Chapter 1

Introduction to Electronic Commerce

Define e-commerce and e-business?Compare and contrast the advantages and disadvantages of e-commerce Compare and contrast the 1st and 2nd waves of e-commerce Comprehend the categories of e-commerce?Why electronic commerce is international by its very nature and what challenges arise in doing global electronic commerce.

WHAT IS E-COMMERCE

Defn: 1. The use of the Internet and the Web to transact business. More formally, we focus on digitally enabled commercial transactions between and among organizations and individuals.

➔Each of these components of our working definition of e-commerce is important.

Digitally enabled transactions include all transactions mediated by digital technology. For the most part this means transactions that occur over the Internet and the Web.

Commercial transactions involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. Exchange of value is important for understanding the limits of e-commerce. Without an exchange of value WHAT IS E-COMMERCE? no commerce occurs.

Defn: 2. It is a general concept covering any form of business transaction or information exchange executed using information and communication technologies (ICT's) .It includes electronic trading of goods, services and electronic material. It takes place between companies, between companies and their customers, or between companies and public administrations.

Ecommerce : The exchange or buying and selling of commodities; esp. the exchange of merchandise, on a large scale, between different places or communities; extended trade or traffic (webster dictionary defn)

Electronic commerce (e-commerce) is a general term for any type of business, or commercial transaction that involves the transfer of information across the Internet.

This covers a range of different types of businesses from consumer-based retail sites, like Amazon.com, through auction and music sites like eBay or MP3.com, to business exchanges trading goods or services between corporations.

Electronic commerce is the use of electronic communication to do business. E-commerce is not about technology. It is not a new business. E-commerce is a method for companies to create and operate their business in new and efficient ways. Most fundamentally, e-commerce represents the realization of digital, as opposed to paper-based, commercial transactions between businesses, between a business and its consumers, or between a government and its citizens or constituent business.

The difference between e-commerce and e-business

There is a debate among consultants and academics about the meaning and limitations of both e-commerce and e-business. Some argue that e-commerce encompasses the entire world of electronically based organizational activities that support a firm's market exchanges—including a firm's entire information system's infrastructure. Others argue, on the other hand, that e-business encompasses the entire world of internal and external electronically based activities, including e-commerce.

**THE DIFFERENCE BETWEEN E-COMMERCE AND E-BUSINESS**
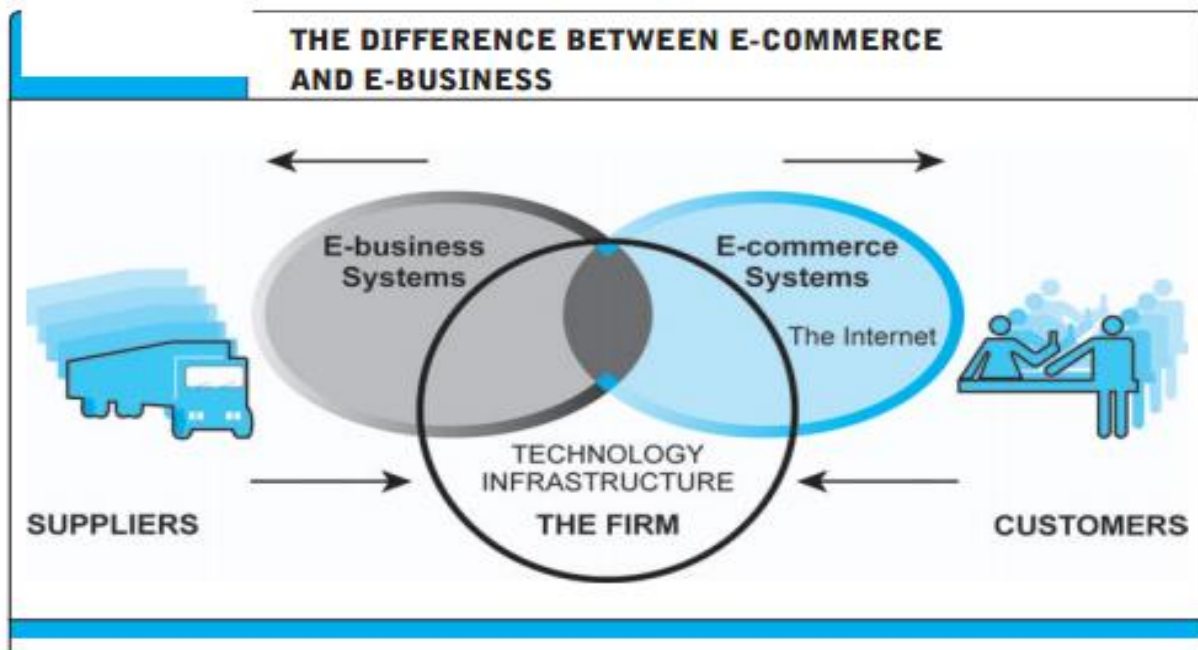
E-commerce primarily involves transactions that cross firm boundaries. E-business primarily involves the application of digital technologies to business processes within the firm.
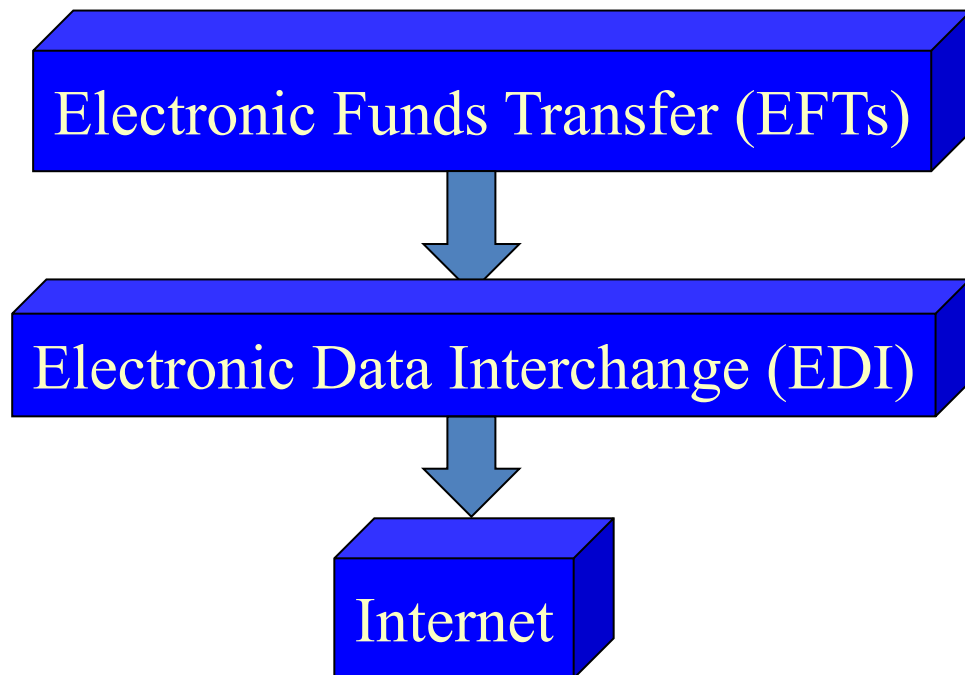
The term e-business is used to refer primarily to the digital enablement of transactions and processes within a firm, involving information systems under the control of the firm.

For the most part, in our view, e-business does not include commercial transactions involving an exchange of value across organizational boundaries. For example, a company's online inventory control mechanisms are a component of e-business, but such internal processes do not directly generate revenue for the firm from outside businesses or consumers, as e-commerce, by definition, does. It is true, however, that a firm's e-business infrastructure provides support for online e-commerce exchanges; the same infrastructure and skill sets are involved in both e-business and e-commerce. Ecommerce and e-business systems blur together at the business firm boundary, at the point where internal business systems link up with suppliers or customers, for instance. E-business applications turn into e-commerce precisely when an exchange of value occurs.

From Traditional Commerce to E-commerce

Sailing ships

Printing press

Steam engine

Telephone
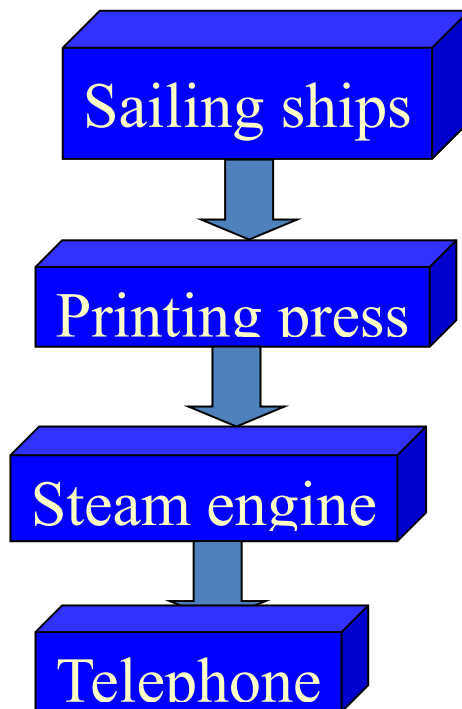
Opened avenues for trade between buyers and sellers. Ancient times (thousands of years ago)

```
┌─────────────────────────────────────────────────┐
│                                                  │
│     Electronic Funds Transfer (EFTs)             │
│                                                  │
└─────────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────────┐
│                                                  │
│     Electronic Data Interchange (EDI)            │
│                                                  │
└─────────────────────────────────────────────────┘
                        │
                        ▼
              ┌───────────────────┐
              │                   │
              │     Internet      │
              │                   │
              └───────────────────┘
```

Wire transfers - used by banks and Businesses transfer electronic data

- data not re-keyed

- high implementation cost, thus excluded small businesses

- On-line shopping

E-commerce types

It is a general concept covering any form of business transaction or information exchange executed using ICT.

- It includes electronic trading of goods, services and electronic material.

- It takes place between companies, between companies and their customers, or between companies and public administrations.

They can be classified by application type:

1. Electronic Markets

Present a range of offerings available in a market segment so that the purchaser can compare the prices of the offerings and make a purchase decision. Example: Airline Booking System

2. Electronic Data Interchange (EDI)

- It provides a standardized system

- Coding trade transactions

- Communicated from one computer to another without the need for printed orders and invoices & delays & errors in paper handling

- It is used by organizations that a make a large no. of regular transactions

Example: EDI is used in the large market chains for transactions with their suppliers

3. Internet Commerce

- It is use to advertise & make sales of wide range of goods & services.

- This application is for both business to business & business to consumer transactions.

Example: The purchase of goods that are then delivered by post or the booking of tickets that can be picked up by the clients when they arrive at the event

Scope of E-Commerce:

Internet e-commerce is one part of the overall sphere of e-commerce. See in Fig below
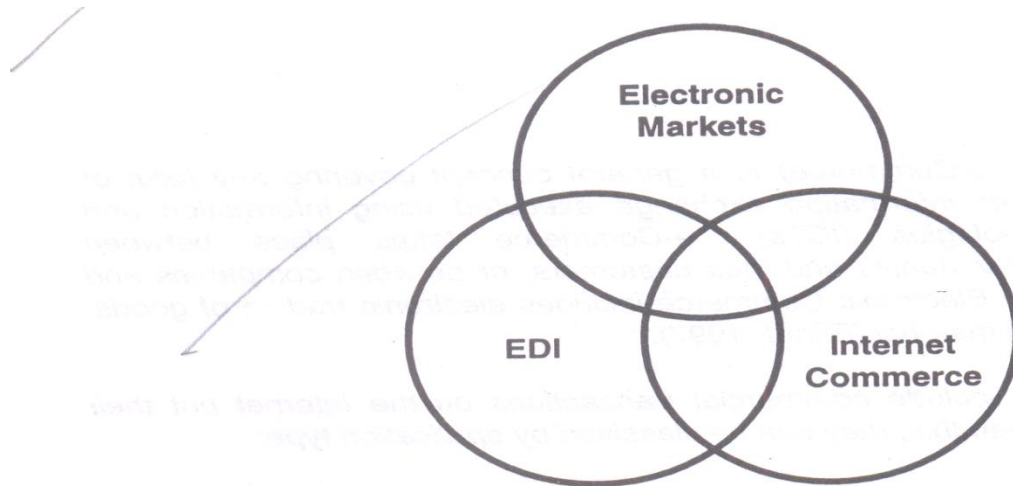
Fig. 1.1 The three categories of e-Commerce.

Advantages of Electronic Commerce

All the advantages of electronic commerce for businesses can be summarized in one statement:

- **Electronic commerce can increase sales and decrease costs.**

- Advertising done well on the Web can get even a small firm's promotional message out to potential customers in every country in the world.

- The Web is particularly useful in creating virtual communities that become ideal target markets for specific types of products or services.

- A virtual community is a gathering of people who share a common interest, but instead of this gathering occurring in the physical world, it takes place on the Internet.

- Business can be transacted 24 hours a day

- The level of detail of purchase information is selected by user

- Digital products can be delivered instantly

- Tax refunds, public retirement and welfare support costs less when distributed over the Internet

- Allows products and services to be available in remote areas, e.g. remote learning

Disadvantages of Electronic Commerce

Some business processes may never lend themselves to electronic commerce. For example, perishable foods and high-cost, unique items, such as custom-designed jewelry and antiques, may be impossible to inspect adequately from a remote location, regardless of any technologies that might be devised in the future. Most of the disadvantages of electronic commerce today, however, stem from the newness and rapidly developing pace of the underlying technologies. These disadvantages will disappear as electronic commerce matures and becomes more available to and accepted by the general population.

Disadvantages:	- Return-on-investment is difficult to calculate. - Many firms have had trouble recruiting and retaining employees with the technological, design, and business process skills needed to create an effective electronic commerce presence. - Difficulty of integrating existing databases and transaction-processing software designed for traditional commerce into the software that enables electronic commerce. - Many businesses face cultural and legal obstacles to conducting electronic commerce.

Some products are easier to sell on the Internet than others, because the merchandising skills related to those products are easier to transfer to the Web.

Product/Process Suitability to Electronic Commerce

Well Suited to Electronic Commerce	Suited to a Combination of Electronic and Traditional Commerce Strategies	Well Suited to Traditional Commerce
Sale/purchase of books and CDs	Sale/purchase of automobiles	Sale/purchase of impulse items for immediate use
Online delivery of software	Online banking	Low-value transactions (total sale/purchase under $10)
Sale/purchase of travel services	Roommate-matching services	
Online shipment tracking	Sale/purchase of residential real estate	
Sale/purchase of investment and insurance products	Sale/purchase of high-value jewelry and antiques	

E-commerce categories

Category	Description	Example
Business-to-consumer (B2C)	Businesses sell products or services to individual consumers.	Walmart.com sells merchandise to consumers through its Web site.
Business-to-business (B2B)	Businesses sell products or services to other businesses.	Grainger.com sells industrial supplies to large and small businesses through its Web site.
Business processes that support buying and selling activities	Businesses and other organizations maintain and use information to identify and evaluate customers, suppliers, and employees. Increasingly, businesses share this information in carefully managed ways with their customers, suppliers, employees, and business partners.	Dell Computer uses secure Internet connections to share current sales and sales forecast information with suppliers. The suppliers can use this information to plan their own production and deliver component parts to Dell in the right quantities at the right time.
Consumer-to-consumer (C2C)	Participants in an online marketplace can buy and sell goods to each other. Because one party is selling, and thus acting as a business, this book treats C2C transactions as part of B2C electronic commerce.	Consumers and businesses trade with each other in the eBay.com online marketplace.

Category	Description	Example
Business-to-government (B2G)	Businesses sell goods or services to governments and government agencies. This book treats B2G transactions as part of B2C electronic commerce.	CAL-Buy portal allows businesses to sell online to the State of California.

B2C e-commerce

- Description: Businesses sell products or services to individual customers (consumers).

- Example: Walmart.com sells merchandise to consumers through its Web site.

- Web site: www.walmart.com.

B2B e-commerce

- Description-Businesses sell products or services to other businesses

- Example-Grainger.com sells industrial supplies to large and small businesses through its Web site

- Web site-www.grainger.com

Business Processes that Support Buy/Sell Activities

- Description: Businesses and other organisations maintain and use information to identify and evaluate customers, suppliers and employees (and to support buying, selling hiring, planning and other activities). More and more of this information is being shared

- Example: Dell Computer uses secure internet connections to share current sales and forecasts information with suppliers who use it to plan their production.as a result they deliver the right quantities of components at the right time.

C2C e-commerce

- Description: Participants in an online marketplace can buy and sell goods from each other

- Example: Consumers and businesses trade with each other on eBay.com

- Web site:www.ebay.com

B2G e-commerce

- Description: Business sell goods or services to governments and government agencies

- Example: Cal-Buy portal for businesses that want to sell online to the State of California

- Web site:www.pd.dgs.ca.gov/calbuy/default.htm

E-commerce Categories Example

You are a computer manufacturing company who performs the following activities on the Internet:

- Sells computers to individuals (**B2C**)

- Purchases parts (e.g. hard drives, power supplies etc.) from a supplier (**B2B**)

- Hires staff, manage customer accounts, advertise, etc. (**Business processes**)

- Sells computers to the Government to be used in schools (**B2G**)

- On eBay.com individuals buy and sell this brand of computers (**C2C**)

M-commerce

Mobile commerce, or m-commerce, refers to the use of wireless digital devices to enable transactions on the Web.

❑ m-commerce involves the use of wireless networks to connect cell phones, handheld devices such Blackberries, and personal computers to the Web. Once connected, mobile consumers can conduct transactions, including stock trades, in-store price comparisons, banking, travel reservations, and more.

❑ m-commerce is used most widely in the west where cell phones are more prevalent

Relative Sizes of E-commerce Categories

Business processes that support buy/sell activities

B2B e-commerce

B2C e-commerce
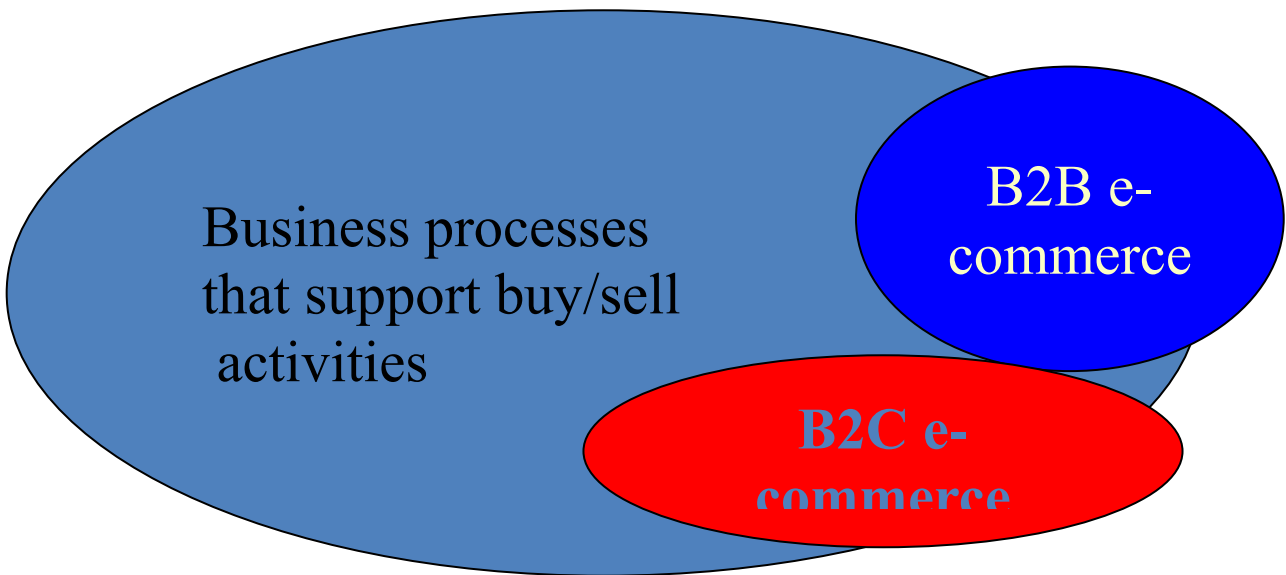
The Second Wave of Electronic Commerce

- Defining characteristics of first wave

    – Dominant influence of U.S. businesses

    – Extensive use of the English language

    – Low bandwidth data transmission technologies

    – Unstructured use of e-mail

    – Overreliance on advertising as a revenue source

- As second wave begins

  – Future of electronic commerce will be international in scope.

  – Language translation and handling currency conversion problem will need to be solved .

  – E-mail will be used as an integral part of marketing and customer contact strategies.
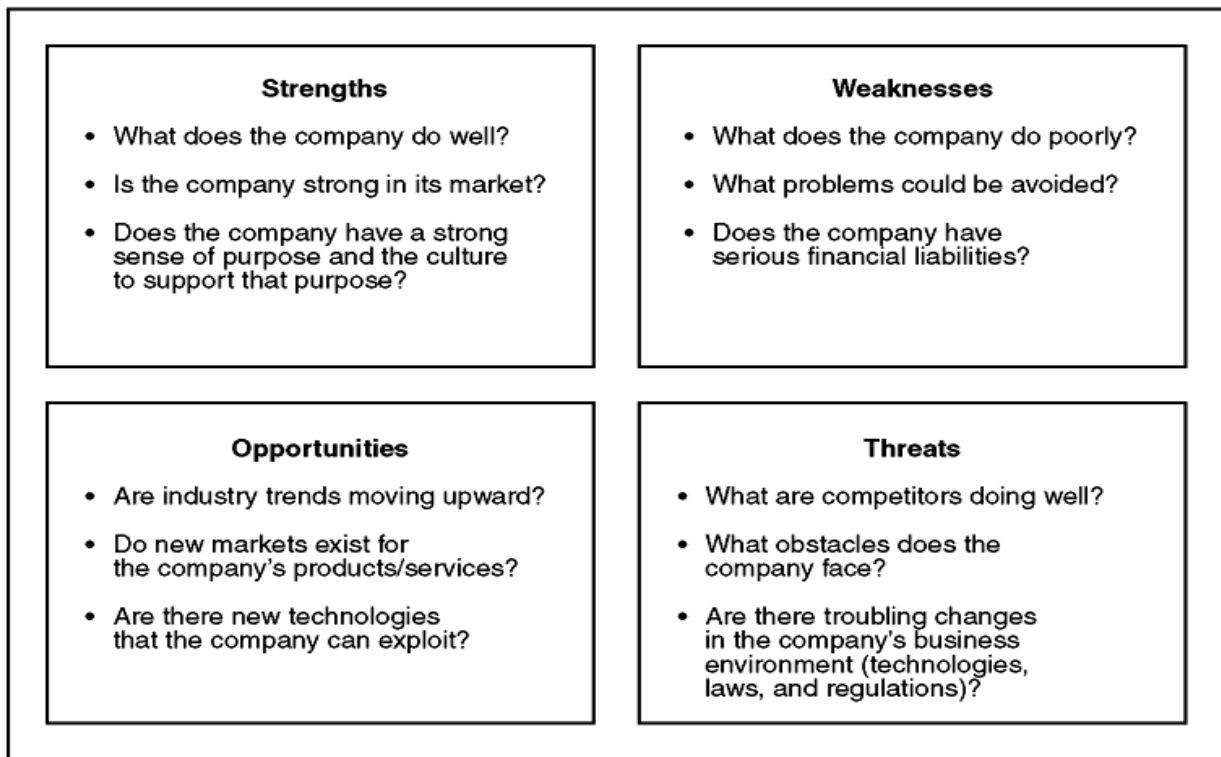
Business Models, Revenue Models, and Business Processes

- Business model: A set of processes that combine to yield a profit

- Revenue model

  – Used to:

    - Identify customers

    - Market to those customers

    - Generate sales to those customers

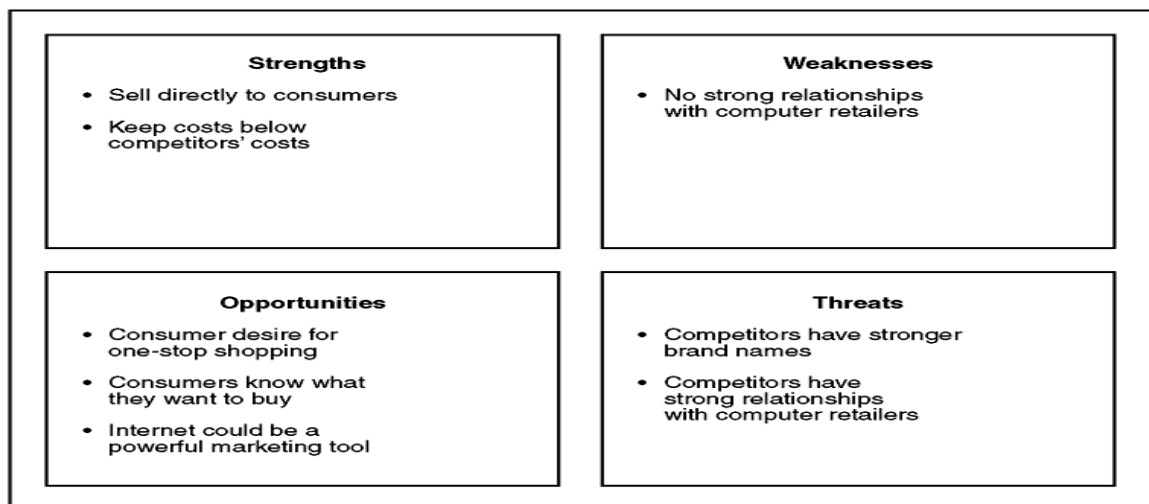## SWOT Analysis: Evaluating Business Unit Opportunities

- SWOT analysis

  – Analyst first looks into the business unit to identify its strengths and weaknesses.

  – Analyst then reviews operating environment   and identifies opportunities and threats.

Strengths

- What does the company do well?

- Is the company strong in its market?

- Does the company have a strong sense of purpose and the culture to support that purpose?

Weaknesses

- What does the company do poorly?

- What problems could be avoided?

- Does the company have serious financial liabilities?

Opportunities

- Are industry trends moving upward?

- Do new markets exist for the company's products/services?

- Are there new technologies that the company can exploit?

Threats

- What are competitors doing well?

- What obstacles does the company face?

- Are there troubling changes in the company's business environment (technologies, laws, and regulations)?

Figure 1-10   *SWOT analysis questions*

Results of Dell's SWOT Analysis

Strengths

- Sell directly to consumers

- Keep costs below competitors' costs

Weaknesses

- No strong relationships with computer retailers

Opportunities

- Consumer desire for one-stop shopping

- Consumers know what they want to buy

- Internet could be a powerful marketing tool

Threats

- Competitors have stronger brand names

- Competitors have strong relationships with computer retailers

Figure 1-11   *Results of Dell's SWOT analysis*

Language Issues

To do business effectively in other cultures Must adapt to culture Researchers have found that Customers are more likely to buy products and services from Web sites in **their own language**.

Localization: Translation that considers multiple elements of local environment.

Culture Issues

- Important element of business trust anticipate how the other party to a transaction will act in specific circumstances

- Culture combination of language and customs, a varies across national boundaries and varies across regions within nations.

Infrastructure Issues

- Internet infrastructure includes Computers and software connected to Internet and Communications networks over which message packets travel.

- Organization for Economic Cooperation and Development's (OECD) Statements on Information and Communications Policy Deal with telecommunications infrastructure development issues.

- Flat-rate access system Consumer or business pays one monthly fee for unlimited telephone line usage and Contributed to rapid rise of U.S. electronic commerce

- Targets for technological solutions Paperwork and processes that accompany international transactions.

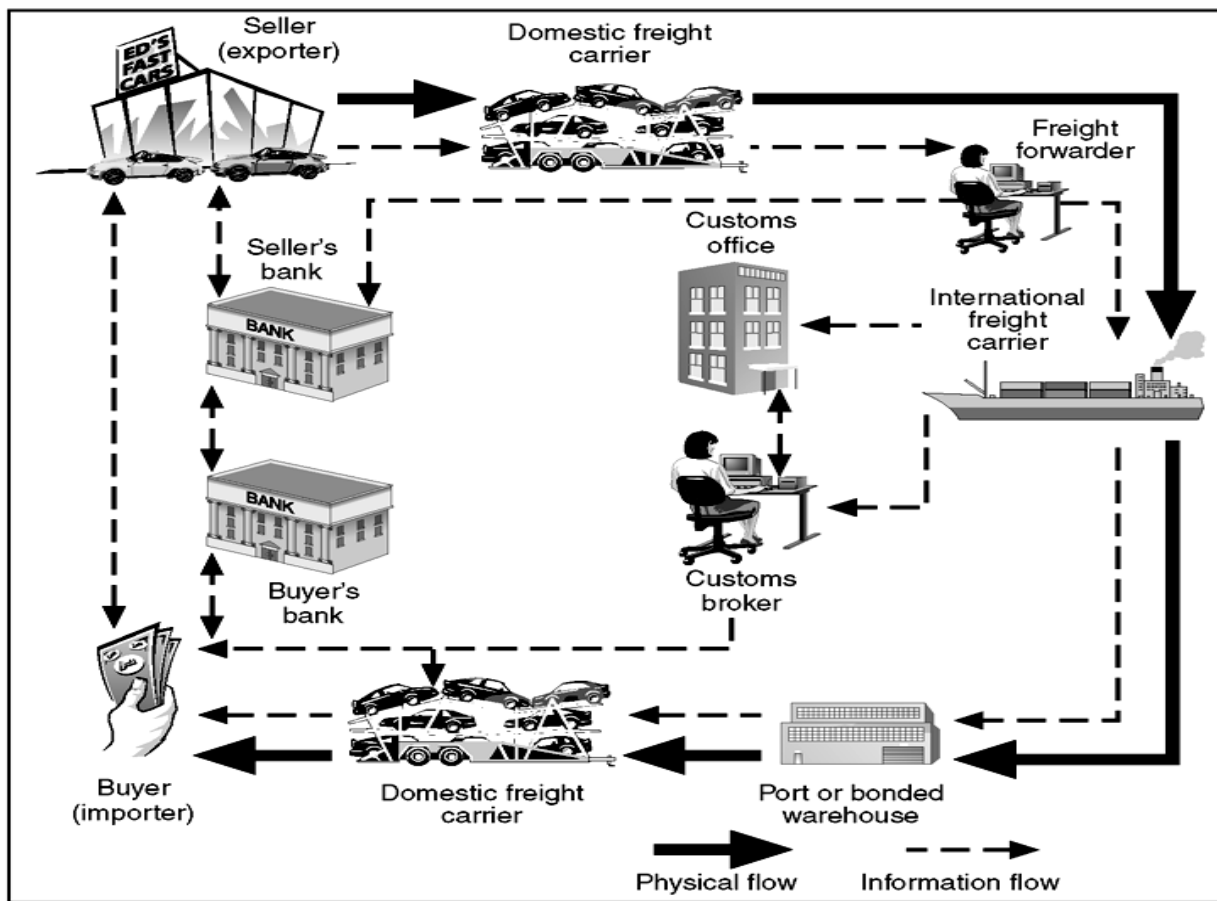**Parties Involved in a Typical International Trade Transaction**

Figure 1-15   *Parties involved in a typical international trade transaction*

Electronic Commerce and the trade cycle

It can be applied to all, or to different phases of the trade cycle

➔The trade cycle various depending on

> ➢ The nature of the organizations
>
> ➢ Frequency of trade between the patterns to the exchange
>
> ➢ The nature of goods and services being exchanged

➔Trade cycle support

1. Finding goods and services (referred to as a search & negotiation)

2. Placing the order, taking delivery & making payment (execution and settlement)

3. After sales activities such as warrantee, services etc.

The three generic trade cycles can be identified

1. Regular, repeat transactions (repeat trade cycle)

2. Irregular transactions, where execution & settlement are separated (credit transactions)

3. Irregular transactions where execution & settlement are combined (cash transactions)

See in fig. below
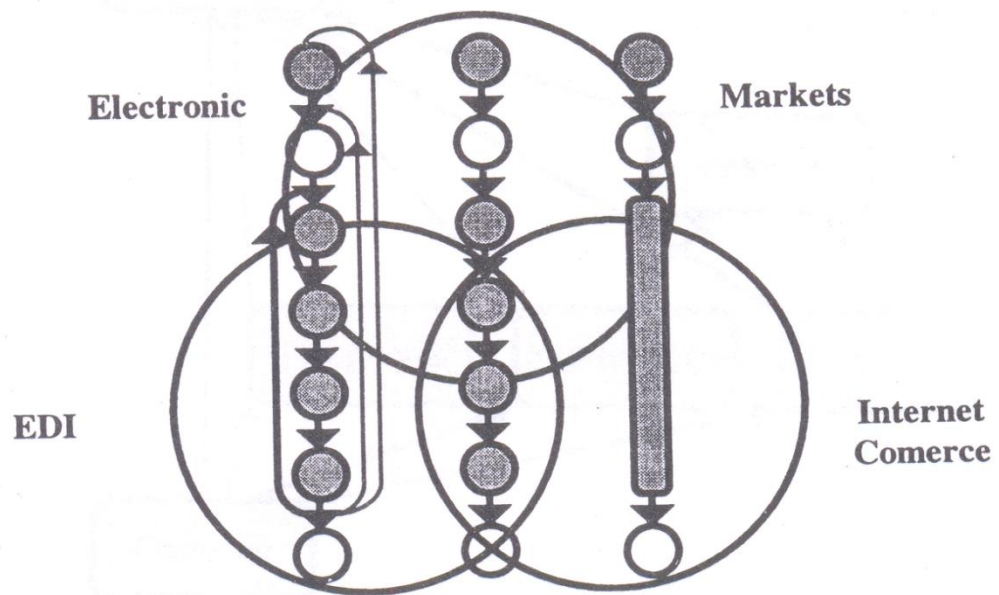
Fig. 1.6 e-Commerce Technologies and Generic Trade Cycles.

Electronic Markets:

- It increases the efficiency of the market
- It reduces the search cost for the buyer & makes it more likely that buyer will continue the search until the best buy is found
- It exist in commodity, financial markets & they are also used in airline booking system
- It is irregular transaction trade cycle.
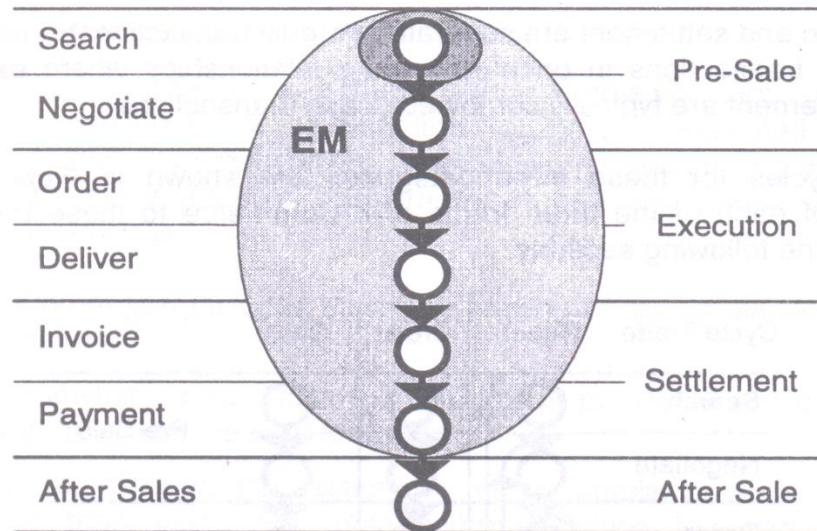
Fig. 1.3 Electronic Markets and Trade Cycle.

Electronic Data Interchange:

➔Applications are sending test results from the pathology laboratory to the hospital or dispatching exam results from exam boards to school

 ➢ It is used trade exchanges

 ➢ Users are vehicle assemblers, ordering components for the supermarkets

 ➢ It is used for regular repeat transactions

 ➢ It takes quite lot of work to set up systems

 ➢ It is part of schemes for just-in-manufacture and quick response supply

 ➢ Mature use of EDI allows for a change in the nature of the product or service

 ➢ Mass Customization is such an example

Electronic Commerce Framework

E-Commerce application will be built on the existing technology infrastructure

- ➢ A myriad of computers

- ➢ Communication networks

- ➢ Communication software

➔Common business services for facilitating the buying and selling process

- Messaging & information distribution as a means of sending and retrieving information.

- Multimedia content & network publishing, for creating a product & a means to communicate about it.

- The information superhighway- the very foundation-for providing the high way system along which all e-commerce must travel.

The two pillars supporting all e-commerce applications & infrastructure

- Any successful e-commerce will require the I-way infrastructure in the same way that regular commerce needs
- I-way will be a mesh of interconnected data highways of many forms

- ➢ Telephone, wires , cable TV wire

- ➢ Radio-based wireless-cellular & satellite

- ❑ Movies=video + audio

- ❑ Digital games=music + video + software

- ❑ Electronic books=text + data + graphics + music + photographs + video

- ❑ In the electronic 'highway system' multimedia content is stores in the form of electronic documents These are often digitized

On the I-way messaging software fulfills the role, in any no. of forms: e-mail, EDI, or point-to-point file transfers Encryption & authentication methods to ensure security Electronic payment schemes developed to handle complex transactions These logistics issues are difficult in long-established transportation.

Anatomy of E-Commerce applications

E-Commerce applications are:

1. Multimedia Content for E-Commerce Applications

2. Multimedia Storage Servers & E-Commerce Applications

      i. Client-Server Architecture in Electronic Commerce

      ii. Internal Processes of Multimedia Servers

      iii. Video Servers & E-Commerce

3. Information Delivery/Transport & E-Commerce Applications

4. Consumer Access Devices
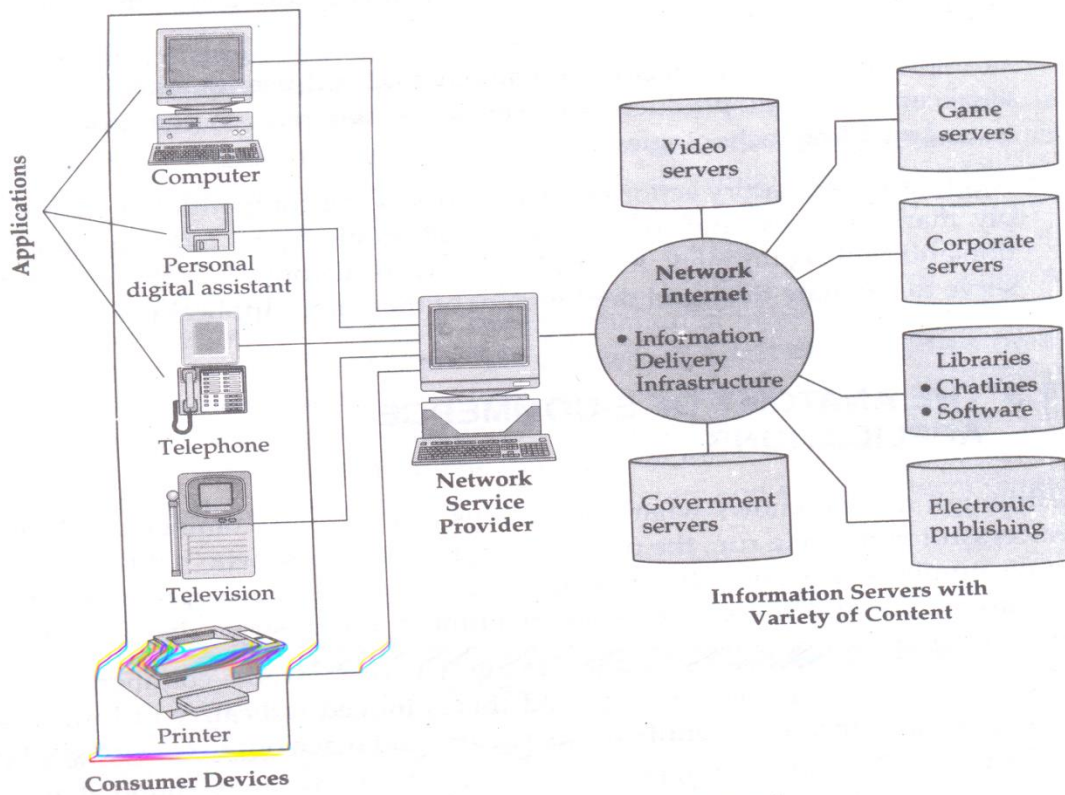

Figure 1.2 Elements of electronic commerce applications

Multimedia Content for E-Commerce Applications

Multimedia content can be considered both fuel and traffic for electronic commerce applications. the technical definition of multimedia is the use of digital data in more than one format, such as the combination of text, audio, video, images, graphics, numerical data, holograms, and animations in a computer file/document. See in Fig.

Multimedia is associated with Hardware components in different networks. the Accessing of multimedia content depends on the hardware capabilities of the customer.
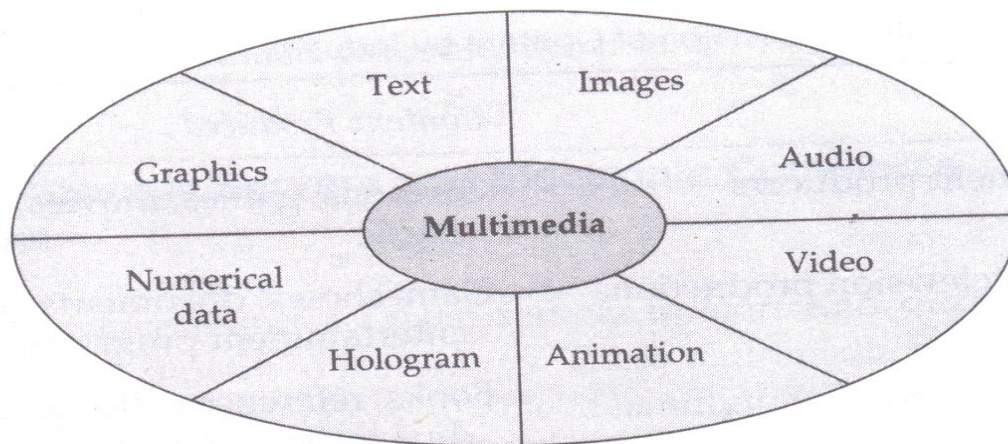
Figure 1.3 Possible components of multimedia

Multimedia Storage Servers & E-Commerce Applications

E-Commerce requires robust servers to store and distribute large amounts of digital content to consumers. these Multimedia storage servers are large information warehouses capable of handling various content, ranging from books, newspapers, advertisement catalogs, movies, games, & X-ray images. these servers, deriving their name because they serve information upon request, must handle large-scale distribution, guarantee security, & complete reliability.

## Client-Server Architecture in Electronic Commerce

All e-commerce applications follow the client-server model.

Clients are devices plus software that request information from servers or interact known as message passing.

 Mainframe computing , which meant for "dump".

The client server model, allows client to interact with server through request-reply sequence governed by a paradigm known as message passing.

The server manages application tasks, storage & security & provides scalability-ability to add more clients and client devices(like Personal digital assistants to Pc's. See in fig.
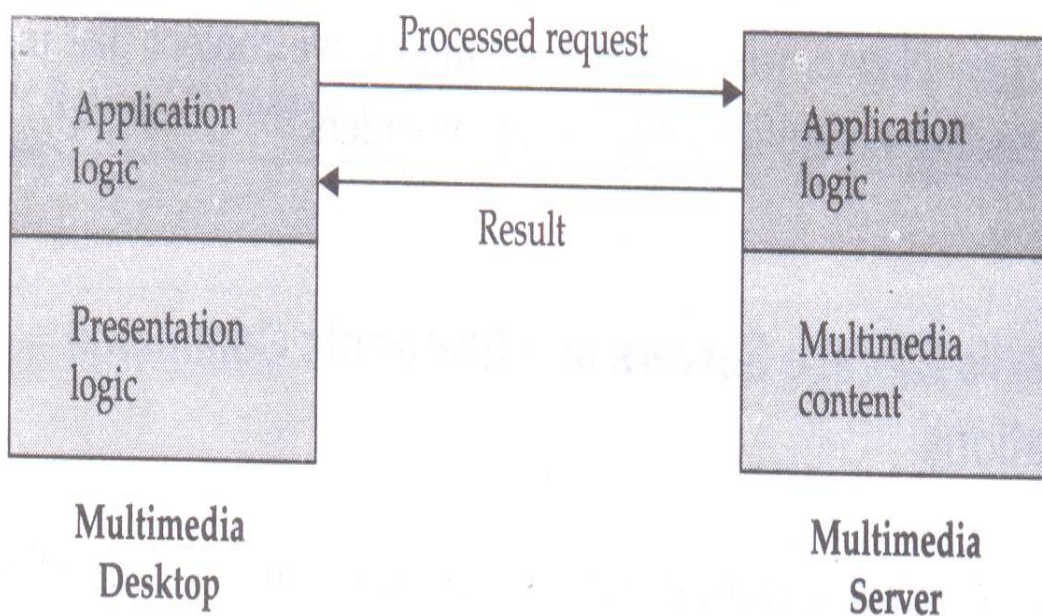
Figure 1.4 Distribution of processing in multimedia client–server world

Internal Processes of Multimedia Servers

- The internal processes involved in the storage, retrieval & management of multimedia data objects are integral to e-commerce applications.

- A multimedia server is a hardware & software combination that converts raw data into usable information & then dishes out.

- It captures, processes, manages, & delivers text, images, audio & video.

- It must do to handle thousands of simultaneous users.

- Include high-end symmetric multiprocessors, clustered architecture, and massive parallel systems.

Video Servers & E-Commerce

- The electronic commerce applications related to digital video will include

    1. Telecommunicating and video conferencing

    2. Geographical information systems that require storage & navigation over maps

    3. Corporate multimedia servers

    4. Postproduction studios

    5. shopping kiosks.

➔Consumer applications will include video-on-demand.

➔The figure which is of video–on demand consist video servers, is an link between the content providers (media) & transport providers (cable operators).
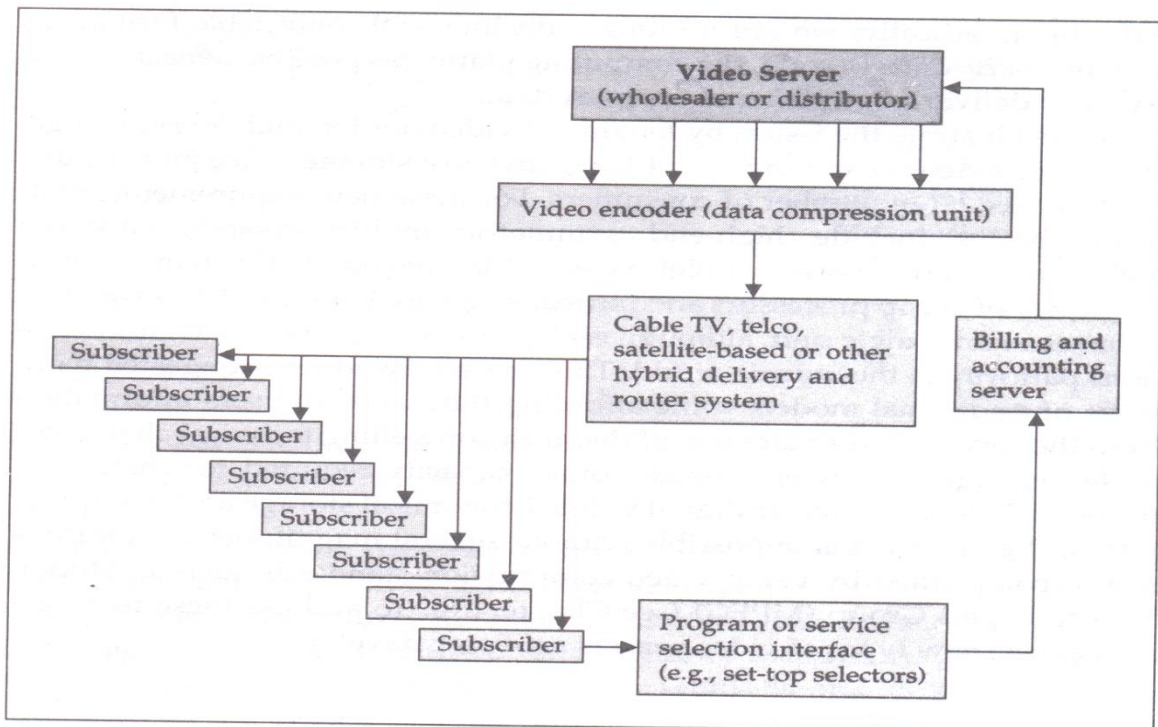
Figure 1.5 Block diagram of a generic video on-demand system

Information Delivery/Transport & E-Commerce Applications

- Transport providers are principally telecommunications, cable, & wireless industries.

Transport Routers

Information Transport Providers   Information Delivery Methods

- Telecommunication companies   long-distance telephone lines;

                                                        local telephone lines

- Cable television companies   Cable TV coaxial, fiber optic &

                                                        satellite lines

- Computer-based on-line servers   Internet; commercial on-line

                                                        service providers

- Wireless communications   Cellular & radio networks;paging systems

22

Consumer Access Devices

Information Consumers	Access Devices
• Computers with audio & video Mobile computing	Personal/desktop computin capabilities
• Telephonic devices	Videophone
• Consumer electronics	Television + set-top box Game systems
• Personal digital assistants (PDAs)	Pen-based computing, voice-driven computing

E-Commerce Consumer applications

People needs entertainment on demand including video, games, news on-demand, electronic retailing via catalogs etc. Currently now we are taking the video on-demand.

Why most companies betting heavily on this?

1. 93 million homes have television.

2. Americans spend nearly half their free time watching television.

3. Every evening, more than one-third of the population is in front of a television.

4. Sight, sound, and motion combine to make television a powerful means of marketing.

Consumer Applications and Social Interaction:

Lessons from history indicate that the most successful technologies are those that make their mark social In 1945, in U.S no one had TV. By 1960 about 86percent of households did Now contrast with Telephone. Bell invented the telephone in 1876 and by1940, 40% of U.S. households and by 1980 about 95-98 percent of household connected Penetration was slower for Telephone than for TV because of the effort needed to set up the wiring infrastructure. The impact of both was good on business, social, consumer behavior and entertainment habits Radio began in 1960, and by 1989, almost 3 decades later, just 319 radio stations followed the news format In 1994, their number exceeded 1000.

What do Consumers Really want?

1. They want quality and cost of service.

2. If a new system requires more steps to do essentially the same things, consumers may resist it.

3. Some people fit that mold, but most of public prefers to lay back and just watch television and let someone else do the work of figuring out the sequence of television programming.

What are Consumers willing to spend?

1. According to the video on-demand, consumers get the cable bill at basic charge they will buy.

2. If it is doubled they will not buy and at the service provider economics will increased then network operators might look to advertises to fill the gap.

Delivering products to Consumers

1. Packing and distribution must be considered.

2. Blockbuster video collects the information and shows the typical consumer.

3. Spends $12 a month on home video expenditures.

4. Go to video store to select video on limited budget and has time to kill.

5. Only periodically expends a large sum of money.

Consumer Research and E-Commerce

Consumer opinion about interactive television is:

- 46% be willing to pay.

- 39% want video phone calls.

- 63% would pay for movies on-demand.

- 57% would pay for Television shows on-demand.

- 78% said their worry about it is that they will pay for something that they previously received free of charge.

- 64% are think it make it harder for viewers to protect privacy.

- 41% are tell that it is too confusing to use.

Changing business Environment

1. The traditional business environment is changing rapidly

2. Many companies are looking outside and within to shape business strategies

3. These activities include private electronic connections to customers, suppliers, distributors, industry groups etc.

4. The I-superhighway will expand this trend so that it allow business to exchange information.

E-Commerce Organization applications

E-Commerce and the retail Industry

1. Conditions are changing in the "new economy" with respect to the retail industry

2. Consumers are demanding lower prices, better quality, a large selection of in-season goods.

3. Retailers are filling their order by slashing back-office costs, reducing profit margins, reducing cycle times. buying more wisely and making huge investments in technology

4. Retailers are in the immediate line of fire and were first to bear the brunt of cost cutting

Marketing and E-Commerce

1. E-commerce is forcing companies to rethink the existing ways of doing target marketing and even event marketing.

2. Interactive marketing is in electronic markets via interactive multimedia catalogs

3. Users find moving images more appealing than still image and listening more appealing than reading text on a screen

4. Consumer information services are a new type of catalog business

Inventory Management and Organizational Applications

1. With borders opening up and companies facing stiff global competition.

2. Adaptation would include moving to computerized, "paperless" operations to reduce.

3. Once targeted business process is inventory management, solutions for these processes go by different names.

4. In manufacturing industry they're known as just-in-time inventory systems, in the retail as quick response programs, and in transportation industry as consignment tracking systems.

Just-in-Time (JIT) Manufacturing

1. It is viewed as an integrated management system consisting of a number of different management practices dependent on the characteristics of specific plants.

2. The first principle is elimination of all waste (time, materials, labour & equipment).

3. The following management practices are focused factory, reduced set-up times, group technology, total productive maintenance, multifunction employees, uniform workloads, IT purchasing, kanban total quality control & quality circles.

Quick Response Retailing (QR)

1. It is a version of JIT purchasing tailored for retailing.

2. To reduce the risk of being of out of stock, retailers are implementing QR systems.

3. It provides for a flexible response to product ordering and lowers costly inventory levels.

4. QR retailing focuses on market responsiveness while maintaining low levels of stocks.

5. It creates a closed loop consisting of retailer, vendor, & consumer chain,& as consumers make purchases the vendor orders new deliveries from the retailer through its computer network.

Supply Chain Management

1. QR and JIT address only part of the overall picture.

2. Supply Chain Management (SCM) is also called "extending", which means integrating the internal and external partners on the supply and process chains to get raw materials to the manufacturer and finished products to the consumer.

3. It includes following functions:

- Supplier management: The goal is to reduce the number of suppliers and get them to partners.

- Inventory management: The goal is to shorten the order-ship-bill cycle. When a majority of partners are electronically linked, information faxed or mailed.

- Distribution management: The goal is to move documents (accurate data) related to shipping.

- Channel management: The goal is to quickly disseminate information about changing operational conditions (technical,product,and pricing information) to trading partners.

- Payment management: The goal is to link company and the suppliers and distributors so that payments can be sent and received electronically.

- Financial management: The goal is to enable global companies to manage their money in various foreign exchange accounts.

- Sales force productivity: The goal is to improve the communication flow of information among the sales, customer & production functions.

➔In sum, the supply chain management process increasingly depends on electronic markets

Work group Collaboration Applications:

1. A internetwork that enables easy and inexpensive connection of various organizational segments
2. It is to improve communications and information sharing and to gather and analyze competitive data in real-time
3. Videoconferencing, document sharing and multimedia e-mail, are expected to reduce travel and encourage telecommuting
4. Improves the distribution channel for documents and records to suppliers, collaborators and distributors

E-commerce software building blocks

WEB HOSTING ALTERNATIVES

When companies need to incorporate electronic commerce components, they may opt to run servers in-house; this approach is called **self-hosting**. This is the option used most often by large companies.

Other companies, especially midsize and smaller companies, often decide that a **third-party Web-hosting service provider** is a better choice than self-hosting.

Many small Web stores use a third-party host provider for both Web services and electronic commerce functions, particularly when the Web site is small or the company sells a limited number of products.

A number of companies, called Internet service providers (ISPs), are in the business of providing Internet access to companies and individuals. Many of these companies offer Web-hosting services as well. To distinguish themselves from companies that provide only Internet access services, these hosting service firms sometimes call themselves something other than ISPs. Because the hosting services they offer are designed to help companies conduct electronic commerce, these hosting service firms sometimes call themselves **commerce service providers (CSPs**). These firms often offer Web server management and rent application software (such as databases, shopping carts, and content management programs) to businesses; thus, these companies also sometimes call themselves **managed service providers (MSPs**) or **application service providers (ASPs).**Despite the increasing variety of acronyms, many companies that provide some or all of these additional services still call themselves ISPs.

Service providers offer **clients hosting arrangements** that include shared hosting, dedicated hosting, and co-location.

Shared hosting-means that the client's Web site is on a server that hosts other Web sites simultaneously and is operated by the service provider at its location.

With **dedicated hosting**, the service provider makes a Web server available to the client, but the client does not share the server with other clients of the service provider.

 In both shared hosting and dedicated hosting, the service provider owns the server hardware and leases it to the client. *The service provider is responsible for maintaining the Web server hardware and software, and provides the connection to the Internet through its routers and other network hardware.*

In a **co-location** (also spelled collocation and collocation) service, the service provider rents a physical space to the client to install its own server hardware. The client installs its own software and maintains the server. The service provider is responsible only for providing a reliable power supply and a connection to the Internet through its routers and other networking hardware.

You can find service providers by looking in your local telephone directory or by using a Web directory such as The List, or a site listed in the **Google Directory of Web Host Directories.**

BASIC FUNCTIONS OF ELECTRONIC COMMERCE SOFTWARE

Because electronic commerce sites vary so greatly in terms of size, purpose, audience, and other factors, a vast range of software and hardware products are available for building electronic commerce sites.

Sites with minimal needs can use externally hosted stores that   provide software tools to build an online store on a host's site. At the other end of the range are sophisticated electronic commerce software suites that can handle high-transaction volumes and include a broad assortment of features and tools.

The type of electronic commerce software an organization needs depends on several factors, with size and budget being the primary drivers.

One of the most important factors is the expected size of the enterprise and its projected traffic and sales. A high-traffic electronic commerce site with thousands of catalog inquiries each minute requires different software than a small online shop selling a dozen items.

Another determining factor is budget. Creating an online store can be much less expensive than building a chain of retail stores. The start-up cost of an electronic commerce operation can be much lower than the cost of creating a brick-and-mortar sales and distribution channel **that includes warehouses and multiple retail outlets.**

A *traditional store requires a physical location with leases, employees, utility payments, and maintenance. The cost of creating the infrastructure for an online business can be much lower*. Another early decision is whether the company should use an external host or host the electronic commerce site in-house.

*Companies that have an existing information technology (IT) staff of programmers, Web designers, and network engineers are more likely to choose an **in-house hosting approach.***

If a company does not have or cannot easily hire people with the skills required setting up and maintaining an electronic commerce site, it can outsource all or part of the job to a service provider.

Companies that are located outside of major metropolitan areas and want to host sites themselves must also consider whether **their Internet connections are sufficient.**

In many cases, these companies find that they are not close enough to a major Internet access point or that their connections *do not have sufficient bandwidth to handle large volumes of traffic efficiently*. Even if these companies have employees with sufficient skills, they might decide to use a service provider to host their electronic commerce sites.

The specific duties that electronic commerce software performs range from a few fundamental operations to a complete solution—from **catalog display** to **fulfillment notification.**

All electronic commerce software must provide:

- ⌘ A catalog display

- ⌘ Shopping cart capabilities

- ⌘ Transaction processing

Larger and more complex electronic commerce sites also use software that adds other features and capabilities to the basic set of commerce tools. These additional software components can include:

- ⌘ Middleware that integrates the electronic commerce system with existing company information systems that handle inventory control, order processing, and accounting

- ⌘ Enterprise application integration

- ⌘ Web services

- ⌘ Integration with enterprise resource planning (ERP) software

- ⌘ Supply chain management (SCM) software

- ⌘ Customer relationship management (CRM) software

- ⌘ Content management software

- ⌘ Knowledge management software

  Catalog Display

A catalog organizes the goods and services being sold. To further organize its offerings, a retailer may break them down into departments. As in a physical store, merchandise in an online store can be grouped within logical departments to make locating an item, such as a camping stove, simpler. **Web stores** often use the same department names as their physical counterparts.

In most physical stores, each product is kept in only one place. A web store has the **advantage of being able to include a single product in multiple categories.** For example, running shoes can be listed as both footwear and athletic gear.

A small commerce site can have a very simple **static catalog**. A catalog-is a listing of goods and services.

A static catalog is a simple list written in HTML that appears on a Web page or a series of Web pages. To add an item, delete an item, or change an item's listing, the company must edit the HTML of one or more pages.

Larger commerce sites are more likely to use a **dynamic catalog**. A dynamic catalog **stores the information about items in a database,** usually on a separate computer that is accessible to the server that is running the Website itself.

A dynamic catalog can feature multiple photos of each item, detailed descriptions, and a search tool that **allows customers to search for an item and determine its availability.**

The software that implements a dynamic catalog is often included in larger electronic commerce software packages; however, some companies write their own software to link their existing databases of product information to their Web sites. Both types of catalog (static and dynamic) are located in the **third tier of the Web site architecture**.

Shopping Cart

In the early days of electronic commerce, **shoppers selected items they wanted to purchase by filling out online forms.** Using text box and list box form controls to indicate their choices, users entered the quantity of an item in the quantity text box, the SKU (stock keeping unit) or product number in another text box, and the unit price in yet another text box. This system was awkward (difficult) for ordering more than one or two items at a time. One problem with forms-based shopping was that shoppers had to write down product codes, unit prices, and other information about the product before going to the order form, which was inevitably on another page. Another problem was that customers sometimes forgot whether they had clicked the submit button to send in

their orders. As a result, they either sent the same order twice (pressing the submit button when they had already done so) or thought they had submitted the order when they really had not (consequently failing to submit the order). The forms-based method of shopping was confusing and error prone.

The problems that shoppers faced with forms-based ordering systems: First, many customers found it difficult to remember the exact descriptions of the products.

Second, customers had to enter the item numbers, which were located on a different Web page, in the text boxes. Thus, the customers needed to either write down or memorize the numbers.

Because **forms-based ordering** is cumbersome and error-prone, only a few of the smallest online stores still use it.

 Shopping carts are now the standard method for processing sales on most electronic commerce sites. A shopping cart, also sometimes called a **shopping bag or shopping basket, keeps track of the items the customer has selected and allows customers to view the contents of their carts, add new items, or remove items.**

To order an item, the customer simply clicks that item. All of the details about the item, including its price, product number, and other identifying information, are stored automatically in the cart. If a customer later changes his or her mind about an item, he or she can view the cart's contents and remove the unwanted items. When the customer is ready to conclude the shopping session, the click of a button executes the purchase transaction. Figure below shows a typical shopping cart page at a site that sells computer equipment.

FIGURE Typical shopping cart page

Clicking the Checkout button usually displays a screen that asks for billing and shipping information and that confirms the order. As you can see from the figure, the shopping cart software keeps a running total of each type of item. The shopping cart calculates a total as well as sales tax and shipping costs. Some shopping cart software allows the customer to fill a shopping cart with purchases, put the cart in virtual storage, and come back days later to confirm and pay for the purchases. A number of companies, including **BIZNET Internet Services, SalesCart, and WebGenie Software**, sell shopping cart software that sellers can add to their Web sites. These software packages range in price from a few hundred dollars to several thousand dollars, plus an ongoing monthly fee.

 The shopping cart software sold by SalesCart works with several different Web site design tools.

⌘   Because the Web is a stateless system—unable to remember anything from one transmission or session to another—shopping cart information must be stored

33

explicitly for the shopper to retrieve later. Furthermore, it must distinguish one shopper from another so that the purchases are not mixed up.

One way to uniquely identify users and store information about their choices is to create and **store cookies**, which, as you learned in earlier chapters, are bits of information stored on a client computer. When a customer returns to a site that issued a particular cookie, the shopping software reads either the cookie from the customer's computer or the database record from the merchant's server.

⌘ If a shopper's browser does not allow storage of cookies, sites can use another way to preserve shopping cart information from one browser session to another.

Some shopping cart software packages, such as **ShopSite** , do this by automatically assigning a shopper a temporary number. The number is added to the end of the URL that appears in the browser's address bar and persists as the shopper navigates from one Web site to another. When the customer returns, the URL still contains shopping cart information that the Web server can interpret. When the shopper closes the browser, the temporary number is discarded and is no longer available, even if the customer later reopens the browser and returns to the same Web site.

Transaction Processing

Transaction processing occurs when the shopper proceeds to the virtual checkout counter by clicking a **checkout button**. Then the electronic commerce software performs any necessary calculations, such as **volume discounts, sales tax, and shipping costs. At checkout,** the **customer's Web browser software** and the **seller's Web server software** both switch into **a secure state of communication.** Figure below   shows how the three key functions of a basic electronic commerce Web site (**catalog display, shopping cart, and transaction processing**) are combined in the site's architecture.
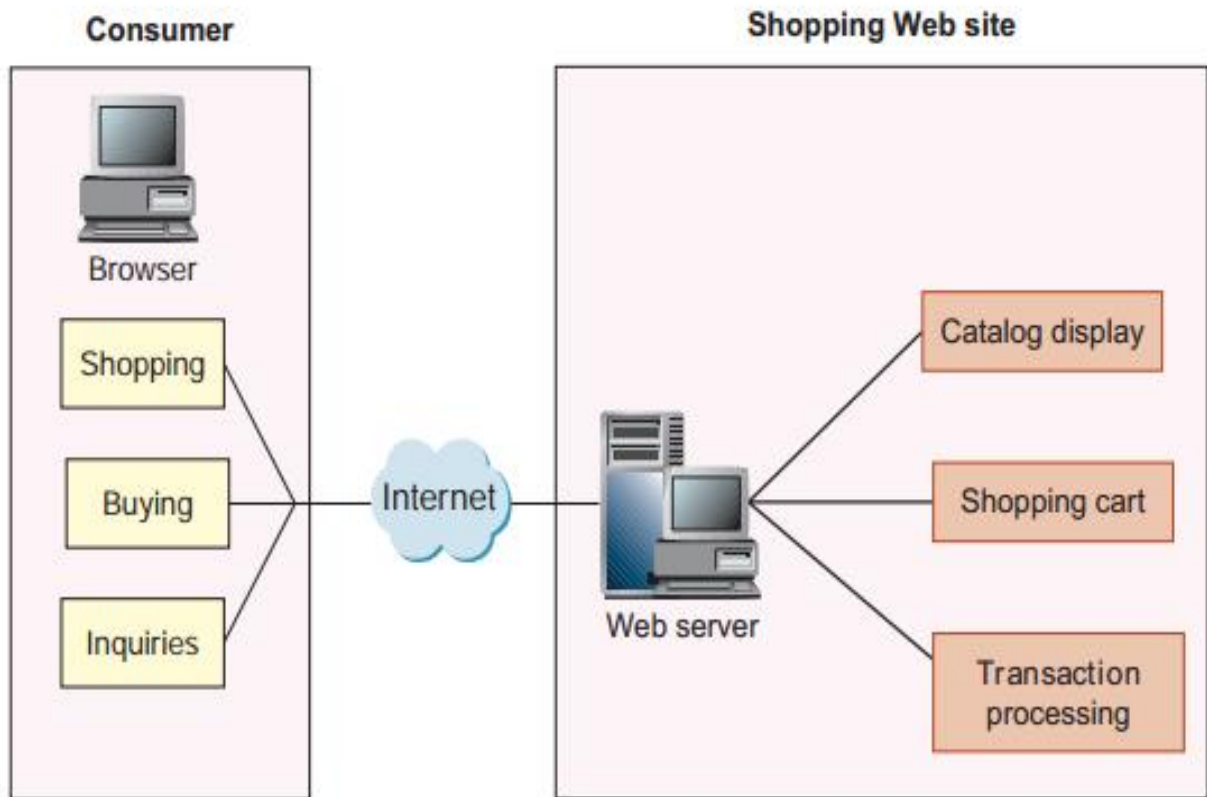
FIGURE   Basic electronic commerce Web site architecture

⌘ Although a basic online store's electronic commerce software can generate reports that **summarize sales and inventory shipped**, most midsize and larger companies use an **accounting software package** to record sales and inventory movements.

To integrate effectively with accounting software, the electronic commerce software must communicate with that accounting software, which typically runs on other computers in the seller's network.

When an item is sold online, the electronic commerce software must communicate that fact to both the sales and inventory management modules in the accounting software.

⌘ Computing sales taxes and shipping costs are also important parts of **online sales**. Sales tax rates and shipping rates can change often, so Web site managers must either monitor and update the rates continually or use software that updates the rates automatically. Shipping companies such as **FedEx and UPS** offer software to shippers that integrates with electronic commerce software to ensure that the rates they have are current. Other calculation complications include provisions for coupons, special

promotions, and time sensitive offers; for example, "purchase a round-trip ticket before the end of the month and receive a 50 percent discount."

ADVANCED FUNCTIONS OF ELECTRONIC COMMERCE SOFTWARE

In this section, you will learn about the features that larger companies need in their electronic commerce software. Although there are exceptions, such as **Amazon.com and Buy.com**, most large companies that have electronic commerce operations also have substantial business activity that is not related to electronic commerce. Thus, integrating electronic commerce activities into the company's other operations is very important. A basic element of any large company's information system is its collection of databases.

Databases

A **database- is a collection of information that is stored on a computer in a highly structured way.** The rules a business establishes about its database structure are carefully thought out and take into account how the company does business its business rules and how the company can reduce the likelihood that errors and inconsistencies will develop in the database.

A database manager (or database management software) is software that makes it easy for users to enter, edit, update, and retrieve information in the database. One common low end database manager is **Microsoft Access**. More complex database managers that can handle larger databases and can perform more functions at higher speeds include **IBM DB2, Microsoft SQL Server**, and **Oracle**. Companies with very large databases that have operations in many locations must make most (or all) of their data available to users in those locations.

Large information systems that store the same data in many different physical locations are called **distributed information systems,** and the databases within those systems are called **distributed database systems**. The complexity of these systems leads to their **high cost**. Most companies that can afford it do use commercial database products; however, an increasing number of companies and other organizations are using **MySQL**, which was developed and is maintained by a community of programmers on the Web. Similar to the Linux operating system you learnt, **MySQL is open-source software, even though it was developed by a Swedish company (MySQL AB), which has been owned since 2008 by Sun.**

Except for small sites offering only a few products, companies should determine the level of database support provided by any electronic commerce software they are considering. Most online stores that sell many products use a database that stores product information, including size, color, type, and price details. Usually, the database that serves an online

store is the same one that is used by the company's existing sales operations. **It is usually better to have one database serving the two sales functions (online and in-store retail, for example) because it eliminates the errors that can occur when running parallel but distinct databases. If a company has existing inventory and product databases, then it should consider only electronic commerce software that supports these systems.**

Middleware

Larger companies usually establish the connections between their **electronic commerce software** (that is, their catalog display, shopping cart, and transaction processing software) **and their accounting and inventory management databases or applications by using middleware**.

Middleware is software that takes information about sales and inventory shipments from the **electronic commerce software** and transmits it to **accounting and inventory management software** in a form that these systems can read.

For example, the sales module of an accounting system might be designed to accept the input of a **telephone salesperson**. The salesperson enters the product numbers, quantities, and shipping method into the sales module by using a keyboard while talking to the customer on the phone.

Middleware would extract information about a sale from the Web site's shopping cart software and enter it directly into the accounting software's sales module without requiring that a person re-enter the information.

Some large companies that have sufficient IT staff write their own middleware; however, most companies purchase middleware that is customized for their businesses by the middleware vendor or a consulting firm. Thus, most of the cost of middleware is not the software itself, but the consulting fees needed to make the software work in a given company. Making a company's information systems work together is called interoperability and is an important goal of companies when they install middleware.

The total cost of a middleware implementation can range from $50,000 to several million dollars, depending on the complexity of the company's underlying operations and its existing information systems. Major Middleware vendors include **BEA Systems**, **Broad vision, Digital River, and IBM Tivoli Systems.** As the market for this type of software has matured, the companies that provide this software have worked to build products that can integrate software throughout the enterprise with company Web sites.

Enterprise Application Integration

A program that performs a specific function, such as **creating invoices, calculating payroll, or processing payments received from customers,** is called an **application program**, *application software* or, more simply, an application**.**

An application server is a computer that takes the request messages received by the Web server and runs application programs that perform some kind of action based on the contents of the request messages.

The actions that the application server software performs are determined by the rules used in the business. These rules are called business logic. An example of a business rule is: When a customer logs in, check the password entered against the password file in the database.

In many organizations, the business logic is distributed among many different applications that are used in different parts of the organization. In recent years, **many IT departments have devoted significant resources to the creation of links among these scattered applications so that the organization's business logic can be interconnected.** The creation and management of these links is called **application integration or enterprise application integration**. The integration is accomplished by programs that transfer information from one application to another.

For example, a program might transfer information from order entry systems in several different divisions to a single accounts receivable and sales system that integrates all enterprise-wide sales activity.

In many cases, the data formats in the various programs are different and the transfer programs must edit and reformat the data before transferring it. Increasingly, programmers are using **XML data feeds** to move data from one application to another in enterprise integration implementations**.**

⌘ **Application servers are usually grouped into two types**: page-based and component based systems. **Page-based application systems return pages generated by scripts that include the rules for presenting data on the Web page with the business logic**. Common page-based server systems include **Adobe ColdFusion, Java Server Pages (JSP), Microsoft Active Server Pages (ASP), and Hypertext Preprocessor (PHP).** These page-based systems work quite **well for small and midsize Web sites**. Because they combine the page **presentation logic with the business logic**, however, **they can be difficult to revise and update**.

⌘ Larger businesses often prefer to use a component-based application system that **separates the presentation logic from the business logic.** Each component of logic is created and maintained separately. This makes updating and changing elements of the system much

easier—especially on large electronic commerce sites that are built and maintained by teams of programmers. **The most common component-based systems used on the Web are Enterprise JavaBeans (EJBs), Microsoft Component Object Model (COM), and the Object Management Group Common Object Request Broker Architecture (CORBA).**

Integration with ERP Systems

⌘ Many B2B Web sites must be able to connect to existing information systems such as enterprise resource planning software.

⌘ **Enterprise resource planning (ERP)** software packages are business systems that integrate all facets of a business, including accounting, logistics, manufacturing, marketing, planning, project management, and treasury functions.

The two major ERP vendors are **Oracle and SAP**. A typical installation of ERP software costs between $2 million and $25 million; thus, companies that are already running these systems have made a significant investment in them and **require that their electronic commerce and EDI operations to integrate with them**.

➔Figure below   shows a typical architecture for a B2B Web site that connects to several existing information systems, including the ERP system within the company and its trading partners' systems through EDI connections.
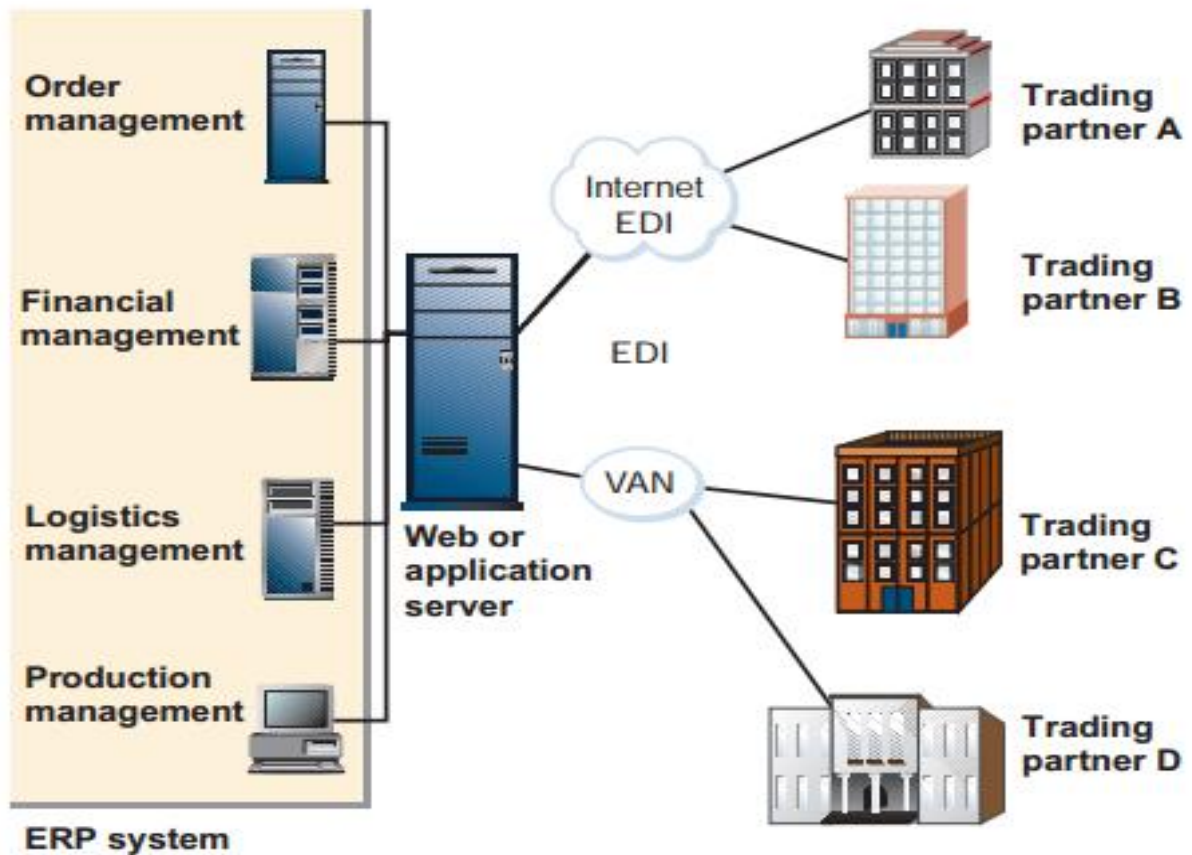
FIGURE ERP system integration with EDI

Web Services

Companies are using the Internet to connect specific software applications at one organization directly to software applications at other organizations.

⌘ **The W3C defines Web services as software systems that support interoperable machine-to-machine interaction over a network**.

⌘ In other words, a Web service is a set of software and technologies that allow computers to use the Web to interact with each other directly, without human operators directing the specific interactions.

 For example, a handbag manufacturer's computers can contact its customers' computers to learn which of its products are selling well. Once it obtains this information from a number of the company's customers, the computer can adjust manufacturing schedules, increasing the production of some handbags and reducing the production of others.

⌘ **A general name for the ways programs interconnect with each other is application program interface (API).** When the interaction is done over the Web, the techniques are called **Web APIs.** Web services use Web APIs of various types, as you will learn later in this section.

⌘ A number of major software vendors have embraced the idea of **Web services** in new technology initiatives such as **Microsoft .NET and the Sun Java 2 Platform, Enterprise Edition**.

What Web Services Can Do

Companies are using Web services to offer **improved customer service and reduce costs.**

⌘ **In some companies, Web services are used to transmit the XML-tagged data from one application to another in enterprise application integration efforts**.

⌘ In other applications, **Web services provide data feeds between two different companies**.

⌘ Many companies that have used Web services to accomplish application integration have found it to be less expensive to implement than older approaches that required programmers to write or adapt multiple middleware software programs. **Here are some examples of specific Web services implementations:**

i.   J.P. Morgan Chase & Co., a major investment bank, uses Web services in its investment information portal. The Web services pull information, such as general economic forecasts, financial analyses of specific companies, industry forecasts, and financial markets results into continually updated online reports that customers can obtain on the J.P. Morgan Chase portal site. The bank's customers could obtain all of this information themselves, but the aggregation is a service that the bank provides. The information flow in this case is from the bank to its customers.

ii.   Nationwide Building Society, a mortgage company in Swindon , England, uses a Web services tool to automate its communications with mortgage application service companies. These service companies obtain information from consumers who want mortgages and then forward the information in a prescribed XML format to Nationwide. The Nationwide Web services software reformats the submission and submits it to Nationwide's enterprise computer system. When a lending decision has been reached, the Web services tool conveys the decision back to the mortgage application service company. This Web services approach has reduced costs and decreased turnaround time for loan decisions at Nationwide.

iii.   CUNA Mutual Group sells services to credit unions throughout the United States from its headquarters in Madison, Wisconsin. These services include everything from check clearing to construction management. CUNA provides many of its services by running programs on old computer systems that have been in operation for years. Instead of reprogramming everything so it could be accessible on the Web, CUNA created a Web services layer that takes information from the old computer systems and generates Web pages that its customers can use to obtain those services.

iv.   The MSN Money site buys stock quotes from the Interactive Data Corporation, which delivers them, computer-to-computer, using Web services. If you view an MSN Money stock quote page, you can see the Interactive Data Real-Time Services acknowledgement for those stock quotes (along with those of other Web services providers that contributed to the page) near the bottom of the Web page under the heading" Data Providers."

v.   Merrill Lynch, which had more than 400 programs running on its old mainframe computers, wanted to combine the information managed by those programs into new reports to support the company's product management and sales efforts. The old programs had been refined over the years and were highly reliable, so Merrill Lynch did not want to rebuild them. Instead, it used Web services to create links into those programs and make their data available to software running in new environments (such as Sun's Java and Microsoft's .NET) on different computers. This integration project cost $30,000 instead of the estimated $800,000 it would have cost to use an older application integration approach.

How Web Services Work

A key element of the **Web services approach** is that programmers can write software that accesses these units of business application logic without knowing the details of how each unit is implemented.

Web services can be mixed and matched with other Web services to execute a complex business transaction. **Thus, Web services allow programs written in different languages on different platforms to communicate with each other and accomplish transaction processing and other business tasks.**

The common format of this machine-to-machine communication was originally HTML; however, most **Web services implementations now use XML. Organizations can use XML to mark up content with agreed-upon sets of descriptive tags.**

⌘ The first Web services were nothing more than sources of information. The Web services model allowed programmers to incorporate these information sources into software applications.

For example, a company that wanted to collect all of its financial management information into one spreadsheet could use Web services to obtain information about bank account and loan balances, stock portfolio holdings, and current interest rates on financial instruments. Commonly available spreadsheet software can then be used to create a spreadsheet model that uses the information supplied by those Web services to update itself automatically. Some of the information might be available as a Web service at no cost; other information access might require a subscription. But Web services can make accessing the information much easier and more efficient.

⌘ A more advanced example would be a company that uses purchasing software to help manage that activity. The **purchasing software can use Web services to obtain price information from a variety of vendors. After the purchasing agent reviews the price and delivery information and authorizes the purchase, the software can submit the order and track it until the shipment is received. On the other side of this transaction, the vendor's software can use Web services (in addition to providing price and delivery information) to check the buyer's credit and contract with a freight company to handle the shipment.** As Web services become more sophisticated, they can make the decisions rather than simply providing information to people who then make decisions.

SOAP Specifications

⌘ The first widely used approach to Web services was Simple Object Access Protocol (SOAP), which is a message-passing protocol that defines how to send marked-up data from one software application to another across a network.

⌘ Implementing SOAP uses three rule sets (usually called protocols or specifications) that let programs work with the formatted (**using XML or HTML**) data flows to accomplish the communication that makes Web services work.

⌘ The communication rules are included in the SOAP protocol. You can see the full SOAP specification and learn more about SOAP at **theW3C SOAP Page**.

⌘ The other two rule sets are the **Web Services Description Language (WSDL)**, **which is used to describe the characteristics of the logic units that make up specific Web services,** and the **Universal Description, Discovery, and Integration Specification (UDDI)**, **a set of**

protocols that identify the locations of Web services and their associated WSDL descriptions.

⌘ Programmers use the information in a **WSDL description** to modify an application program so it can connect to a Web service. **WSDL descriptions also allow programs to configure themselves so they can connect to multiple Web services.** You can learn more about WSDL and related topics at the **W3C Web Services Activity pages.**

⌘ Programmers (and the programs themselves) use **UDDI to find the location of Web services before they can interpret their characteristics (described in WSDL) or communicate with them (using SOAP)**. The UDDI Web site is a good source of information about this specification and includes the current **UDDI Business Registry**, which provides a catalog of currently available Web services.

⌘ Much of the data in SOAP applications is stored and transmitted in XML format. Because there are so many variations of XML in use today, it is critical that **data-providing and data-using** partners agree on **which XML implementation to use.**

⌘ SOAP-based Web services often include quality of service and service level specifications on which applications developers at each company can rely. In many cases, each Web services subscriber must work out a detailed agreement (specifying service levels, quality of service standards, and so on) with each Web services provider.

⌘ Although the SOAP set of protocols was the first approach to implementing Web services to be widely used (and continues to be widely used in large corporate information management applications), only about **20 percent of Web services today use SOAP**, according to statistics compiled by Programmable Web. An approach to Web services implementation that was developed later, but which uses a somewhat simpler structure, has become the leader in Web services implementations, as you will learn in the next section.

REST and Restful Design

Roy Fielding, one of the authors of the original HTTP specification, wrote his doctoral dissertation in 2000 on the subject of network-based software architectures. In the dissertation, he outlined a principle called **Representational State Transfer (REST),**that describes the way the Web uses networking architecture to identify and locate Web pages and the elements (graphics, audio clips, and so on) that make up those Web pages.

⌘ **Designers of Web services who found SOAP to be unnecessarily complex for the applications they were building** turned to Fielding's REST idea and began using it as a structure for their work.

⌘ Web services that are built on the **REST model** are said to use RESTful design and are sometimes called **RESTful applications.**

⌘ A **RESTful application** transfers structured information from one Web location to another. This structured information can be any type of media, but it is most often an **XML-tagged data set**. RESTful applications can also transfer **HTML- or XHTML-tagged data**. **The Web service is made available at a specific address (much as a Web page is made available at its URL) and can be accessed by any other computer that has a Web browser function**.

⌘ More than half of all Web services applications today are **RESTful applications**. Probably the most widely used is the **Atom Publishing Protocol**, **a blogging application that simplifies the blog publishing process and makes its functions available as a Web service so other computers can interact with blog content**.

⌘ You can learn more about REST and RESTful applications by visiting the **RestWiki** and you can see examples of Web services that use **RESTful design at Programmable Web.**

ELECTRONIC COMMERCE SOFTWARE FOR SMALL AND MIDSIZE COMPANIES

I)   Basic Commerce Service Providers

Using a service provider's shared or dedicated hosting services instead of building an in-house server or using a co-location service means that the staffing burden shifts from the company to the Web host. CSPs have the same advantages as ISP hosting services, including spreading the cost of a large Web site over several "renters" hosted by the service. The biggest single advantage—low cost—occurs because the host provider has already purchased the server and configured it. The host provider has to worry about keeping it working through lightning storms and power outages.

CSPs offer **free or low-cost** electronic commerce software for building electronic commerce sites that are then kept on the CSP's server. Services in this category usually cost **less than $20 per month**, and the software is built into the CSP's site, allowing companies to immediately begin building and storing a storefront using the Web interface of the software.

These services are designed for small online businesses selling only a few items (usually no more than 50) and having relatively low transaction volumes (fewer than 20 transactions per day).

ValueWeb, operating since 1996, is an example of a CSP. ValueWeb offers businesses comprehensive electronic commerce hosting services including shared hosting, dedicated hosting, and co-location services.

ProHosting.com and **1&1 Internet** are other examples of Web-hosting companies serving the small and midsize company market. Because these companies offer a variety of services, they might be called ISPs, CSPs, MSPs, or ASPs by different users, depending on the service they are seeking.

Yahoo! offers a wide range of Web-hosting and electronic commerce services for companies of all sizes. Its commerce services are offered on its Yahoo! Merchant Solutions. Web page, shown in Figure below.

Mall-Style Commerce Service Providers

Mall-style CSPs provide small businesses with an Internet connection, Web site creation tools, and little or no banner advertising clutter. These service providers **charge a low monthly fee and may also charge one-time setup fees.** Some of these providers also **charge a percentage of or fixed amount for each customer transaction.** These Web hosts also provide online store design tools, storefront templates, an easy-to-use interface, and Web page-generation capabilities and page maintenance. Mall-style CSPs provide shopping cart software or the ability to use another vendor's shopping cart software. They also **provide payment processing services so the online store can accept credit cards**.

⌘ In the early days of the Web, many mall-style CSPs were offering their services. Some even provided free Web site hosting in exchange for displaying ads on the sites. Today, the main mall-style CSP that remains in business is **eBay Stores.** You can open an eBay Store for a monthly fee that is **less than $20**.

⌘ Another mall-style option for a beginning online merchant is **to sell through Amazon.com**, which allows an individual to sell certain used items (such as books) on the same page that Amazon.com lists the new product. Instead of the eBay Stores approach, in which each small merchant has its own store, Amazon.com lets merchants display their offerings product by product, **mixed in with all of the other items Amazon.com offers for sale**. For businesses that want to sell more than a few items, **Amazon offers its Pro Merchant program.**

⌘ Both basic and mall-style CSPs usually provide data-mining capabilities that search through site data collected in log files. Data mining, which you know, **can help businesses find customers with common interests and discover previously unknown relationships among the data**. Reports can indicate problematic pages in a store's design where, for example, a large number of customers get stuck and then leave the Web site. Other facts that data-mining reports can reveal include the number of pages an average customer must load and display before locating the merchandise he or she wants. If customers have to load too many pages, they might become impatient and leave without making a purchase.

ELECTRONIC COMMERCE SOFTWARE FOR MIDSIZE TO LARGE BUSINESSES Web Site Development Tools

Although they are more often used for creating small business sites, it is possible to construct the elements of a midrange electronic commerce Web site using the Web page creation and site management tools you learned about previously. After creating the Web site with these development tools, **the designer can add purchased software elements, such as shopping carts and content management software, to the site**. The final step is to **Create the middleware that connects the site to the company's existing product and transaction-processing databases**.

Buying and using midrange electronic commerce software is significantly more expensive than using one of the CSPs described in the previous section, with annual costs ranging from **$2000 to $50,000**.

Midrange software traditionally offers **connectivity to database systems tha**t **store catalog information**. Having the catalog stored in a database simplifies updates and changes. Several of the midrange systems provide **connections into existing inventory and ERP systems**. This can yield savings because there is no need to run duplicate inventory systems, and the cost of the existing systems is spread across several software systems.

⌘ Three midrange electronic commerce systems are described in this section. They are representative of the whole group, yet are different from one another in important ways. The systems are **Intershop Enfinity**, **WebSphere Commerce Suite by IBM**, and **Commerce Server by Microsoft.**

Intershop Enfinity

➔Intershop Enfinity provides **search and catalog capabilities, electronic shopping carts, online credit card transaction processing, and the ability to connect to existing back-end business systems and databases**.

➔Intershop Enfinity has setup wizards and **good catalog and data management tools**.

➔It provides many **built-in storefront templates**.

➔**Management and editing of a storefront** are done through a Web browser—either locally at the server or remotely through any Internet connection.

➔The products **inventory management module tracks inventory levels** and allows merchants to view the quantity of items available, create a list of inventory transactions, and enter new products into the inventory.

➔Discount rules are also easy to enter. Merchants define the business rules for a discount and dates during which special discounts apply.

➔Bundled with the software is a database management system. Alternatively, Enfinity can work with **DB2 (IBM's relational database) or Oracle databases.**

➔The software includes an **automated e-mail facility that can send order confirmations to customers**.

➔Enfinity includes support for **secure transactions**. A wide variety of site and customer reports are available to **track Web page visits and customer activities.**

IBM WebSphere Commerce Professional

IBM produces the Web Sphere Commerce Professional, which is a family of electronic commerce packages. IBM Web Sphere is a set of software components that provides software suitable for midsize to large businesses to sell goods and services on the Internet.

⌘ It includes catalog templates, setup wizards, and advanced catalog tools to help companies create attractive and efficient electronic commerce sites.

⌘ Web Sphere Commerce Professional Edition can be **used both for business-to-business and business-to-consumer applications** and **provides a smooth connection to existing corporate systems**, such as inventory databases and procurement systems**.**

⌘ **Web Sphere Commerce products run on many different operating systems. Merchants can begin with a small store and then move up to a bigger, more capable store as necessary. A wizard leads the merchant through the process of creating a starter store. Once that is up and working, more functionality can be added by executing commands and writing code. With the basic pages built, the merchant can populate the catalog with products, prices, and product pictures.**

⌘ **The Web Sphere Commerce Professional Edition also accommodates electronic downloads products, such as audio tracks or software. Web Sphere offers a large collection of functions, utility programs, and commands that allow a merchant to create a customized online store experience. However, JavaScript,**

Java, or Cþþ expertise is required. Typical of commerce programs in this class, Web Sphere can connect to existing databases and other legacy systems through DB2 or Oracle databases.

⌘ A single store or several different stores can be administered from the same browser-based interface. A large number of midrange electronic commerce sites use Web Sphere software.

⌘ The system has all the standard electronic commerce features, including tools for a shopping cart, e-mail notifications upon sale completion**,** secure transaction support, promotions and discounting, shipment tracking, links to legacy accounting systems, and browser-based local and remote administration.

⌘ A typical installation of Web Sphere Commerce Professional Edition costs between $100,000 and $200,000, depending on how many servers will be running the product and which options are purchased with the software.

Microsoft Commerce Server

Microsoft Commerce Server allows businesses to sell products or services on the Web using tools such as user **profiling and management, transaction processing, product and service management, and target audience marketing**.

Commerce Server has wizards that can help users build a site in several steps, but **program code must be written to make the software meet specific user needs**. The Microsoft Visual Studio .NET tools are bundled with the software and allow companies to customize the sites they build. Like other midrange electronic commerce software, Commerce Server has tools that help companies engage the customer (**through marketing and advertising), complete an order, and analyze the sales information after the sale**.

Commerce Server also includes tools **for advertising, promotions, cross-selling, and customer targeting and personalization.**

Commerce Server provides many predefined reports for analyzing site activities and product sales data. The system provides several storefront templates, wizards for setting up and initializing a store, and database connections. It also provides a shopping cart, confirms completed sales transactions by e-mail, and supports secure transactions. It can connect to existing accounting systems, and the administrator can oversee the site through a Web browser.

The product only runs on systems that are running the **Windows Server operating system and the SQL Server database system**. Commerce Server licenses cost between $7100 and $21,000

per processor, but the required operating system and database software licenses add another $7000 per processor. Licensing a typical installation of Microsoft Commerce Server usually runs between $**50,000 and $300,000.**

ELECTRONIC COMMERCE SOFTWARE FOR LARGE BUSINESSES

Commerce software in this class is sometimes called **enterprise-class software.** The term "**enterprise**" is used in information systems to describe a **system that serves multiple locations or divisions of one company and encompasses all areas of the business or enterprise.** Enterprise-class electronic commerce software provides tools for both **B2B and B2C commerce**.

 In addition, this software interacts with a wide variety of existing systems, **including database, accounting, and ERP systems.** As electronic commerce has become more sophisticated, large companies have demanded that their Web sites and supporting information infrastructure do more things. The cost of these enterprise systems for large companies ranges from $**100,000 for basic systems to $10 million** and more for comprehensive solutions.

Enterprise-Class Electronic Commerce Software

Enterprise-class electronic commerce software running large online organizations usually requires several **dedicated computers**—in addition to the Web server system and any necessary firewalls. Examples of enterprise-class products that can be used to run a large online business with high transaction rates include **IBM Web Sphere Commerce Enterprise, Oracle E-Business Suite, and several products from Broad vision**.

Enterprise-class software typically provides tools for linking to and supporting supply and purchasing activities. A large part of B2B commerce is ordering supplies from trading or business partners and issuing the appropriate documents (or EDI transaction sets), such as purchase orders. For a selling business, e-business software provides standard electronic commerce activities, such as secure transaction processing and fulfillment, but it can also do more. For instance, it can interact with the firm's inventory system and make the proper adjustments to stock, issue purchase orders for needed supplies when they reach a critically low point, and generate other accounting entries in ERP, legacy accounting, or file systems.

In contrast, both basic and midrange electronic commerce packages usually require an administrator to check inventory manually and place orders explicitly for items that need to be replenished. In B2C situations, customers use their Web browsers to locate and browse a company's catalog. For electronic goods (software, research papers, music tracks, and so on), customers can download the items directly from the site, or they can complete order forms and have the hard-copy versions of the products shipped to them. **The Web server is linked to back-end systems, including a database management system, a merchant server, and an**

Electronic Commerce Software application server. The database usually contains millions of rows of information about products, prices, inventory, user profiles, and user purchasing history. **The history provides a way to recommend to a user on a return visit related items that he or she might wish to purchase**.

A **merchant server** houses **the e-business system and key back-end software.** It processes payments, computes shipping and taxes, and sends a message to the fulfillment department when it must ship goods to a purchaser. Figure below shows a typical enterprise-class electronic commerce architecture.

Large companies also use additional specialized software to accomplish particular objectives that are not met by existing comprehensive electronic commerce software packages. For example, a company that wants to deliver entertainment (music or videos) directly to consumers' mobile devices might use **Open Market software**, a product designed to deliver and charge for that specific type of content in a mobile environment.

Companies are storing data about site visitors in large databases and analyzing it to improve their relationships with those customers. These **click streams** track the path a visitor takes through a Web site, including which pages were viewed, the amount of time spent on each page, and the sequence in which pages were viewed.

Thus, large electronic commerce sites must include **customer relationship management software**. Enterprise-class commerce Web sites must include or work with **supply chain management software**. Useful also for companies that were building business portal sites to engage their customers and suppliers. A significant part of that strategy is providing useful, **fresh content to attract site visitors to the portal.** This need has given rise to software that **automatically manages and rotates content on Web sites**. Some companies have even developed software that helps them **manage the knowledge that exists in their businesses.**

An enterprise-class Web site often includes several of these types of software packages in its design. The next **four sections** discuss software that works with electronic commerce software in large companies to help those companies achieve all of their electronic commerce objectives.
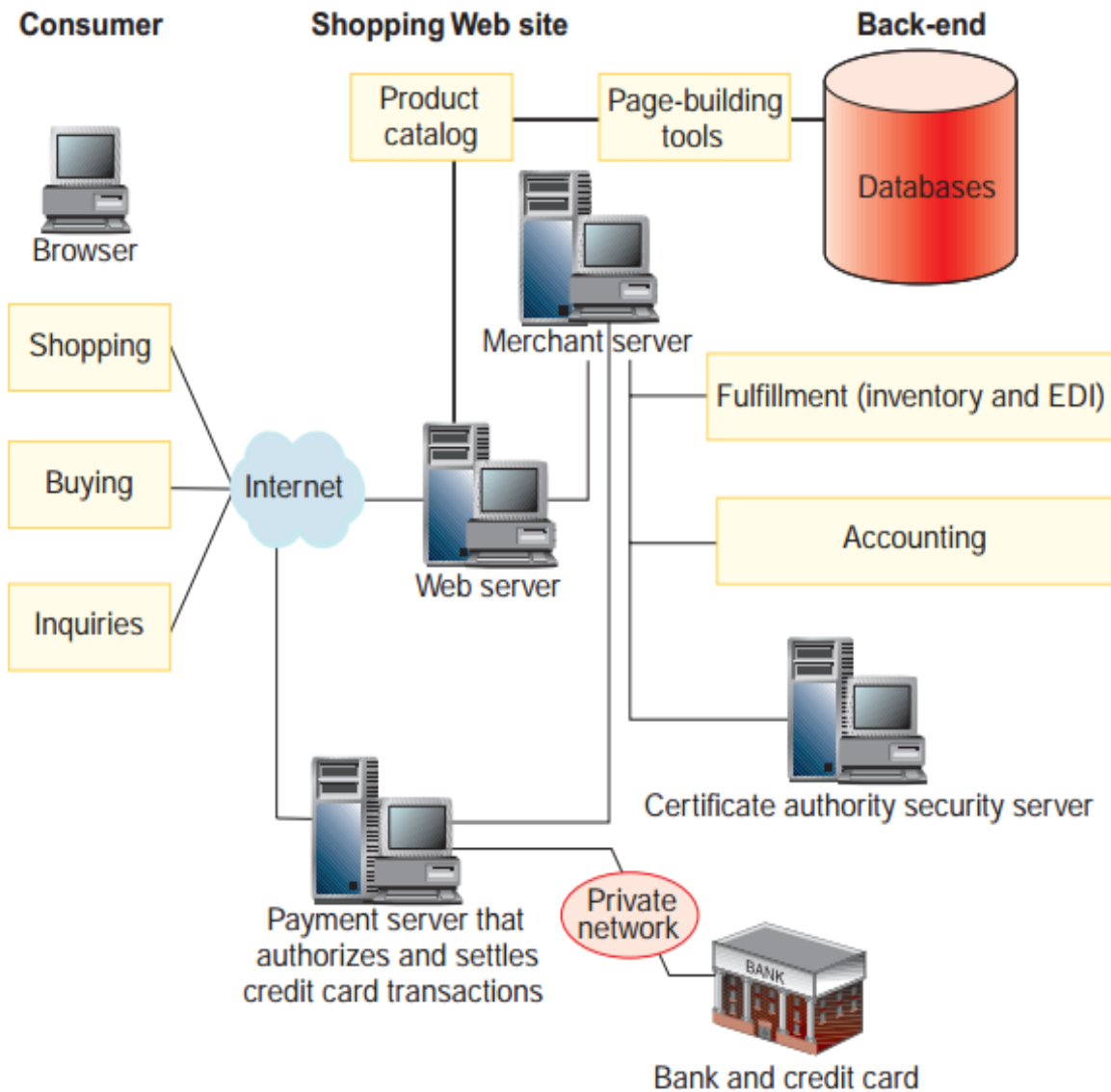
Customer Relationship Management Software

You learned about the philosophy and techniques of customer relationship management (CRM). **The goal of CRM is to understand each customer's specific needs and then customize a product or service to meet those needs**. The idea is that a customer whose needs are being met exactly is willing to pay more for the goods or services that they need. Although companies of all sizes can practice CRM techniques, large companies can afford to buy and implement software products that automate many CRM functions.

Customer relationship management (CRM) software must obtain data from operations software that conducts activities such as **sales automation, customer service center operations, and marketing campaigns**. The software must also gather data about customer

activities on the company's Web site and any other points of contact the company has with its existing and potential customers.

CRM software uses this data to help managers conduct analytical activities, such as **gathering business intelligence, planning marketing strategies, customer behavior modeling, and customizing the products and services to meet the needs of specific customers or categories of customers**. In its most basic form, CRM uses information about customers to sell them more (or more profitable) goods or services.

More advanced CRM is about **delivering extremely attractive and positive experiences regularly to customers.** CRM can be very important in **maintaining customer loyalty** in businesses where the purchase process is long and complex. Companies that design and install custom machinery, software products, or office workflow systems often find themselves involved in these types of long and complex processes. CRM software can help maintain positive and consistent contacts with multiple employees at the purchasing company. Some companies create their own CRM software using outside consultants and their own IT staffs. In recent years, software vendors have increased the quality and variety of their offerings and today, most companies are likely to buy a CRM software package rather than create their own.

Siebel Systems was the first company to specialize in CRM software and it had a large share of the market. In 2005, Oracle bought Siebel and merged its operations into its existing CRM business. The resulting division, called **Oracle Siebel CRM** Applications, continues to be the leading provider of CRM software to midsize and larger businesses. Other major software firms have created products in this market, including **SAP CRM**. Prices for these systems start at around **$25,000 (on average, about $1500 per user**); large implementations can cost millions of dollars.

 One of the most interesting new developments in the CRM software market has come from companies that offer the software for use on their Web site. That is, **the buyer does not have to install the CRM software on its own servers. The buyer's employees simply log in to the CRM vendor's Web site and use the software**. The cost of this software is **much lower;** in fact, it can be **under $200 per user per year**. **Salesforce.com** is one of the leading vendors of this type of **online CRM software**. The Salesforce.com home page is shown in Figure below.

In the early days of CRM software implementation (approximately 1996–2000), companies spent many millions of dollars to buy CRM systems that promised to monitor and improve relationships with existing customers.

Supply Chain Management Software

Supply chain management (SCM) software helps companies to coordinate planning and operations with their partners in the industry supply chains of which they are members. SCM software performs two general types of functions: **planning and execution.** Most companies that sell SCM software offer products that include both components, but the functions are quite different.

SCM planning software helps companies develop coordinated demand forecasts using information from each participant in the supply chain.

SCM execution software helps with tasks such as warehouse and transportation management.

The two major firms offering SCM software are **i2 Technologies** and **JDA Software**.

The **i2 Technologies product, RHYTHM**, includes components that **manage demand planning, supply planning, and demand fulfillment. The demand planning module includes proprietary algorithms customized for specific industry markets that examine customers' buying patterns and generate continually updated forecasts.**

The **supply planning module** coordinates **distribution logistics, inventory-level forecasting, collaborative procurement, and supply allocations.**

The **demand fulfillment module** handles the execution elements, including order management, customer verification, backlog control, and order fulfillment.

Most supply chain management software was developed for manufacturing firms that wanted to **manage inventory purchases and manufacturing processes**. JDA Software had a successful line of software products for managing retail order entry and the sales side of inventory control. In 2006, it decided to expand its product line to include supply chain management tools. Rather than develop its own software from the ground up, it purchased **Manugistics**, which had a full line of supply management, demand management, and transportation and logistics management software. **JDA Software now offers software that companies can use to manage every operation in the supply chain, from raw materials purchase to the delivery of finished products to consumers.**

The cost of SCM software implementations varies tremendously depending on how many locations (retail stores, wholesale warehouses, distribution centers, and manufacturing plants) are in the supply chain. For example, a retailer with 500 stores might pay between $3 million and $10 million for an SCM package that includes both planning and execution functions, but a wholesaler with only three or four distribution centers might be able to install an SCM product for under **$1 million.**

Content Management Software

Large companies are finding new ways to use the Web to share information among their employees, customers, suppliers, and partners. Content management software helps companies control the large amounts of text, graphics, and media files that have become crucial to doing business. Increased use of smart phones, net book computers, and pad computing devices has made content management even more important.

Most electronic commerce software comes with wizards and other automated helpers that create template-driven pages, such as home pages, about pages, and contact pages. But most businesses want to customize Web pages with company and product pictures and text.

Content management software should be tested before committing to it. The testing should ensure that company employees find the software's procedures for performing regular maintenance (for example, adding new categories of products and new items to existing product pages) to be straightforward**.**

The software should also facilitate typical content creation tasks, such as adding sale-item specials.

Companies that need many different ways to access corporate information—for example, product specifications, drawings, photographs, or lab test results—often choose to manage the information and access to that information using content management software**.**

The leading providers of content management software include IBM and Oracle, which provide the software as components in other enterprise software packages, and two companies, EMC and Open Text Corporation, that provide stand-alone content management software. Content management software generally costs between $100,000 and $500,000, but it can cost three or four times that much to customize, configure, and implement.

Knowledge Management Software

An increasing number of large companies have achieved cost savings by using content management software. **Most content management software is designed to help companies manage information that, until recently, was stored in paper reports, schedules, analyses, and memos.** Although the cost reductions that can be obtained by moving mountains of paper into an electronic format are significant, some companies have begun to understand that **the true value of those documents is in the information contained in them.**

Thus, they began the search for systems that would help them manage the knowledge itself, rather than the documentary representations of that knowledge. The software that has been developed to meet that goal is called knowledge management (KM) software.

KM software helps companies do four main things: collect and organize information, share the information among users, enhance the ability of users to collaborate, and preserve the knowledge gained through the use of information so that future users can benefit from the learning of current users.

KM software includes tools that read electronic documents (in formats such as Microsoft Word or Adobe PDF), scanned paper documents, e-mail messages, and Web pages.

KM software often includes powerful search tools that use proprietary semantic and statistical algorithms to help users find the content, human experts, and other resources that can aid them in their research and decision-making tasks. Early KM systems often disrupted the flow of users' work. Today, KM systems collect knowledge elements by extracting them from the normal interactions users have with information.

➔The major software vendors have KM software offerings, including IBM and Microsoft SharePoint. Smaller companies, such as BMC Software and Customer Vision, also offer KM software and technologies. Total costs for a KM software implementation, including hardware, software licenses, and consultant fees, typically range from $10,000 to $1 million or more.

CHAPTER THREE

SECURITY & CRYPTOGRAPHY IN   E-COMMERCE

Dealing about Security was the more important issues

Online security issues

- For example, a business rival might intercept e-mail messages for competitive gain.

- Online payments could be at risk: an individual buying an item on eBay using PayPal to a large company making a vendor payment through a VPN might get security issue & Web shoppers credit card numbers might be stolen.

- In the late 1970s, the Defense Department formed a committee to develop computer security guidelines for handling classified information on computers. The result of that

committee's work was Trusted Computer System Evaluation Criteria, known in defense circles as the " Orange Book" because its cover was orange.

- It spelled out rules for mandatory access control—the separation of confidential, secret, and top secret information—and established criteria for certification levels for computers ranging from D (not trusted to handle multiple levels of classified documents at once) to A1 (the most trustworthy level)

- Computer security is the protection of assets from unauthorized access, use, alteration, or destruction.

- There are two general types of security: physical and logical security

- Physical: includes tangible protection devices, such as alarms, guards, fireproof doors, security fences , safes or vaults, and bombproof buildings.

- Protection of assets using nonphysical means is called logical security.

- Any act or object that poses a danger to computer assets is known as a threat.

- Counter-measure is the general name for a procedure, either physical or logical, that recognizes, reduces, or eliminates a threat.
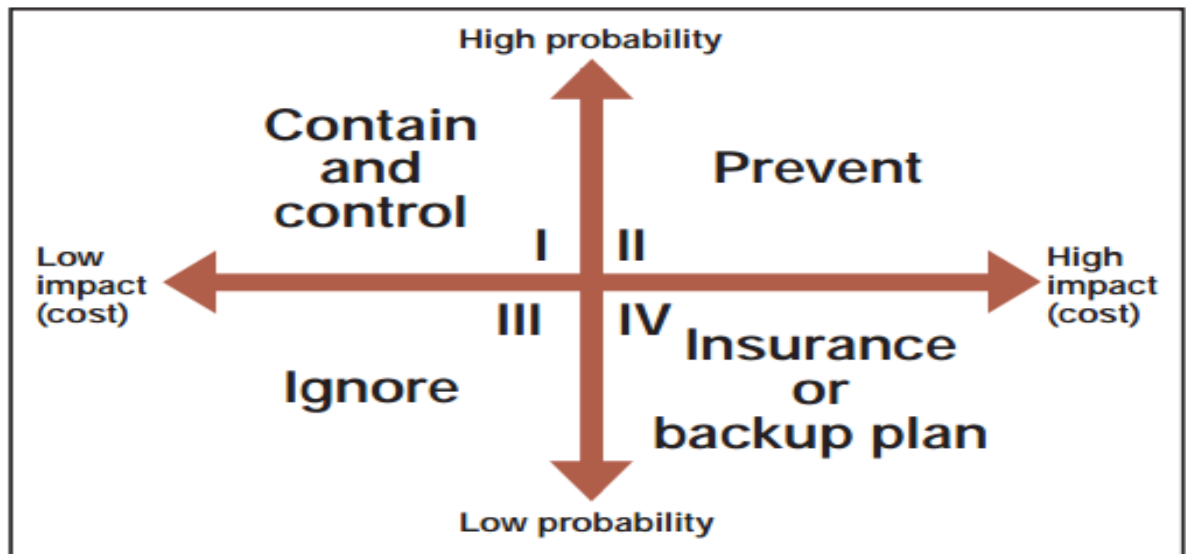
FIGURE   Risk management model

- An eavesdropper is a person or device that can listen in on and copy Internet transmissions. People who write programs or manipulate technologies to obtain unauthorized access to computers and networks are called crackers or hackers.

- A cracker is a technologically skilled person who uses their skills to obtain unauthorized entry into computers or network systems—usually with the intent of stealing information or damaging the information, the system's software, or even the system's hardware. Originally, the term hacker was used to describe a dedicated programmer who enjoyed writing complex code that tested the limits of technology. Some IT people also use the terms white hat hacker and black hat hacker to make the distinction between good hackers and bad hackers.

Elements of Computer Security

Computer security is generally considered to include three main elements: secrecy , integrity, and necessity (also known as denial of service).Secrecy-refers to protecting against unauthorized data disclosure and ensuring the authenticity of the data source. Integrity-refers to preventing unauthorized data modification. Necessity-refers to preventing data delays or denials (removal). Secrecy is the best known of the computer security elements.

For example, an integrity violation occurs when an Internet e-mail message is intercepted and its contents are changed before it is forwarded to its original destination. In this type of integrity violation, which is called a man-in-the-middle exploit, the contents of the e-mail are often changed in a way that negates the message's original meaning.

Necessity violations take several forms, and they occur relatively frequently. Delaying a message or completely destroying it can have grave consequences. Suppose that a message sent at 10:00 a.m. to an online stockbroker includes an order to purchase 1000 shares of IBM at market price. If the stockbroker does not receive the message (because an attacker delays it) until 2:30 p.m. and IBM's stock price has increased by $3, the buyer loses $3000.

Security Policy and Integrated Security

Any organization concerned about protecting its electronic commerce assets should have a security policy in place.

A security policy is a written statement describing which assets to protect and why they are being protected, who is responsible for that protection, and which behaviors are acceptable and which are not.

The policy primarily addresses physical security, network security, access authorizations, virus protection, and disaster recovery.The policy develops over time and is a living document that the company and security officer must review and update at regular intervals.

Most organizations follow a five-step process when creating a security policy. These steps include:

Determine which assets must be protected from which threats. For example , a company that stores customer credit card numbers might decide that those numbers are an asset that must be protected.

2. Determine who should have access to various parts of the system or specific information assets. In many cases, some of those users who need access to some parts of the system (such as suppliers, customers, and strategic partners)are located outside the organization.

3. Identify resources available or needed to protect the information assets while ensuring access by those who need it.

4. Using the information gathered in the first three steps, the organization develops a written security policy.

5. Following the written policy, the organization commits resources to building or buying software, hardware, and physical barriers that implement the security policy. For example, if a security policy disallows unauthorized access to customer information, (such as credit card numbers or credit history), then the organization must either create or purchase software that guarantees end-to-end secrecy for electronic commerce customers.

WindowSecurity.com is a good source of information about security policies. Its Network Security Library includes a number of white papers that provide guidance on how to craft a workable security policy . Information Security Policy World is another Web site that provides information about security policy matters.

Authentication: Who is trying to access the site?
Access control: Who is allowed to log on to and access the site?
Secrecy: Who is permitted to view selected information?
Data integrity: Who is allowed to change data?
Audit: Who or what causes specific events to occur, and when?

Requirement	Meaning
Secrecy	Prevent unauthorized persons from reading messages and business plans, obtaining credit card numbers, or deriving other confidential information.
Integrity	Enclose information in a digital envelope so that the computer can automatically detect messages that have been altered in transit.
Availability	Provide delivery assurance for each message segment so that messages or message segments cannot be lost undetectably.
Key management	Provide secure distribution and management of keys needed to provide secure communications.
Nonrepudiation	Provide undeniable, end-to-end proof of each message's origin and recipient.
Authentication	Securely identify clients and servers with digital signatures and certificates.

FIGURE Requirements for secure electronic commerce

Security for client computers

❖ Client computers, usually PCs, must be protected from threats that originate in software and data that are downloaded to the client computer from the Internet.

1- Cookies

✓ The Internet provides a type of connection between Web clients and servers called a stateless connection.

✓ In a stateless connection, each transmission of information is independent; that is, no continuous connection (also called an open session) is maintained between any client and server on the Internet.

✓ Cookies are small text files that Web servers place on Web client computers to identify returning visitors.

✓ Cookies also allow Web servers to maintain continuing open sessions with Web clients. An open session is necessary to do a number of things that are important in online business activity. For example, shopping cart and payment processing software both need an open session to work properly.

✓ cookies were invented to solve the stateless connection problem by saving information about a Web user from one set of server–client message exchanges to another.

- There are two ways of categorizing cookies: by time duration and by source.

- The two kinds of time duration cookie categories include session cookies, which exist until the Web client ends the connection (or "session"), and .

- Persistent cookies, which remain on the client computer indefinitely. Electronic commerce sites use both kinds of cookies.

- For example, a session cookie might contain information about a particular shopping visit & a persistent cookie might contain login information that can help the Web site recognize visitors when they return to the site on subsequent visits.

- Each time a browser moves to a different part of a merchant's Web site, the merchant's Web server asks the visitor's computer to send back any cookies that the Web server stored previously on the visitor's computer another way of categorizing cookies is by their source. cookies can be placed on the client computer by the Web server site, in which case they are called first-party cookies, or they can be placed by a different Web site, in which case they are called third-party cookies. A third-party cookie originates on a Web site other than the site being visited. These third-party Web sites usually provide advertising or other content that appears on the Web site being viewed. the third-party Web site providing the advertising is often interested in tracking responses to their ads by visitors who have already seen the ads on other sites. If the advertising Web site places its ads on a large number of Web sites, it can use persistent third-party cookies to track visitors from one site to another. Earlier you learned about DoubleClick and similar online ad placement services that perform this function.

- The most complete way for Web site visitors to protect themselves from revealing private information or being tracked by cookies is to disable cookies entirely.

- The problem with this approach is that useful cookies are blocked along with the others, requiring visitors to enter information each time they revisit a Web site.

- The full resources of some sites are not available to visitors unless their browsers are set to allow cookies. For example, most distance learning software used by schools to deliver online courses does not work properly in student Web browsers unless cookies are enabled.

- Web users can accumulate large numbers of cookies as they browse the Internet. Most Web browsers have settings that allow the user to refuse only third-party cookies or to review each cookie before it is accepted. Browsers such as Google Chrome, Microsoft Internet Explorer, Mozilla Firefox, and Opera provide cookie management functions.

Figure below shows the dialog box that can be used to manage stored cookies in the Mozilla Firefox Web browser.

- Figure below shows the dialog box that can be used to manage stored cookies in the Mozilla Firefox Web browser .

- Companies such as **Omniture** provide software that Web site managers can use to analyze Internet traffic at their sites. These services also provide information to Web sites about who visits their sites and what sites the visitors came from.

Web bug

Some advertisers send images (from their third-party servers) that are included on Web pages, but are too small to be visible. A Web bug is a tiny graphic that a third-party Web site places on another site's Web page. When a site visitor loads the Web page, the Web bug is delivered by the third-party site, which can then place a cookie on the visitor's computer.

A Web bug's only purpose is to provide a way for a third-party Web site (the identity of which is unknown to the visitor) to place cookies from that third-party site on the visitor's computer. The Internet advertising community sometimes calls Web bugs "clear GIFs"or "1-by-1 GIFs" because the graphics can be created in the GIF format with a color value of "transparent" and can be as small as 1 pixel by 1 pixel. You can learn more about Web bugs by visiting the Electronic Frontier Foundation's Web Bug FAQ.

Active Content

Until the debut of executable Web content, Web pages could do little more than display content and provide links to related pages with additional information. The widespread use of active content has changed the situation. Active content refers to programs that are embedded transparently in Web pages and that cause action to occur. For example, active content can display moving graphics, download and play audio, or implement Web-based spreadsheet programs. Active content is used in electronic commerce to place items into a shopping cart and compute a total invoice amount, including sales tax, handling, and shipping costs. Developers use active content because it extends the functionality of HTML and moves some data processing chores(task) from the busy(full) server machine to the user's client computer. Unfortunately, because active content elements are programs that run on the client computer, active content can damage the client computer. Thus, active content can pose a threat to the security of client computers.

Active content is provided in several forms. The best-known active content forms are cookies, Java applets, JavaScript, VBScript, and ActiveX controls. Other ways to provide Web active content include graphics, Web browser plug-ins, and e-mail attachments.

JavaScript and VBScript are scripting languages; they provide scripts, or commands, that are executed. An applet is a small application program. Applets typically run within the Web browser. Active content is launched in a Web browser automatically when that browser loads a Web page containing active content. The applet downloads automatically with the page and begins running. Some browsers include tools that can limit the actions taken by JavaScript applets. For example, the Options dialog box in Mozilla Firefox has an Advanced JavaScript Settings dialog box in which you can specify the types of JavaScript actions your browser may execute.

A Trojan horse is a program hidden inside another program or Web page that masks its true purpose. The Trojan horse could snoop around a client computer and send back private information to a cooperating Web server—a secrecy violation. The program could alter or erase information on a client computer—an integrity violation. Zombies are equally threatening.

A zombie is a Trojan horse that secretly takes over another computer for the purpose of launching attacks on other computers. The computers running the zombie are also sometimes called zombies. When a Trojan horse (or other type of virus) has taken over a large number of computers (and thus made them into zombies), the person who planted the virus can take control of all the computers and form a **botnet** (short for robotic network, also called a zombie farm when the computers in the network are zombies) that can act as an attacking unit, sending spam or launching denial-of-service attacks against specific Web sites.

Java Applets

- Java is a programming language developed by Sun Microsystems that is used widely in Web pages to provide active content. The Web server sends the Java applets along with Web pages requested by the Web client.

- In most cases, the Java applet's operation will be visible to the site visitor; however, it is possible for a Java applet to perform functions that would not be noticed by the site visitor (such as reading, writing, or erasing files on the site visitor's computer). The client computer then runs the programs within its Web browser.

- Java can also run outside the confines of a Web browser. Java is platform independent; that is, it can run on many different computers. This "develop once, deploy everywhere" feature reduces development costs because only one program needs to be developed for all

operating systems. Once downloaded, embedded Java code can run on a client's computer and damage the computer, run a Trojan horse ,or turn the computer into a zombie.

- **To counter this threat, the Java sandbox security model was developed.** The Java sandbox confines (limit) Java applet actions to a set of rules defined by the security model. These rules apply to all un trusted Java applets. Un trusted Java applets are those that have not been established as secure.

- When Java applets are run within the constraints of the sandbox, they do not have full access to the client computer. For example, Java applets operating in the sandbox cannot perform file input, output, or delete operations. This prevents secrecy (disclosure) and integrity (deletion or modification) violations.

- You can follow the Online Companion link to the Java Security Page maintained by the Center for Education and Research in Information Assurance and Security (CERIAS) to learn more about Java applet security.

Java script

- Java Script is a scripting language developed by Netscape to enable Web page designers to build active content.
- Despite the similar-sounding names, JavaScript is based only loosely on Sun's Java programming language.
- Supported by popular Web browsers , JavaScript shares many of the structures of the full Java language.
- When a user downloads a Web page with embedded JavaScript code, it executes on the user's (client) computer.
- Like other active content vehicles, JavaScript can be used for attacks by executing code that destroys the client's hard disk, discloses the e-mail stored in client mailboxes, or sends sensitive information to the attacker's Web server. JavaScript code can also record the URLs of Web pages a user visits and capture information entered into Web forms.

- For example, if a user enters credit card numbers while reserving a rental car, a JavaScript program could copy the credit card number.

- JavaScript programs , unlike Java applets, do not operate under the restrictions of the Java sandbox security model.

- Unlike Java applets, a JavaScript program cannot commence(begins) execution on its own.

- To run an ill-intentioned JavaScript program, a user must start the program.

- For example, a site with a retirement income calculator might require a visitor to click a button to see a retirement income projection. Once the user clicks the button, the JavaScript program starts and does its work.

ActiveX Controls

An ActiveX control is an object that contains programs and properties that Web designers place on Web pages to perform particular tasks. ActiveX components can be constructed using many different programming languages, but the most common are Cþþ and Visual Basic. Unlike Java or JavaScript code, ActiveX controls run only on computers with Windows operating systems. when a Windows-based Web browser downloads a Web page containing an embedded ActiveX control, the control is executed on the client computer. Other ActiveX controls include Web-enabled calendar controls and Web games. The ActiveX page at Download.com contains a comprehensive list of ActiveX controls.

The security danger with ActiveX controls is that once they are downloaded, they execute like any other program on a client computer. They have full access to all system resources, including operating system code. An ill-intentioned ActiveX control could reformat a user's hard disk, rename or delete files, send e-mails to all the people listed in the user's address book, or simply shut down the computer. Because ActiveX controls have full access to client computers, they can cause secrecy, integrity, or necessity violations. The actions of ActiveX controls cannot be halted once they begin execution. Most Web browsers can be configured to provide a notice when a Web site attempts to download and install an ActiveX control (or other software).

Graphics & plug-ins

Graphics, browser plug-ins, and e-mail attachments can harbor executable content.

 Some graphics file formats have been designed specifically to contain instructions on how to render a graphic. That means that any Web page containing such a graphic could be a threat because the code embedded in the graphic could cause harm to a client computer.

Browser plug-ins, are programs that enhance the capabilities of browsers, handle Web content that a browser cannot handle. Plug-ins are normally beneficial and perform tasks for a browser, such as playing audio clips, displaying movies, or animating graphics.

Apple's QuickTime, for example, is a plug-in that downloads and plays movies stored in a special format. Plug-ins can also pose security threats to a client computer.

- Users download these plug-in programs and install them so their browsers can display content that cannot be included in HTML tags.

- Popular plug-ins include Adobe's Macromedia's Flash Player, Apple's QuickTime Player, Microsoft's Silverlight , and RealNetworks' RealPlayer.

- In 1999,The New York Times revealed that Real Networks had been using its RealPlayer plug-in to gather information surreptitiously from users.

- Downloaded and installed easily from the Internet, RealPlayer was recording user information such as the RealPlayer user's name, e-mail address, country, ZIP code, computer operating system, and other details. RealPlayer used the Internet connection to send the information it had gathered back to Real Networks.

- Soon after the discovery, and after considerable public embarrassment, Real Networks issued a statement that a software patch was available that users could install to prevent the Real Networks software from collecting and transmitting their information.

Viruses, Worms, and Antivirus Software

- E-mail attachments provide a convenient way to send non-text information over a text-only system—electronic mail.

- Attachments can contain word-processing files, spreadsheets, databases, images, or virtually any other information you can imagine.

- Most programs, including Web browser e-mail programs, display attachments by automatically executing an associated program; for example, the recipient's Excel program reads an attached Excel workbook file and opens it, or Word opens and displays a Word document.

- Although this activity itself does not cause damage, Word and Excel macro viruses inside the loaded files can damage a client computer and reveal confidential information when those files are opened.

- A virus is software that attaches itself to another program and can cause damage when the host program is activated.

- A worm is a type of virus that replicates itself on the computers that it infects. Worms can spread quickly through the Internet.

- A macro virus is a type of virus that is coded as a small program, called a macro, and is embedded in a file.

Viruses

- Although the history of e-mailed viruses dates back to the 1980s, the first virus to become major news in the mainstream media was the ILOVEYOU virus, also known as the " love bug," and its variants in 2000. The ILOVEYOU virus was eventually traced to a 23-year-old computer science student who lived in the Philippines.

- The virus spread through the Internet with amazing speed as an e-mail message. It infected the computer of anyone who opened the e-mail attachment and blocked e-mail systems with thousands of copies of the useless e-mail message.

- The virus spread quickly because it automatically sent itself to as many as 300 addresses stored in a computer's Microsoft Outlook address book.

- Besides replicating itself explosively through e-mail, the virus caused other harm, destroying digital music and photo files stored on the target computers.

- The ILOVEYOU virus also searched for other users' passwords and forwarded that information to the original perpetrator.

- Within days, the virus spread to 40 million computers in more than 20 countries and caused an estimated $9 billion in damages—most of it in lost worker productivity.

- In 2001, the incidences of virus and worm attacks increased. With more than 40,000 reported security violations occurring that year, the parade of attacks included **Code Red and Nimda** virus–worm combinations, each affecting millions of computers and costing billions of dollars to clean up.

- Both Code Red and Nimda are examples of a multivector virus, so-called because they can enter a computer system in several different ways (vectors).

- Even though Microsoft issued security patches that should have stopped the Code Red virus–worm , it continued to propagate throughout the Internet in 2002.

- Both the original Code Red virus and a variant called Code Red 2 infected thousands of new computers during the year.

MAJOR VIRUSES,WORMS & TROJAN

Year	Name	Type	Description
1986	Brain	Virus	Written in Pakistan, this virus infects floppy disks used in personal computers at that time. It consumes empty space on the disks, preventing them from being used to store data or programs.
1988	Internet Worm	Worm	Robert Morris, Jr., a graduate student at Cornell University, wrote this experimental, self-replicating, self-propagating program and released it onto the Internet. It replicated faster than he had anticipated, crashing computers at universities, military sites, and medical research facilities throughout the world.
1991	Tequila	Virus	Tequila writes itself to a computer's hard disk and runs any time the computer is started. It also infects programs when they are executed. Tequila originated in Switzerland and was mostly transmitted through Internet downloads.
1992	Michelangelo	Trojan horse	Set to activate on March 6 (Michelangelo's birthday), this Trojan horse overwrites large portions of the infected computer's hard disk.
1993	SatanBug	Virus	Infects programs when they run, causing them to fail or perform incorrectly. SatanBug was designed to interfere with antivirus programs so they cannot detect it.
1996	Concept	Virus, Worm	One of the first viruses to be written in Microsoft Word's macro language, Concept travels with infected Word document files. When an infected document is opened, Concept places macros in Word's default document template, which infects any new Word document created on that computer.

ANTI-VIRUS

- Antivirus software detects viruses and worms and either deletes them or isolates them on the client computer so they cannot run.
- Symantec and McAfee, among other companies, keep track of viruses and sell antivirus software.
- You can follow the links in the Online Companion (Symantec Security Response and McAfee Virus Information) to find descriptions of thousands of viruses.
- Antivirus software is only effective if the antivirus data files are kept current.
- The data files contain virus-identifying information that is used to detect viruses on a client computer.
- Because people generate new viruses by the hundreds every month, users must be vigilant and update their antivirus data files regularly so that the newest viruses are recognized and eliminated.

Digital Certificates

- One way to control threats from active content is to use digital certificates.

- A digital certificate or digital ID is an attachment to an e-mail message or a program embedded in a Web page that verifies that the sender or Web site is who or what it claims to be.

- In addition, the digital certificate contains a means to send an encrypted message— encoded so others cannot read it—to the entity that sent the original Web page or e-mail message.

- In the case of a downloaded program containing a digital certificate, the encrypted message identifies the software publisher (ensuring that the identity of the software publisher matches the certificate) and indicates whether the certificate has expired or is still valid.

- The digital certificate is a signed message or code.

- Signed code or messages serve the same function as a photo on a driver's license or passport.

- They provide proof that the holder is the person identified by the certificate. Just like a passport, a certificate does not imply anything about either the usefulness or quality of the downloaded program. The certificate only supplies a level of assurance that the software is genuine.

- The idea behind certificates is that if the user trusts the software developer, signed software can be trusted because, as proven by the certificate, it came from that trusted developer

- Digital certificates are used for many different types of online transactions, including electronic commerce, electronic mail, and electronic funds transfers.

- A digital ID verifies a Web site to a shopper and, optionally, identifies a shopper to a Web site.

- Web browsers or e-mail programs exchange digital certificates automatically and invisibly when requested to validate the identity of each party involved in a transaction.

- A digital certificate for software is an assurance that the software was created by a specific company.

- The certificate does not attest to the quality of the software, just to the identity of the company that published it.

- Digital certificates are issued by a certification authority (CA). A CA can issue digital certificates to organizations or individuals.

A CA requires entities applying for digital certificates to supply appropriate proof of identity. Once the CA is satisfied, it issues a certificate. Then, the CA signs the certificate, and its stamp of approval is affixed in the form of a public encryption key.

A digital certificate includes six main elements, including:

- Certificate owner's identifying information, such as name, organization, address, and so on
- Certificate owner's public encryption key
- Dates between which the certificate is valid
- Serial number of the certificate
- Name of the certificate issuer
- Digital signature of the certificate issuer

- A key is simply a number—usually a long binary number—that is used with the encryption algorithm to "lock" the characters of the message being protected so that they are undecipherable without the key.

- Longer keys usually provide significantly better protection than shorter keys.

- The CA is guaranteeing that the individual or organization that presents the certificate is who or what it claims to be.

- Identification requirements vary from one CA to another. One CA might require a driver's license for individuals' certificates; others might require a notarized form or fingerprints.

- CAs usually publish identification requirements so that any Web user or site accepting certificates from each CA understands the stringency of that CA's validation procedures.

- Only a small number of CAs exist because the certificates issued are only as trustworthy as the CA itself, and only a few companies have decided to build the reputation needed to be a successful seller of digital certificates.

- Two of the most commonly used CAs are Thawte and VeriSign, but other companies such as DigiCert , Entrust, GeoTrust , Equifax Secure, and RapidSSL.com also offer CA services.

- In 2008, the higher standards for verification led to the establishment of stricter criteria and an assurance of consistent application of verification procedures.

- CAs that followed these more extensive verification procedures were permitted to issue a new type of certificate called a Secure Sockets Layer-Extended Validation (SSL-EV) digital certificate.

- To issue an SSL-EV certificate, a certification authority must confirm the legal existence of the organization by verifying the organization's registered legal name, registration number, registered address, and physical business address.

- The CA must also verify the organization's right to use the domain name and that the organization has authorized the request for an SSL-EV certificate.

- You can tell if you are visiting a Web site that has an SSL-EV certificate by looking at the address window of your browser.

- In Firefox, the site's verified organization name appears in the address window to the left of the URL with a green background.

- In Internet Explorer, the background of the address window turns green and the verified name of the organization appears to the right of the URL and alternates with the name of the certification authority, as shown in Figure below

FIGURE Internet Explorer address window display for an SSL-EV Web site

- Annual fees for digital certificates range from about $200 to more than $1500, depending on the features they include (such as **encryption strength, or the SSL-EV designation**) and whether they are purchased alone or with certificates for other Web sites owned by the same company.

- Digital certificates expire after a period of time (often one year). This built-in limit provides protection for both users and businesses. Limited-duration certificates guarantee that businesses and individuals must submit their credentials for reevaluation periodically.

- The expiration date appears in the certificate itself and in the dialog boxes that browsers display when a Web page or applet that has a digital certificate is about to be opened.

- **Certificates become invalid on their expiration dates or when they are revoked by the CA.**

- If the CA determines that a Web site has delivered malicious code or has otherwise violated the terms to which it agreed, the CA will refuse to issue new certificates to that site and revoke existing certificates.

Steganography

- The term steganography describes the process of hiding information (a command, for example) within another piece of information. This information can be used for malicious purposes.

- Frequently, computer files contain redundant or insignificant information that can be replaced with other information. This other information resides in the background and is undetectable by anyone without the correct decoding software.

- Steganography provides a way of hiding an encrypted file within another file so that a casual observer cannot detect that there is anything of importance in the container file.

- In this **two-step process,** encrypting the file protects it from being read, and steganography makes it invisible.

- Many security analysts believe that the terrorist organization Al Qaeda used steganography to hide attack orders and other messages in images that its confederates posted on Websites in preparation for the attacks of September 11, 2001.

- Messages hidden using steganography are extremely difficult to detect. This fact, combined with the fact that there are millions of images on the Web, makes the use of steganography by global terrorist organizations a deep concern of governments and security professionals.

The internet contains numerous sites with more information about Steganography and Digital Watermarking.

Physical Security for Clients

- Many of the physical security measures used today are the same as those used in the early days of computing; however, some interesting new technologies have been implemented as well.(sensors ,locks , alarms etc)

- Devices that read fingerprints are now available for personal computers. These devices, which cost less than $100, provide a much stronger protection than traditional password approaches.

- In addition to fingerprint readers, companies can use other biometric security devices that are more accurate and, of course, cost more.

- A biometric security device is one that uses an element of a person's biological makeup to perform the identification.

- ➔These devices include:

  o writing pads that detect the form and pressure of a person writing a signature,

  o eye scanners that read the pattern of blood vessels in a person's retina or the color levels in a person's iris, and

  o Scanners that read the palm of a person's hand (rather than just one fingerprint) or that read the pattern of veins on the back of a person's hand.

COMMUNICATION CHANNEL SECURITY

- Today, the Internet remains largely unchanged from its original, insecure state.

- Message packets on the Internet travel an unplanned path from a source node to a destination node.

- A packet passes through a number of intermediate computers on the network before reaching its final destination. The path can vary each time a packet is sent between the same source and destination points.

- Because users cannot control the path and do not know where their packets have been, it is possible that an intermediary can read the packets, alter them, or even delete them.

- That is, any message traveling on the Internet is subject to secrecy, integrity, and necessity threats.

Secrecy and privacy Threats

❖ Secrecy and privacy, though similar, are different issues. Secrecy is the prevention of unauthorized information disclosure. Privacy is the protection of individual rights to nondisclosure. The Privacy Council, which helps businesses implement smart privacy and data practices, created an extensive Web site surrounding privacy—covering both business and legal issues.

❖ Secrecy is a technical issue requiring sophisticated physical and logical mechanisms, whereas privacy protection is a legal matter. A classic example of the difference between secrecy and privacy is e-mail.

❖ A company might protect its e-mail messages against secrecy violations by using encryption In encryption, a message is encoded into an unintelligible form that only the proper recipient can convert back into the original message. Secrecy countermeasures protect outgoing messages.

E-mail privacy issues address whether company supervisors should be permitted to read employees' messages randomly. Disputes in this area center around who owns the e-mail messages: the company or the employees who sent them.

Sniffers, backdoors

- Software applications called sniffer programs provide the means to record information that passes through a computer or router that is handling Internet traffic.

- Using a sniffer program is analogous to tapping a telephone line and recording a conversation. Sniffer programs can read e-mail messages and unencrypted Web client–server message traffic, such as user logins, passwords, and credit card numbers.

- Periodically, security experts find electronic holes, called backdoors, in electronic commerce software. A backdoor is an element of a program (or a separate program) that allows users to run the program without going through the normal authentication procedure for access to the program.

- Programmers often build backdoors into programs while they are building and testing them to save the time it would take to enter a login and password every time they open the program.

- Sometimes programmers forget to remove backdoors when they are finished writing the program, other times, programmers intentionally leave a backdoor.

- A backdoor allows anyone with knowledge of its existence to cause damage by observing transactions, deleting data, or stealing data.

- For example, a security consulting firm found that Cart32, a widely used shopping cart program, had a backdoor through which credit card numbers could be obtained by anyone with knowledge of the backdoor. This backdoor resulted from a programming error and not an intentional effort (and Cart32 provided a software patch that closed the backdoor immediately), but customers of the merchants who used Cart32 had their credit card numbers exposed to hackers around the world until those merchants applied the patch.

Web anonymity

- Web users continually reveal information about themselves when they use the Web. This information includes IP addresses and the type of browser being used. Such data exposure is a secrecy breach.

- Several Web sites offer an anonymous browser service that hides personal information from sites visited.

- These sites provide a measure of secrecy to Web surfers who use them by replacing the user's IP address with the IP address of the anonymous Web service on the front end of any URLs that the user visits. When the Web site logs the site visitor's IP address, it logs the IP address of the anonymous Web service rather than that of the visitor, which preserves the visitor's privacy.

- To make the process easier, companies such as Anonymizer provide browser plug-in software that users can download and install for an annual subscription fee.

- ShadowSurf.com provides a free anonymous browser service online.

Integrity Threats

- An integrity threat, also known as active wiretapping, exists when an unauthorized party can alter a message stream of information.

- Unprotected banking transactions, such as deposit amounts transmitted over the Internet, are subject to integrity violations.

- An integrity violation implies a secrecy violation because an intruder who alters information can read and interpret that information.

- Unlike secrecy threats, where a viewer simply sees information he or she should not, integrity threats can cause a change in the actions a person or corporation takes because a mission-critical transmission has been altered

- Cyber vandalism is an example of an integrity violation.

- Cyber-vandalism is the electronic defacing of an existing Web site's page. The electronic equivalent of destroying property or placing graffiti on objects, cyber-vandalism occurs whenever someone replaces a Web site's regular content with his or her own content.

- Recently, several cases of Web page defacing involved vandals replacing business content with pornographic material and other offensive content.

Masquerading or spoofing

- Masquerading or spoofing—. pretending to be someone you are not, or representing a Web site as an original when it is a fake—is one means of disrupting Web sites.

- Domain name servers (DNSs)are the computers on the Internet that maintain directories that link domain names to IP addresses. Perpetrators can use a security hole in the software that runs on some of these computers to substitute the addresses of their Web sites in place of the real ones to spoof Web site visitors.

- ➔For example, a hacker could create a fictitious Web site masquerading as www.widgets.com by exploiting a DNS security hole that substitutes his or her fake IP address for Widgets.com's real IP address. All subsequent visits to Widgets.com would be redirected to the fictitious site. There, the hacker could alter any orders to change the number of widgets ordered and redirect shipment of those products to another address. The integrity attack consists of altering an order and passing it to the real company's Web server. The Web server is unaware of the integrity attack and simply verifies the consumer's credit card number and passes on the order for fulfillment.

Necessity Threats

- The purpose of a necessity threat, which usually occurs as a delay, denial, or denial-of-service (DoS) attack, is to disrupt normal computer processing, or deny processing entirely.

- A computer that has experienced a necessity threat slows processing to an intolerably slow speed. For example, if the processing speed of a single ATM transaction slows from one or two seconds to 30 seconds, users will abandon ATMs entirely.

- Similarly, slowing any Internet service drives customers to competitors' Web or commerce sites—possibly discouraging them from ever returning to the original commerce site. In other words, slower processing can render a service unusable or unattractive.

- For example, an online newspaper that reports three-day-old news is worth very little. The Internet Worm attack of 1998, which disabled thousands of computer systems that were connected to the Internet, was the first recorded example of a DoS attack.

- Attackers can use the to launch a simultaneous attack on a Web site (or a number of Web sites) from all of the computers in the bot-net. This form of attack is called a distributed denial-of-service (DDoS) attack.

- Networks can use wireless access points (WAPs) to provide network connections to computers and other mobile devices within a range of several hundred feet. If not protected, a wireless network allows anyone within that range to log in and have access to any resources connected to that network.

- Such resources might include any data stored on any computer connected to the network, networked printers, messages sent on the network, and, if the network is connected to the Internet, free access to the Internet.

- The security of the connection depends on the Wireless Encryption Protocol (WEP), which is a set of rules for encrypting transmissions from the wireless devices to the WAPs.

- In some cities that have large concentrations of wireless networks, attackers drive around in cars using their wireless-equipped laptop computers to search for accessible networks. These attackers are called war drivers.

Encryption Solutions

- Encryption-is the coding of information by using a mathematically based program and a secret key to produce a string of characters that is unintelligible.

- The science that studies encryption is called cryptography, which comes from a combination of the two Greek words krypto and grapho, which mean "secret" and "writing," respectively. That is, cryptography is the science of creating messages that only the sender and receiver can read.

- Cryptography is different from steganography, which makes text undetectable to the naked eye. Cryptography does not hide text; it converts it to other text that is visible, but does not appear to have any meaning. What an unauthorized reader sees is a string of random text characters, numbers, and punctuation.

Encryption Algorithms

- The program that transforms normal text, called plain text, into cipher text(the unintelligible string of characters) is called an encryption program.

- The logic behind an encryption program that includes the mathematics used to do the transformation from plain text to cipher text is called an encryption algorithm. There are a number of different encryption algorithms in use today.

- Some have been developed by the U.S. government and others have been developed by IBM and other commercial enterprises.

- Messages are encrypted just before they are sent over a network or the Internet. Upon arrival, each message is decoded, or decrypted, **using a decryption program—a type of encryption-reversing procedure.**

- Encryption algorithms are considered so vitally important to preserving security within the United States that the National Security Agency has control over their dissemination. Some encryption algorithms are considered so important that the U.S. government has banned publication of details about them.

- Currently, it is illegal for U.S. companies to export some of these encryption algorithms.

- The Freedom Forum Online contains a number of articles on lawsuits and legislation surrounding encryption export laws. Critics consider publication restrictions a freedom of speech issue.

CHAPTER FOUR

THE ENVIRONMENT OF ELECTRONIC COMMERCE: LEGAL, ETHICAL, AND TAX ISSUES

THE LEGAL ENVIRONMENT OF ELECTRONIC COMMERCE

Businesses that operate on the Web must comply with the same laws and regulations that govern the operations of all businesses. If they do not, they face the same penalties including *fines, reparation payments, court-imposed dissolution, and even jail time for officers and owners—that any business faces.*

Businesses operating on the Web face two additional complicating factors as they try to comply with the law.

⌘ **First, the Web extends a company's reach beyond traditional boundaries**. A business that **uses the Web immediately becomes an international business.** Thus, a company can become subject to many more laws more quickly than a traditional brick-and-mortar business based in one specific physical location.

⌘ **Second, the Web increases the speed and efficiency of business communications**. Customers often have **much more interactive and complex relationships with online merchants than they do with traditional merchants.** Further, the **Web creates a network of customers who often have significant levels of interaction with each other.** Web businesses that violate the law or breach ethical standards can face rapid and intense reactions from many customers and other stakeholders who become aware of the businesses' activities.

➔In this section, you will learn about the issues of borders, jurisdiction, and Web site content and how these factors affect a company's ability to conduct electronic commerce. You will also learn about legal issues that arise when the Web is used in the **commission of crimes, terrorist acts, and even the conduct of war.**

Borders and Jurisdiction

Territorial borders in the physical world serve a useful purpose in traditional commerce: They mark the range of culture and reach of applicable laws very clearly. When people travel across international borders, they are made aware of the transition in many ways.

For example, exiting one country and entering another usually requires a formal examination of documents, such as passports and visas. In addition, both the language and the currency usually change upon entry into a new country. Each of these experiences, and countless others, are manifestations of the differences in legal rules and cultural customs in the two countries. In the physical world, geographic boundaries almost always coincide with legal and cultural boundaries. The limits of **acceptable ethical behavior and the laws** that are adopted in a geographic area are the result of the influences of the area's dominant culture. The relationships among a society's culture, laws, and ethical standards appear in Figure below, which shows that **culture affects laws directly and indirectly through its effect on ethical standards**. The figure also shows that laws and ethical standards affect each other.

➔The **geographic boundaries** on *culture are logical; for most of our history, slow methods of transportation and conflicts among various nations have prevented people from travelling great distances to learn about other cultures*.

➔Both restrictions have changed in recent years, however, and now people can travel easily from one country to another within many geographic regions.

One example is the European Union (EU), which allows free movement within the EU for citizens of member countries. Most of the EU countries (Great Britain being a notable exception) now use a common currency (the euro) instead of their former individual currencies (for example, French francs, German marks, and Italian lire).

➔**Legal scholars** define the relationship between *geographic boundaries and legal boundaries in terms of four elements: power, effects, legitimacy, and notice.* EU for citizens of member countries.

A) Power

➔*Power* **is a form of control over physical space and the people and objects that reside in that space, and is a defining characteristic of statehood**. For laws to be effective, a government must be able to enforce them. Effective enforcement requires the power both to exercise physical control over residents, if necessary, and to impose sanctions on those who violate the law.

➔*The ability of a government to exert control over a person or corporation is called jurisdiction.* Laws in the physical world do not apply to people who are not located in or do not own assets in the geographic area that created those particular laws. *For example, the United States cannot enforce its copyright laws on a citizen of Japan who is doing business in Japan and owns no assets in the United States*. Any assertion of power by the United States over such a Japanese citizen would conflict with the Japanese government's recognized authority over its citizens. Japanese citizens who bring goods into the United States to sell, however, are subject to applicable U.S. copyright laws. A Japanese Web site that

offers delivery of goods into the United States is, similarly, subject to applicable U.S. laws.

➔The level of power asserted by a government is limited to that which is accepted by the culture that exists within its geographic boundaries. **Ideally, geographic boundaries, cultural groupings, and legal structures all coincide**. When they do not, internal strife and civil wars can erupt.

➔*Effects Laws in the physical world are grounded in the relationship between physical proximity and the effects, or impact, of a person's behavior*. **Personal or corporate actions have stronger effects on people and things that are nearby than on those that are far away**. **Government provided trademark protection is a good example of this**. For instance, the Italian government can provide and enforce trademark protection for a business named **Casa di Baffi** located in Rome. The effects of another restaurant using the same name are strongest in Rome, somewhat less in geographic areas close to Rome, and even less in other parts of Italy. That is, the effects diminish as geographic distance increases. If someone were to open a restaurant in Kansas City and call it Casa di Baffi, the restaurant in Rome would experience few, if any, negative effects from the use of its trademarked name in Kansas City because it would be so far away and because so few people would be potential customers of both restaurants. Thus, the effects of the trademark infringement would be controlled by Italian law because of the limited range within which such an infringement has an effect.

The characteristics of laws are determined by the local culture's acceptance or rejection of various kinds of effects. For example, certain communities in the United States require that houses be built on lots that are at least 5 acres. Other communities prohibit outdoor advertising of various kinds. The local cultures in these communities make the effects of such restrictions acceptable. Once businesses begin operating online, they found that traditional effects-based measures did not apply as well and that the laws based on these measures did not work well either. For example, France has a law that prohibits the sale of Nazi memorabilia. The effects of this law were limited to people in France and they considered it reasonable. U.S. laws do not include a similar prohibition because

U.S. culture makes a different tradeoff between the value of memorabilia (in general) and the negative cultural memory of Nazism.

When U.S.-based online auction sites began hosting auctions of Nazi memorabilia, those sites were in compliance with U.S. laws. However, because of the international nature of the Web, these auctions were available to people around the world, including residents of France. In other words, the effects of U.S. culture and law were being felt in France. The French government ordered Yahoo! Auctions to stop these auctions. Yahoo! argued that it was in compliance with U.S. law, but the French government insisted that the effects of those Yahoo! auctions extended to France and thus violated French law. To avoid protracted legal actions over the jurisdiction issue, Yahoo! decided that it would no longer carry such auctions.

Legitimacy

Most people agree that the legitimate right to create and enforce laws derives from the mandate of those who are subject to those laws. In 1970, the United Nations passed a resolution that affirmed this idea of governmental legitimacy. **The resolution made clear that the people residing within a set of recognized geographic boundaries are the ultimate source of legitimate legal authority for people and actions within those boundaries**. Thus, legitimacy is the idea that those subject to laws should have some role in formulating them.

Some cultures allow their governments to operate with a high degree of autonomy and unquestioned authority. China and Singapore are countries in which national culture permits the government to exert high levels of unchecked authority. Other cultures, such as those of the Scandinavian countries, place strict limits on governmental authority.

The levels of authority and autonomy with which governments of various countries operate varies significantly from one country to another. Online businesses must be ready to deal with a wide variety of regulations and levels of enforcement of those regulations as they expand their businesses to other countries. This can be difficult for smaller businesses that operate on the Web.

Notice

Physical boundaries are a convenient and effective way to announce the ending of one legal or cultural system and the beginning of another. The physical boundary, when crossed, provides notice that one set of rules has been replaced by a different set of rules. Notice is the expression of such a change in rules. People can obey and perceive a law or cultural norm as fair only if they are notified of its existence.

Borders provide this notice in the physical world. *The legal systems of most countries include a concept called constructive notice*. People receive constructive notice that they have become subject to new laws and cultural norms when they cross an international border, even if they are not specifically warned of the changed laws and norms by a sign or a border guard's statement. Thus, ignorance of the law is not a sustainable defense, even in a new and unfamiliar jurisdiction. This concept presents particular problems for online businesses, because they may not know that customers from another country are accessing their Web sites. Thus, the concept of notice—even constructive notice does not translate very well to online business. The relationship between physical geographic boundaries and legal boundaries in terms of these four elements is summarized in Figure below.

Jurisdiction on the Internet

The tasks of defining, establishing, and asserting jurisdiction are much more difficult on the Internet than they are in the physical world, mainly because traditional geographic boundaries do not exist. For example, a Swedish company that engages in electronic commerce could have a Web site that is entirely in English and a URL that ends in ".com," thus not indicating to customers that it is a Swedish firm. The server that hosts this company's Web page could be in Canada, and the people who maintain the Web site might work from their homes in Australia. If a Mexican citizen buys a product from the swedish firm and is unhappy with the goods received, that person might want to file a lawsuit against the seller firm. However, the world's physical border-based systems of law and jurisdiction do not help this Mexican citizen determine where to file the lawsuit.

The Internet does not provide anything like the obvious international boundary lines in the physical world.

Thus, the four considerations that works so well in the physical world—power, effects, legitimacy, and notice—do not translate very well to the virtual world of electronic commerce. Governments that want to enforce laws regarding business conduct on the Internet must establish jurisdiction over that conduct.

A contract is a promise or set of promises between two or more legal entities— people or corporations—that provides for an exchange of value (goods, services, or money) between or among them. If either party to a contract does not comply with the terms of the contract, the other party can sue for failure to comply, which is called **breach of contract**. Persons and corporations that engage in business are also expected to exercise due care and not violate laws that prohibit specific actions (such as trespassing, libel, or professional malpractice)

A tort is an intentional or negligent action (other than breach of contract) taken by a legal entity that causes harm to another legal entity. People or corporations that wish to enforce their rights based on either contract or tort law must file their claims in courts with jurisdiction to hear their cases. A court has sufficient jurisdiction to hear a matter if it has both subject-matter jurisdiction and personal jurisdiction.

Subject-Matter Jurisdiction

Subject-matter jurisdiction is a court's authority to decide a particular type of dispute.

For example, in the United States, federal courts have subject-matter jurisdiction over issues governed by federal law (such as bankruptcy, copyright, patent, and

federal tax matters), and state courts have subject-matter jurisdiction over issues governed by state laws (such as professional licensing and state tax matters).

 If the parties to a contract are both located in the same state, a state court has subject-matter jurisdiction over disputes that arise from the terms of that contract. **The rules for determining whether a court has subject-matter jurisdiction are clear and easy to apply.** Few disputes arise over subject-matter jurisdiction.

Personal Jurisdiction

Personal jurisdiction is, in general, determined by the residence of the parties. A court has personal jurisdiction over a case if the defendant is a resident of the state in which the court is located. In such cases, the determination of personal jurisdiction is straightforward.

However, an out-of-state person or corporation can also voluntarily submit to the jurisdiction of a particular state court by agreeing to do so in writing or by taking certain actions in the state.

⌘ One of the most common ways that people voluntarily submit to a jurisdiction is by ***signing a contract that includes a statement, known as a forum selection clause, that the contract will be enforced according to the laws of a particular state***. That state then has personal jurisdiction over the parties who signed the contract regarding any enforcement issue that arises from the terms of that contract.