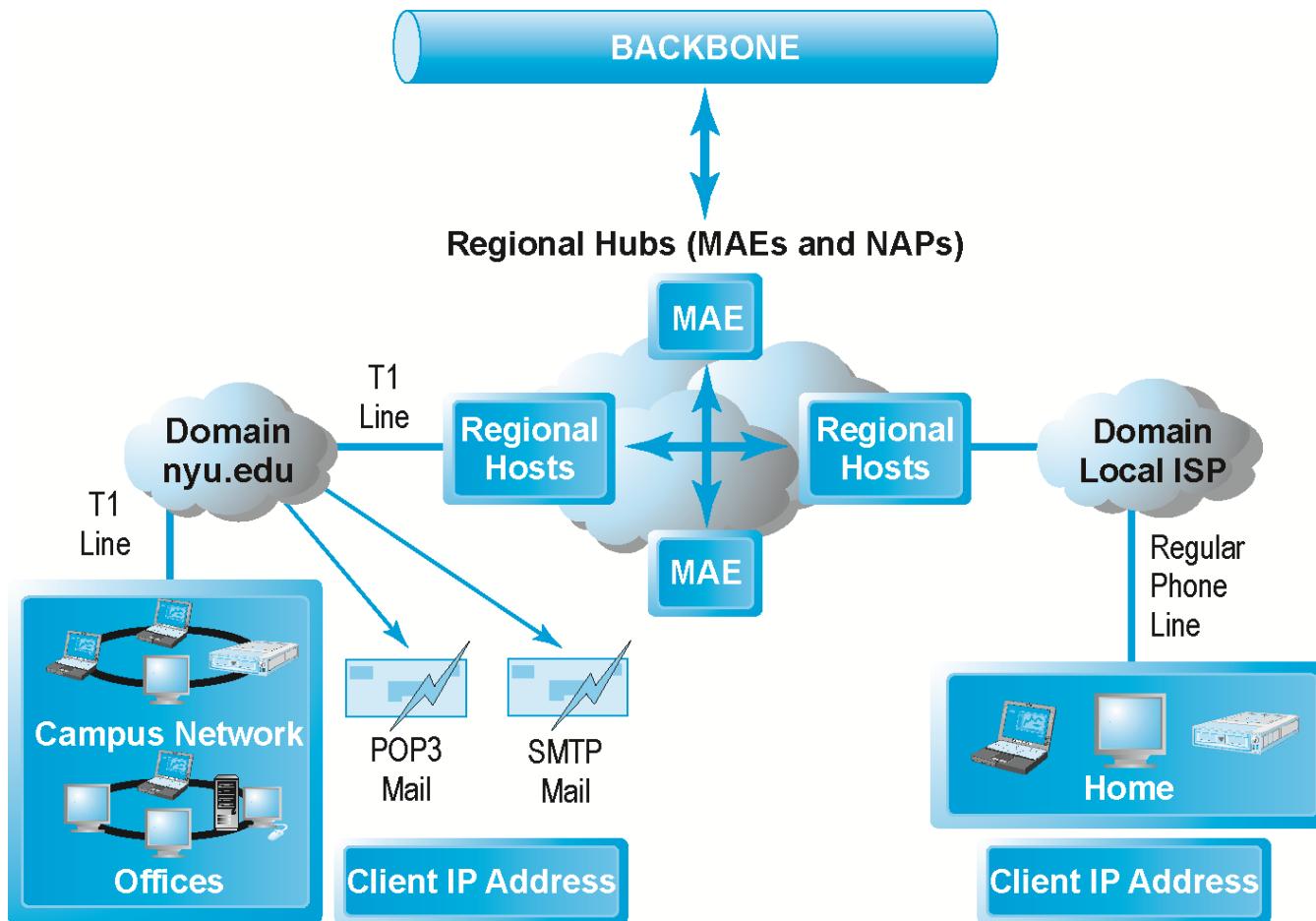


Figure 3.12, Page 129



Internet Service Providers (ISPs)

- Provide lowest level of service to individuals, small businesses, some institutions

- Types of service

- ❖ Narrowband (dial-up)
- ❖ Broadband
 - Digital Subscriber Line (DSL)
 - Cable modem
 - T1 and T3
 - Satellite



Intranets

■ Intranet

- ❖ TCP/IP network located within a single organization for communications and processing
- ❖ Used by private and government organizations for internal networks
- ❖ All Internet applications can be used in private intranets



Who Governs the Internet?

■ Organizations that influence the Internet and monitor its operations include:

- ❖ Internet Corporation for Assigned Names and Numbers (ICANN)
- ❖ Internet Assigned Numbers Authority (IANA)
- ❖ Internet Engineering Task Force (IETF)
- ❖ Internet Research Task Force (IRTF)
- ❖ Internet Engineering Steering Group (IESG)
- ❖ Internet Architecture Board (IAB)
- ❖ Internet Society (ISOC)
- ❖ Internet Governance Forum (IGF)
- ❖ World Wide Web Consortium (W3C)
- ❖ Internet Network Operators Groups (NOGs)

Government Regulation and Surveillance of the Internet

- How is it possible for any government to “control” or censor the Web?
- Does the Chinese government, or the U.S. government, have the right to censor content on the Web?
- How should U.S. companies deal with governments that want to censor content?
- What would happen to e-commerce if the existing Web split into a different Web for each country?



Limitations of the Current Internet

■ Bandwidth limitations

- ❖ Slow peak-hour service

■ Quality of service limitations

- ❖ Latency

■ Network architecture limitations

- ❖ Identical requests are processed individually

■ Wired Internet

- ❖ Copper and expensive fiber-optic cables



The Internet2 Project

- **Internet2®** is an advanced networking consortium of more than 350 member institutions including universities, corporations, government research agencies, and not-for profit networking organizations, all working in partnership to facilitate the development, deployment, and use of revolutionary Internet technologies
- **Primary goals:**
 - ❖ Create leading-edge very-high speed network for national research community (100 gigabit-per-second network)
 - ❖ Enable revolutionary Internet applications
 - ❖ Distributed and collaborative computing environments for sciences, health, arts, and humanities initiatives



The First Mile and the Last Mile

- **GENI Initiative**
 - ❖ Proposed by NSF to develop new core functionality for Internet
- In 2007, the NSF began work on the Global Environment for Network Innovations (GENI) initiative. GENI is a unique virtual laboratory for exploring future internets at scale. GENI aims to promote innovations in network science, security technologies, services, and applications. GENI is a partnership of leading academic centers and private corporations such as Cisco, IBM, and HP, among many others
- **Most significant private initiatives**
 - ❖ Fiber optic trunk-line bandwidth
 - First mile



The First Mile and the Last Mile

- **Most significant private initiatives**
 - ❖ Fiber optic trunk-line bandwidth
 - First mile
 - ❖ Wireless Internet services
 - Last mile
- The most significant privately initiated (but often government-influenced) changes are coming in two areas: fiber-optic trunk line bandwidth and wireless Internet services. Fiber optics is concerned with the first mile or backbone Internet services that carry bulk traffic long distances. Wireless Internet is concerned with the last mile—from the larger Internet to the user's smartphone, tablet computer, or laptop.



Fiber Optics and the Bandwidth Explosion in the First Mile

- “First mile”: Backbone Internet services that carry bulk traffic over long distances
- Fiber-optic cable: hundreds of glass strands that use light to transmit data
 - ❖ Faster speeds and greater bandwidth
 - ❖ Thinner, lighter cables
 - ❖ Less interference
 - ❖ Better data security
- Substantial investments in fiber optic by telecommunications firms in last decade
 - ❖ Enable integrated phone, broadband access, video services



The Last Mile: Mobile Internet Access

- “Last mile”: From Internet backbone to user’s computer, smartphone, and so on
- Two different basic types of wireless Internet access:
 - ❖ Telephone-based (mobile phones, smartphones)
 - ❖ Wireless local area network (WLAN)-based



Telephone-based versus Computer Network-based Wireless Internet Access

- ***Telephone-based*** wireless Internet access connects the user to a global telephone system (land, satellite, and microwave) that has a long history of dealing with thousands of users simultaneously and already has in place a large-scale transaction billing system and related infrastructure. Cellular telephones and the telephone industry are currently the largest providers of wireless access to the Internet today



Telephone-based versus Computer Network-based Wireless Internet Access

TABLE 3.8

WIRELESS INTERNET ACCESS TELEPHONE TECHNOLOGIES

TECHNOLOGY	SPEED	DESCRIPTION	PLAYERS
3G (THIRD GENERATION)			
CDMA2000 EV-DO HSPA (W-CDMA)	144 Kbps–2 Mbps	High-speed, mobile, always on for e-mail, browsing, instant messaging. Implementing technologies include versions of CDMA2000 EV-DO (used by CDMA providers) and HSPDA (used by GSM providers). Nearly as fast as Wi-Fi.	Verizon, Sprint, AT&T, T-Mobile, Vodafone
3.5G (3G+)			
CDMA2000 EV-DO, Rev.B HSPA+	Up to 14.4 Mbps Up to 11 Mbps	Enhanced version of CDMA 2000 EV-DO. Enhanced version of HSPA.	Verizon, Sprint AT&T, T-Mobile
4G (FOURTH GENERATION)			
Long-Term Evolution (LTE)	Up to 100 Mbps	True broadband on cell phone.	AT&T, Verizon, Sprint, T-Mobile (in 2013)



Telephone-based versus Computer Network-based Wireless Internet Access

- *Wireless local area network (WLAN)-based Internet access* derives from a completely different background from telephone-based wireless Internet access. Popularly known as **Wi-Fi**, WLANs are based on computer local area networks where the task is to connect client computers (generally stationary) to server computers within local areas of, say, a few hundred meters. WLANs function by sending radio signals that are broadcast over the airwaves using certain radio frequency ranges (2.4 GHz to 5.875 GHz, depending on the type of standard involved). The major technologies here are the various versions of the Wi-Fi standard, WiMax, and Bluetooth.



Wireless Internet Access Network Technologies

■ Wi-Fi

- ❖ High-speed, fixed broadband wireless LAN (WLAN)
- ❖ Wireless access point (“hot spots”)
- ❖ Limited range but inexpensive
- ❖ For-profit Wi-Fi networks: Boingo, AT&T Wi-Fi Services

■ WiMax

- ❖ High-speed, medium range broadband wireless metropolitan area network

■ Bluetooth

- ❖ Personal connectivity between devices and to Internet
- ❖ Low-speed, short range connection



Wireless Internet Access Network Technologies

TABLE 3.9

WIRELESS INTERNET ACCESS NETWORK TECHNOLOGIES

TECHNOLOGY	RANGE/ SPEED	DESCRIPTION	PLAYERS
Wi-Fi (IEEE 802.11 a/b/g/n)	300 feet/ 11–70 Mbps	Evolving high-speed, fixed broadband wireless local area network for commercial and residential use	Linksys, Cisco, and other Wi-Fi router manufacturers; entrepreneurial network developers
WiMax (IEEE 802.16)	30 miles/ 50–70 Mbps	High-speed, medium-range, broadband wireless metropolitan area network	Clearwire, Sprint, Fujitsu, Intel, Alcatel, Proxim
Bluetooth (wireless personal area network)	1–30 meters/ 1–3 Mbps	Modest-speed, low-power, short-range connection of digital devices	Sony Ericsson, Nokia, Apple, HP, and other device makers



Wi-Fi Networks

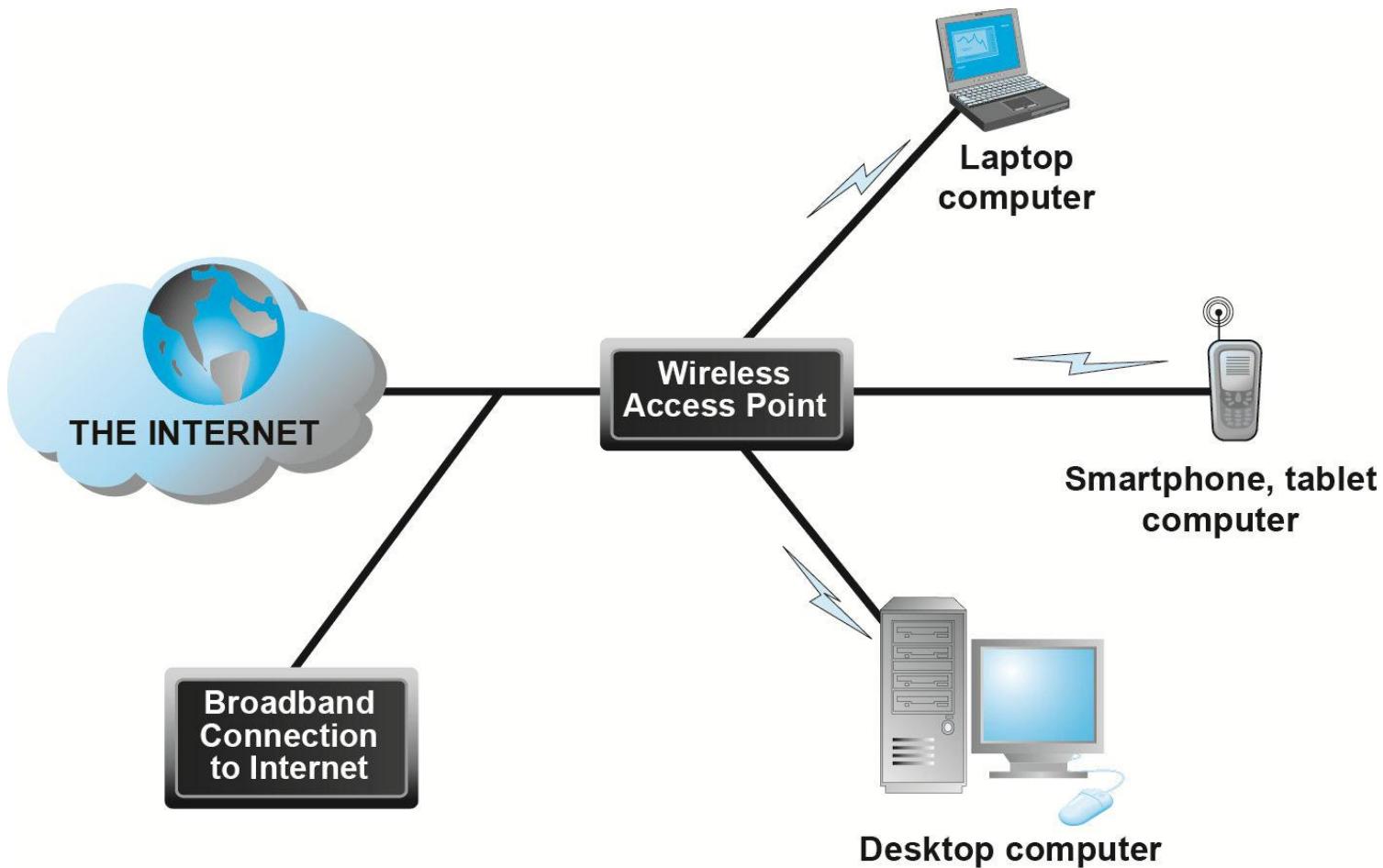


Figure 3.15, Page 145



Standard Speed

TABLE 3.7**HIGH-SPEED OPTICAL BANDWIDTH STANDARDS****STANDARD SPEED**

T1	1.544 Mbps
T3	43.232 Mbps
OC-3	155 Mbps
OC-12	622 Mbps
OC-48	2.5 Gbps
OC-192	9.6 Gbps

Figure 3.15, Page 145



The Future Internet

1- Latency solutions

- One of the challenges of packet switching, where data is divided into chunks and then sent separately to meet again at the destination, is that the Internet does not differentiate between high-priority packets, such as video clips, and those of lower priority, such as self-contained e-mail messages. Because the packets cannot yet be simultaneously reassembled, the result can be distorted audio and video streams.
- Differentiated quality of service (**difffserv**) is a technology that assigns levels of priority to packets based on the type of data being transmitted. Video conference packets, for example, which need to reach their destination almost instantaneously, receive much higher priority than e-mail messages.



The Future Internet

2- Guaranteed service levels and lower error rates

- In today's Internet, there is no service-level guarantee and no way to purchase the right to move data through the Internet at a fixed pace. Today's Internet promises only "best effort." The Internet is democratic—it speeds or slows everyone's traffic alike. In the future, it will be possible to purchase the right to move data through the network at a guaranteed speed in return for higher fees.

3- Declining costs

- As the Internet pipeline is upgraded, the availability of broadband service will expand beyond major metropolitan areas, significantly reducing the cost of access. More users means lower cost, as products and technology catch on in the mass market. Higher volume usage enables providers to lower the cost of both access devices, or clients, and the service required to use such products. Both broadband and wireless service fees are expected to decline as geographic service areas increase, in part due to competition for that business.



The Future Internet

4- The Internet of Things (IoT)

- No discussion of the future Internet would be complete without mentioning the **Internet of Things (IoT)**, also sometimes referred to as the Industrial Internet. Internet technology is spreading beyond the desktop, laptop, and tablet computer, and beyond the smartphone, to consumer electronics, electrical appliances, cars, medical devices, utility systems, machines of all types, even clothing—just about anything that can be equipped with sensors that collect data and connect to the Internet, enabling the data to be analyzed with data analytics software
- The Internet of Things builds on a foundation of existing technologies, such as
 - ❖ **Objects connected via sensors/RFID to the Internet**



The Web

- **1989–1991: Web invented**
 - ❖ Tim Berners-Lee at CERN
 - ❖ HTML, HTTP, Web server, Web browser
- **1993: Mosaic Web browser w/GUI**
 - ❖ Andreessen and others at NCSA
 - ❖ Runs on Windows, Macintosh, or Unix
- **1994: Netscape Navigator, first commercial Web browser**
 - ❖ Andreessen, Jim Clark
- **1995: Microsoft Internet Explorer**
- **universal computing** refers to the sharing of files, information, graphics, sound, video, and other objects across all computer platforms in the world, regardless of operating system.



Hypertext

- **Text formatted with embedded links**
 - ❖ Links connect documents to one another, and to other objects such as sound, video, or animation files
- **Uses Hypertext Transfer Protocol (HTTP) and URLs to locate resources on the Web**
 - ❖ Example URL:
`http://megacorp.com/content/features/082602.html`



Markup Languages

■ Hypertext Markup Language (HTML)

- ❖ Fixed set of pre-defined markup “tags” used to format text
- ❖ Controls look and feel of Web pages
- ❖ HTML5 the newest version

■ eXtensible Markup Language (XML)

- ❖ Designed to describe data and information
- ❖ Tags used are defined by user

Is HTML5 Ready for Primetime?

- What features of HTML5 are changing the way Web sites are built?
- Is HTML5 a disruptive technology, and if so, for whom?
- Are there any disadvantages in Web sites and mobile apps moving to an HTML5 platform?



Web Servers and Web Clients

■ Web server software

- ❖ Enables a computer to deliver Web pages to clients on a network that request this service by sending an HTTP request
- ❖ Apache, Microsoft IIS
- ❖ Basic capabilities: Security services, FTP, search engine, data capture

■ Web server

- ❖ May refer to either Web server software or physical server
- ❖ Specialized servers: Database servers, ad servers, and so on

■ Web client

- ❖ Any computing device attached to the Internet that is capable of making HTTP requests and displaying HTML pages



Web Browsers

- Primary purpose to display Web pages
- Internet Explorer—54% of market
- Mozilla Firefox—20%
 - ❖ Open source
- Other browsers
 - ❖ Google Chrome—19%
 - ❖ Apple's Safari—5%



The Internet and Web: Features

■ Features on which the foundations of e-commerce are built:

- ❖ E-mail
- ❖ Instant messaging
- ❖ Search engines
- ❖ Online forums and chat
- ❖ Streaming media
- ❖ Cookies



E-mail

- Most used application of the Internet
- Uses series of protocols for transferring messages with text and attachments from one Internet user to another

Instant Messaging

- Displays words typed on a computer almost instantly, and recipients can respond immediately in the same way



Search Engines

- Identify Web pages that match queries based on one or more techniques
 - ❖ Keyword indexes, page ranking
- Also serve as:
 - ❖ Shopping tools
 - ❖ Advertising vehicles (search engine marketing)
 - ❖ Tool within e-commerce sites
- Outside of e-mail, most commonly used Internet activity



How Google Works

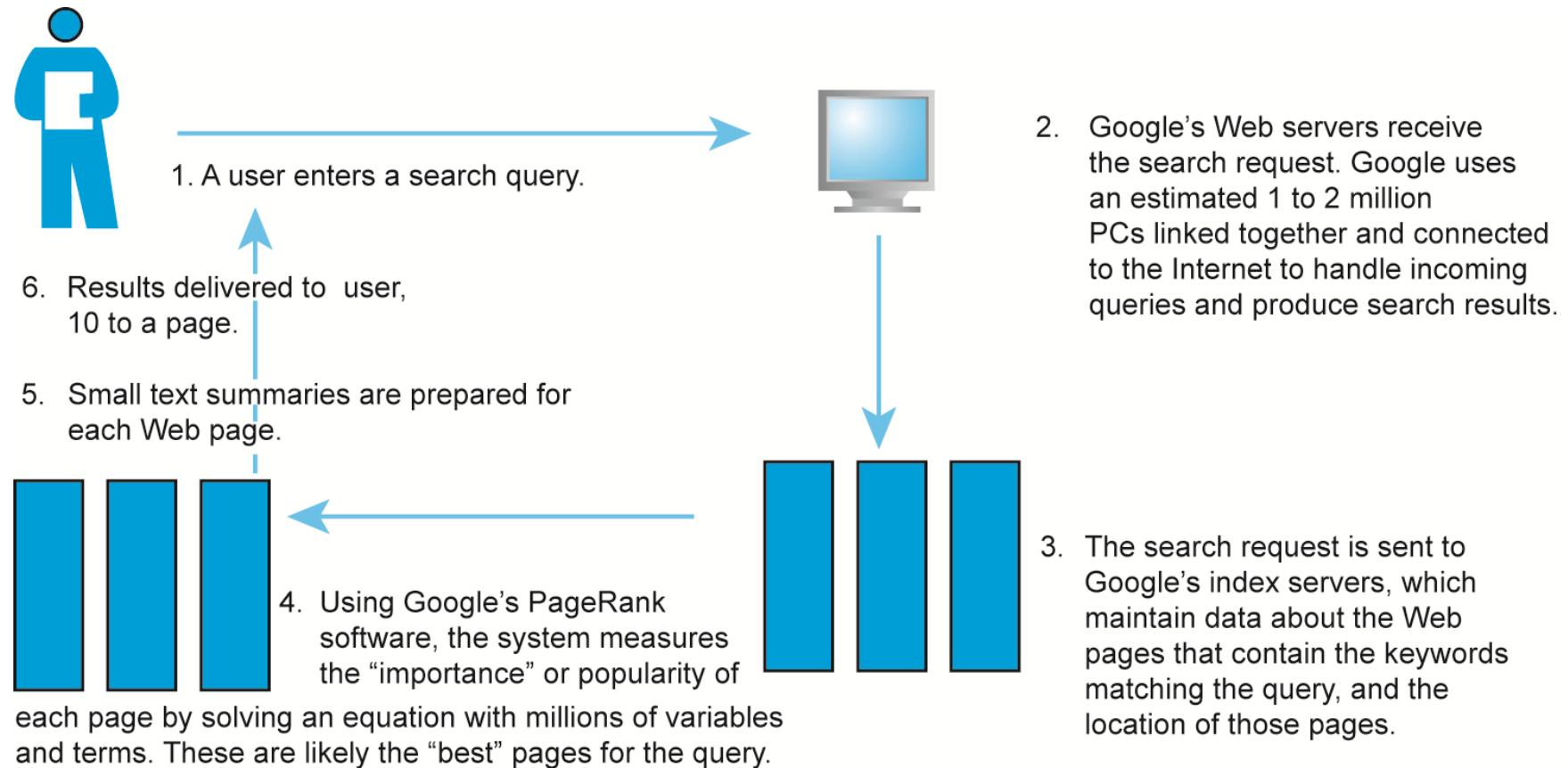


Figure 3.20, Page 161



Online Forums and Chat

■ Online forum

- ❖ Also known as a message board, bulletin board, discussion board, discussion group, board, or forum
- ❖ Web application that enables Internet users to communicate with one another, although not in real time
- ❖ Members visit online forum to check for new posts

■ Online chat

- ❖ Similar to IM, but for multiple users
- ❖ Typically, users log into chat room



Streaming Media

- Enables music, video, and other large files to be sent to users in chunks so that when received and played, file comes through uninterrupted
- Allows users to begin playing media files before file is fully downloaded



Cookies

- Small text files deposited by Web site on user's computer to store information about user, accessed when user next visits Web site
- Can help personalize Web site experience
- Can pose privacy threat



Web 2.0 Features and Services

■ Online Social Networks

- ❖ Services that support communication among networks of friends, peers

■ Blogs

- ❖ Personal Web page of chronological entries

■ Really Simple Syndication (RSS)

- ❖ Program that allows users to have digital content automatically sent to their computers over the Internet



Web 2.0 Features and Services

- **Podcasting** an audio presentation—such as a radio show, audio from a movie, or simply a personal audio presentation stored as an audio file and posted to the Web#
- **Wikis**
 - ❖ Allows user to easily add and edit content on Web page



Web 2.0 Features and Services

■ Music and video services

- ❖ Online video viewing
- ❖ Digital video on demand

■ Internet telephony (VoIP)

- ❖ Voice over Internet Protocol (VoIP) uses Internet to transmit voice communication

■ Video conferencing, video chatting, and telepresence

■ Online software and Web services

- ❖ Web apps, widgets, and gadgets



Intelligent Personal Assistants

- Software that interacts with the user through voice commands
- Features
 - ❖ Natural language; conversational interface
 - ❖ Situational awareness
 - ❖ Interpret voice commands to interact with various Web services
- Examples: Siri, Google Now



Mobile Apps

■ Use of mobile apps has exploded

- ❖ More than 60% of online shoppers are mobile shoppers as well

■ Increased use/purchasing from tablets

■ Platforms

- ❖ iPhone/iPad (iOS), Android, Blackberry

■ App marketplaces

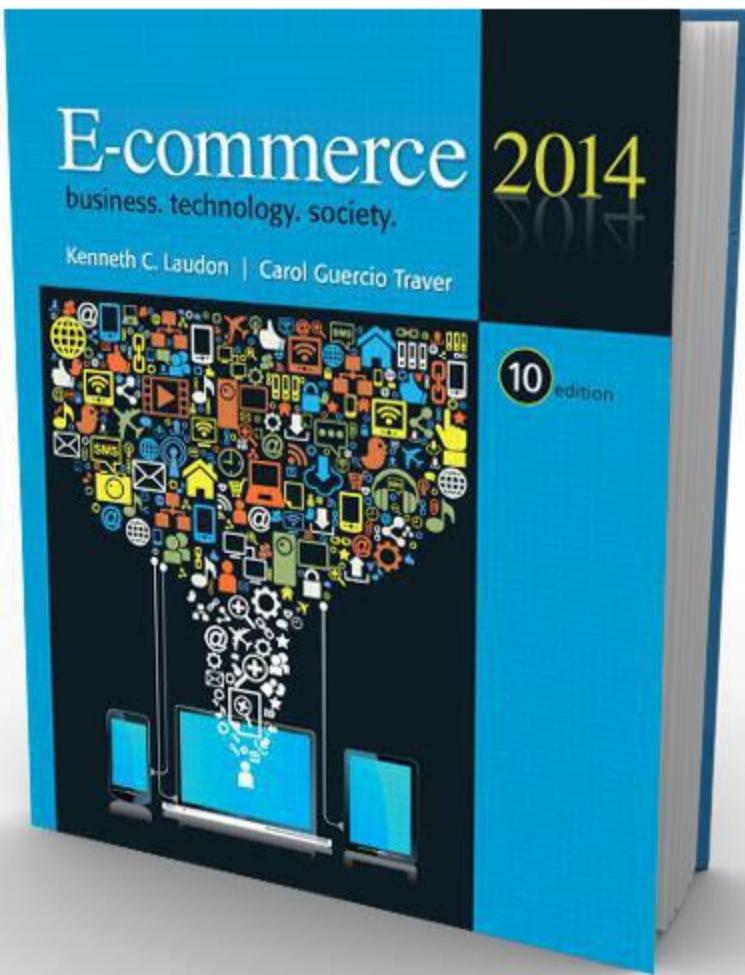
- ❖ Google Play, Apple's App Store, RIM's App World, Windows Phone Marketplace

Apps for Everything: The App Ecosystem

- **What are apps and why are they so popular?**
- **Do you use any apps regularly? Which ones, and what are their functions?**
- **What are the benefits of apps? The disadvantages?**
- **Are there any benefits/disadvantages to the proprietary nature of the Apple platform?**



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Chapter 4

Building an E-commerce Presence: Web Sites, Mobile Sites, and Apps



Class Discussion

USA Today Redesigns

- **What were *USA Today*'s objectives in redesigning its e-commerce presence?**
- **What considerations, if any, unique to the newspaper business were involved?**
- **What did *USA Today* do to meet the needs of mobile device users?**



Imagine Your E-commerce Presence

■ What's the idea?

- ❖ Vision
- ❖ Mission statement
- ❖ Target audience
- ❖ Intended market space
- ❖ Strategic analysis
- ❖ Internet marketing matrix
- ❖ Development timeline and preliminary budget



Imagine Your E-commerce Presence (cont.)

■ Where's the money?

- ❖ Business model(s):
 - Portal, e-tailer, content provider, transaction broker, market creator, service provider, community provider
- ❖ Revenue model(s):
 - Advertising, subscriptions, transaction fees, sales, and affiliate revenue



Imagine Your E-commerce Presence (cont.)

■ Who and where is the target audience?

- ❖ Describing your audience
 - Demographics
 - ❖ Age, gender, income, location
 - Behavior patterns (lifestyle)
 - Consumption patterns (purchasing habits)
 - Digital usage patterns
 - Content creation patterns (blogs, Facebook)
 - Buyer personas



Imagine Your E-commerce Presence (cont.)

■ Characterize the marketplace

- ❖ Demographics
- ❖ Size, growth, changes
- ❖ Structure
 - Competitors
 - Suppliers
 - Substitute products

■ Where is the content coming from?

- ❖ Static or dynamic?



Imagine Your E-commerce Presence (cont.)

- Know yourself—SWOT analysis
- Develop an e-commerce presence map
- Develop a timeline: Milestones
- How much will this cost?
 - ❖ Simple Web sites: up to \$5000
 - ❖ Small Web start-up: \$25,000 to \$50,000
 - ❖ Large corporate site: \$100,000+ to millions



SWOT Analysis



Figure 4.1, page 189



E-commerce Presence Map

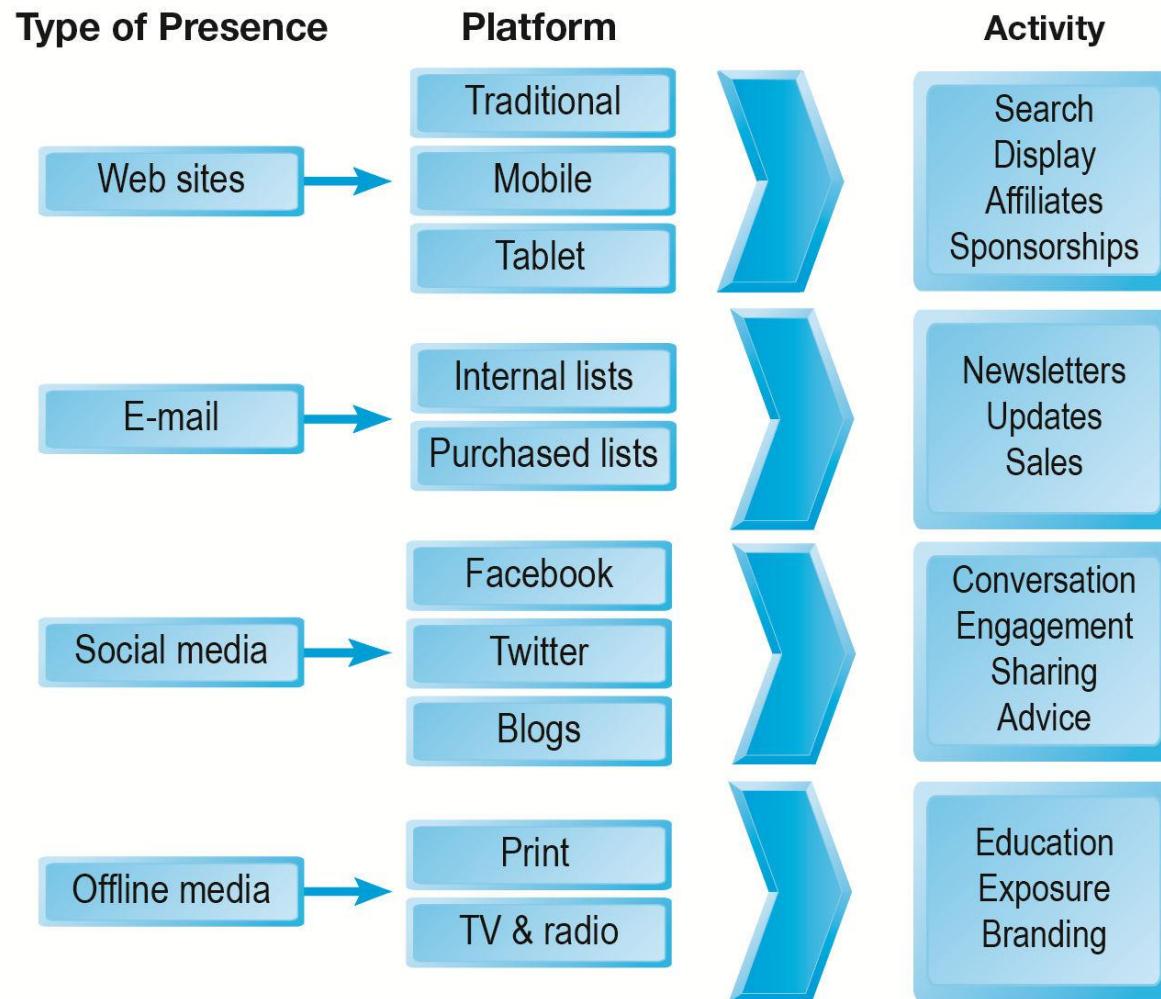


Figure 4.2, page 190



Building an E-commerce Site: A Systematic Approach

■ Most important management challenges:

- ❖ Developing a clear understanding of business objectives
- ❖ Knowing how to choose the right technology to achieve those objectives



Pieces of the Site-Building Puzzle

■ Main areas where you will need to make decisions:

- ❖ Human resources and organizational capabilities
 - Creating team with skill set needed to build and manage a successful site
- ❖ Hardware/software
- ❖ Telecommunications
- ❖ Site design



The Systems Development Life Cycle

- **Methodology for understanding business objectives of a system and designing an appropriate solution**
- **Five major steps:**
 - ❖ Systems analysis/planning
 - ❖ Systems design
 - ❖ Building the system
 - ❖ Testing
 - ❖ Implementation



Web Site Systems Development Life Cycle

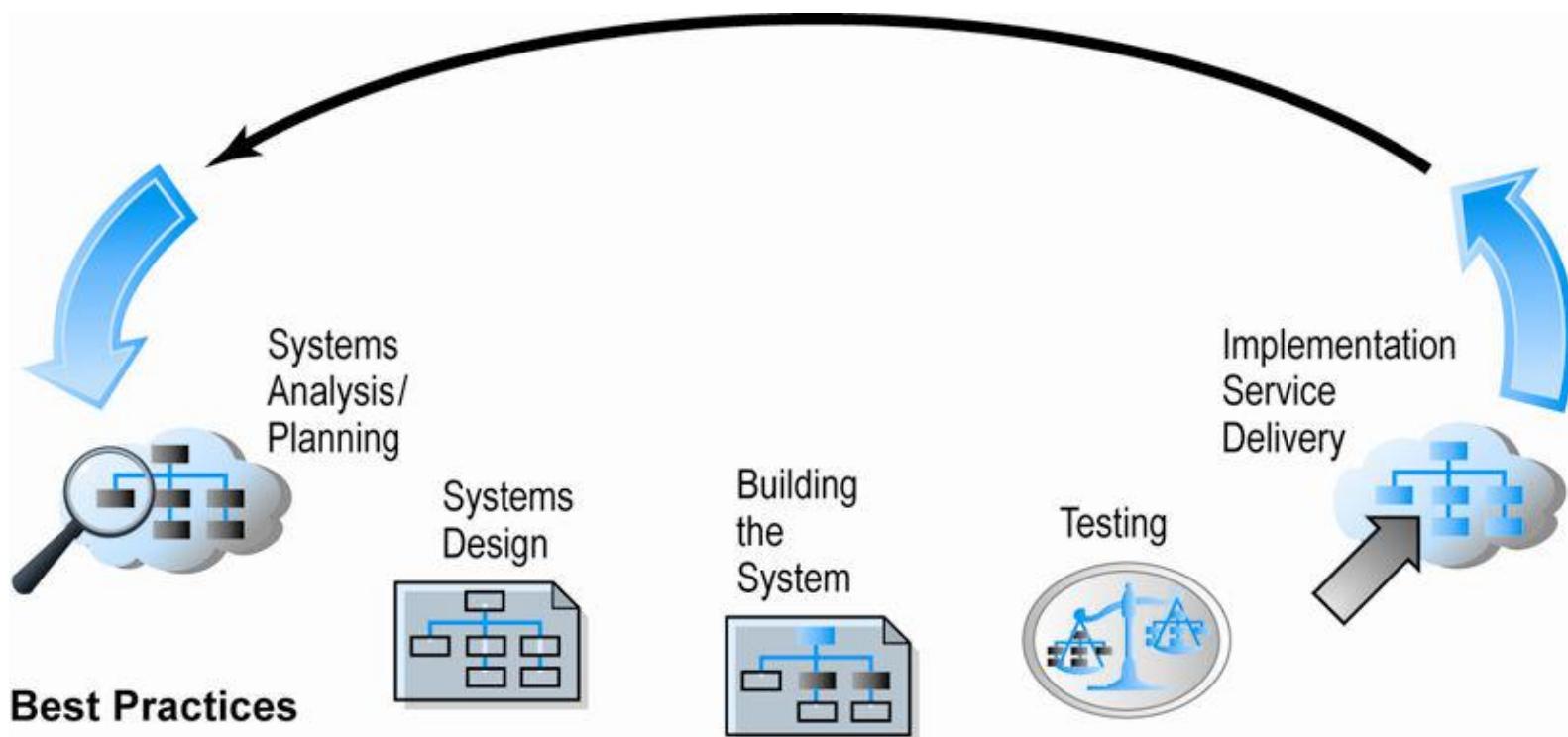


Figure 4.5, Page 194



System Analysis/Planning

■ Business objectives:

- ❖ List of capabilities you want your site to have

■ System functionalities:

- ❖ List of information system capabilities needed to achieve business objectives

■ Information requirements:

- ❖ Information elements that system must produce in order to achieve business objectives

**TABLE 4.2****SYSTEM ANALYSIS: BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITIES, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE**

BUSINESS OBJECTIVE	SYSTEM FUNCTIONALITY	INFORMATION REQUIREMENTS
Display goods	Digital catalog	Dynamic text and graphics catalog
Provide product information (content)	Product database	Product description, stocking numbers, inventory levels
Personalize/customize product	Customer on-site tracking	Site log for every customer visit; data mining capability to identify common customer paths and appropriate responses
Engage customers in conversations	On-site blog	Software with blogging and community response functionality
Execute a transaction	Shopping cart/payment system	Secure credit card clearing; multiple payment options
Accumulate customer information	Customer database	Name, address, phone, and e-mail for all customers; online customer registration
Provide after-sale customer support	Sales database	Customer ID, product, date, payment, shipment date
Coordinate marketing/advertising	Ad server, e-mail server, e-mail, campaign manager, ad banner manager	Site behavior log of prospects and customers linked to e-mail and banner ad campaigns
Understand marketing effectiveness	Site tracking and reporting system	Number of unique visitors, pages visited, products purchased, identified by marketing campaign
Provide production and supplier links	Inventory management system	Product and inventory levels, supplier ID and contact, order quantity data by product

Table 4.2, page 195



Systems Design: Hardware and Software Platforms

■ System design specification:

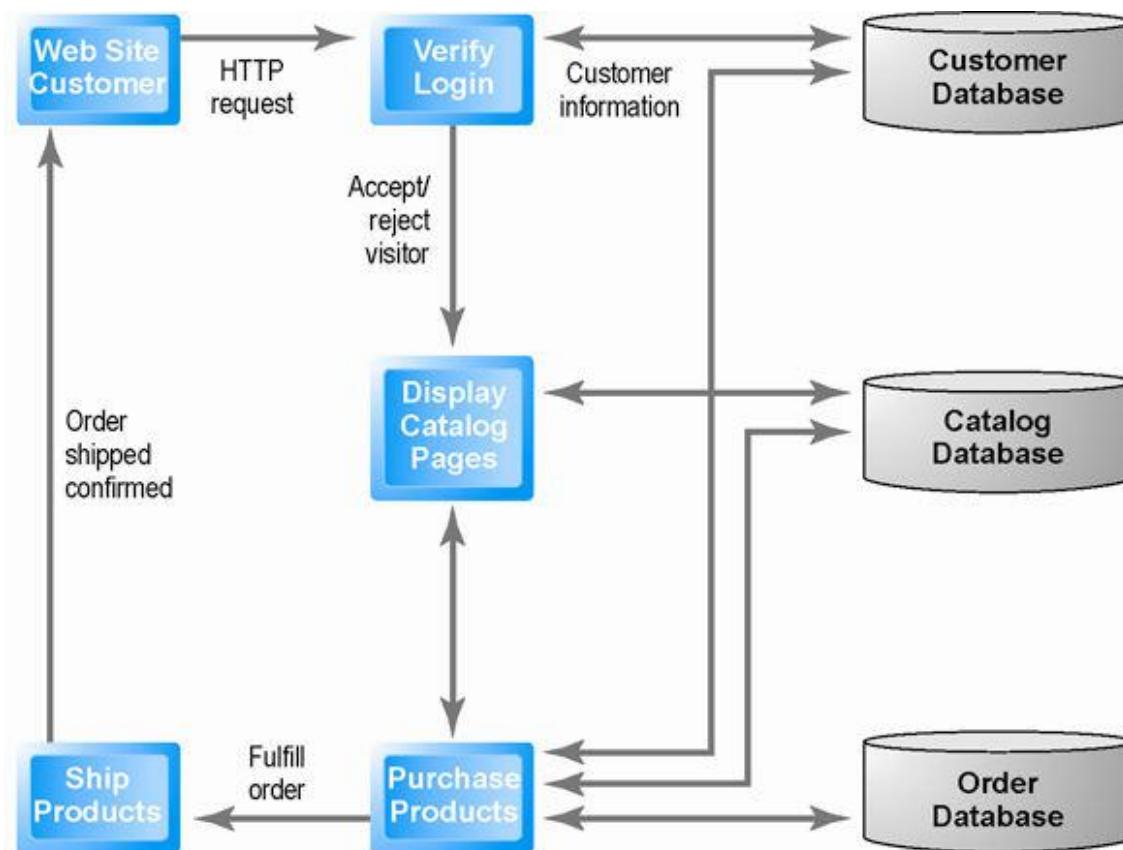
- ❖ Description of main components of a system and their relationship to one another

■ Two components of system design:

- ❖ Logical design
 - Data flow diagrams, processing functions, databases
- ❖ Physical design
 - Specifies actual physical, software components, models, and so on



Logical Design for a Simple Web Site



(a) Simple Data Flow Diagram

This data flow diagram describes the flow of information requests and responses for a sample Web site

Figure 4.6 (a), Page 197



Physical Design for a Simple Web Site

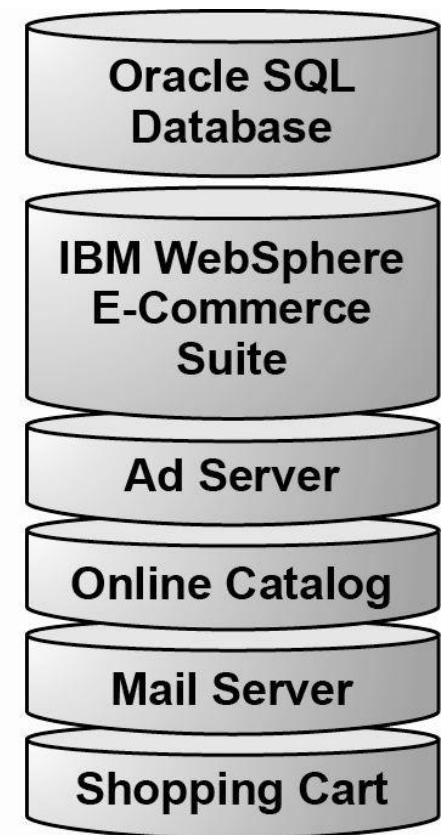
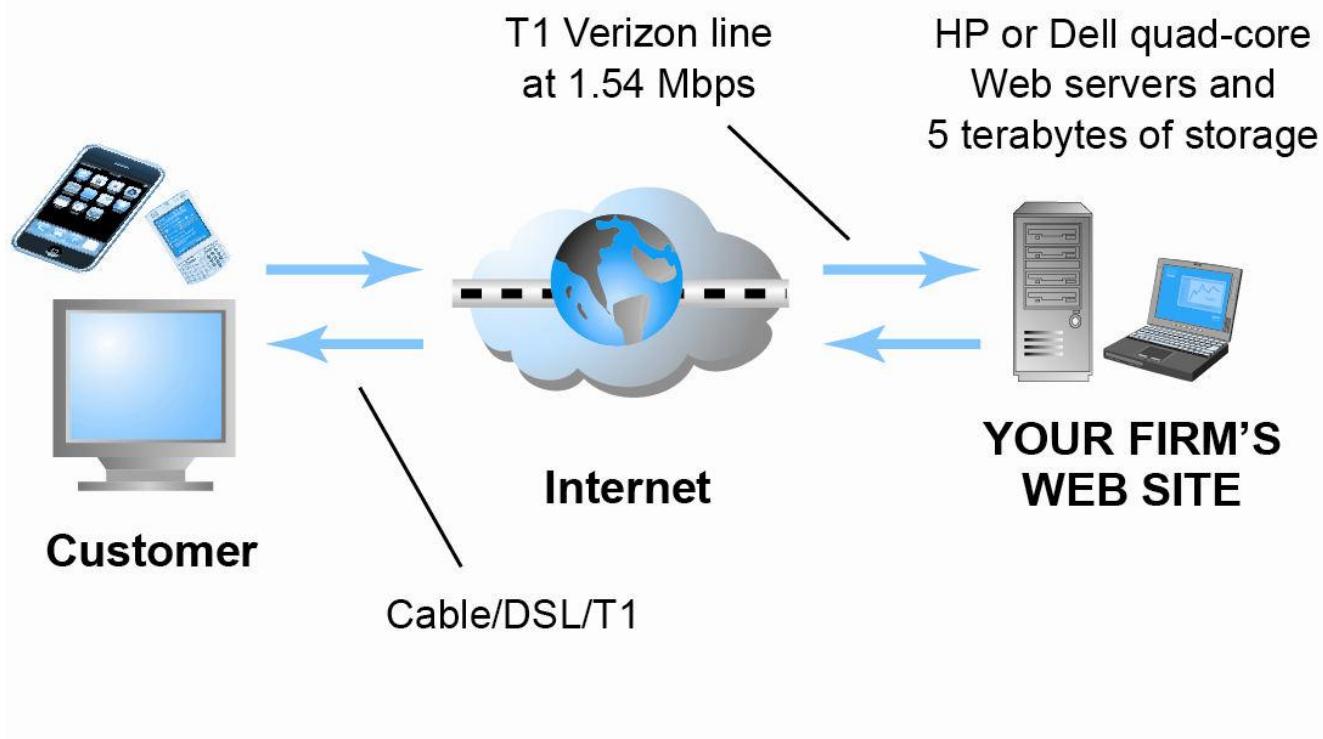


Figure 4.6 (b), Page 197



Build/Host Your Own vs. Outsourcing

- **Outsourcing:** Hiring vendors to provide services involved in building site
- **Build own vs. outsourcing:**
 - ❖ Build your own requires team with diverse skill set; choice of software tools; both risks and possible benefits
- **Host own vs. outsourcing**
 - ❖ **Hosting:** Hosting company responsible for ensuring site is accessible 24/7, for monthly fee
 - ❖ **Co-location:** Firm purchases or leases Web server (with control over its operation), but server is located at vendor's facility



Choices in Building and Hosting

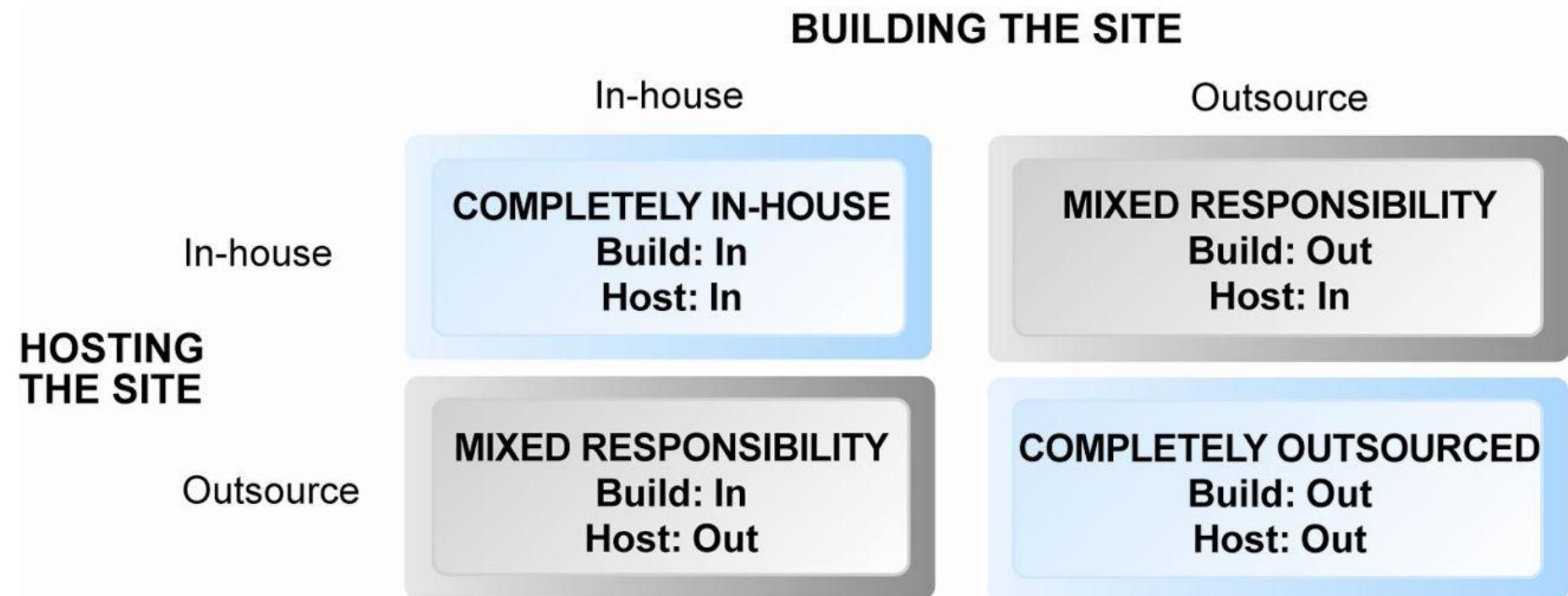


Figure 4.7 Page 198



Insight on Business: Class Discussion

Build Your Own website

- When you decide to build your own site, there are a range of options. Unless you are fairly skilled, you should use a pre-built template to create the Web site.
- For example, Yahoo Merchant Solutions, Amazon Stores, and eBay that all provide templates that merely require you to input text, graphics, and other data, as well as the infrastructure to run the Web site once it has been created.
- WordPress is a blogging tool with a sophisticated content management system.
- A content management system (CMS) is a database software program specifically designed to manage structured and unstructured data and objects in a Web site environment.
- Another examples of CMS are joomla , drupal



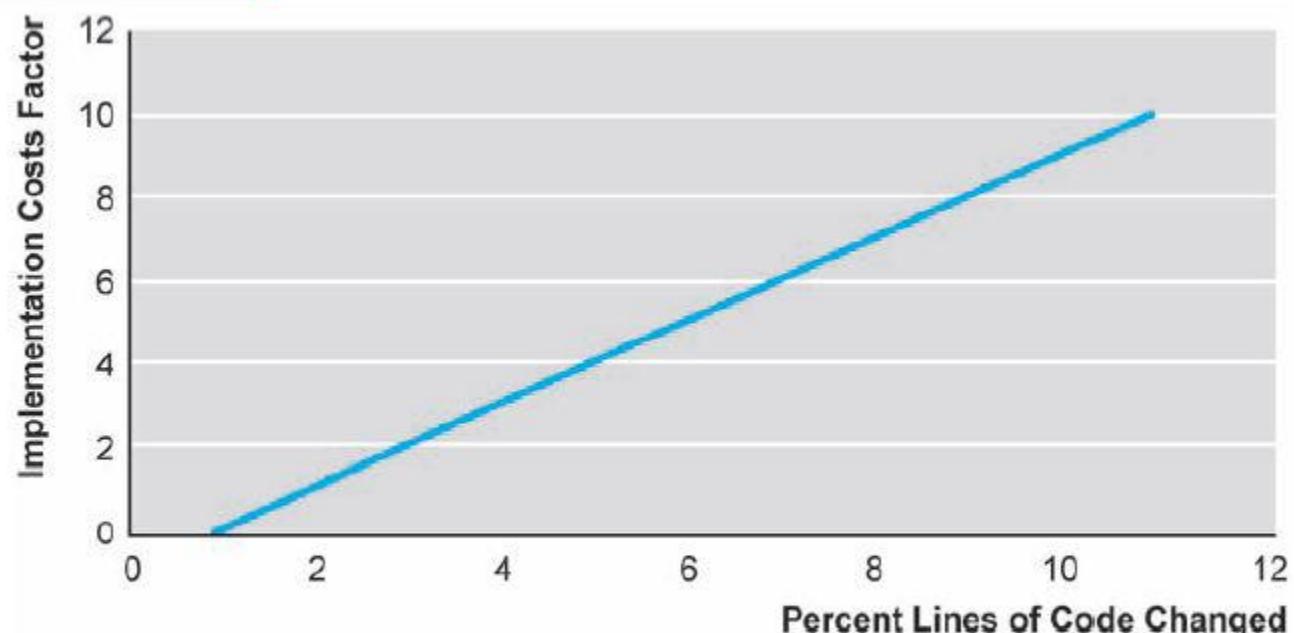
Website Design Cost

- If you choose more expensive site-building packages, you will be purchasing state-of-the art software that is well tested. You could get to market sooner. However, to make a sound decision, you will have to evaluate many different packages, and this can take a long time. You may have to modify the packages to fit your business needs and perhaps hire additional outside vendors to do the modifications. Costs rise rapidly as modifications mount. A \$4,000 package can easily become a \$40,000 to \$60,000 development project (see Figure on the next slide)



FIGURE 4.9

COSTS OF CUSTOMIZING E-COMMERCE PACKAGES



While sophisticated site development packages appear to reduce costs and increase speed to market, as the modifications required to fit the package to your business needs rise, costs rise rapidly.

Curly Hair and Appillionaires

- How does a small, niche Web site such as NaturallyCurly.com become profitable?
- How has cloud computing and social media reduced costs?
- How is the app economy changing the economics of software production and e-commerce?



Testing, Implementation, and Maintenance

■ Testing

- ❖ **Unit testing** : involves testing the site's program modules one at a time
- ❖ **System testing** : involves testing the site as a whole, in the same way a typical user would when using the site
- ❖ **Acceptance testing** : verifies that the business objectives of the system as originally conceived are in fact working

■ Implementation and maintenance:

- ❖ Maintenance is ongoing
- ❖ Maintenance costs: Similar to development costs
- ❖ Benchmarking is a process in which the site is compared with those of competitors in terms of response speed, quality of layout, and design



Factors in Web Site Optimization

- The purpose of a Web site is to deliver content to customers and to complete transactions.
- The faster and more reliably these two objectives are met, the more effective the Web site is from a commerce perspective.
- If you are a manager or marketing executive, you will want the Web site operating in a way that fulfills customers' expectations. You'll have to make sure the Web site is optimized to achieve this business objective.
- The optimization of Web site performance is more complicated than it seems and involves at least three factors: page content, page generation, and page delivery

Figure 4.10, Page 205



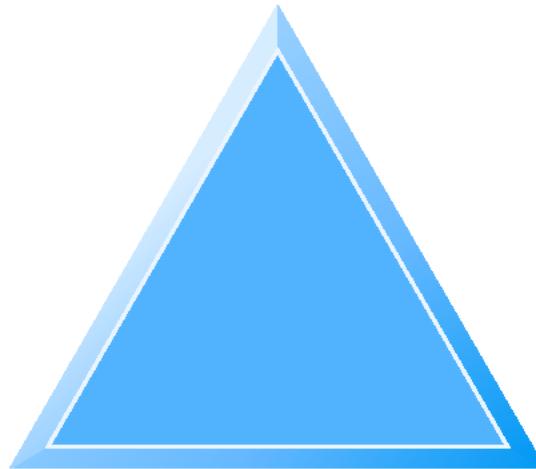
Factors in Web Site Optimization

Page Delivery

Content delivery networks
Edge caching
Bandwidth

Page Generation

Server response time
Device-based accelerators
Efficient resource allocation
Resource utilization thresholds
Monitoring site performance



Page Content

Optimize HTML
Optimize images
Site architecture
Efficient page style

Figure 4.10, Page 205



Simple vs. Multi-tiered Web Site Architecture

- Web site software was appropriately quite simple—it consisted of a server computer running basic Web server software. It might call this arrangement a **single-tier system architecture**

■ System architecture

- ❖ Arrangement of software, machinery, and tasks in an information system needed to achieve a specific functionality

■ Two-tier

- ❖ Web server and database server

■ Multi-tier

- ❖ Web application servers
- ❖ Backend, legacy databases

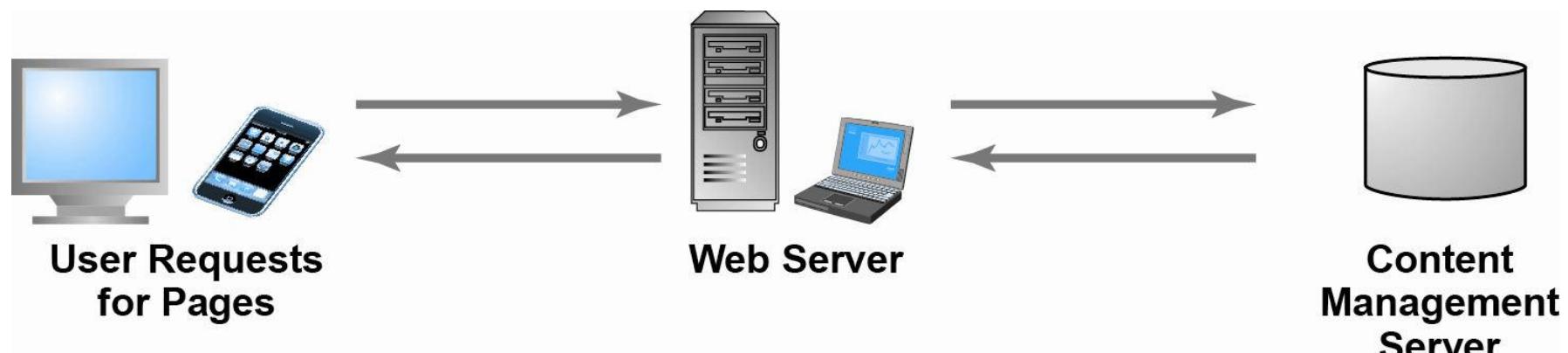


Simple vs. Multi-tiered Web Site Architecture

- **Backend, legacy databases** having specialized application servers, e-commerce sites must be able to pull information from and add information to pre-existing corporate databases. These older databases that predate the e-commerce era are called backend or legacy databases.



Two-Tier E-commerce Architecture



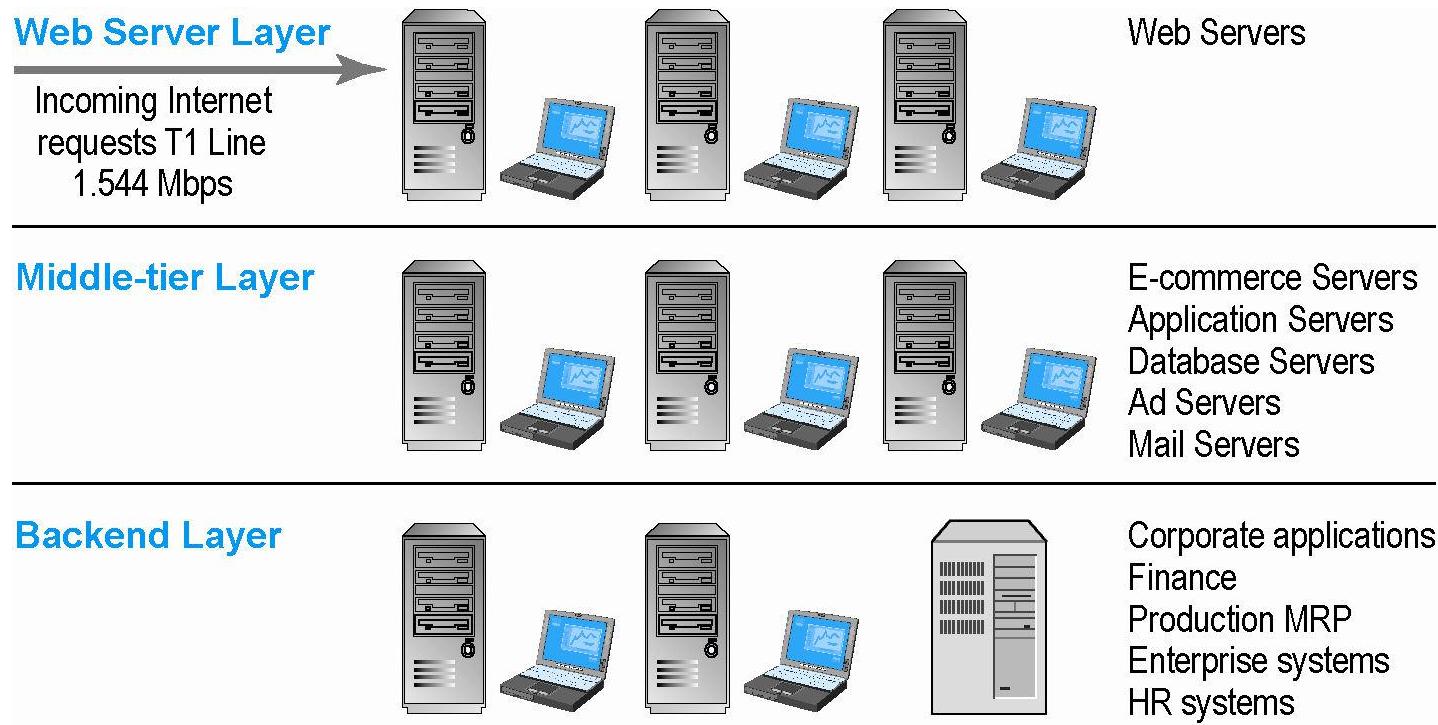
(a) Two-tier Architecture

Two-tier architecture refers to Web server responds to requests for Web pages and a database server provides backend data storage

Figure 4.11(a), Page 207



Multi-Tier E-commerce Architecture



(b) Multi-tier Architecture

In a multi-tier architecture, a Web server is linked to a middle-tier layer that typically includes a series of application servers that perform specific tasks, as well as to a backend layer of existing corporate systems.

Figure 4.11(b), Page 207



Web Server Software

■ Apache

- ❖ Leading Web server software (52% of market)
- ❖ Works with UNIX, Linux operating systems
- ❖ Unix is the original programming language of the Internet and Web, and Linux is a derivative of Unix designed for the personal computer

■ Microsoft's Internet Information Server (IIS)

- ❖ Second major Web server software (20% of market)
- ❖ Windows-based

**TABLE 4.4****BASIC FUNCTIONALITY PROVIDED BY WEB SERVERS**

FUNCTIONALITY	DESCRIPTION
Processing of HTTP requests	Receive and respond to client requests for HTML pages
Security services (Secure Sockets Layer)/Transport Layer Security	Verify username and password; process certificates and private/public key information required for credit card processing and other secure information
File Transfer Protocol	Permits transfer of very large files from server to server
Search engine	Indexing of site content; keyword search capability
Data capture	Log file of all visits, time, duration, and referral source
E-mail	Ability to send, receive, and store e-mail messages
Site management tools	Calculate and display key site statistics, such as unique visitors, page requests, and origin of requests; check links on pages

Table 4.4, Page 208



■ Basic tools **Site Management Tools**

❖ Included in all Web servers

- Verify that links on pages are still valid
- Identify orphan files
- E.g. Your customers will not be impressed if they encounter a “404 Error: Page Does Not Exist” message on your Web site. Links to URLs that have moved or been deleted are called dead links; these can cause error messages for users trying to access that link.

■ Third-party software for advanced management

- Monitor customer purchases, marketing campaign effectiveness, and so on
- WebTrends Analytics 10, Google Analytics

**FIGURE 4.12****WEBTRENDS ANALYTICS**

Using a sophisticated Web analytics solution such as Webtrends Analytics, managers can quickly understand the return on investment of their online marketing efforts and determine how to improve conversion by drilling down into abandonment paths, product preferences, and successful campaign elements for different types of customers.

SOURCE: Webtrends, Inc., 2011.



Dynamic Page Generation Tools

- **Dynamic page generation:** the contents of a Web page are stored as objects in a database, rather than being hard-coded in HTML. When the user requests a Web page, the contents for that page are then fetched from the database
- **Common tools:**
- The objects are retrieved from the database using Common Gateway Interface (CGI), Active Server Pages (ASP), Java Server Pages (JSP), or other server-side programs



Dynamic Page Generation Tools

- A standard data access method called Open Database Connectivity (ODBC) makes it possible to access any data from any application regardless of what database is used. ODBC is supported by most of the large database suppliers such as Oracle, Sybase, and IBM. ODBC makes it possible for HTML pages to be linked to backend corporate databases regardless of who manufactured the database

■ Advantages

- ❖ Lowers menu costs
- ❖ Permits easy online market segmentation
- ❖ Enables cost-free price discrimination
- ❖ Enables content management system (CMS)



Application Servers

■ **Web application servers:**

- ❖ Provide specific business functionality required for a Web site
- ❖ Type of middleware
 - Isolate business applications from Web servers and databases
- ❖ Single-function applications being replaced by integrated software tools that combine all functionality needed for e-commerce site



Application Servers

TABLE 4.5

APPLICATION SERVERS AND THEIR FUNCTION

APPLICATION SERVER	FUNCTIONALITY
Catalog display	Provides a database for product descriptions and prices
Transaction processing (shopping cart)	Accepts orders and clears payments
List server	Creates and serves mailing lists and manages e-mail marketing campaigns
Proxy server	Monitors and controls access to main Web server; implements firewall protection
Mail server	Manages Internet e-mail
Audio/video server	Stores and delivers streaming media content
Chat server	Creates an environment for online real-time text and audio interactions with customers
News server	Provides connectivity and displays Internet news feeds
Fax server	Provides fax reception and sending using a Web server
Groupware server	Creates workgroup environments for online collaboration
Database server	Stores customer, product, and price information
Ad server	Maintains Web-enabled database of advertising banners that permits customized and personalized display of advertisements based on consumer behavior and characteristics
Auction server	Provides a transaction environment for conducting online auctions
B2B server	Implements buy, sell, and link marketplaces for commercial transactions



E-commerce Merchant Server Software

■ Provides basic functionality for sales

❖ Online catalog

- List of products available on Web site

❖ Shopping cart

- Allows shoppers to set aside, review, edit selections, and then make purchase

❖ Credit card processing

- Typically works in conjunction with shopping cart
- Verifies card and puts through credit to company's account at checkout



Merchant Server Software Packages

- **Integrated environment that includes most of functionality needed**
- **Key factors in selecting a package**
 - ❖ Functionality
 - ❖ Support for different business models
 - ❖ Business process modeling tools
 - ❖ Visual site management and reporting
 - ❖ Performance and scalability
 - ❖ Connectivity to existing business systems
 - ❖ Compliance with standards
 - ❖ Global and multicultural capability
 - ❖ Local sales tax and shipping rules



Web Services and Open-Source Options

■ Options for small firms

- ❖ Hosted e-commerce sites
 - Offer site building tools and templates
 - Example: Yahoo's Merchant Solutions
- ❖ Open-source merchant server software
 - Enables you to build truly custom sites
 - Requires programmer with expertise, time



The Hardware Platform

■ **Hardware platform:**

- ❖ Underlying computing equipment needed for e-commerce functionality

■ **Objective:**

- ❖ Enough platform capacity to meet peak demand without wasting money

■ **Important to understand the factors that affect speed, capacity, and scalability of a site**



Right-Sizing Your Hardware Platform: The Demand Side

■ Customer demand:

- ❖ Most important factor affecting speed of site

■ Factors in overall demand:

- ❖ Number of simultaneous users in peak periods
- ❖ Nature of customer requests (user profile)
- ❖ Type of content (dynamic vs. static Web pages)
- ❖ Required security
- ❖ Number of items in inventory
- ❖ Number of page requests
- ❖ Speed of legacy applications



Right-Sizing Your Hardware Platform: The Supply Side

■ Scalability:

- ❖ Ability of site to increase in size as demand warrants

■ Ways to scale hardware:

❖ Vertically

- Increase processing power of individual components

❖ Horizontally

- Employ multiple computers to share workload

❖ Improve processing architecture

**TABLE 4.8****VERTICAL AND HORIZONTAL SCALING TECHNIQUES**

TECHNIQUE	APPLICATION
Use a faster computer	Deploy edge servers, presentation servers, data servers, etc.
Create a cluster of computers	Use computers in parallel to balance loads.
Use appliance servers	Use special-purpose computers optimized for their task.
Segment workload	Segment incoming work to specialized computers.
Batch requests	Combine related requests for data into groups, process as group.
Manage connections	Reduce connections between processes and computers to a minimum.
Aggregate user data	Aggregate user data from legacy applications in single data pools.
Cache	Store frequently used data in cache rather than on the disk.

Table 4.8, Page 219

**TABLE 4.9****IMPROVING THE PROCESSING ARCHITECTURE OF YOUR SITE**

ARCHITECTURE IMPROVEMENT	DESCRIPTION
Separate static content from dynamic content	Use specialized servers for each type of workload.
Cache static content	Increase RAM to the gigabyte range and store static content in RAM.
Cache database lookup tables	Use cache tables used to look up database records.
Consolidate business logic on dedicated servers	Put shopping cart, credit card processing, and other CPU-intensive activity on dedicated servers.
Optimize ASP code	Examine your code to ensure it is operating efficiently.
Optimize the database schema	Examine your database search times and take steps to reduce access times.

Table 4.9, Page 220



Other E-commerce Site Tools

■ Web site design: Basic business considerations

- ❖ Enabling customers to find and buy what they need

■ Tools for Web site optimization

- ❖ Search engine placement
 - Metatags, titles, content
 - Identify market niches, localize site
 - Offer expertise
 - Links
 - Search engine ads
 - Local e-commerce

**TABLE 4.10****E-COMMERCE WEB SITE FEATURES THAT ANNOY CUSTOMERS**

- | | |
|---|---|
| <ul style="list-style-type: none">• Requiring user to view ad or Flash introduction before going to Web site content• Pop-up and pop-under ads and windows• Too many clicks to get to the content• Links that don't work• Confusing navigation; no search function• Requirement to register and log in before viewing content or ordering• Slow loading pages• Content that is out of date | <ul style="list-style-type: none">• Inability to use browser's Back button• No contact information available (Web form only)• Unnecessary splash/flash screens, animation, etc.• Music or other audio that plays automatically• Unprofessional design elements• Text not easily legible due to size, color, format• Typographical errors• No or unclear returns policy |
|---|---|

Table 4.10, Page 221

**TABLE 4.11****THE EIGHT MOST IMPORTANT FACTORS IN SUCCESSFUL
E-COMMERCE SITE DESIGN**

FACTOR	DESCRIPTION
Functionality	Pages that work, load quickly, and point the customer toward your product offerings
Informational	Links that customers can easily find to discover more about you and your products
Ease of use	Simple fool-proof navigation
Redundant navigation	Alternative navigation to the same content
Ease of purchase	One or two clicks to purchase
Multi-browser functionality	Site works with the most popular browsers
Simple graphics	Avoids distracting, obnoxious graphics and sounds that the user cannot control
Legible text	Avoids backgrounds that distort text or make it illegible

Table 4.11, Page 222



Tools for Interactivity and Active Content

- **CGI (Common Gateway Interface)**
- **ASP (Active Server Pages)/ASP.NET**
- **Java, JSP, and JavaScript**
- **ActiveX and VBScript**
- **ColdFusion**
- **Web 2.0 design elements:**
 - ❖ Widgets, mashups



Personalization Tools

■ Personalization

- ❖ Ability to treat people based on personal qualities and prior history with site

■ Customization

- ❖ Ability to change the product to better fit the needs of the customer

■ Cookies

- ❖ Primary method to achieve personalization



The Information Policy Set

■ Privacy policy

- ❖ Set of public statements declaring how site will treat customers' personal information that is gathered by site

■ Accessibility rules

- ❖ Set of design objectives that ensure disabled users can effectively access site

Designing for Accessibility

- Why might some merchants be reluctant to make their Web sites accessible to disabled Americans?
- How can Web sites be made more accessible?
- Should all Web sites be required by law to provide “equivalent alternatives” for visual and sound content?
- What additional accessibility problems do mobile devices pose?



Developing a Mobile Web Site and Building Mobile Applications

■ Three types of m-commerce software

- ❖ Mobile Web site
 - Responsive Web design
- ❖ Mobile Web app
- ❖ Native app

■ Planning and building mobile presence

- ❖ Use systems analysis/design to identify unique and specific business objectives

**TABLE 4.13****UNIQUE FEATURES THAT MUST BE TAKEN INTO ACCOUNT
WHEN DESIGNING A MOBILE WEB PRESENCE**

FEATURE	IMPLICATIONS FOR MOBILE PLATFORM
Hardware	Mobile hardware is smaller, and there are more resource constraints in data storage and processing power.
Connectivity	The mobile platform is constrained by slower connection speeds than desktop Web sites.
Displays	Mobile displays are much smaller and require simplification. Some screens are not good in sunlight.
Interface	Touch-screen technology introduces new interaction routines different from the traditional mouse and keyboard. The mobile platform is not a good data entry tool but can be a good navigational tool.

Table 4.13, Page 231



Developing a Mobile Web Presence

■ Design considerations

- ❖ Platform constraints: Smartphone/tablet

■ Performance and cost

- ❖ Mobile Web site:

- Least expensive

- ❖ Mobile app:

- Can utilize browser API

- ❖ Native app:

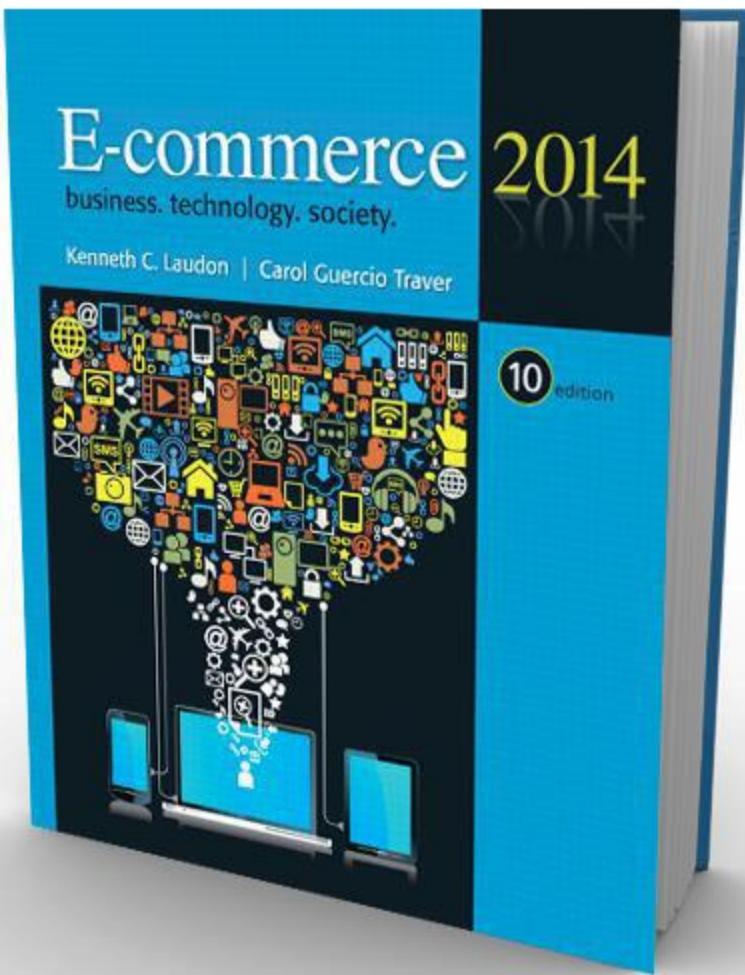
- Most expensive; requires more programming

Building a Mobile Presence

- **What are the key differences between user experience on a Web site and on a mobile device?**
- **Why would a mobile Web site or app from the same merchant need different content or functionality?**
- **In which cases would a merchant want to develop a mobile app over a mobile Web site?**



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Chapter 5

E-commerce Security and Payment Systems

Cyberwar: MAD 2.0

- *Cyberwar: MAD 2.0* illustrates, the Internet and Web are increasingly vulnerable to large-scale attacks and potentially large-scale failure. Increasingly, these attacks are led by organized gangs of criminals operating globally—an unintended consequence of globalization. Even more worrisome is the growing number of large-scale attacks that are funded, organized, and led by various nations against the Internet resources of other nations.

Cyberwar: MAD 2.0

■ What is the difference between hacking and cyberwar?

- ✓ Cyberwar is much more serious threat to infrastructure of entire nation

■ Why has cyberwar become more potentially devastating in the past decade?

- ✓ Because highly developed nations has relied more on the internet for business , government , and industrial utility controls

■ Is it possible to find a political solution to MAD 2.0?

- ✓ Probably not



Class Discussion

The major trends in online security in 2013–2014.

TABLE 5.1

WHAT'S NEW IN E-COMMERCE SECURITY 2013–2014

- Mobile malware presents a tangible threat as smartphones and other mobile devices become more common targets of cybercriminals.
- Politically motivated, targeted attacks by hacktivist groups continue, in some cases merging with financially motivated cybercriminals to target financial systems with advanced persistent threats.
- Hackers and cybercriminals continue to focus their efforts on social network sites to exploit potential victims.
- Nations continue to engage in cyberwarfare and cyberespionage.
- Large-scale data breaches continue to expose data about individuals to hackers and other cybercriminals.
- Certificate authorities and the digital encryption regime that provides a basis for trust within the Internet infrastructure tighten standards in an attempt to prevent further attacks after several high-profile hacks.
- Malicious attacks targeting Mac computers increase.
- The amount of spam continues to decrease as a result of the demise of Rustock, the largest spam-sending botnet in the world and better detection techniques by e-mail providers.



The E-commerce Security Environment

- It's considered less risky to steal online. Rather than rob a bank in person, the Internet makes it possible to rob people remotely and almost anonymously. Rather than steal a CD at a local record store, you can download the same music for free and almost without risk from the Internet. The potential for anonymity on the Internet cloaks many criminals in legitimate-looking identities, allowing them to place fraudulent orders with online merchants, steal information by intercepting e-mail, or simply shut down e-commerce sites by using software viruses and swarm attacks.



The Scope of the Problem

- Cybercrime is becoming a more significant problem for both organizations and consumers. Bot networks, DDoS attacks, Trojans, phishing, data theft, identity fraud, credit card fraud, and spyware are just some of the threats that are making daily headlines. Social networks also have had security breaches. But despite the increasing attention being paid to cybercrime, it is difficult to accurately estimate the actual amount of such crime, in part because many companies are hesitant to report it due to the fear of losing the trust of their customers, and because even if crime is reported, it may be difficult to quantify the actual dollar amount of the loss.



The Scope of the Problem

- The 2012 survey found that the average annualized cost of cybercrime for the organizations in the study was \$8.9 million per year, representing a 6% increase over 2011, and a 38% increase over 2010. The average cost per attack was around \$600,000, an over 40% increase from the previous year. The number of cyberattacks also increased, by over 40%. The most costly cybercrimes were those caused by denial of service, malicious insiders, and Web-based attacks. The most prevalent types of attacks were viruses, worms, and Trojans, experienced by 100% of the companies surveyed, followed by malware (95%), botnets (71%), and Web-based attacks (64%)



The Underground Economy Marketplace: The Value of Stolen Information

- Criminals who steal information on the Internet do not always use this information themselves, but instead derive value by selling the information to others on so-called underground economy servers. For example, in 2013, Vladislav Horohorin (alias “BadB”) was sentenced to over 7 years in federal prison for using online criminal forums to sell stolen credit and debit card information (referred to as “dumps”). At the time of his arrest, Horohorin possessed over 2.5 million stolen credit and debit card numbers. There are several thousand known underground economy servers around the world that sell stolen information (about half of these are in the United States). **Table 5.2** lists some recently observed prices, which typically vary depending on the quantity being purchased



The Underground Economy Marketplace: The Value of Stolen Information

TABLE 5.2 THE CYBER BLACK MARKET FOR STOLEN DATA	
Credit card	\$2–\$90
A full identity (U.S. bank account, credit card, date of birth, social security, etc.)	\$3–\$20
Bank account	\$80–\$700
Online accounts (PayPal, eBay, Facebook, Twitter, etc.)	\$10–\$1500
E-mail accounts	\$5–\$12
Botnet rental	\$15
A single compromised computer	\$6–\$20
Social security number	\$5–\$7
Attack toolkits	\$120 per month
1,000 fake Instagram “followers”	\$15

SOURCES: Based on data from Finkle, 2013; PandaSecurity, 2012; Danchev, 2011; Symantec, Inc., 2011, 2010.



What Is Good E-commerce Security?

- What is a secure commercial transaction? Anytime you go into a marketplace you take risks, including the loss of privacy (information about what you purchased). Your prime risk as a consumer is that you do not get what you paid for. As a merchant in the market, your risk is that you don't get paid for what you sell. Thieves take merchandise and then either walk off without paying anything, or pay you with a fraudulent Instrument, stolen credit card, or forged currency.
- E-commerce merchants and consumers face many of the same risks as participants in traditional commerce, albeit in a new digital environment. Theft is theft, regardless of whether it is digital theft or traditional theft



What Is Good E-commerce Security?

■ To achieve highest degree of security

- ❖ New technologies
- ❖ Organizational policies and procedures
- ❖ Industry standards and government laws

■ Other factors

- ❖ Time value of money
- ❖ Cost of security vs. potential loss
- ❖ Security often breaks at weakest link



The E-commerce Security Environment

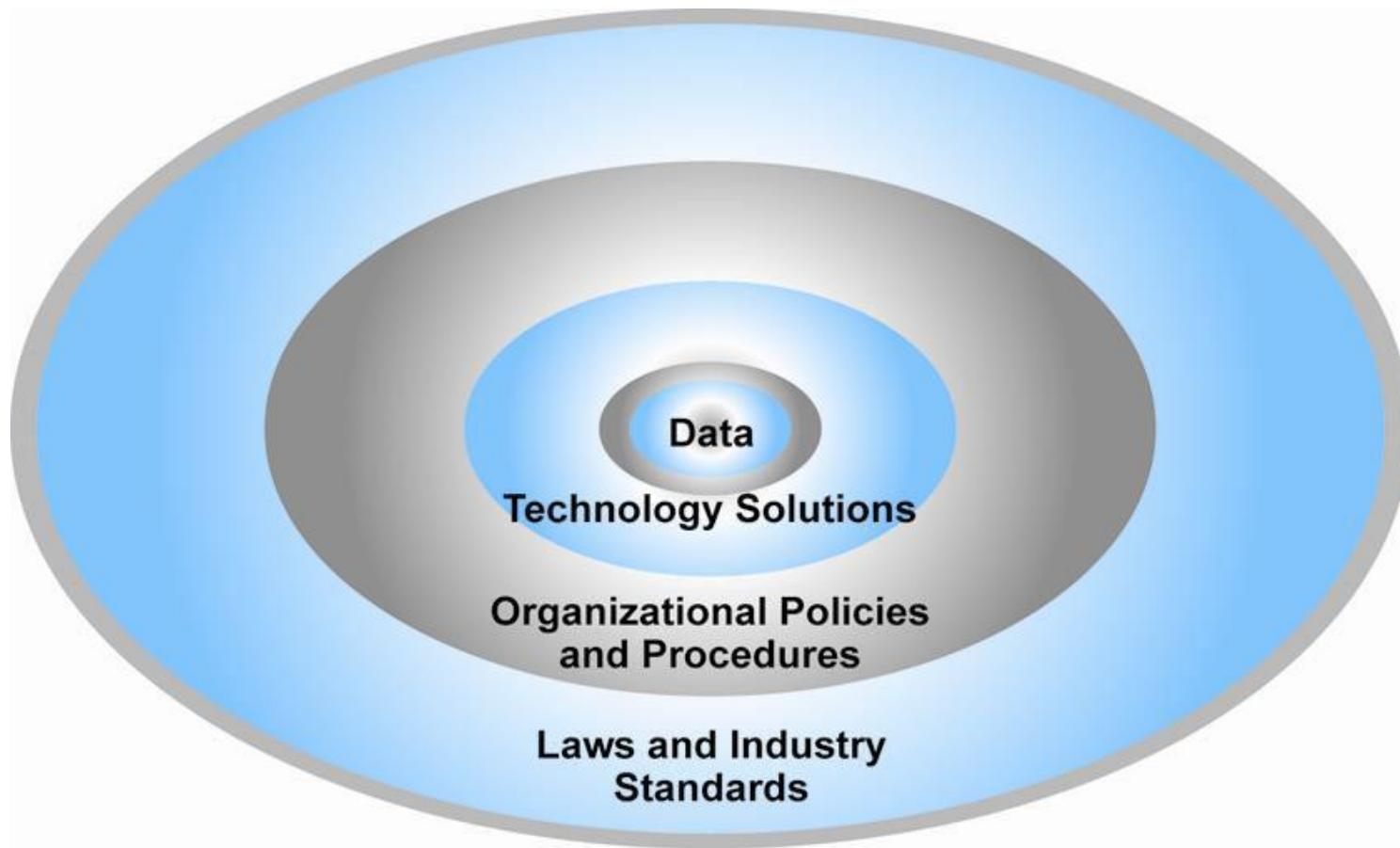


Figure 5.1, Page 252

**TABLE 5.3****CUSTOMER AND MERCHANT PERSPECTIVES ON THE DIFFERENT DIMENSIONS OF E-COMMERCE SECURITY**

DIMENSION	CUSTOMER'S PERSPECTIVE	MERCHANT'S PERSPECTIVE
Integrity	Has information I transmitted or received been altered?	Has data on the site been altered without authorization? Is data being received from customers valid?
Nonrepudiation	Can a party to an action with me later deny taking the action?	Can a customer deny ordering products?
Authenticity	Who am I dealing with? How can I be assured that the person or entity is who they claim to be?	What is the real identity of the customer?
Confidentiality	Can someone other than the intended recipient read my messages?	Are messages or confidential data accessible to anyone other than those authorized to view them?
Privacy	Can I control the use of information about myself transmitted to an e-commerce merchant?	What use, if any, can be made of personal data collected as part of an e-commerce transaction? Is the personal information of customers being used in an unauthorized manner?
Availability	Can I get access to the site?	Is the site operational?

Table 5.3, Page 254



The Tension Between Security and Other Values

■ Ease of use

- ❖ The more security measures added, the more difficult a site is to use, and the slower it becomes

■ Public safety and criminal uses of the Internet

- ❖ Use of technology by criminals to plan crimes or threaten nation-state



Security Threats in the E-commerce Environment

- Three key points of vulnerability in e-commerce environment:
 1. Client
 2. Server
 3. Communications pipeline (Internet communications channels)



A Typical E-commerce Transaction

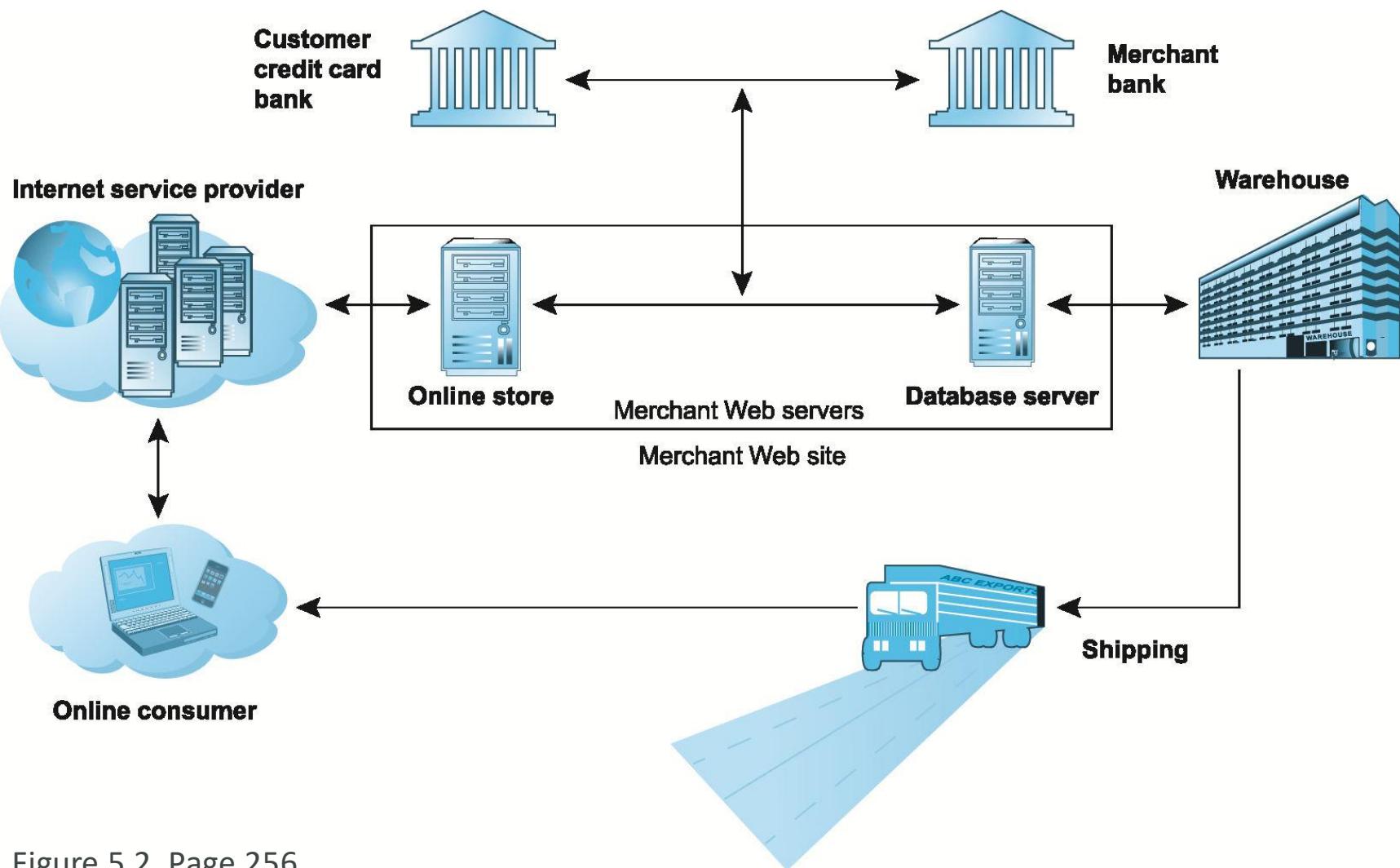


Figure 5.2, Page 256



Vulnerable Points in an E-commerce Transaction

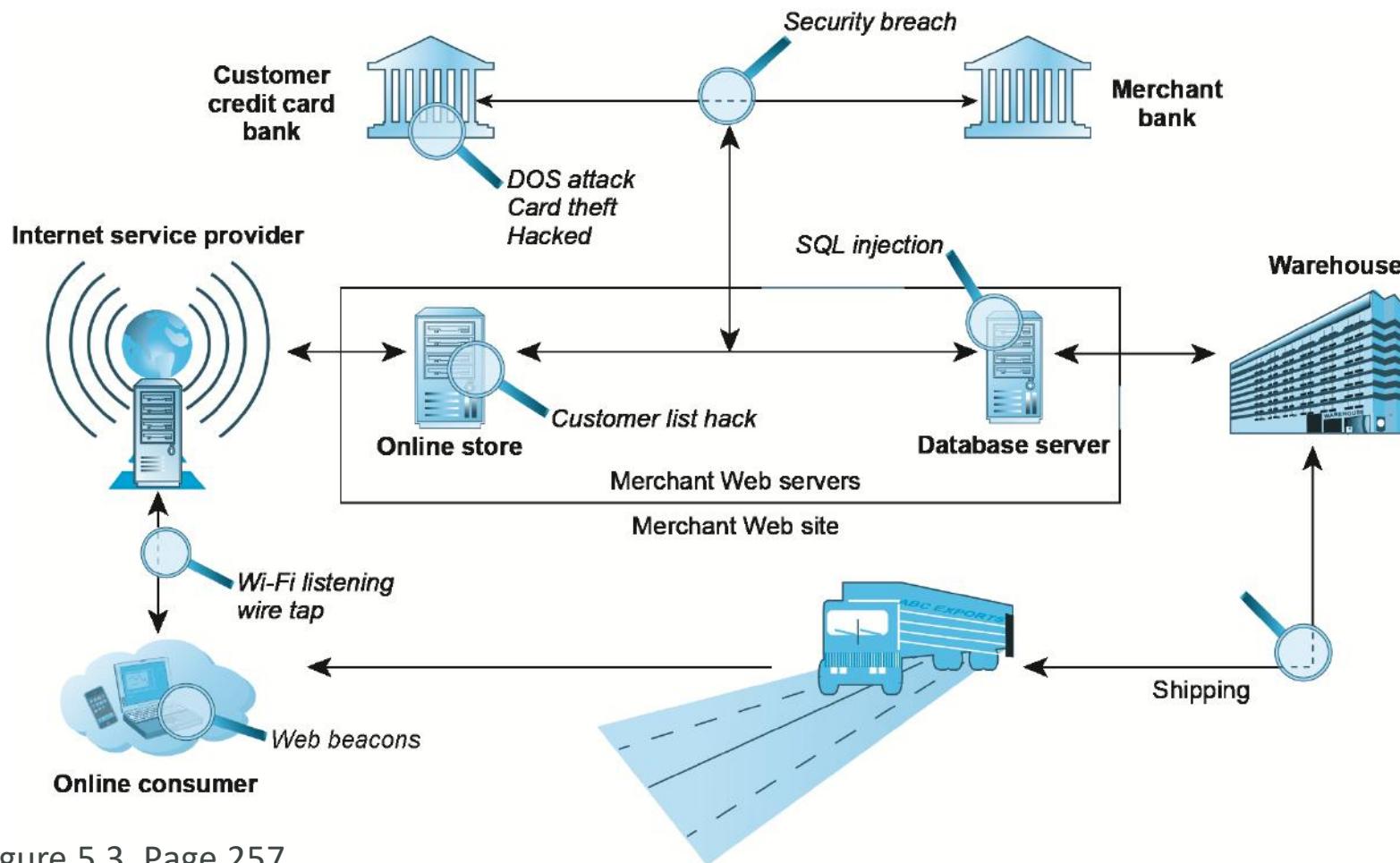


Figure 5.3, Page 257



The most common damaging forms of security threats to e-commerce consumers and site operators

- Phishing
- Hacking and cybervandalism,
- Credit card fraud/theft,
- Spoofing, pharming, and spam (junk) Web sites
- Identity fraud, Denial of Service (DoS) and DDoS attacks
- Sniffing, and insider attacks
- Poor designed server and client software
- Social network security issues, mobile platform security issues, and finally, cloud security issues.



Most Common Security Threats in the E-commerce Environment

- **Malicious code (malware, exploits)**
 - ❖ **Drive-by downloads** (malware that comes with a downloaded file that a user requests)
 - ❖ **Viruses** (a computer program that has the ability to replicate or make copies of itself, and spread to other files)
 - ❖ **Worms** (malware that is designed to spread from computer to computer) eg. Slammer
 - ❖ **Ransomware**(malware that prevents you from accessing your computer or files and demands that you pay a fine)
 - ❖ **Trojan horses** (appears to be benign, but then does something other than expected. Often a way for viruses or other malicious code to be introduced into a computer system)
 - ❖ **Backdoors** (is a feature of viruses, worms, and Trojans that allows an attacker to remotely access a compromised computer)
- **Bots, botnets** (short for robots) are a type of malicious code that can be covertly installed on your computer when attached to the Internet



Most Common Security Threats in the E-commerce Environment

- Some malicious code, sometimes referred to as an *exploit*, is designed to take advantage of software vulnerabilities in a computer's operating system, Web browser, applications, or other software components. For example, Microsoft reported that the Blackhole exploit kit available for purchase or rent from various hacker forums was the most commonly detected exploit family in the second half of 2012. Java exploits, those that affected Adobe products,



Most Common Security Threats (cont.)

- **Potentially unwanted programs (PUPs)** is defined as program that installs itself on a computer, typically without the user's informed consent .
- **PUPs could be :**
 1. **Browser parasites** : is a program that can monitor and change the settings of a user's browser, for instance, changing the browser's home page, or sending information about the sites visited to a remote computer. Browser parasites are often a component of adware. For example, Websearch is an adware component that modifies Internet Explorer's default home page and search settings.
 2. **Adware** is typically used to call for pop-up ads to display when the user visits certain sites. While annoying, adware is not typically used for criminal activities
 3. **Spyware**: is a program used to obtain information such as a user's keystrokes, copies of e-mail and instant messages, and even take screenshots (and thereby capture passwords or other confidential data).
- **Phishing**



Most Common Security Threats (cont.)

- **Phishing** : is any deceptive, online attempt by a third party to obtain confidential information for financial gain.
- Phishing attacks typically do not involve malicious code but instead rely on straightforward misrepresentation and fraud, so-called “social engineering” techniques
- **Social engineering** : relies on human curiosity, greed, and gullibility in order to trick people into taking an action that will result in the downloading of malware
- Thousands of other phishing attacks use other scams, some pretending to be eBay, PayPal, or Citibank writing to you for “account verification” (known as “spear phishing,” or targeting a known customer of a specific bank or other type of business). Click on a link in the e-mail and you will be taken to a Web site controlled by the scammer, and prompted to enter confidential information about your accounts, such as your account number and PIN codes. On any given day, millions of these phishing attack e-mails are sent, and, unfortunately, some people are fooled and disclose their personal account information



Most Common Security Threats (cont.)

- Hacking
 - ❖ Hackers vs. crackers
- **Hacker:** is an individual who intends to gain unauthorized access to a computer system , while the term **cracker** is typically used to denote a hacker with criminal intent
- **Types of hackers: White, black, grey hats**
 1. **White hats** “good” hackers who help organizations locate and fix security flaws.
 2. **black hats** are hackers who engage in the same kinds of activities but without pay or any buy-in from the targeted organization, and with the intention of causing harmre
 3. **Grey hats**, hackers who believe they a pursuing some greater good by breaking in and revealing system flaws. Grey hats discover weaknesses in a system’s security, and then publish the weakness without disrupting the site or attempting to profit from their finds. Their only reward is the prestige of discovering the weakness.



Most Common Security Threats (cont.)

- **Hacktivism :** Hacktivism adds a political twist. Hacktivists typically attack governments, organizations, and even individuals for political purposes, employing the tactics of cybervandalism, distributed denial of service attacks, data thefts, doxing (gathering and exposing personal information of public figures, originating from the term “documents” or “docx”)
- **Cybervandalism:**
 - ❖ Disrupting, defacing, destroying Web site
- **Data breach** occurs whenever organizations lose control over corporate information to outsiders. According to Symantec, data about more than 230 million people were exposed in 2011 as a result of data breaches



Most Common Security Threats (cont.)

- Credit card fraud/theft
- Theft of credit card data is one of the most feared occurrences on the Internet. Fear that credit card information will be stolen prevents users from making online purchases in many cases. Interestingly, this fear appears to be largely unfounded. Incidences of stolen credit card information are much lower than users think, around 0.8% of all online card transactions. Nevertheless, online credit card fraud is twice as common as offline card fraud.
- In the past, the most common cause of credit card fraud was a lost or stolen card that was used by someone else, followed by employee theft of customer numbers and stolen identities (criminals applying for credit cards using false identities)
- Federal law limits the liability of individuals to \$50 for a stolen credit card. For amounts more than \$50, the credit card company generally pays the amount, although in some cases, the merchant may be held liable if it failed to verify the account or consult published lists of invalid cards
- Currently there is no technology that can identify a person with certainty. Until a customer's identity can be guaranteed, online companies are at a much higher risk of loss than traditional offline companies.
- Who is Albert Gonzalez ???



Most Common Security Threats (cont.)

- **Spoofing , pharming , and spam**
- **Spoofing** involves attempting to hide a true identity by using someone else's e-mail or IP address. For instance, a spoofed e-mail will have a forged sender e-mail address designed to mislead the receiver about who sent the e-mail. IP spoofing involves the creation of TCP/IP packets that use someone else's source IP address, indicating that the packets are coming from a trusted host.
- Spoofing a Web site sometimes involves **pharming**, automatically redirecting a Web link to an address different from the intended one, with the site masquerading as the intended destination. Links that are designed to lead to one site can be reset to send users to a totally unrelated site—one that benefits the hacker.
- **Spam (junk) Web sites** (also sometimes referred to as *link farms*) are a little different. These are sites that promise to offer some product or service, but in fact are just a collection of advertisements for other sites, some of which contain malicious code. For instance, you may search for “[name of town] weather,” and then click on a link that promises your local weather, but then discover that all the site does is display ads for weather-related products or other Web sites.



Most Common Security Threats (cont.)

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Most Common Security Threats (cont.)

- Identity fraud , Denial of Service (DoS) attack and Distributed Denial of Service (DDoS)
- identity fraud involves the unauthorized use of another person's personal data for illegal financial benefit
- In a **Denial of Service (DoS) attack**, hackers flood a Web site with useless pings or page requests that inundate and overwhelm the site's Web servers. Increasingly, DoS attacks involve the use of bot networks and so-called "distributed attacks" built from thousands of compromised client computers. DoS attacks typically cause a Web site to shut down, making it impossible for users to access the site. For busy e-commerce sites, these attacks are costly; while the site is shut down, customers cannot make purchases. And the longer a site is shut down, the more damage is done to a site's reputation. Although such attacks do not destroy information or access restricted areas of the server, they can destroy a firm's online business.
- A **Distributed Denial of Service (DDoS) attack** uses hundreds or even thousands of computers to attack the target network from numerous launch points.
- In August 2012, WikiLeaks, a site dedicated to the release of classified information, was hit by a massive DDoS attack that left its Web site effectively inoperable. According to WikiLeaks, the amount of bandwidth consumed by the attacks was in the 10 gigabits per second range



Most Common Security Threats (cont.)

- **Sniffing**
- A **sniffer** is a type of eavesdropping program that monitors information traveling over. Sniffers enable hackers to steal proprietary information from anywhere on a network, including passwords, e-mail messages, company files, and confidential reports.
- **E-mail wiretaps** are a variation on the sniffing threat. An e-mail wiretap is a method for recording or journaling e-mail traffic generally at the mail server level from any individual. E-mail wiretaps are used by employers to track employee messages, and by government agencies to surveil individuals or groups.
- **Insider attacks**
- **Poorly designed server and client software**
- **Social network security issues**
- **Mobile platform security issues**



Most Common Security Threats (cont.)

- **Insider attacks and Poorly designed server and client software**
- In fact, the largest financial threats to business institutions come not from robberies but from embezzlement by insiders. Bank employees steal far more money than bank robbers. The same is true for e-commerce sites. Some of the largest disruptions to service, destruction to sites, and diversion of customer credit data and personal information have come from insiders—once trusted employees. Employees have access to privileged information, and, in the presence of sloppy internal security procedures, they are often able to roam throughout an organization's systems without leaving a trace.
- **Poorly designed server and client software refers** on poorly designed server and client software, sometimes in the operating system and sometimes in the application software, including browsers. For instance, **SQL injection attacks** take advantage of vulnerabilities in poorly coded Web application software that fails to properly validate or filter data entered by a user on a Web page to introduce malicious program code into a company's systems and networks



Most Common Security Threats (cont.)

- **Social network security issues#**
- **Social networks** like Facebook, Twitter, LinkedIn, Pinterest, and Tumblr provide a rich and rewarding environment for hackers. Viruses, site takeovers, identity fraud, malware-loaded apps, click hijacking, phishing, and spam are all found on social networks (US-CERT, 2011). For instance, the Ramnit worm stole account information from more than 45,000 Facebook users in 2012. Also in 2012, LinkedIn revealed that Russian hackers had obtained almost 6.5 million user passwords and posted them online and Twitter was hit by a widespread spam attack involving malicious tweets that included a user's Twitter name, which ultimately redirected the user to a Russian Web site containing the Blackhole exploit kit



Most Common Security Threats (cont.)

- **Mobile platform security issues: Vishing, smishing, madware**
- **Vishing attacks** target gullible cell phone users with verbal messages to call a certain number and, for example, donate money to starving children in Haiti.
- **Smishing attacks** exploit SMS/text messages. Compromised text messages can contain e-mail and Web site addresses that can lead the innocent user to a malware site.
- **Madware**—innocent-looking apps that contain adware that launches pop-up ads and text messages on your mobile device—is also becoming an increasing problem
- **Cloud security issues**
- The move of so many Internet services into the cloud also raises security risks. From an infrastructure standpoint, DDoS attacks threaten the availability of cloud services on which more and more companies are relying

Think Your Smartphone Is Secure?

- The explosion in mobile devices has broadened opportunities for hackers. Mobile users are filling their devices with personal and financial information, and using them to conduct an increasing number of transactions, from retail purchases to mobile banking, making them excellent targets for hackers. In general, mobile devices face all the same risks as any Internet device as well as some new risks associated with wireless network security. For instance, public Wi-Fi networks that are not secured are very susceptible to hacking. While most PC users are aware their computers and Web sites may be hacked and contain malware, most cell phone users believe their cell phone is as secure as a traditional landline phone. As with social network members, mobile users are prone to think they are in a shared, trustworthy environment.

Think Your Smartphone Is Secure?

■ What types of threats do smartphones face?

- Mobile cell phone malware was developed as early as 2004 with Cabir, a Bluetooth worm affecting Symbian operating systems (Nokia phones) and causing the phone to continuously seek out other Bluetooth-enabled devices, quickly draining the battery.
- The iKee.B worm infected jailbroken iPhones, turning the phones into botnet-controlled devices. An iPhone in Europe could be hacked by an iPhone in the United States, and all its private data sent to a server in Poland. Ikee.B established the feasibility of cell phone botnets
- Many—if not most—apps written for Android phones have poor protection for user information, and the number of malicious and high-risk Android apps detected by TrendMicro skyrocketed to 350,000 in 2012, an exponential increase when compared to just the 1,000 detected in 2011

Think Your Smartphone Is Secure?

■ Are there any particular vulnerabilities to this type of device?

- Many—if not most—apps written for Android phones have poor protection for user information, and the number of malicious and high-risk Android apps detected by TrendMicro skyrocketed to 350,000 in 2012, an exponential increase when compared to just the 1,000 detected in 2011
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- **Smishing** attacks exploit SMS/text messages. Compromised text messages can contain e-mail and Web site addresses that can lead the innocent user to a malware site. Criminal SMS spoofing services have emerged, which conceal the cybercriminal's true phone number, replacing it with a false alpha-numeric name

Think Your Smartphone Is Secure?

- **Are apps more or less likely to be subject to threats than traditional PC software programs?**
- A small number of downloaded apps from app stores have also contained malware. *Madware*—innocent-looking apps that contain adware that launches pop-up ads and text messages on your mobile device—is also becoming an increasing problem.
- ViaForensics, a mobile security firm in Chicago, found in a study of 50 popular iPhone apps that only three had adequate protection for usernames, passwords, and other sensitive data



Insight on Technology: Class Discussion

Cloud Security Issues

- The move of so many Internet services into the cloud also raises security risks. From an infrastructure standpoint, DDoS attacks threaten the availability of cloud services on which more and more companies are relying. Safeguarding data being maintained in a cloud environment is also a major concern. For example, researchers identified several ways data could be accessed without authorization on Dropbox, which offers a popular cloud file-sharing service. Dropbox has also experienced several security snafus, including leaving all of its users' files publicly accessible for four hours in June 2011 due to a software bug, the discovery of a security hole in its iOS app that allowed anyone with physical access to the phone to copy login credentials, and the theft of usernames and passwords in August 2012



Technology Solutions

- It is clear that the threats to e-commerce are very real, potentially devastating for individuals, businesses, and entire nations, and likely to be increasing in intensity along with the growth in e-commerce. But in fact a great deal of progress has been made by private security firms, corporate and home users, network administrators, technology firms, and government agencies. There are two lines of defense:
 1. Technology solutions
 2. policy solutions



Technology Solutions

■ Protecting Internet communications

- ❖ Encryption

■ Securing channels of communication

- ❖ SSL, VPNs

■ Protecting networks

- ❖ Firewalls

■ Protecting servers and clients



Tools Available to Achieve Site Security

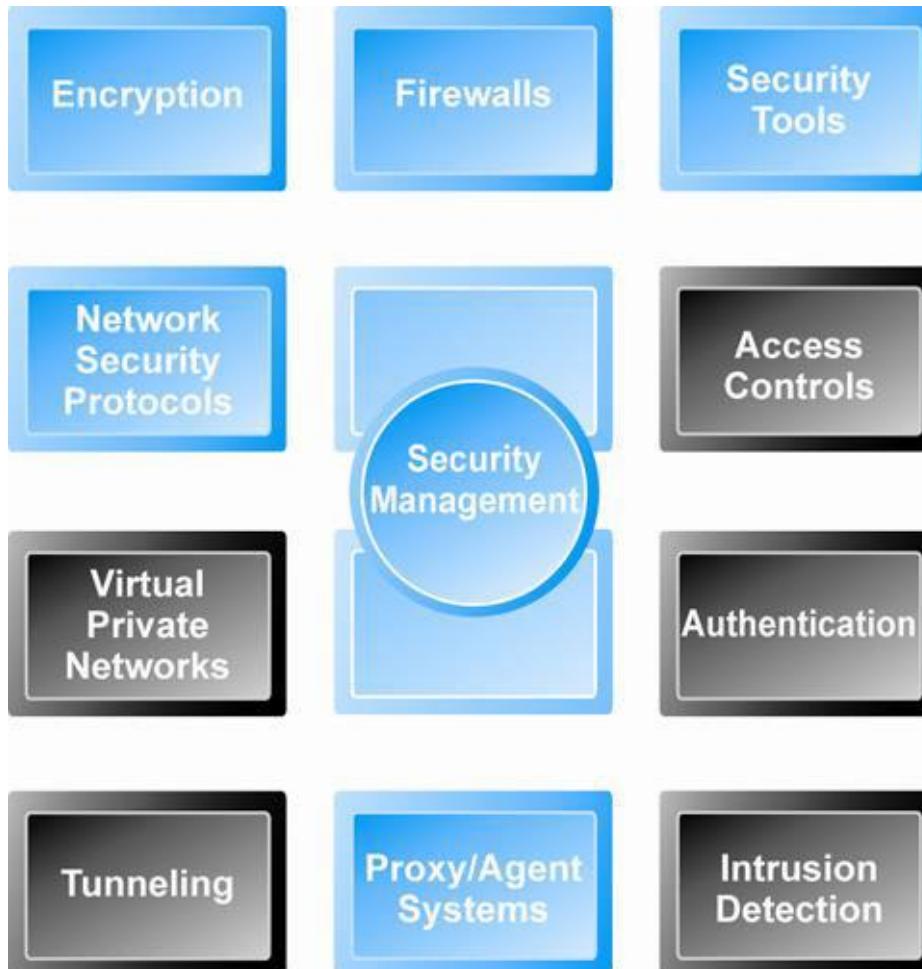


Figure 5.5, Page 276



Encryption

- **Encryption :** Encryption is the process of transforming plain text or data into cipher text that cannot be read by anyone other than the sender and the receiver. The purpose of encryption is (a) to secure stored information and (b) to secure information transmission. Encryption can provide four of the six key dimensions of e-commerce security
- **Encryption can provides 4 of 6 key dimensions of e-commerce security:**
 1. **Message integrity :** provides assurance that the message has not been altered
 2. **Nonrepudiation :** prevents the user from denying he or she sent the message
 3. **Authentication :** provides verification of the identity of the person (or computer)
 4. **Confidentiality :** gives assurance that the message was not read by others.



Encryption

- key (cipher) refers to any method for transforming plain text to cipher text
- Ancient Egyptian and Phoenician commercial records were encrypted using substitution and transposition ciphers. In a **substitution cipher**, every occurrence of a given letter is replaced systematically by another letter. For instance, if we used the cipher “letter plus two”—meaning replace every letter in a word with a new letter two places forward—then the word “Hello” in plain text would be transformed into the following cipher text: “JGNQ.”
- In a **transposition cipher**, the ordering of the letters in each word is changed in some systematic way. Leonardo Da Vinci recorded his shop notes in reverse order, making them readable only with a mirror. The word “Hello” can be written backwards as “OLLEH.”
- A more complicated cipher would (a) break all words into two words and (b) spell the first word with every other letter beginning with the first letter, and then spell the second word with all the remaining letters. In this cipher, “HELLO” would be written as “HLO EL.”



Symmetric Key Encryption

- In symmetric key the Sender and receiver use same digital key to encrypt and decrypt message
- Requires different set of keys for each transaction
- Strength of encryption
 - ❖ Length of binary key used to encrypt data
- Data Encryption Standard (DES)
- Advanced Encryption Standard (AES)
 - ❖ Most widely used symmetric key encryption
 - ❖ Uses 128-, 192-, and 256-bit encryption keys
- Other standards use keys with up to 2,048 bits



Disadvantages of using Symmetric Key Encryption

1. computers are so powerful and fast that these ancient means of encryption can be broken quickly.
2. Symmetric key encryption requires that both parties share the same key. In order to share the same key, they must send the key over a presumably *insecure* medium where it could be stolen and used to decipher messages. If the secret key is lost or stolen, the entire encryption system fails.
3. In commercial use, where we are not all part of the same team, you would need a secret key for each of the parties with whom you transacted, that is, one key for the bank, another for the department store, and another for the government



Public Key Encryption

- Public key cryptography solves the problem of exchanging keys. In this method, two mathematically related digital keys are used: a public key and a private key. The private key is kept secret by the owner, and the public key is widely disseminated. Both keys can be used to encrypt and decrypt a message.
- **It Uses two mathematically related digital keys**
 - ❖ Public key (widely disseminated)
 - ❖ Private key (kept secret by owner)
- **Both keys used to encrypt and decrypt message**
- **Once key used to encrypt message, same key cannot be used to decrypt message**
- **Sender uses recipient's public key to encrypt message; recipient uses private key to decrypt it**

Public Key Cryptography: A Simple Case

FIGURE 5.6	PUBLIC KEY CRYPTOGRAPHY—A SIMPLE CASE
STEP	DESCRIPTION
1. The sender creates a digital message.	The message could be a document, spreadsheet, or any digital object.
2. The sender obtains the recipient's public key from a public directory and applies it to the message.	Public keys are distributed widely and can be obtained from recipients directly.
3. Application of the recipient's key produces an encrypted cipher text message.	Once encrypted using the public key, the message cannot be reverse-engineered or unencrypted using the same public key. The process is irreversible.
4. The encrypted message is sent over the Internet.	The encrypted message is broken into packets and sent through several different pathways, making interception of the entire message difficult (but not impossible).
5. The recipient uses his/her private key to decrypt the message.	The only person who can decrypt the message is the person who has possession of the recipient's private key. Hopefully, this is the legitimate recipient.

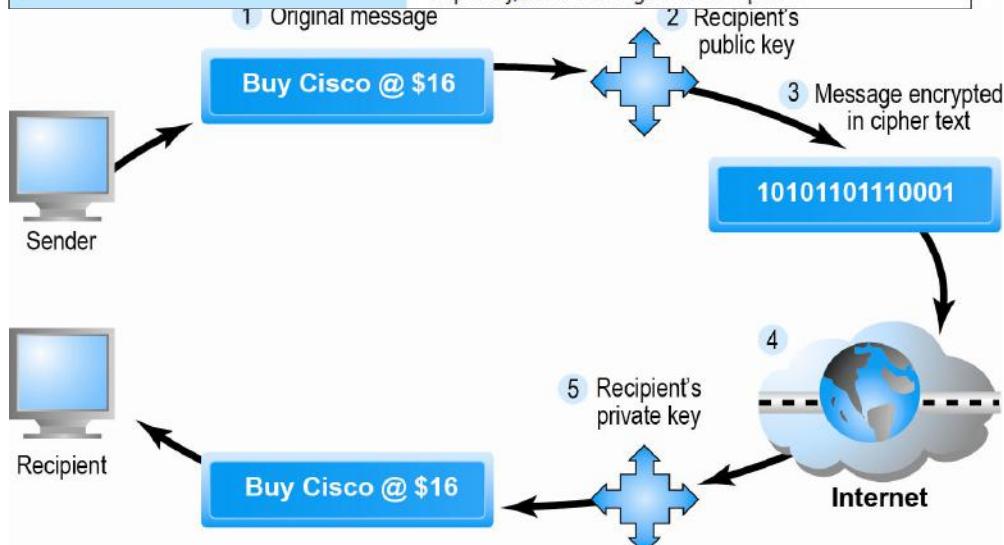


Figure 5.6, Page 279



Public Key Encryption using Digital Signatures and Hash Digests

- **Hash function:**
 - ❖ Mathematical algorithm that produces fixed-length number called message or hash digest
- **Hash digest of message sent to recipient along with message to verify integrity**
- **Hash digest and message encrypted with recipient's public key**
- **Entire cipher text then encrypted with recipient's private key—creating digital signature—for authenticity, nonrepudiation**



Public Key Cryptography with Digital Signatures

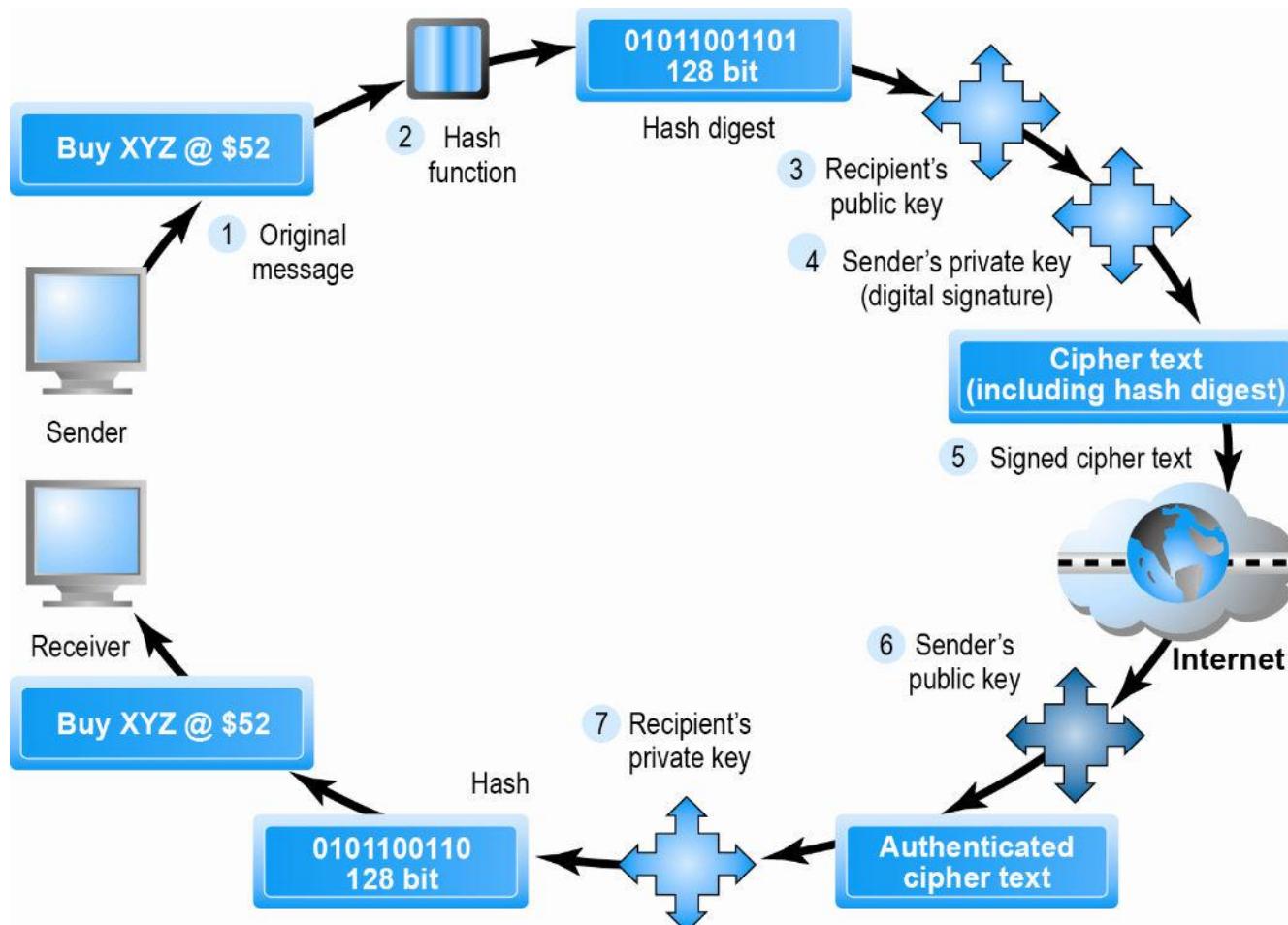


Figure 5.7, Page 281



Digital Envelopes

■ Address weaknesses of:

- ❖ Public key encryption
 - Computationally slow, decreased transmission speed, increased processing time
- ❖ Symmetric key encryption
 - Insecure transmission lines

■ Uses symmetric key encryption to encrypt document

■ Uses public key encryption to encrypt and send symmetric key



Creating a Digital Envelope

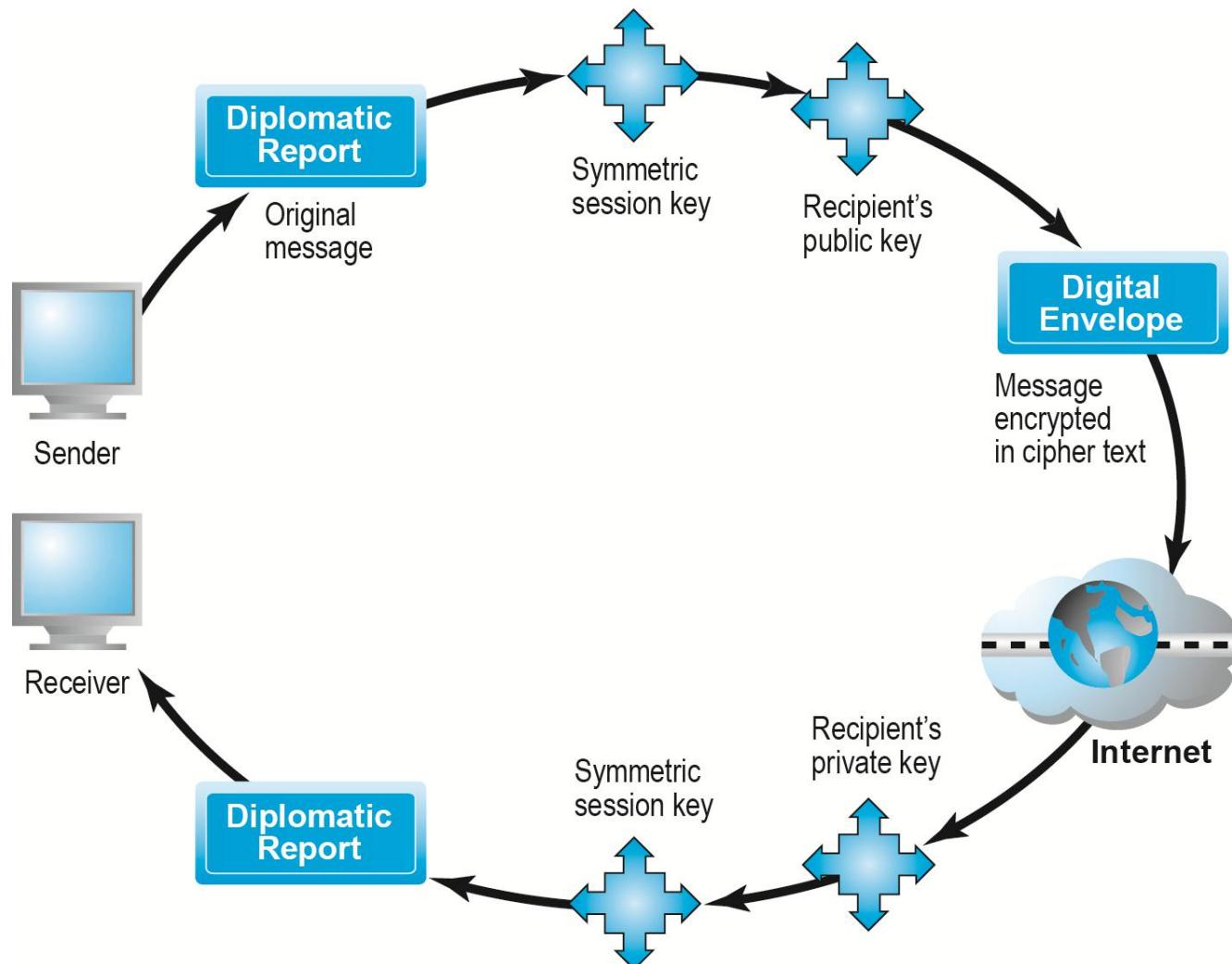


Figure 5.8, Page 282



Digital Certificates and

Public Key Infrastructure (PKI)

■ Digital certificate includes:

- ❖ Name of subject/company
- ❖ Subject's public key
- ❖ Digital certificate serial number
- ❖ Expiration date, issuance date
- ❖ Digital signature of CA

■ Public Key Infrastructure (PKI):

- ❖ CAs and digital certificate procedures
- ❖ PGP



Digital Certificates and Certification Authorities

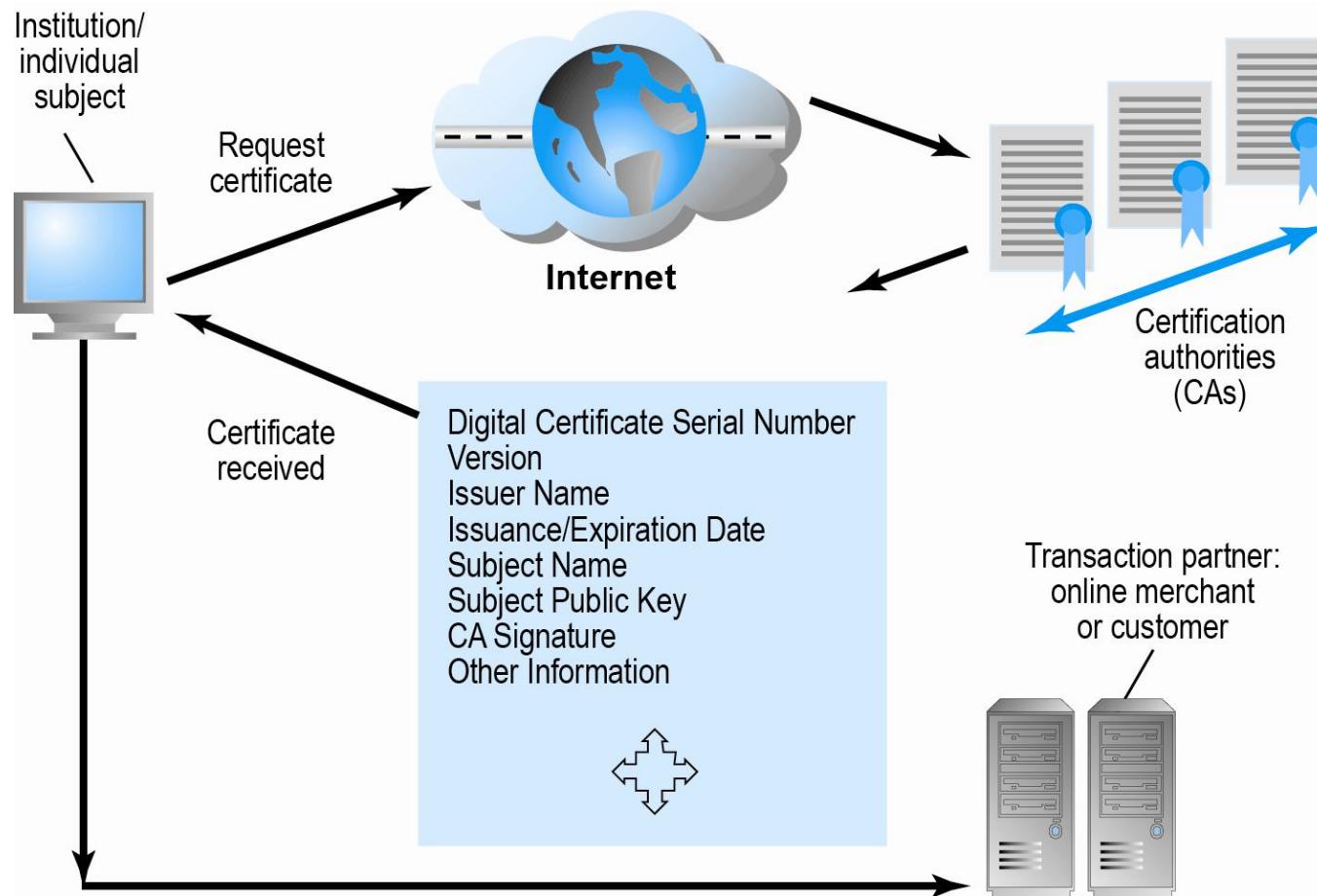


Figure 5.9, Page 283



Limits to Encryption Solutions

- **Doesn't protect storage of private key**
 - ❖ PKI not effective against insiders, employees
 - ❖ Protection of private keys by individuals may be haphazard
- **No guarantee that verifying computer of merchant is secure**
- **CAs are unregulated, self-selecting organizations**



Securing Channels of Communication

■ Secure Sockets Layer (SSL)/Transport Layer Security (TLS)

- ❖ Establishes secure, negotiated client–server session

■ Virtual Private Network (VPN)

- ❖ Allows remote users to securely access internal network via the Internet

■ Wireless (Wi-Fi) networks

- ❖ WPA2



Secure Negotiated Sessions Using SSL/TLS

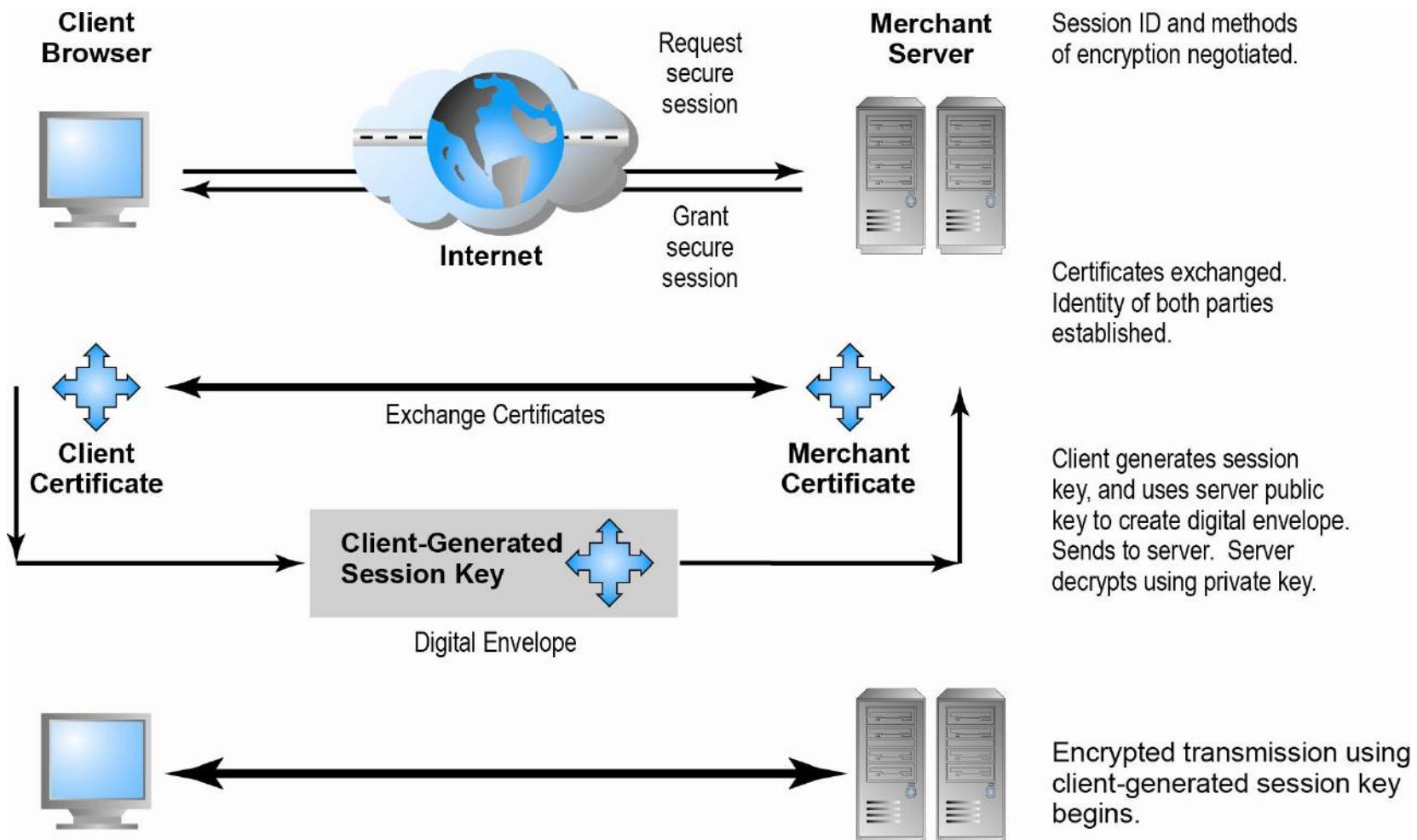


Figure 5.10, Page 286



Protecting Networks

■ Firewall

- ❖ Hardware or software
- ❖ Uses security policy to filter packets
- ❖ Two main methods:
 - Packet filters
 - Application gateways

■ Proxy servers (proxies)

- ❖ Software servers that handle all communications from or sent to the Internet

■ Intrusion detection systems

■ Intrusion prevention systems



Firewalls and Proxy Servers

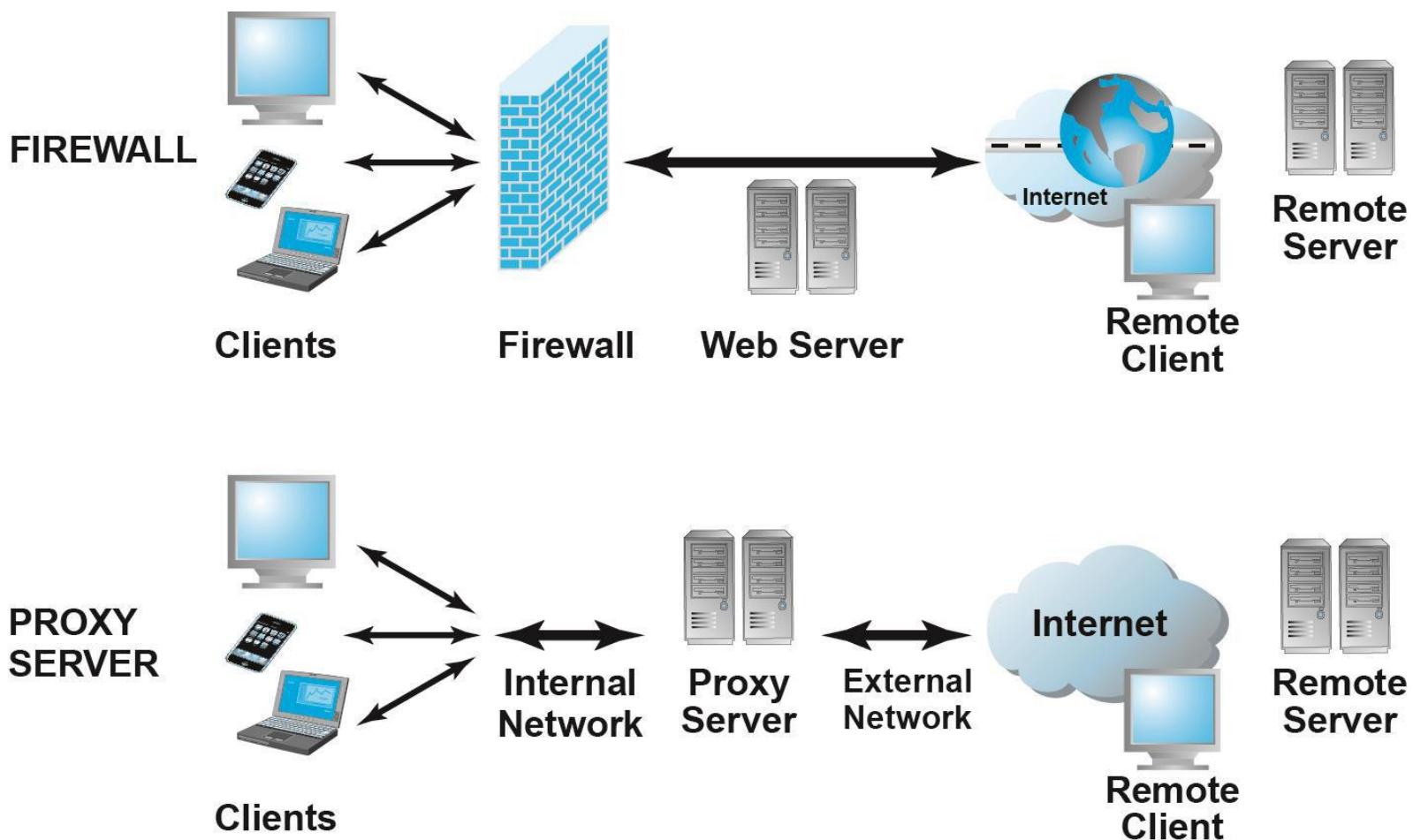


Figure 5.11, Page 289



Protecting Servers and Clients

■ Operating system security enhancements

- ❖ Upgrades, patches

■ Anti-virus software

- ❖ Easiest and least expensive way to prevent threats to system integrity
- ❖ Requires daily updates



Management Policies, Business Procedures, and Public Laws

- Worldwide, companies spend more than \$65 billion on security hardware, software, services
- Managing risk includes:
 - ❖ Technology
 - ❖ Effective management policies
 - ❖ Public laws and active enforcement



A Security Plan: Management Policies

- Risk assessment
- Security policy
- Implementation plan
 - ❖ Security organization
 - ❖ Access controls
 - ❖ Authentication procedures, including biometrics
 - ❖ Authorization policies, authorization management systems
- Security audit



Developing an E-commerce Security Plan

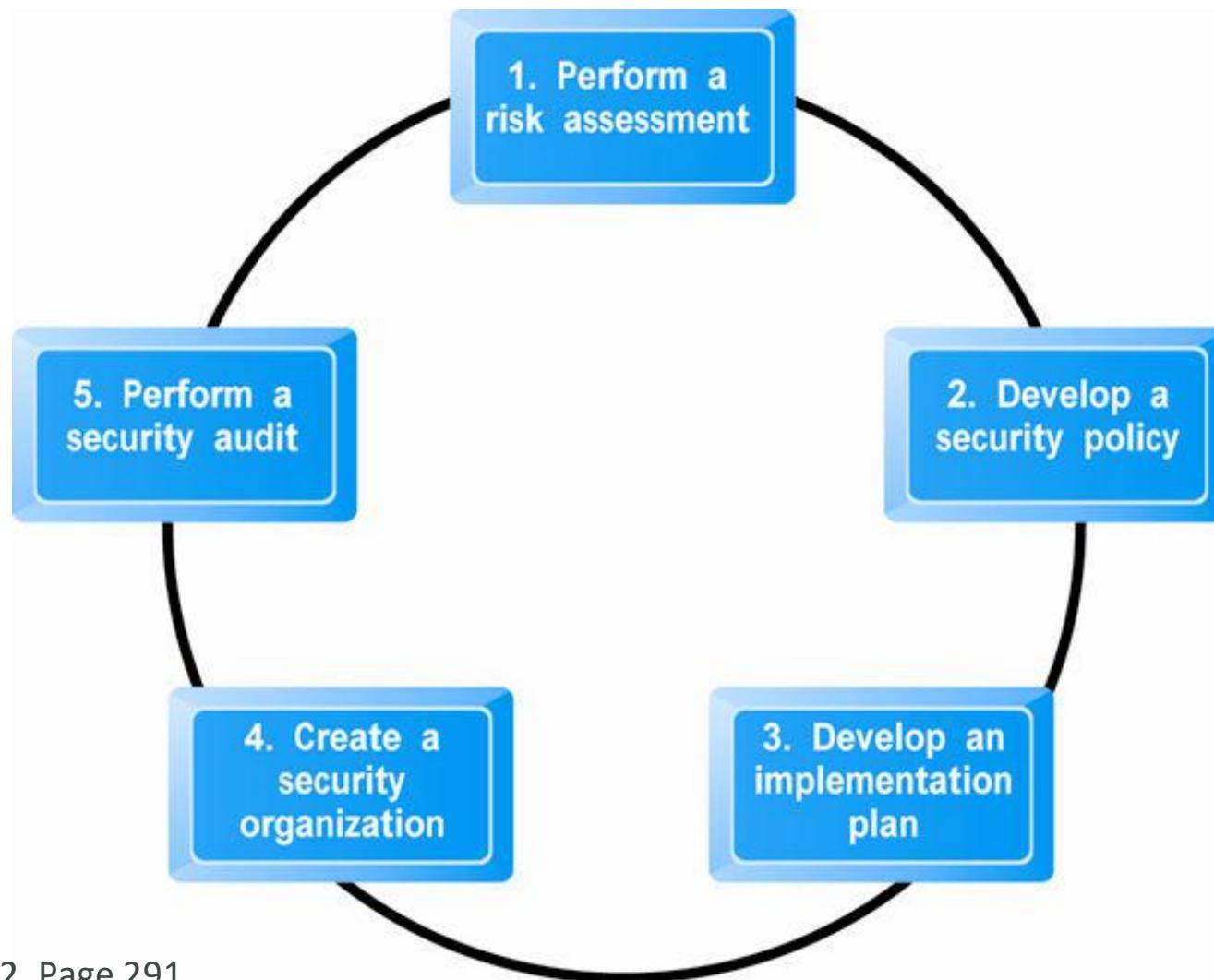


Figure 5.12, Page 291



The Role of Laws and Public Policy

■ Laws that give authorities tools for identifying, tracing, prosecuting cybercriminals:

- ❖ National Information Infrastructure Protection Act of 1996
- ❖ USA Patriot Act
- ❖ Homeland Security Act

■ Private and private-public cooperation

- ❖ CERT Coordination Center
- ❖ US-CERT

■ Government policies and controls on encryption software

- ❖ OECD, G7/G8, Council of Europe, Wassener Arrangement



Types of Payment Systems

■ Cash

- ❖ Most common form of payment
- ❖ Instantly convertible into other forms of value
- ❖ No float

■ Checking transfer

- ❖ Second most common payment form in United States

■ Credit card

- ❖ Credit card associations
- ❖ Issuing banks
- ❖ Processing centers



Types of Payment Systems (cont.)

■ Stored value

- ❖ Funds deposited into account, from which funds are paid out or withdrawn as needed
- ❖ Debit cards, gift certificates
- ❖ Peer-to-peer payment systems

■ Accumulating balance

- ❖ Accounts that accumulate expenditures and to which consumers make period payments
- ❖ Utility, phone, American Express accounts



Payment System Stakeholders

■ Consumers

- ❖ Low-risk, low-cost, refutable, convenience, reliability

■ Merchants

- ❖ Low-risk, low-cost, irrefutable, secure, reliable

■ Financial intermediaries

- ❖ Secure, low-risk, maximizing profit

■ Government regulators

- ❖ Security, trust, protecting participants and enforcing reporting



E-commerce Payment Systems

■ Credit cards

- ❖ 42% of online payments in 2013 (United States)

■ Debit cards

- ❖ 29% online payments in 2013 (United States)

■ Limitations of online credit card payment

- ❖ Security, merchant risk
- ❖ Cost
- ❖ Social equity



How an Online Credit Transaction Works

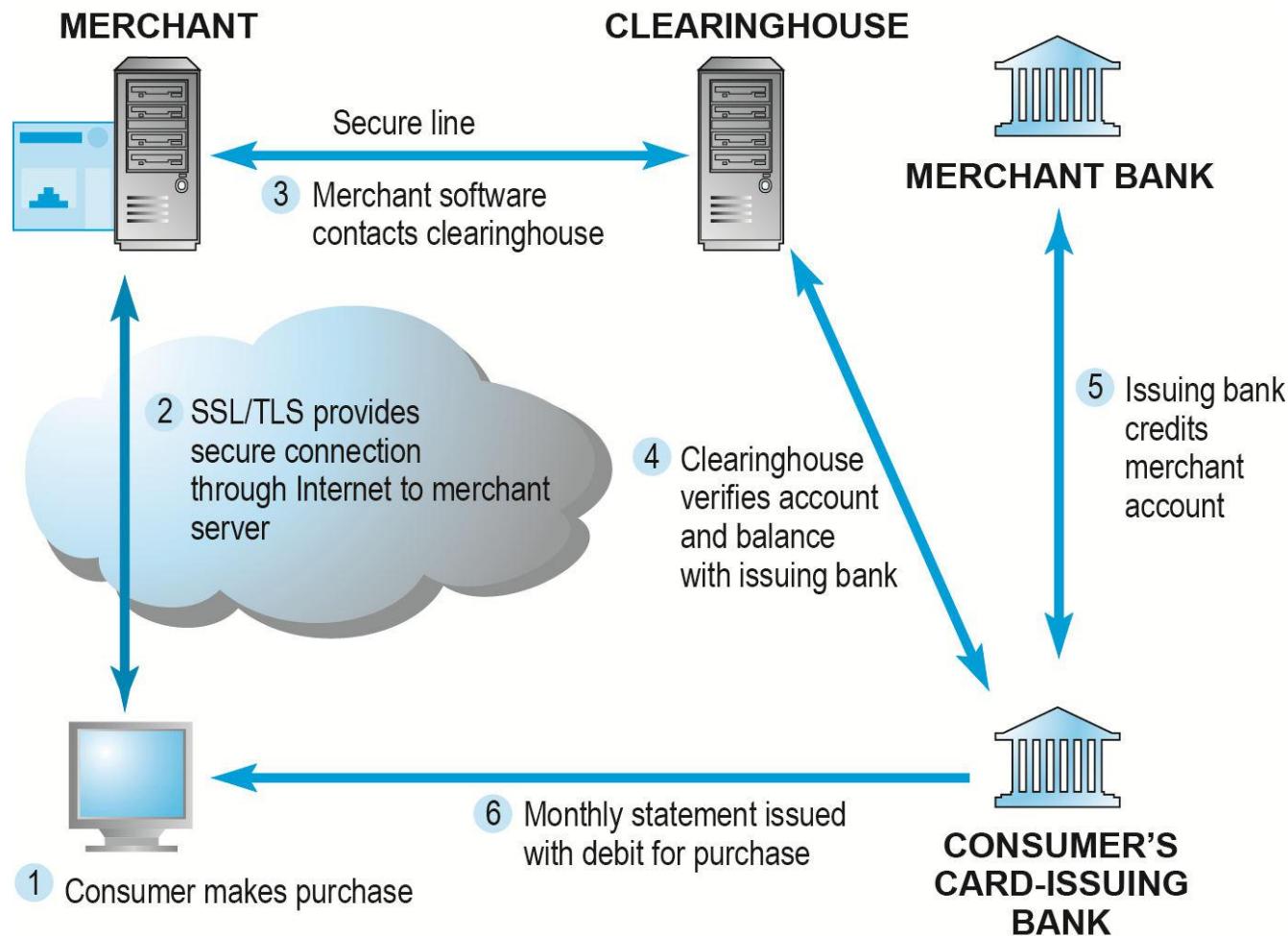


Figure 5.15, Page 302



Alternative Online Payment Systems

■ Online stored value systems:

- ❖ Based on value stored in a consumer's bank, checking, or credit card account
- ❖ Example: PayPal

■ Other alternatives:

- ❖ Amazon Payments
- ❖ Google Checkout
- ❖ Bill Me Later
- ❖ WUPay, Dwolla, Stripe



Mobile Payment Systems

- Use of mobile phones as payment devices established in Europe, Japan, South Korea
- Near field communication (NFC)
 - ❖ Short-range (2") wireless for sharing data between devices
- Expanding in United States
 - ❖ Google Wallet
 - Mobile app designed to work with NFC chips
 - ❖ PayPal
 - ❖ Square



Digital Cash and Virtual Currencies

■ Digital cash

- ❖ Based on algorithm that generates unique tokens that can be used in “real” world
- ❖ Example: Bitcoin

■ Virtual currencies

- ❖ Circulate within internal virtual world
- ❖ Example: Linden Dollars in Second Life, Facebook Credits

Bitcoin

- **What are some of the benefits of using a digital currency?**
- **What are the risks involved to the user?**
- **What are the political and economic repercussions of a digital currency?**
- **Have you or anyone you know ever used Bitcoin?**

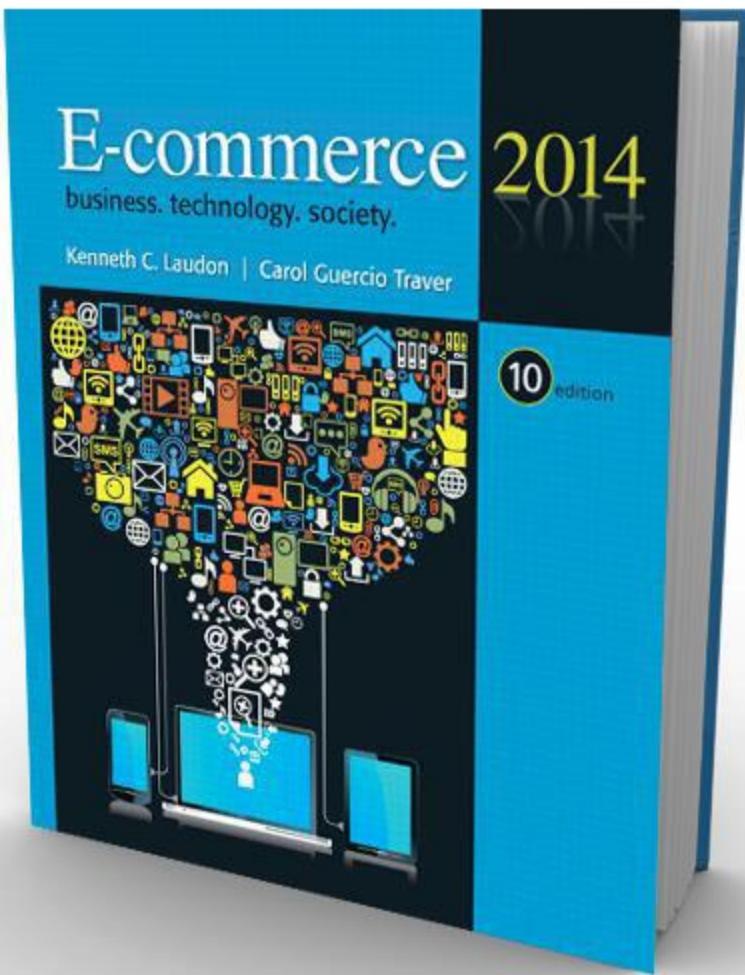


Electronic Billing Presentment and Payment (EBPP)

- Online payment systems for monthly bills
- 50% of all bill payments
- Two competing EBPP business models:
 - ❖ Biller-direct (dominant model)
 - ❖ Consolidator
- Both models are supported by EBPP infrastructure providers



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E-commerce 2014

business. technology. society.

tenth edition

Kenneth C. Laudon
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Chapter 1

The Revolution Is Just Beginning

Pinterest: A Picture Is Worth a Thousand Words

- **Have you used Pinterest or any other content curation sites? What are your main interests?**
- **Have you purchased anything based on a pin or board on Pinterest or any other curation site?**
- **Why do Pinterest links drive more purchasing than Facebook links?**



E-commerce Trends 2013–2014

- Expansion of social, local, and mobile e-commerce
- Mobile platform begins to rival PC platform
- Continued growth of cloud computing
- Explosive growth in “Big Data”
- E-books gain wide acceptance
- Continued growth of user-generated content



The First 30 Seconds

- **First 17 years of e-commerce**
 - ❖ Just the beginning
 - ❖ Rapid growth and change
- **Technologies continue to evolve at exponential rates**
 - ❖ Disruptive business change
 - ❖ New opportunities



What Is E-commerce?

- **Use of Internet and Web to transact business**
- **More formally:**
 - ❖ Digitally enabled commercial transactions between and among organizations and individuals



E-commerce vs. E-business

■ E-business:

- ❖ Digital enabling of transactions and processes within a firm, involving information systems under firm's control
- ❖ Does not include commercial transactions involving an exchange of value across organizational boundaries



Why Study E-commerce?

- E-commerce technology is different, more powerful than previous technologies
- E-commerce brings fundamental changes to commerce
- Traditional commerce:
 - ❖ Consumer as passive targets
 - ❖ Mass-marketing driven
 - ❖ Sales-force driven
 - ❖ Fixed prices
 - ❖ Information asymmetry



Eight Unique Features of E-commerce Technology

1. Ubiquity

Ubiquity is defined as an available just about every where , at all times . While traditional commerce based on marketplace , which is restricted to physical place and time , this is called bricks and mortar. When traditional commerce carried out by electronic means, and removed from temporal and geographic location , this is called marketspace.

Eight Unique Features of E-commerce Technology

- **2. Global reach** when e-commerce technology permits commercial transactions to cross cultural, regional, and national boundaries far more conveniently and cost-effectively than is true in TC. Therefore , the total of internet customer is equal the word's online population. Reach in e-commerce is defined as “The total number of users or customers an e-commerce business can obtain”.
- **3. universal standards**
- e-commerce has unusual feature of e-commerce technologies is that the technical standards of the Internet, and therefore the technical standards for conducting e-commerce, are **universal standards**—they are shared by all nations around the world. In contrast, most traditional commerce technologies differ from one nation to the next (e.g TV, Radio, mobile)
- universal standards **reduce search costs** —the effort required to find the prices of products.

Eight Unique Features of E-commerce Technology

- **4. Richness** refers to the complexity and content of a message.
- Traditional markets, national sales forces, and small retail stores have great richness: they are able to provide personal, face-to-face service using aural and visual cues when making a sale. The Internet has the potential for offering considerably . more information richness than traditional media such as printing presses, radio, and television because it is interactive and can adjust the message to individual users.
- **5. Interactivity** Unlike any of the commercial technologies of the twentieth century, with the possible exception of the telephone, e-commerce technologies allow for **interactivity**, meaning they enable two-way communication between merchant and consumer and among consumers. Traditional television, for instance, cannot ask viewers questions or enter into conversations with them, or request that customer information be entered into a form.

Eight Unique Features of E-commerce Technology

- **6. Information Density** the total amount and quality of information available to all market participants, consumers, and merchants alike.
- *Price transparency* refers to the ease with which consumers can find out the variety of prices in a market; *cost transparency* refers to the ability of consumers to discover the actual costs merchants pay for products.
- **7. Personalization/Customization**
- *Personalization* refers :merchants can target their marketing messages to specific individuals by adjusting the message to a person's name, interests, and past purchases. Today this is achieved in a few milliseconds and followed by an advertisement based on the consumer's profile.
- **Customization** means the changing the delivered product or service based on a user's preferences or prior behavior



Eight Unique Features of E-commerce Technology

- **8. Social Technology** : allowing users to create and share content with a worldwide community.



Web 2.0

- **Web 1.0** :The Internet started out as a simple network to support e-mail and file transfers among remote computers. The Web started out as a way to use the Internet to display simple pages and allow the user to navigate among the pages by linking them together electronically.
- **Web 2.0** : set of applications and technologies that allows users to create, edit, and distribute content; share preferences, bookmarks, and online personas; participate in virtual lives; and build online communities.
 - ❖ Examples: Twitter, YouTube, Instagram, Wikipedia, Tumblr
 - ❖ How many characters does twitter allow users to send messages ?



Types of E-commerce

- *May be classified by market relationship or technology*
- **Business-to-Consumer (B2C)**
- **Business-to-Business (B2B)**
- **Consumer-to-Consumer (C2C)**
- **Social e-commerce**
- **Mobile e-commerce (M-commerce)**
- **Local e-commerce**



Business-to-Business (B2B) E-commerce

- **Business-to-business (B2B) e-commerce**, in which businesses focus on selling to other businesses, is the largest form of e-commerce, with about \$4.7 trillion in transactions in the United States in 2013
- There is an estimated \$12.9 trillion in business-to-business exchanges of all kinds, online and offline, suggesting that B2B e-commerce has significant growth potential. The ultimate size of B2B e-commerce is potentially huge. There are two primary business models used within the B2B arena: Net marketplaces, which include e-distributors, e-procurement companies, exchanges and industry consortia, and private industrial networks.



- **Consumer-to-consumer (C2C) e-commerce** provides a way for consumers to sell to each other, with the help of an online market maker such as eBay or Etsy, or the classifieds site Craigslist. Given that in 2013, eBay is likely to generate around \$75 billion in gross merchandise volume around the world, it is probably safe to estimate that the size of the global C2C market in 2013 is more than \$90 billion.
- **Mobile e-commerce, or m-commerce**, refers to the use of mobile devices to enable online transactions. M-commerce involves the use of cellular and wireless networks to connect laptops, smartphones such as the iPhone, Android, and BlackBerry, and tablet computers such as the iPad to the Internet. Once connected, mobile consumers can conduct transactions, including stock trades, in-store price comparisons, banking, travel reservations, and more.



Class Discussion

- **Local e-commerce**, as its name suggests, is a form of e-commerce that is focused on engaging the consumer based on his or her current geographic location. Local merchants use a variety of online marketing techniques to drive consumers to their stores. Local e-commerce is the third prong of the social, mobile, local e-commerce wave, and is expected to grow in the United States from \$3.6 billion in 2011 to an estimated \$4.4 billion in 2013
e.g of local e-commerce is groupon which offers subscribers daily deals from local businesses in the form of “Groupons,” discount coupons that take effect once enough subscribers have agreed to purchase.

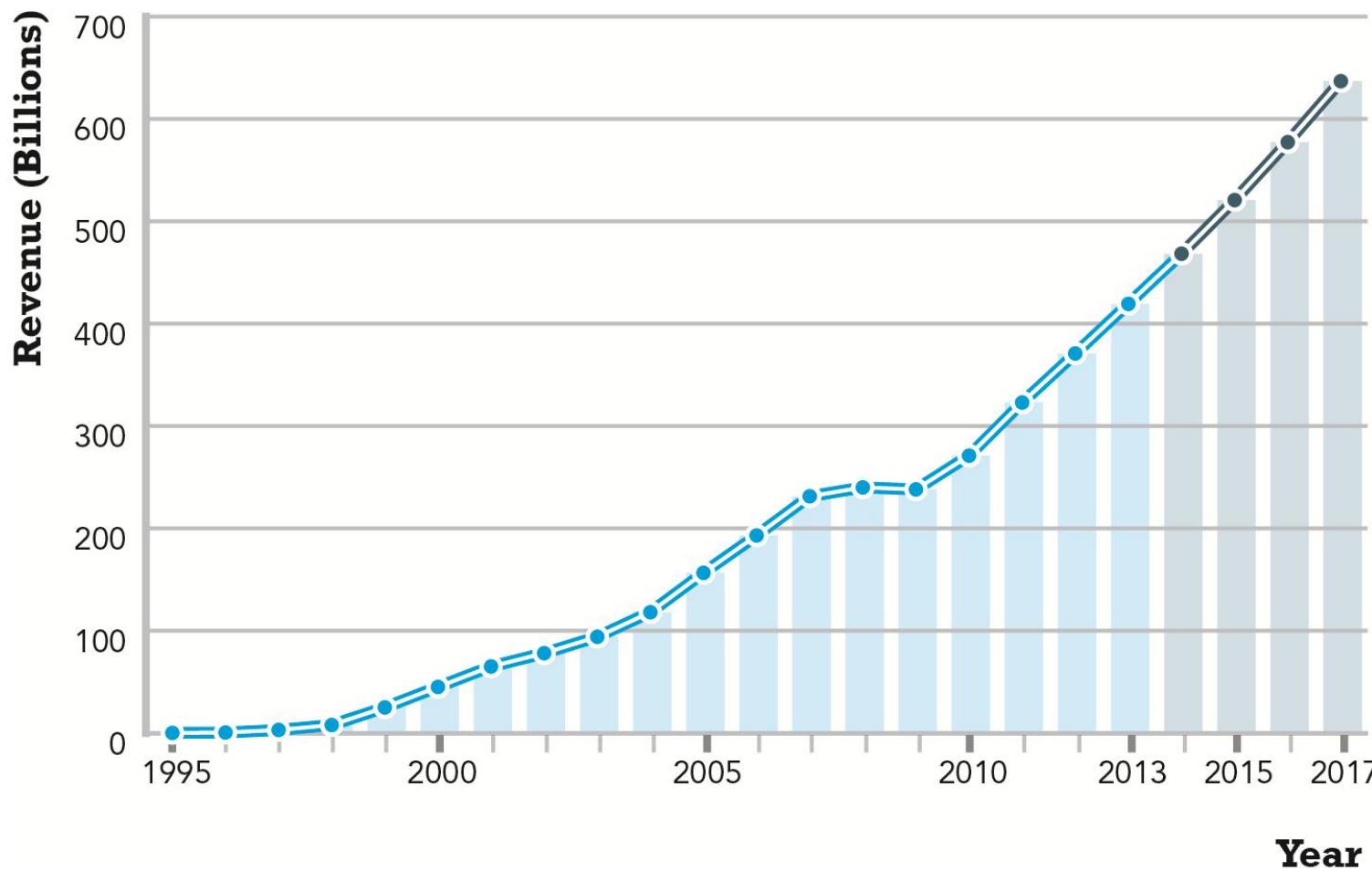


- **Business-to-Consumer (B2C) E-commerce** is The most commonly discussed type of e-commerce is **business-to-consumer (B2C) e-commerce**, in which online businesses attempt to reach individual consumers. B2C commerce includes purchases of retail goods, travel services, and online content. Even though B2C is comparatively small
- **Social e-commerce** is e-commerce that is enabled by social networks and online social relationships. It is sometimes also referred to as Facebook commerce, but in actuality is a much larger phenomenon that extends beyond just Facebook. The growth of social e-commerce is being driven by a number of factors, including the increasing popularity of social sign-on (signing onto Web sites using your Facebook or other social network ID), network notification (the sharing of approval or disapproval of products, services, and content via Facebook's Like button or Twitter tweets), online collaborative shopping tools, and social search (recommendations from online trusted friends).



The Growth of B2C E-commerce

Figure 1.3, Page 20

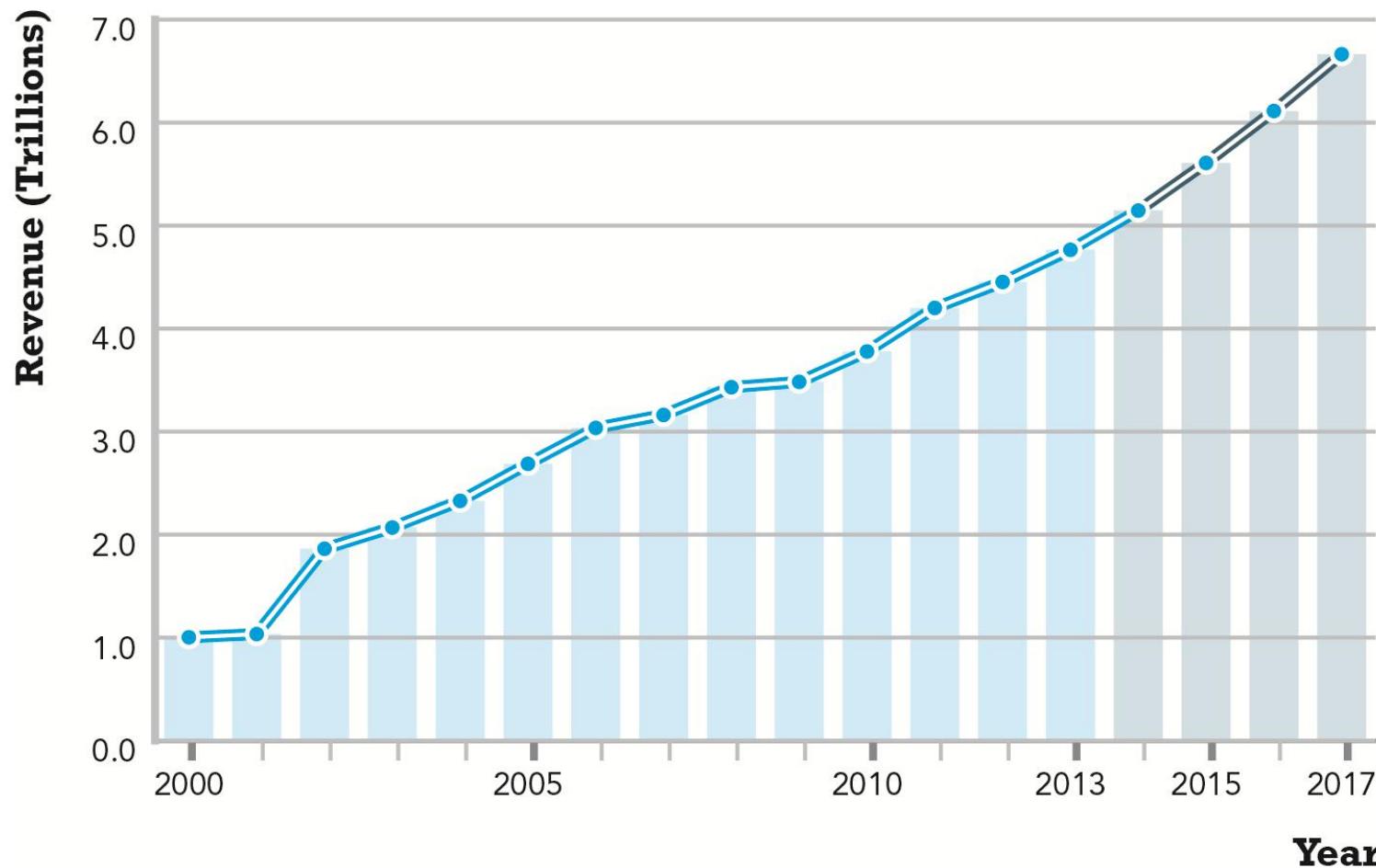


SOURCE: Based on data from eMarketer, Inc., 2013a; authors' estimates.



The Growth of B2B E-commerce

Figure 1.4, Page 21



SOURCE: Based on data from U.S. Census Bureau, 2013; authors' estimates.



The Internet

- Worldwide network of computer networks built on common standards
- Created in late 1960s
- Services include the Web, e-mail, file transfers, and so on
- Can measure growth by number of Internet hosts with domain names



The Web

- **Most popular Internet service**
- **Developed in early 1990s**
- **Provides access to Web pages**
 - ❖ HTML documents that may include text, graphics, animations, music, videos
- **Web content has grown exponentially**
 - ❖ Google reports 30 trillion unique URLs; 120 billion Web pages indexed



The Mobile Platform

- **Most recent development in Internet infrastructure**
- **Enables access to the Internet via wireless networks or cell-phone service**
- **Mobile devices include**
 - ❖ Tablets
 - ❖ Smartphones
 - ❖ Ultra-lightweight laptops

Will Apps Make the Web Irrelevant?

- What are the advantages and disadvantages of apps, compared with Web sites, for mobile users?
- What are the benefits of apps for content owners and creators?
- Will apps eventually make the Web irrelevant? Why or why not?



Origins and Growth of E-commerce

■ Precursors:

- ❖ Baxter Healthcare
- ❖ Electronic Data Interchange (EDI)
- ❖ French Minitel (1980s videotex system)
- ❖ None had functionality of Internet

■ 1995: Beginning of e-commerce

- ❖ First sales of banner advertisements

■ E-commerce fastest growing form of commerce in United States



E-commerce: A Brief History

■ 1995–2000: Invention

- ❖ Key concepts developed
- ❖ Limited bandwidth and media
- ❖ Euphoric visions of
 - Friction-free commerce
 - ❖ Lowered search costs, disintermediation, price transparency, elimination of unfair competitive advantage
 - First-mover advantages
 - ❖ Network profits
- ❖ Dot-com crash of 2000



E-commerce: A Brief History (cont.)

■ 2001–2006: Consolidation

- ❖ Emphasis on business-driven approach
- ❖ Traditional large firms expand presence
- ❖ Start-up financing shrinks up
- ❖ More complex products and services sold
- ❖ Growth of search engine advertising
- ❖ Business Web presences expand to include e-mail, display and search advertising, and limited community feedback features



E-commerce: A Brief History (cont.)

■ 2007–Present: Reinvention

- ❖ Rapid growth of:
 - Online social networks
 - Mobile platform
 - Local commerce
- ❖ Entertainment content develops as source of revenues
- ❖ Transformation of marketing
 - Coordinated marketing on social, mobile, local platforms
 - Analytic technologies



Insight on Business: Class Discussion

TABLE 1.4	EVOLUTION OF E-COMMERCE	
1995–2000 INVENTION	2001–2006 CONSOLIDATION	2007–PRESENT RE-INVENTION
Technology driven	Business driven	Mobile technology enables social, local, and mobile commerce
Revenue growth emphasis	Earnings and profits emphasis	Audience and social network connections emphasis
Venture capital financing	Traditional financing	Smaller VC investments; early small-firm buyouts by large online players
Ungoverned	Stronger regulation and governance	Extensive government surveillance
Entrepreneurial	Large traditional firms	Entrepreneurial social and local firms
Disintermediation	Strengthening intermediaries	Proliferation of small online intermediaries renting business processes of larger firms
Perfect markets	Imperfect markets, brands, and network effects	Continuation of online market imperfections; commodity competition in select markets
Pure online strategies	Mixed "bricks-and-clicks" strategies	Return of pure online strategies in new markets; extension of bricks-and-clicks in traditional retail markets
First-mover advantages	Strategic-follower strength; complementary assets	First-mover advantages return in new markets as traditional Web players catch up
Low-complexity retail products	High-complexity retail products and services	Retail, services, and content

Start-up Boot Camp

- Why do you think investors today are still interested in investing in start-ups?
- What are the benefits of investing in a company that is a graduate of a Y Combinator boot camp?
- Is an incubator the best solution for start-ups to find funding? Why or why not?



Assessing E-commerce

■ Many early visions not fulfilled

- ❖ Friction-free commerce
 - Consumers less price sensitive
 - Considerable price dispersion
- ❖ Perfect competition
 - Information asymmetries persist
- ❖ Intermediaries have not disappeared
- ❖ First mover advantages
 - Fast-followers often overtake first movers



Predictions for the Future

- **Technology will propagate through all commercial activity**
- **Large, traditional companies will continue to play dominant role, consolidating audiences**
 - ❖ Start-up ventures can still attract large audiences in non-dominated arenas
- **Integrated online/offline companies will experience more growth than purely online companies**
- **Additional factors:**
 - ❖ Increased regulation and control
 - ❖ Cost of energy



Understanding E-commerce: Organizing Themes

■ Technology:

- ❖ Development and mastery of digital computing and communications technology

■ Business:

- ❖ New technologies present businesses with new ways of organizing production and transacting business

■ Society:

- ❖ Intellectual property, individual privacy, public welfare policy



The Internet and the Evolution of Corporate Computing

Figure 1.11, Page 41

COMPUTER TECHNOLOGY

Mainframe Computers
1950 – 1975



Minicomputers
1970 – 1980



Personal Computers
1980 – Present



Local Area Networks
Client/Server Computing
1980 – Present



Enterprise-wide Computing
1990 – Present



Internet and Web
Mobile platform
1995 – Present



BUSINESS APPLICATION

Transaction automation
Payroll
Accounts receivable

Business function automation
Marketing
Human resources
Design

Desktop automation
Word processing
Spreadsheets
Databases

Workgroup automation
Document sharing
Project management
Messaging, e-mail

Enterprise-wide automation
Resource planning systems
Integrated finance-manufacturing systems
Human resource planning

Industrial system automation
Supply chain management
Customer relationship management
Channel management systems
Web and cloud services

Facebook and the Age of Privacy

- Why are social network sites interested in collecting user information?
- What types of privacy invasion are described in the case? Which is the most privacy-invading, and why?
- Is e-commerce any different than traditional markets with respect to privacy? Don't merchants always want to know their customer?
- How do you protect your privacy on the Web?



Academic Disciplines Concerned with E-commerce

■ Technical approach

- ❖ Computer science
- ❖ Management science
- ❖ Information systems

■ Behavioral approach

- ❖ Information systems
- ❖ Economics
- ❖ Marketing
- ❖ Management
- ❖ Finance/accounting
- ❖ Sociology



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