Electronic Business (E-Business) Systems

Some say that e-Business was born in 1910 when several florists formed the Florists’ Telegraph Delivery group (FTD Inc.) to exchange out-of-town orders. While electronic transmission of orders may have helped the florists incrementally improve their businesses, more recent technological advances have supported major changes in the way existing businesses operate and enabled the creation of new e-Businesses such as Amazon.com. Amazon.com began business with only a few workstations and no physical sales locations (i.e., no “bricks and mortar”). Because it began early in the era of business-to-consumer (B2C) e-Business, many customers were skeptical of providing credit card information online. To provide comfort to these customers, Amazon.com processed credit card orders by receiving orders on one computer, writing the information to a floppy disk and physically walking the order to a separate computer. Amazon.com could not have grown to nearly $4 billion in annual sales on such primitive systems. Instead, Amazon.com grew by developing and implementing secure transaction software, online shopping carts, and sophisticated data analysis programs.

Amazon.com’s e-Business model would not be feasible without this software. The model is based on Amazon.com’s “almost-in-time” inventory concept. It supplements the B2C interface that you see as a customer with an innovative B2B interface for quick acquisition and shipment of non-stocked items. That is, if the item that you order is not in stock, the company gets it from its supplier for shipment to you, the customer.

Through the development of technology, Amazon.com has been able to develop its e-Business model as well as use its technology to provide similar services to companies such as Borders, Inc., and Toys“R”Us, Inc., which traditionally would have been its competitors. Amazon.com’s future may revolve around its B2C and B2B technology capabilities, rather than its ability to sell books.

1 Frank Hayes, “The Story So Far: FTD’s flowers-by-wire network planted the seeds of e-Commerce a century ago,” Computerworld (June 17, 2002): 24
2 Taken from the company’s 2002 income statement at http://www.amazon.com.
SYNOPSIS

This chapter introduces the concept of electronic business (e-Business), which was defined in the Preface and Chapter 1 as the application of electronic networks (including the Internet) to exchange information and link business processes among organizations and/or individuals. These processes include interaction between back-office (i.e., internal) processes, such as distribution, manufacturing, and accounting; and front-office (i.e., external) processes, such as those that connect an organization to its customers and suppliers.4 We also explore how communications technology is revolutionizing the way individuals and organizations conduct business.

As organizations venture down this trail of electronic communications-driven business processes, the trail of paper including invoices, check payments, and so forth quickly disappears by capturing business event data at the e-Business connection with a customer or supplier and by using enterprise systems to store data and make it accessible. The evolution to e-Business has been slow in the past, but advances in Internet communication have switched the evolution into high gear. As you read and study this chapter, you will learn about the underlying technologies that facilitate e-Business, the complexities

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4 Some would distinguish the terms e-Business, the comprehensive concept we have defined, and e-Commerce, the external e-Business processes (i.e., the buying and selling of products and services electronically, typically on the Internet). For simplicity, we do not distinguish the terms e-Business and e-Commerce in this text.
of displacing paper records with electronic ones, the challenges faced in overcoming dif-
fferences in technology and accounting systems design in order to link two companies’
computer systems, and finally the barriers that must be overcome for successful execu-
tion of secure business events over the Internet. All these technologies, along with the
flexible processes they allow to exist, are fundamental to providing traditional companies
with the capability to implement new streamlined processes and new services for their
customers. These new technologies also have enabled e-Businesses like Amazon.com to
exist and prosper. Amazon.com’s business processes are dependent on technology to
provide efficient processing and the analysis of information to support product sales and
delivery and the acquisition of replacement products—virtually all of the company’s
value chain.

INTRODUCTION

The power of computers in transforming society is perhaps most obvious today in the
way communications have changed. Our society has evolved from one that relied on
face-to-face communication, to one in which phones became the primary medium, to a
contemporary society that is increasingly dependent on electronic messages (i.e., e-mail
and instant messaging). In essence, the richness of the media has been sacrificed for ef-
ficiency and effectiveness. In other words, the phone took away the ability to detect
emotions through an individual’s appearance, including smiles, frowns or other facial ex-
pressions. E-mail went a step beyond the phone and also took away the ability to detect
emotions through voice inflection and context sounds such as a chuckle. For example,
you may have chosen in the past to send a family member or friend a voice mail, e-mail,
or fax when you wanted to get them a message quickly, but didn’t really have time to
talk beyond what you could deliver in the message. In effect, you used technology to
make the delivery of the message more efficient. Through these actions, you made the
completion of the necessary activities a more efficient process—much like the objectives
of most business organizations in today’s heavily competitive business environment.

From a business perspective, the shift toward increasingly automated business
processes and communications based on the transfer of electronic data is designed to
achieve greater efficiencies in business processing. When an organization engages in e-
Business, they complete electronic-based business events (i.e., the partial or complete
elimination of paper documentation during business processes in favor of more effi-
cient electronic-based communication). These electronic-based business events entail
the interconnection of the underlying back-office processes of both organizations, ef-
ectively eliminating the errors associated with a paper-driven process. A by-product of
e-Business is often the elimination of the sales staff that would normally serve as the in-
termediary between the two parties to the business event. Bypassing the sales staff
speeds up the business event by eliminating the interaction with a salesperson, estab-
lishing a direct and therefore immediate linkage to the vendor’s computerized informa-
tion system (which for many organizations participating in e-Business today will be
their enterprise systems) for faster communication of an order, and facilitating the elec-
tronic transfer of funds for immediate payment. The business event is completed more
quickly. Additionally, the purchaser will normally electronically solicit pricing and
quickly determine the best price—increasing price efficiency as well. Even price check-
ing may be done automatically by the computer, eliminating the waste of the pur-
chaser’s time on such activities.
Amazon.com’s success is not solely driven by its B2C sales systems. As we mentioned earlier, sophisticated B2B systems that are integrated with Amazon.com’s suppliers’ systems must exist to support acquiring products that consumers want. When Amazon.com needs to obtain a book or other item, it electronically sends a purchase order to the manufacturer or distributor of the item. The vendor will provide Amazon.com with the product (a physical flow) and also the expected warehouse delivery time—information that is ultimately used to provide the expected shipping and delivery dates to its customer.

B2B systems are not limited to companies that sell predominately over the Internet. Using processes similar to Amazon.com, companies such as Wal-Mart, which sell most of their merchandise in retail stores, also rely heavily on B2B. When the cashier at Wal-Mart scans an item, not only are sales recorded, but the inventory balance in the warehouse is updated. Wal-Mart’s vendors read that data and, if the warehouse quantities fall below the desired reorder point for the item, the vendor ships replenishment stock to Wal-Mart automatically.\(^5\) Today, the majority of e-Business volume is conducted between business trading partners rather than consumers and businesses. That is, B2B is much bigger than B2C.

It is not just big organizations that are using such technologies to quicken the process. For instance, your favorite pizza joint or sandwich shop may accept e-mail or online ordering—basically allowing you to avoid being put on hold when you place your order and the risk of the phone answerer getting the wrong ingredients on your pizza or sandwich. You simply create the order yourself and ship it off, reducing the business’ need for people to answer the phones and take orders.

With the Internet, many organizations have the opportunity to directly reach customers through electronic communication. The potential in this market has led to the explosion of e-Business over the Internet. Airlines had such success with ticket sales over the Internet, that they discontinued paying commissions to travel agents. In this chapter, we will explore a variety of technologies that enable e-Business. We also will learn about the various forms of e-Business that are used by organizations in today’s business environment.

Throughout this text the discussion of e-Business is highlighted as it relates to various business processes, controls, and systems development issues. Since this chapter is specifically on e-Business, we will reserve use of the e-Business icon to those places in the chapter where a particularly critical e-Business technology or concept is discussed.

**Applying E-Business to the Value Chain**

Amazon.com has grown because it has used technology to enhance the company’s value chain and satisfy customer needs. The basic function of providing a book to a customer is not new; for centuries booksellers have been in existence. Historically, booksellers have stocked books that are consistent with their target customers. The customers personally visited the store for their selection, or perhaps in the case of a specialty store, corresponded by mail. Amazon.com’s primary innovation was to offer a vast selection of books that were not necessarily in stock, and to have the systems in place to acquire the nonstocked items quickly and relatively inexpensively. This concept allows a customer to

\(^5\) This process, called Vendor Managed Inventory (VMI), is described in Chapter 12.
shop at one “location” (although it may not be a physical location) for many different items, without burdening Amazon.com with the inventory carrying expenses of traditional retailers.

A second major innovation from Amazon.com is the collection and analysis of customer purchase data. The analysis uses sophisticated software to identify patterns and trends in customer preferences. When such information is identified, Amazon.com suggests items that customers with similar buying patterns have purchased; in other words, items that the customer has not purchased, but might want. This process can obviously benefit Amazon.com through increased sales but may also increase the customer’s satisfaction by offering to them additional products they may enjoy.

Amazon.com has used each of these technology innovations to enhance its value chain and value system. By offering a wide variety of books (and ultimately other products) online, and having the procurement and delivery systems in place to satisfy orders in a timely manner, Amazon.com has been able to grow substantially. This growth has come without having a physical retail presence or vast numbers of items in inventory. Another major component of Amazon.com’s value chain is the ability to market and sell items to customers based on customer interest. Each of these items has provided Amazon.com a competitive advantage in the online retailers’ marketplace—an advantage that has persuaded some competitors (such as Borders and Toys“R”Us) to outsource their online operations to Amazon.com.

If you have purchased a book or other item from Amazon.com (or read or heard about the process), you are familiar with the process that we have described here. This has been an example of B2C (business-to-consumer) e-Business. While much is written about B2C e-Business and it is probably familiar to you, it is a small part of the overall e-Business picture. The U.S. Census Bureau estimated that in 2001 only 7 percent of e-Business is B2C. The remaining 93 percent falls under B2B (business-to-business) categories. B2B e-Business includes Amazon.com’s book purchases from its suppliers. It also includes raw materials purchased electronically for manufacturing concerns and electronic purchases by retailers, such as Wal-Mart and Kohl’s. It follows that the cost saving and decrease in delivery time when the purchasing process is automated yields a more efficient organization and improves the value chain.

THE CHANGING WORLD OF BUSINESS PROCESSING

For centuries, the basic manner in which commerce transpired changed very little. In the past, a merchant would meet with a customer or another merchant and form an agreement to provide goods to customers in exchange for cash or other goods and services. The merchant would then record these exchanges in books of accounts, and periodically consolidate the entries recorded in the books to determine how much various individuals owed the merchant, how much the merchant owed other people, and the excess cash and assets that the merchant owned.

Over the past three decades, the relative change in commercial practices has been exponential. At the leading edge of technological advance, cottage industries now are springing up on the Internet where personal contacts and face-to-face negotiations do not occur. Online catalogs can be viewed through an Internet browser, and orders can immediately be placed and paid for over the Internet. Of course, the bookkeeping func-

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6 In recent years, Amazon.com has increased the items stocked in inventory.
tions may be done in much the same way as the ancient merchant did them, but in many cases the system will automatically trigger collection from the credit card company, automatically record the business event in the electronic database, and automatically update all of the related accounts. Indeed, many companies are using Web development tools from their ERP vendors to build web sites that are linked to the ERP system’s processing and central database.

While it may appear that companies have switched from an old way of doing commerce to a brand new way, both methods are actually used by many organizations. The evolution of information technology has simply provided for alternative forms of business processes and business event data processing that enable some organizations to become more efficient and effective by altering the traditional means by which they have done business. To fully understand how technology can enable an organization to reengineer its business processes and more effectively enter into commerce activities, you first must have a solid understanding of how business event data processing can be completed. Once you understand how processing is done, then the exploration of the technologies that enable improved efficiencies in business event data processing will be more meaningful.

In this chapter, the evolution of business event data processing is examined. This will help in understanding and appreciating the evolution of business, including the different stages of e-Business.

**Automating Manual Systems**

Since the earliest days of accounting when fairly primitive manual approaches were the only available accounting information systems, accountants recognized that the cheapest and most efficient way to do data processing on large volumes of similar business event data was to aggregate (i.e., batch) several events together and then periodically complete the processing on all the event data at once. The **periodic mode** is the processing mode in which a delay exists between the various data processing steps. Although technically not the same, the **periodic mode** is heavily dependent on the use of **batch processing**, and the two terms are often used interchangeably. **Batch processing** is the aggregation of several business events over some period of time with the subsequent processing of these data as a group by the information system.

Almost all manual systems use the **periodic mode**. If you think about how you learned the basics of financial accounting and financial statement development, you likely started by recording a set of journal entries that represented the business activities that had occurred. These journal entries were then transferred as a group (posted) to the general ledger and then to the trial balance. Executing the journal entry transfers as a **batch** was a more efficient way of maintaining the financial statements than transferring each business event individually to create a complete set of financial statements after each event was recorded (i.e., after each journal entry you would have to post to the general ledger and recreate the trial balance). In a computerized environment, the easiest approach to automating the accounting process has been to simply mirror these manual batch processing systems, which are relatively simple to develop, and provide for the most efficient use of employees and computer hardware.

Batch processing systems typically require four basic subprocesses to be completed before an event is converted into information reports that can be used by decision makers. Follow along with Figure 3.1 (page 74) as we explain how each of these four subprocesses is typically completed.
• **Business event occurs.** At the point of occurrence for the business event, the information for the event will be recorded on a source document (by the sales clerk in Figure 3.1). For example, if you think of one of the small businesses you might frequent, such as a used books and CDs shop, they often will have you bring the books and CDs you wish to purchase to a clerk at the front of the store. The clerk will then write a description of the items purchased on a sales slip (prepared in duplicate) and total the sale. The clerk will return one copy to you (often a white copy) and stuff the other copy (generally a yellow or pink copy) into the cash register drawer.

• **Record business event data.** A batch of source documents will be transferred (taken out of the cash register and sent) to a data entry operator who will take the information from the source documents and enter the data in a computerized format. The business event data are usually entered using an offline device (i.e., one, such as the PC in Figure 3.1, that is not directly connected to a central computer or network). The resulting computerized format becomes the sales event data store. In our used books and CDs store, the owner-manager or the employee closing up at the end of the day may take responsibility for keying all the sales slips into a personal computer for storage on a disk. The PC becomes simply a data entry device for keying in the sales data. Upon completing the entry, the copies of the sales receipts will be clipped together and stored in a file cabinet for possible future reference.

• **Update master data.** After all the data have been entered into the system, the sales event data store is brought to the computer (using a disk or CD) to be processed, and any calculations and summarizations completed (represented by the central
computer symbol in Figure 3.1). This information is used to update the master data. In the sales example, this might include taking prior inventory totals and subtracting out the items sold to derive the new inventory levels. The new inventory levels are accordingly written to an updated master data store. The sales event data also would be stored in a more permanent data store, such as the sales data store. It would not be uncommon for the owner-manager of our used books and CDs store to either take the data stores home and process them on a computer at home or, perhaps even more likely, to take the information to a public accountant for processing.

- **Generate outputs.** After all the calculations have been completed and the data updated, the system will periodically generate the applicable reports (the report generator program in Figure 3.1). For our used books and CDs store, this might include such documents as a sales report and an inventory update report. For our small store, both reports would probably go to the owner-manager.

Note that between each step is a time delay before the next step occurs. We might think of this form of automated system as a pure periodic system in that the entire process uses a periodic mode for processing. For instance, in our used books and CDs store, the day’s sales documents are collected before being passed on for keying. After keying, the sales data are held until the data can be transferred to the location and person where the data can be used to update the master data. After the data are updated each day, the reports still may not be generated until later—perhaps on a weekly or monthly basis.

A disadvantage of periodic mode systems is that the only time the master data are up to date is right after the processing has been completed. As soon as the next business event occurs, the master data are no longer up to date. As a result, little reason exists to provide a query capability (as discussed in Chapters 5 and 6) for data that are used in a periodic mode system. Usually, systems users will simply get a copy of the reports generated at the end of a processing run and use this information to make their decisions until the next processing run and a new set of reports is available. Only in rare situations will a query capability be provided, and then only to eliminate the needless printing of reports for occasional users of the information generated by the system.

**Online Transaction Entry (OLTE)**

Information technology improvements in recent years have provided a low-cost means for improving the efficiency of these traditional automated equivalents to manual accounting systems. The most prevalent change has been the increasing use of online transaction entry to reduce redundancies in pure periodic mode processing (see Figure 3.2, page 76). In an online transaction entry (OLTE) system, use of data entry devices allows business event data to be entered directly into the information system at the time and place that the business event occurs. These systems merge the traditional sub-processes of *business event occurs* (which includes completion of the source document) and *record business event data* into a single operation. At the point of the business event, a computer input device is used to enter the event data into the data entry system rather than onto a source document. Generally, prices are automatically generated by the system as the computer retrieves the data from the system data stores. Such a system is considered online because the data entry device is connected to the computer. The input system usually also will serve as a printer that will then print document copies to serve the still-needed role of source documents. As business events occur, they are usually accumulated either on magnetic tape or on disk.
If we go back to our used books and CDs store scenario, it may be that you prefer to buy your books and CDs at one of the chain stores such as those found in shopping malls. When you take your books and CDs to the clerk at the counter in these types of stores, the clerk generally keys the purchase straight into the cash register. As noted in Figure 3.2, what is occurring at this point is that the sales items are being entered into a terminal that is creating (recording) a log of the sales event (the sales event data store), retrieving price list information, and generating duplicate copies of the sales receipt. One copy of the sales receipt is given to you (the customer) and the other is placed in the cash register drawer (for filing in the audit file). Note the differences between Figures 3.1 and 3.2. The manual recording process (in Figure 3.1) by the sales clerk becomes a terminal entry process (in Figure 3.2), and the record input (i.e., data entry) process in Figure 3.1 becomes part of process sales in Figure 3.2. Other than these changes, the two processes are the same.

The use of OLTE eliminates the need to have one person enter business event data on a source document and then have a second person perform the data entry to convert the business event data to a computer-ready form. In an OLTE system, one person performs both operations. In many contemporary systems, this data entry will be completed using bar code readers, scanners, (see Chapter 10), or RFID (Radio-Frequency Identification) readers (see Chapter 12). The use of such technologies eliminates the human error that can result from entering the data manually. Thus, in many OLTE systems the only human impact on the accuracy of the input data is the necessity to properly scan items into the system. Various control procedures that are used to ensure data accuracy are discussed in detail in Chapter 9.

It should be noted that the processing of the data in Figure 3.2 is still completed on a batch of event data at a later point in time. In the case of many sophisticated systems...
in use by businesses today, sales event data are aggregated by cash register terminals for the entire day; after the store has closed, the data is electronically transferred over phone lines to the computer system where the business event data are processed. This is reflected in Figure 3.2 by the communications line connecting the sales event data in the local system to the central computer. The processing is typically completed overnight while all stores in a region are closed, and updated reports are periodically generated to reflect the sales event updates to the master data.

Note that the use of electronic communication technology does not change the traditional periodic approach, but rather makes the approach more efficient. Hence, we encounter one of the first steps in the evolution toward advanced-level e-Business systems.

Periodic mode systems traditionally have been the most common method for completing business event data processing. Nonetheless, with accounting information systems being transferred almost exclusively to computerized systems, and given the rapid improvements in information technologies, periodic mode systems are becoming less common for most activities. However, for some applications periodic mode processing is the preferred approach. For instance, payroll systems are a natural match with the batching of business event data, since all employees are generally paid on a periodic basis and at the same time. It is unrealistic to think that such an application will eventually be processed using systems other than periodic mode.

Online Real-Time (OLRT) Processing

Among the many clichés that one hears in today’s rather harried business environment is the phrase “time is money.” While the cliché tends to be somewhat worn out, it is descriptive of the current demands on information systems. Traditional periodic mode systems that provide information primarily through periodic reports that are hours, days, or weeks out of date can put an organization’s decision makers at a disadvantage if its competitors are using up-to-date information to make the same decisions (e.g., recall the importance placed on timeliness and relevance in Chapter 1). The pressures for timely information flows coupled with significant advances in available information technologies have led to a rapid migration toward online real-time systems. Online real-time (OLRT) systems gather business event data at the time of occurrence, update the master data essentially instantaneously, and provide the results arising from the business event within a very short amount of time—that is, in real-time. OLRT systems complete all stages of business event data processing in immediate mode. Immediate mode is the data processing mode in which little or no delay occurs between any two data processing steps (as opposed to periodic mode where a significant delay occurs between two or more data processing steps).

OLRT systems typically require three basic subprocesses to be completed before an event is converted into information that can be used by decision makers. Follow along with Figure 3.3 (page 78) as we discuss each of these subprocesses.

- **Business event occurrence and recording of event data.** At the time of the business event, the related data are entered directly into the system. Source documents are almost never used, as they significantly slow the process and remove some of the advantages of nonredundant data entry. Notice that the data entry process where the sale is entered into the system is the same as in Figure 3.2 (other than the absence of the filed copy of the sales receipt). This is consistent with the use of online transaction entry (OLTE) for OLRT systems.

- **Update master data.** Each business event that has been entered into the system is processed individually and any calculations and summarizations completed. This
information is then used to update the master data. Note in Figure 3.3 that the processing is now being done on-site where the sales event data are entered. Because each business event is processed independently and immediately, the master data at any given point in time will be within minutes or seconds of being up to date. When your books and CDs store is entering your information into the terminal, it may actually be using an OLRT system if it is important to the store to know whether a given book or CD title is in stock at a given point in time—perhaps to answer a customer’s question.

• Generate reports and support queries. It is neither practical nor desirable that reports be generated after each business event is recorded and master data have been updated. Typically, applicable reports will still be generated by the system on a periodic basis. At the same time, however, these reports will usually be instantaneously available through access of the system on an as-needed basis, as demonstrated in Figure 3.3 with the communications links to the sales and inventory managers. One of the main advantages provided by many OLRT systems is an ability to check the current status of master data items at any given point in time. In the books and CDs store, it would allow the sales staff to quickly check whether a given book or CD is in stock. In many cases, rather than using pre-specified reports that may not necessarily provide the information that decision makers need, these information systems users will use a query language (as discussed in Chap-

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7 This is one method of accomplishing OLRT that uses expensive, continuous direct communications to a remotely located central computer. Many organizations use a distributed processing mode that places the computer locally to avoid the costs associated with the continuous communications line; however, as in the case shown here, the need to centrally process information for multiple locations may warrant the communications line costs of continuous direct communication.
 ters 5 and 6) to dynamically create unique reports that provide the one-time information they need to make key decisions. For instance, the store manager may want to run a report on the inventory stock for the top-10 selling CDs and books.

While another cliché says that “you cannot buy time,” OLRT systems allow users to nearly eliminate the delay in accessing up-to-date information. However, the primary disadvantage of real-time systems is clearly the cost. To efficiently operate an OLRT system, it is imperative that the point of the business event be linked directly with the computer system—that is, online. Accordingly, to operate an OLRT system, online transaction entry (OLTE) methods must also be used.

It was noted previously that OLTE systems are increasingly being used with systems that primarily use the periodic mode. While the data entry performed in all OLTE systems is essentially the same, the mode of processing may vary. While a pure periodic mode system still processes business event data in batches, an OLRT system using OLTE will process each recorded business event in real time. In a real-time system, business event data cannot be aggregated on a local computer to be transferred later to the data processing center. Rather, each business event must be communicated for processing at the time the event occurs. This results in a more expensive approach to OLTE. In essence, rather than creating a temporary electronic communications connection to download the data to the central computer, an OLRT system generally requires a continuous electronic communication connection that will usually necessitate the use of some form of network. This will be addressed later in this chapter.

It should be noted here that automated systems that model manual systems and OLRT systems are the two extremes in business event data processing. The systems that mimic manual systems are what we might term pure periodic mode systems in that a delay occurs between every step of the processing. On the other hand, OLRT systems represent pure immediate mode systems in that little or no delay occurs between any steps in the processing. We note these as the extremes because many systems lie somewhere between these two extremes, exhibiting a mix of periodic and immediate mode processes at various stages. For example, OLTE used with batch processing results in an immediate mode approach for combining the business event occurrence and record event data steps, while periodic mode processing might be used for the remainder of the steps.

**Online Transaction Processing (OLTP)**

In an effort to reduce both the expense and time delay resulting from the need to communicate business event data over what are sometimes great distances to complete business event data processing in real time, many entities are turning to online transaction processing (OLTP) systems. An OLTP system is a real-time system that performs all or part of the processing activities at the data entry terminal location. These systems use business event data processing terminals that have the capability to manage data, run applications, and control communications with the central processing computer and data stores. Hence, by performing most of the processing at the terminal location, the delays caused from electronic communications between the terminal and the central computer are reduced or eliminated (see Figure 3.4) as is the cost associated with communicating to the central processing location during the processing of the business event. Only the results need be communicated. The most common applications for these systems to date have been automatic teller machines (ATMs) and computerized reservation systems. Note in Figure 3.4 that the electronic communication network in an OLTP system becomes even more complex as processing occurs at the terminal end, but then data must be updated at all terminals. For instance, in the case of an ATM, once an individual has
withdrawn money from his or her account, the system needs to update the balance at all ATMs before additional withdrawals may be made.

It should be noted that most banks have converted to OLTP technology, with only a few not yet using this advanced processing method. Microprocessor technology only recently has become powerful enough to make this approach feasible for banks. You should also note that in an OLTP system, the immediate updating of balances at the central processing unit and the terminal locations is done with shadow data (e.g., copies of the master data used for real-time processing) that are duplicated at each site, but for control purposes the actual master data are usually updated once a day using batch processing.

While immediate mode-dominated systems are becoming the most prevalent method for new business event data processing applications, they are not necessarily the end-all solution for all applications. Both periodic mode and immediate mode approaches have distinctive characteristics that make each a preferable option for certain types of applications. While primarily periodic mode systems, as noted earlier, are preferable for most payroll systems, you would certainly use an immediate mode system for maintaining working balances for ATM event data. If periodic processing was used, a person might withdraw the entire balance out of his or her account multiple times before the system
processed the event data and updated the accounts—a significant losing proposition for a bank. Clearly, any given application should be matched with the best or most applicable processing method.

Each of the described processing methods requires data communications pathways among PCs, terminals, and/or other systems. Technology Summary 3.1 describes the interconnectivity of such systems.

**Technology Summary 3.1**

**Communication Networks**

The key component for electronic communication systems is the network that provides the pathways for transfer of the electronic data. Communication networks range from those designed to link a few computers together to the Internet, where the goal can almost be perceived as linking all computers in the world together.

Within organizations, a major focus of network computing has been on client server technology. **Client server technology** is the physical and logical division between user-oriented application programs that are run at the client level (i.e., user level) and the shared data that must be available through the server (i.e., a separate computer that handles centrally shared activities—such as databases and printing queues—between multiple users). The enabling networks underlying client server technologies are **local area networks (LANs)** and **wide area networks (WANs)**. LANs are communication networks that link several different local user machines with printers, databases, and other shared devices. WANs are communication networks that link distributed users and local networks into an integrated communications network. Such systems have traditionally been the backbone of enterprise systems technology, but recent advances in communications technology are rapidly changing the underlying infrastructure models.

These emerging network technologies are driving the future of e-Business. These technologies allow for more simplified user interaction with networks and empower users to access broad arrays of data for supplementing management decision making as well as opening new avenues for direct commerce linkages. The leading technology in this arena is the Internet. The **Internet** is a massive interconnection of computer networks worldwide that enables communication between dissimilar technology platforms. The Internet is the network that connects all the WANs to which organizations choose to allow access. With the expansion of the Internet also has come increased accessibility to public databases that provide rich information sources, searchable on a for-fee basis (see Technology Summary 3.2, page 83).

**Web browsers** are software programs designed specifically to allow users to easily browse various documents and data sources available on the Internet. The advent of this easy-to-use software has rippled through organizations and caused a rethinking of how companies can set up their own internal networks to be more accessible to decision makers. The result has been the growing development of intranets, which are essentially mini-internal equivalents to the Internet that link an organization’s internal documents and databases into a system that is accessible through Web browsers or, increasingly, through internally developed software designed to maximize the benefits from utilization of organizational information resources.

By combining the benefits of the Internet and intranets, many organizations have begun to allow customers, vendors, and other members of their value system access to the company’s intranet. This type of intranet, which has been extended to limited external access, is referred to as an **extranet**.

The by-product of the expansion in intranets, extranets, and the Internet is a rich medium for e-Business. These networks provide the foundation for what likely will be exponential growth in e-Business—both at the resale level and in supplier-buyer relationships.
METHODS FOR CONDUCTING E-BUSINESS

To this point the discussion has focused on the modes of business event data processing and related communication technologies that underlie the ability of organizations to enter into e-Business. In this segment of the chapter, we redirect the discussion to specific methods for conducting e-Business and how these methods utilize alternative modes of business event data processing and available electronic communication technologies.

The four methods of e-Business that we will discuss are fairly diverse. First, we provide an overview of the role of electronic mail (e-mail) in e-Business—a lesser-used, but more directed approach. Second, we discuss electronic document management (EDM). Many would not include EDM as part of e-Business since the majority of such applications support non-e-Business events. We chose to include it in this section because of the integral role it has in supporting the last two stages. Electronic data interchange (EDI) is the third area we discuss. It currently represents the predominant form of e-Business. The fourth method is Internet commerce, which represents the fastest-growing segment of e-Business. Concurrent with the development of Internet businesses that sell physical products, new organizations have surfaced existing solely to provide data through the Internet. Technology Summary 3.2 describes some businesses focused on Internet commerce, providing information in the form of public databases.

Commerce Through E-Mail

Electronic mail (e-mail) is the electronic transmission of non-standardized messages between two individuals who are linked via a communications network (usually an intranet or the Internet). E-mail represents a weak form for e-Business because of the non-standardized format by which messages are transmitted. Before exploring the use of e-mail as a mode for e-Business, let’s briefly examine the limitations of using a non-standardized format.

If you think back to our earlier discussions in this chapter related to various technologies that can be used to automate the data entry process, all the technologies relied on a standardized format for the data (e.g., a bar code or a printed response such as amount paid written on the transmittal document). This is almost the antithesis of e-mail. E-mail tends to be a very free-form mode of expression and, for the most part, a fairly casual and informal mode of communication. This unstructured nature of the communication mode makes data capturing more difficult and generally requires human translation and entry of the data. This increases the likelihood of error and requires more stringent data control procedures to be in place. The e-mail essentially becomes a source document for use in the business event data processing. Organizations using e-mail as source documents also must have in place a mechanism to deal with unsolicited, non-document mail (SPAM).

Despite the limitations, e-mail does have several characteristics that make it tolerable for some e-Business events. From a sales standpoint, a targeted market can often be identified by locating an appropriate e-mail list. Much like their mailing list counterparts that are used for postal delivery, lists of e-mail addresses for individuals that are likely to be interested in a given product can be useful. Generally, if the marketing medium is e-mail, then the purchase request also will be transmitted in this manner.

As a means of getting around the unstructured nature of e-mail transmissions, marketers will frequently provide an electronic order form that adds structure to the information content of the message. However, even with the electronic order form, entry of the data into the system generally requires some keying by data entry personnel. Thus,
the general objectives of e-Business—to avoid the need for a salesperson to make the contact and to avoid the business event recording activities during business event data processing—are not achieved.

**Electronic Document Management**

Electronic document management (EDM) is the capturing, storage, management, and control of electronic document images for the purpose of supporting management decision making and facilitating business event data processing. The capturing and storage of document images typically relies on the digital image processing approaches (see Chapter 10). The added dimensions of management and control are critical to maintaining the physical security of the documents while at the same time assuring timely distribution to users requiring the information. Technology Application 3.1 (page 84) discusses some general uses of EDM.

In general, business applications of EDM fall into two categories:

1. **Document storage and retrieval.** For example, mortgages, deeds, and liens are archived and made available to the public for such uses as title searches. Other documents in this category include birth certificates, death certificates, marriage
licenses, banking-account signature cards, user manuals, price lists, and catalogs. An EDM system stores the images (e.g., pdf files) of these items and displays or prints a copy of them upon request. Document storage and retrieval also could be implemented using micrographic-based image processing systems (i.e., microfilm).

2. **Business event data processing.** For example, loan and insurance applications must pass through several stages, such as origination, underwriting, and closing. The EDM system can manage the workflow and route the documents to the appropriate people—even if these people are geographically dispersed. **Electronic-based image processing systems** must be used for this type of application. An organization’s communications networks also must be interconnected in a manner that facilitates access and transmission of document images.

EDM systems provide a relatively inexpensive alternative to paper documentation. Although computer storage and processing requirements are much greater than for key-entered documents, the ability to access and manipulate real images of business documents offers great opportunities for improving the efficiency and effectiveness of many business applications and can create significant competitive advantages for an organization. For instance, fast access to imaged documents often translates into faster and better customer service and results in increased customer loyalty—themes we explore in some depth in Chapter 10. The typical benefits include:

- **Reduced cost of handling and storing paper.**
- **Improved staff productivity.**
- **Superior customer service.**

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**Technology Application 3.1**

**General Uses of Electronic Document Management Systems**

**Case 1**
The need to organize client files for quick access and processing leads many accounting firms to adopt document management systems. One such system was developed by Integrated Computer Management (ICM). The Electronic Compliance File (ECF) created for Ernst & Young LLP lets thousands of tax professionals in 100 cities manage their documents and images in one structured folder. In addition to eliminating the loss of critical paper-based information, the folder provides secure, distributed, online access, regardless of a staff member’s location. The program reduced shipping costs, cut paperwork, and increased overall efficiency.

**Case 2**
A new law, Check 21 was recently enacted to allow banks to substitute electronic images for paper checks in the check clearing and settlement process. The legislation is expected to save the banking industry billions of dollars. Although the law calls for “electronic replacement documents” to be in use within a year, industry experts caution that it will take years for the clearance process to include the entire financial industry. One of the main issues that will determine the success of the electronic processes is the attitude of consumers. Consumers willing to accept copies, rather than their original checks, will be one determining factor for the success of the implementation of the new processes. The success of technology, such as document processing, is heavily dependent on the acceptance those receiving outputs.

 CHAPTER 3  Electronic Business (E-Business) Systems

• Enhanced management of operational workflow.
• Faster processing.

However, as with any technology, the applications selected for EDM should be chosen wisely. Applications with a high chance of success might be those in which:

• A large amount of paper is produced and stored. We know of an organization that adopted EDM because they had no more room to store paper within their existing office space. In fact, the engineers told them that the floor could not support another file cabinet! Imaging systems also can produce economies in situations where paper documents are not abandoned altogether, but are moved from storage in expensive office locations to cheaper off-site warehouse storage.

• Data, such as signatures, must be scanned. For example, banks use image processing for signature verification cards.

• Frequent access to the stored data from geographically dispersed locations is needed. For example, clerks at every branch of a bank must be able to view signature verification cards.

• Processing of the stored data are extensive and complex and takes place from multiple locations, as in the case of loan and insurance applications that must be processed, reviewed, and approved by many people.

EDM also is becoming an increasingly important component of electronic data interchange (EDI). In many cases, organizations are requiring document and image support for EDI data. Most notable are manufacturing- and engineering-related event data where specifications may need to be more clearly defined with computer-aided design/computer-aided manufacturing drawings.

**Electronic Data Interchange**

Computer and communications technology have been successfully applied by organizations to improve accuracy and control and to eliminate paper within their information systems applications. However, direct, paperless, business communication between organizations has been slowed by the lack of transmission and presentation standards. What this often means is that an organization uses its computer technology to prepare a purchase order (PO), for example, completely without paper and human intervention—efficient, fast, and accurate process. But the PO must then be printed and mailed to the vendor. Then, at the vendor, the PO must be sorted from other mail in the mailroom, routed to the appropriate clerk, and entered in the vendor’s computer. The efficiency, timeliness, and accuracy gained by the automated purchasing process at the originating organization are lost through the mailing and reentry of the data at the vendor.

One technology that has had a significant impact on streamlining data communication among organizations is that of electronic data interchange (EDI). Electronic data interchange (EDI) is the computer-to-computer exchange of business data (i.e., documents) in structured formats that allow direct processing of those electronic documents by the receiving computer system. Figure 3.5 (page 86) depicts the typical EDI components. Follow along with us as we describe those components; the numbers in circles are cross-references to corresponding locations in the narrative description.

**Application Software (Circles 1 and 7)**

An originating application prepares an electronic business document, such as a purchase order (PO). At the destination organization, an application processes the business data. For example, the originating application’s PO would be processed as a customer order by the destination organization’s order entry/sales (OE/S) process.
**Figure 3.5** Electronic Data Interchange Components

Translation Software (Circles 2 and 6)

An application’s electronic business document must be translated to the structured EDI format that will be recognized by the receiving computer. Presently, two major, nonproprietary, public translation standards exist:

1. In the United States and Canada, the American National Standards Institute (ANSI) X12 standard has been used.
2. EDIFACT (EDI for Administration, Commerce, and Transport) is the predominant standard for international EDI transactions. Actively promoted by the United Nations for member nations, this standard includes some aspects of ANSI X12 and permits global communication between trading partners.

In addition, several standards are specific to particular industries, such as the Automotive Industry Action Group (AIAG), Transportation Data Coordinating Committee (TDCC), and Chemical Industry Data eXchange (CIDX). Some of these industry standards are compatible with the public, interindustry standards (e.g., ANSI X12); some are not compatible.

Translation standards include formats and codes for each transmission type, called a transaction set, as well as standards for combining several transaction sets for transmission. For example, under the ANSI X12 standard, a purchase order (PO) is a transaction set “850,” a shipping notice is a transaction set “856,” an invoice is a transaction set “810,” and so forth. The ANSI data dictionary for transaction set 850 defines the length, type, and acceptable coding for each data element in an EDI purchase order. For example, ANSI X12 describes the format and location within the message of the customer name and address, the part numbers and quantities ordered, the unit of measure of the items ordered (e.g., each, dozen, ton), and so on. Figure 3.6 (page 88) depicts the translation process. The figure shows a sample PO as it might appear as a conventional paper document and then illustrates how the PO is transformed into EDI transaction set 850.

Besides purchase orders, other typical EDI transaction sets include (the ANSI X12 transaction set number appears in parentheses):

- Purchase order acknowledgment (855).
- Advance shipping notice (ASN) (856). From supplier to customer, advising that the goods are on the way.
- Receiving advice (861). From customer to supplier to report late, incomplete, or incorrect shipments.
- Invoice (810).
- Payment order/remittance advice (820). From customer to supplier for payment.
- Functional acknowledgment (FA) (997). A message is sent from receiver to sender to acknowledge receipt of each and every one of the previous transaction sets. For instance, when the seller receives a purchase order (850) from the buyer, the seller sends back an FA (997) to indicate the message was received. Then, when the buyer receives a purchase order acknowledgment (855), the buyer acknowledges that the message was received by sending the seller an FA (997).

Translation software translates outgoing messages so that they are in the standard message format (e.g., ANSI X12) and translates the incoming messages from the standard message format into the form understood by the application system. This intermediate translation to/from the EDI format precludes the need for an organization to reprogram its application so that it can communicate with each trading partner’s application.

The translation software also performs administrative, audit, and control functions. For example, the software inserts identification and control information in front of (header) and after (trailer):

- Each transaction set, such as one purchase order.
- Each functional group (e.g., a group of purchase orders, a group of receiving advices, and so forth) so that several groups may be sent in one transmission.
- All components comprising one transmission.
Figure 3.6  Electronic Data Interchange Transaction Set

<table>
<thead>
<tr>
<th>PURCHASE ORDER DOCUMENT</th>
<th>EDI TRANSACTION SET</th>
</tr>
</thead>
</table>

**Purchase Order**

To: Compu Supply 82645
986 Silicon Drive
Napa Valley, CA 97624

From: Delta Fabricating 29327
2901 Second Ave.
Van Nuys, CA 95862

Date: 09/01/07
Order No.: BL2-1563

**Freight Prepaid Terms Ship Date Due Date**

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Your Item No.</th>
<th>Our Item No.</th>
<th>Item Description</th>
<th>Unit Price</th>
<th>Quantity</th>
<th>Unit of Meas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>86240</td>
<td>A235</td>
<td>4-meg DRAM 50 mhz 486 CPU 32 bit</td>
<td>29.60</td>
<td>140</td>
<td>CA</td>
</tr>
<tr>
<td>2</td>
<td>15965</td>
<td>1936</td>
<td></td>
<td>269.95</td>
<td>25</td>
<td>EA</td>
</tr>
</tbody>
</table>

**Summary Area**

CTT*2*165 N/L

SE*12*73561 N/L

NOTES: The asterisk (*) character designates a field separator. Consecutive field separators (**) signify omitted data. N/L denotes a new line (e.g., a carriage return).

**850 Purchase Order Transaction Set**

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
</table>

**Heading Area**

ST*850*73561 N/L

BEG*00*SA*BL2-1563 N/L

***950901 N/L

N1*SE*Compu Supply**82645 N/L

N1*BY*Delta Fabricating**29327 N/L

ITD*01*03*2**10*N30 N/L

SHH*SD*010*950904 N/L

SHH*DD*002*950907 N/L

FOB*PP N/L

**Detail Area**

PO1*01*140*CA*29.6*QT*IN*A235*

*VN*86240 N/L

Order line item data (PO1): line no. (01), 140 (140) cases (CA) ordered, quoted (QT) unit selling price of $29.60 (29.6), with buyer's ID (IN) number of A235 and seller's ID (VN) of 86240

PO1*02*25*EA*269.95*QT*IN*1936*

*VN*15965 N/L

Order line item data (PO1): line no. (02), 25 (25) units (each) (EA) ordered, quoted (QT) unit price of $269.95 (269.95), with buyer's ID (IN) number of 1936 and seller's ID (VN) of 15965

**Summary Area**

CTT*2*165 N/L

SE*12*73561 N/L

End the transaction set (SE), give the number of segments included (12) and the control number from the header (73561)

In EDI lingo, the data sets and the headers/trailers are called “envelopes.” In addition to assembling and disassembling the EDI envelopes, the translation software may log incoming and outgoing messages and route the messages from and to the proper application.

**Communications Network (Circles 3 and 5)**
The two trading partners must have a method of communicating the electronic messages to each other. One procedure is for the originating organization to put its messages on a computer disk or CD and deliver the disk/CD to the receiving organization. But this approach offsets some of the time and cost benefits that an organization can accrue by adopting EDI.

A second method is to establish a direct computer-to-computer link between the origination computer and one or more destination computers. This interface is accomplished through a leased or dedicated communication line with each trading partner, or through a communications network in which one of the partners—let’s say a large manufacturer—serves as the “hub” of the network, and its suppliers and other trading partners are the network “spokes.” The modem and communications software in your PC exemplifies such a communications system. However, communications system incompatibilities may require that one partner or the other purchase communications hardware or software, making this a costly option. Further, agreeing on such details as what time of day to send and receive data from trading partners makes this option difficult to manage.

To overcome some of the shortcomings of these direct connections, organizations may use either EDI service bureaus or the Internet. The EDI *service bureau* is an organization that acts as an intermediary between a large hub company and its suppliers. The EDI service bureau generally works with smaller suppliers that are reluctant to acquire in-house translation and communications software. In such a case, the *translation software* and *communications software* reside on the service bureau’s computer system. For a fee, the service bureau takes EDI messages from the hub, translates the messages into formats that are usable by the suppliers’ computer applications, and forwards them to the suppliers. In the other direction, the bureau translates suppliers’ *paper* documents—such as shipping notices or invoices—into EDI format and sends the electronic documents to the hub. The Internet provides organizations with a modern network infrastructure to accomplish direct communications and has increasingly become the communication method of choice for EDI transmissions. (We discuss Internet connections later in this chapter.)

**Value-Added Network (VAN) Service (Circle 4)**
Rather than connecting to *each* trading partner, an organization can connect to a *value-added network (VAN)* service. A VAN service acts as the EDI “postman.” An organization can connect to the VAN when it wants, leave its outgoing messages and, at the same time, pick up incoming messages from its “mailbox.” A VAN is a packet-switched network service that provides communications capabilities for organizations not wishing to obtain their own packet-switched or dedicated communications links.

As shown in Figure 3.5 (page 86), one of the several functions that the VAN will perform is to translate the message from one communications protocol to another, if necessary. Presently, two protocols are used for much of the EDI traffic: the ITU Telecommunication Standardization Sector (formerly the Consultative Committee for International Telegraph and Telephone, or CCITT) X.400 and the X25 protocols. X.400 is generally the preferred method as it can accommodate multiple message
formats in a single transmission. For example, an EDI document and an e-mail message or an electronic document image could all be sent in the same “envelope.”

Technology Summary 3.3 presents some management, operational, and control issues associated with EDI, and Technology Application 3.2 (page 92) describes some general uses of EDI.

### Technology Summary 3.3

**EDI Management, Operational, and Control Considerations**

**Benefits of EDI include the following:**

- Many organizations have survived by being “forced” to implement EDI if they wished to continue doing business with certain customers. For instance, Wal-Mart Stores and Kmart Corporation have told all their suppliers to establish EDI capability by a specified deadline if they wished to continue doing business with these retail giants.
- Responsiveness to customers’ needs has improved. In many cases, trading partners have discovered that the cooperation engendered by EDI has reduced conflicts between them, improved communication, and fostered trust. In some cases, EDI has led to what are known as “quick response” replenishment systems. In such systems, a large customer—Sears Roebuck, for instance—gives its suppliers access (through EDI communication links) to real-time, point of sale (POS) information about what is and is not selling at its various retail outlets. With that information available, the suppliers can forecast customer demand more accurately, fine-tune their production schedules accordingly, and meet that demand in a highly responsive manner. This is discussed further in Chapter 12.
- By not reentering data at the receiving organization, processing costs are reduced and accuracy is improved. To better appreciate the potential impact of this benefit, consider the fact that, according to one estimate, 70 percent of the data processed by a typical company’s mainframe computer had been output by another computer system.
- Mailroom and other document preparation and handling costs are eliminated. For example, in the automobile industry, it is estimated that $200 of the cost of each car is incurred because of the amount of paper shuffling that has to be done.
- By providing timely and accurate data, forecasting and analysis and cash flow are improved, and the occurrence of stock-outs is reduced.
- In the course of implementing EDI, an organization has the chance to rethink and redesign existing processes and controls.

**Costs of EDI include:**

- Modifying trading relationships and negotiating contracts.
- Buying or leasing hardware and software.
- Establishing relationships with VANs and negotiating contracts.
- Training employees.
- Reengineering affected applications.
- Implementing security, audit, and control procedures.

**Control considerations:**

- Since signatures will no longer evidence authorizations, controls must ensure proper authorization. And, at some point during the process, we must authenticate that the message is sent to—and received from—the party intended and is authorized by someone having the proper authority.
- Without external, visual review, some business event data can be significantly in error. For example, a payment could
be off by one decimal point! Therefore, controls must prevent rather than detect such errors.

• Given that the computer will initiate and authenticate messages, controls over the computer programs and data—program change controls and physical security (see Chapter 8)—become even more important than in non-EDI systems.

• If a VAN is used for communicating between partners, security procedures must prevent compromise of sensitive data, and controls must ensure correct translation and routing of messages.

Therefore, controls must be in place to ensure that:

• All transaction sets are received from the trading partners.
• All transaction sets are received by the trading partners.
• All recorded business event data are recorded once and only once.
• Data are accurately received (sent).
• Data are accurately translated.
• Data are accurately passed through the application interface (EDI translator).
• Business event data are received from authorized senders.
• Senders are authorized to send the transaction type.
• Messages are not intercepted or altered during transmission.
• The log of business event data is protected.
• Unauthorized messages are prevented from being sent.

To attain these control goals, organizations have implemented the following control plans, among others:

• Some control plans are inherent in the very nature of the way that EDI is implemented. As we noted, the EDI headers and trailers accompanying transaction sets contain important control data. For example, the next to last line in Figure 3.6 (page 88) contains an item/line count and a hash total of the number of units ordered. The last line includes a control total of the number of segments comprising the transaction set (12) and a control number (73561) that should agree with the corresponding number from the header on line one of the table. Functional acknowledgments (FAs) also help to ensure the integrity of EDI messages (i.e., that data have not been lost or garbled in transmission).

• Expert systems (see Chapter 5) may be used to determine that incoming messages are reasonable—consistent with normal message patterns—to authenticate the source and authorization for the message.

• Access to EDI applications may require a biometric security system, a smartcard, or a physical key as well as a password (see Chapter 8).

• Data encryption (see Chapter 9) may be employed to protect data during transmission.

• Digital signatures (see Chapter 9) may be used. Much like a password or other access code, the digital signature uniquely identifies who approved a business event and also helps to ensure that the EDI message was not altered during transmission.

• “Continuous auditing” may be implemented through the use of integrated test facilities (ITF) or imbedded audit modules. An ITF creates dummy corporations or branches in the system data and processes test data for these dummy entities at the same time that live data are being processed for real entities. An imbedded audit module acts like an audit “alarm” that is programmed to alert the auditor—by printing an audit log—to suspect data (e.g., business event data of an unusually high dollar amount) or to unauthorized attempts to access the system.

Finally, contracts between trading partners and with the VANs must specify responsibility for controls and for erroneous transmissions. For
example, who is responsible for authenticating the source and destination of messages? If a message is garbled by the VAN, who is responsible for any resulting financial loss—the sender, the receiver, or the VAN? Contracts might address the following issues:

- When is a message considered received: When it is sent, when it is transmitted, when it gets to the mailbox, or when it is picked up? The answers to such questions are important in establishing the point at which an agreement, such as a purchase, legally exists between trading partners. Resolving such questions also is critical in situations where the message is a bid with a time deadline.
- Who is responsible for data integrity, audit trails, security, and so on?
- What are the penalties for failing to perform as required?

Technology Application 3.2

General Uses of Electronic Data Interchange

Case 1
The cost of processing a purchase order can reach $150, due to manual processes and paperwork. Saks Department Store Group purchases over $900 million of product per year, from over 5,000 vendors. Such a volume of purchases executed in a manual environment can lead to a costly and inefficient process. In addition to experiencing significant savings on purchases, management is able to identify and monitor purchasing and spending patterns across stores, regions, and nationally, uncovering opportunities for additional savings or purchase consolidation. The system also facilitates the procurement cycle, speeding up the process and reducing the risk of running out of items or requiring expensive, last-minute shipments.

Case 2
Perhaps the biggest change in EDI in recent years is being driven by the Internet. Recently, Wal-Mart announced that it would move its EDI purchases from VANs to the Internet. The use of the Internet for EDI is a sign of confidence in the stability of the environment. The use of the Internet is relatively free of transaction cost, providing significant cost savings over the old VAN processes for Wal-Mart and its vendors. Until recently, to implement EDI over the Internet, software on each side of the transaction had to be provided from the same vendor. This lack of standardization meant that frequently, companies had to purchase and support several different EDI software packages to deal with multiple customers/vendors. Today, using the Electronic Data Interchange Internet Integration Applicability Statement 2 protocol (AS2) standard, interoperability of EDI software is becoming a reality.


EDI and Business Event Data Processing
If we consider the implications of EDI to business event data processing, one of the main advantages is the significant reduction in need for interaction between purchasers and salespeople, coupled with the standard implementation of online transaction entry (OLTE). You should recall from our earlier discussion in this chapter that OLTE eliminates the redundancy between source document capture of business event data and subsequent keying in of the source document. With EDI, both activities are eliminated for
the selling organization as OLTE activities are initiated and completed by the linking purchaser. This eliminates any risk of erroneous data entry from within the selling organization. As we go forward, you should keep in mind that EDI may be completed through traditional modes using dedicated communications lines, but EDI is increasingly moving to the Internet as was demonstrated in Technology Application 3.2.

You should be careful, however, not to draw any assumptions as to the mode of business event data processing. You will recall from our earlier discussion that OLTE can be used with both periodic and immediate modes of processing. The same holds true for the core business processing activities in an EDI environment. The business event data are frequently processed using an online real-time system, but many organizations also choose to do the bulk of the processing steps using periodic mode as well—particularly with batching of business event data for more efficient processing. It is worth noting also that particularly when batch processing is being used, the need may exist to use online transaction processing (OLTP) approaches to handle order and payment confirmation activities during acceptance of the externally generated OLTE transmission—in other words, the customer may need an immediate confirmation that the order has been accepted and that the business event will be completed by the vendor.

Let us offer one additional comment before we move on. When trading partners communicate with each other electronically, they also discover that they have to communicate internally in new ways to achieve the full benefit of EDI. That is, EDI forces an organization to assume that all information flows—both internally and externally—are instantaneous. Accordingly, for many, EDI—along with other enabling technologies such as electronic document management—has been the catalyst for change in a firm’s basic business processes. In other words, EDI has been the forerunner to business process reengineering (BPR) for those companies.

**Internet Commerce**

To date, EDI has clearly been the dominant domain in e-Business. In fact, a mere decade or so ago, e-Business was basically EDI. The Internet is radically changing the nature of e-Business to the point that in the not-too-distant future, the Internet will become the dominant platform for not only e-Business, but EDI as well. Does this mean EDI is dying? Well, not exactly. Many experts believe EDI is here to stay and currently EDI volume continues to grow at a rate of about 15 percent per year. Still, the Internet shows far more potential growth—primarily from the potential seen in the emerging replacement language for HTML on the Web, XML (eXtensible Markup Language).  

**Internet commerce** is the computer-to-computer exchange of business event data in structured or semi-structured formats via Internet communication that allows the initiation and consummation of business events. In many cases, the goods or services that are contracted for through the Internet are immediately (or soon thereafter) forwarded back to the consumer via the Internet as well (i.e., when the goods or services can be provided in electronic format, such as the case with software and music). Internet commerce radically simplifies e-Business by allowing the organization that is receiving and processing business event data to project template formats across the Internet to business partners for easy data entry and data transmission. For instance, if you connect across the Internet with Lands’ End (a direct merchandiser of clothing) it has what it refers to as the “catalog quick order” form. With this form, you are provided an entry

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8 Carol Sliwa, “Firms Wait on XML, Increase Use of EDI,” *Computerworld Online* (May 1, 2000).
box to key the product number for the item you want to order. The Web page automatically takes the number and identifies what additional information is needed (e.g., for most clothing, it will be size, color, and quantity). The additional information is presented in menu form for you to select from the options that are available (e.g., for color, the menu might show red, navy, black, white, and green). As you enter the responses on your computer, the data are automatically captured and recorded on the Lands’ End computer. Technology Summary 3.4 provides some management, operational, and control issues associated with Internet commerce, while Technology Application 3.3 (page 96) provides some examples of ventures into Internet commerce.

Two primary categories of e-Business exist over the Web: (1) business to consumer, or B2C (e.g., Lands’ End), and (2) business to business (B2B). Internet commerce has traditionally referred to the first category, business to consumer linkage although recently more B2B commerce is taking place over the Internet. Figure 3.7 (page 97) depicts a typical secure Internet commerce arrangement. Follow along with us as we describe the components in the commerce relationship. Note that the numbers in the circles are cross-references to corresponding locations in the narrative description.

**Client-Server Relationship (Circles 1 and 7)**
The connection created between the customer and the vendor is an extended form of client-server applications. The customer (circle 1) is the client node—dictating that during connection, the customer computer environment should be secure and essentially nonaccessible via the network. The vendor (circle 7) is the server node and therefore must have the capability to receive the customer’s transmission and translate that transmission into processable data for use in the vendor’s application programs. This translation is made through common gateway interface (CGI) software. The vendor, acting as the server part of the relationship, then provides the necessary correspondence back to the customer (client) in an understandable format (i.e., Internet-based language). To use the Lands’ End example again, this means that when you place your order, your computer should be nonaccessible (i.e., secure) over the Internet, and the type of computer and software you are using will be unknown on the system. The Lands’ End computer will receive your order and use CGI to translate your message into a form its program can understand and process. Similar to EDI environments, once the business event data have been collected by the vendor, the applications can be completed through any of the modes of business event data processing. For instance, Lands’ End uses a perpetual mode approach to process sales events immediately upon receipt.9

**Network Providers (Circles 2 and 5)**
Much like the examples discussed with EDI, to participate in Internet commerce both parties to the business event must have the capability to communicate. For Internet commerce, this means being connected to the Internet. For many companies and organizations (as well as some individuals), this access will be obtained through a direct connection between the entity’s computer networks (or a single server) and the Internet. For other companies and organizations, as well as the vast majority of individuals, it will be more desirable to gain access through a network provider.

Network providers are companies that provide a link to the Internet by making their directly connected networks available for access by fee-paying customers. From the customer side, this connection is made in Figure 3.7 by using a modem to dial in over

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Benefits of Internet commerce include the following:

- Many organizations have survived by being “forced” to implement Internet commerce to compete in the changing nature of their industry. If they wish to remain competitive with other industry companies that may be taking advantage of the cost savings accruing from use of the Internet for commerce, they may need to venture to the Web.
- Responsiveness to customers’ needs has improved. Increasingly, customers are expecting immediate feedback and easy availability of information and help. The Internet can be a useful tool for servicing customer and client needs—forming the communications medium for distributing information and support services.
- Many organizations have achieved global penetration. The Internet is generally the easiest and least expensive way to reach global customers that an organization may never have been able to reach before. The Internet commerce marketplace is truly global.
- By not reentering data at the organization receiving the electronic transmission, processing costs are reduced and accuracy is improved. Customers now provide most of the data entry themselves, removing the need for the selling organization to key most of the business event data.
- Mailroom and other document preparation and handling costs are eliminated. The business event data processing side of a business can operate with virtually no human intervention until it is time to prepare and deliver goods.
- In the course of implementing Internet commerce, an organization has the opportunity to rethink and redesign existing business processes and controls.

Costs of Internet commerce include:

- Organizational change to a completely different way of doing business.
- Buying equipment and maintaining connection to the Internet (or leasing through a network provider).
- Establishing connections with a new set of customers.
- Staffing and training employees to work in a technology-driven environment.
- Reengineering application systems to process data acquired through the Internet.
- Maintaining security of the Internet site.

Risks of Internet commerce include:

- Hackers attempting to access sensitive information such as customer lists or customer credit card information.
- Denial of service attacks. Denial of service attacks are expected to escalate over the next few years as individuals or organizations attempt to knock out Web sites by overloading them with site visits and preventing customers or other users from gaining access. These attacks may occur simply for the challenge or frequently due to a political or other difference with the organization that hosts the site.
- Trust. Increasingly, the success of B2B Internet commerce relationships necessitate the identification of business partners that are allowed to gain access to sensitive internal information. Trust must be placed with these business partners, but certainly a breakdown of that trust can have grave consequences to the organization making its information available.
PART 1 Understanding Information Systems

phone lines and connect with the network provider’s network (examples of phone connection providers include AOL, MSN, Earthlink, as well as many local phone companies). A variety of alternatives to phone line connections are available for linking with network providers. While phone linkage is the most common contemporary approach, access using high-speed phone connections (DSL) as well as service over cable television lines is quickly overtaking traditional phone connections. Service is also available using mini-satellite dishes (similar to those used for satellite television!), and cellular technologies are also eating into the phone-based market share. Some companies and other organizations are also using high-speed direct lines (referred to as “Trunk Level 1” or T1 lines) to maintain continuous access.

Most network providers bring a host of other benefits along with Internet access. Common benefits include e-mail access, electronic mail boxes, space allocation for personal Web pages, and remote connection to other computer sites (e.g., telnet and FTP connection). Many organizations also will use network providers to run their Internet servers for them, thus hosting their Web presence. In Figure 3.7, circle 5 denotes a network provider that is providing server management services for the CPA or CA firm denoted by circle 6. Hence, when the business event is being completed between the customer and the vendor, information from the accounting firm would be acquired from a server operated by the firm’s network provider.

Technology Application 3.3

General Uses of Internet Commerce

Case 1
One type of business that is particularly compatible with Internet commerce is one where the goods or services can be delivered across the Internet instantaneously, much the same as the payment is provided by the customer. TheStreet.com is one company that has implemented such a business plan. TheStreet.com is in the business of providing financial information that is valuable, unique, and timely. The company philosophy is that if it fails in any of these three attributes for the information it delivers, customers will stop coming. The only appropriate medium for delivery was the Internet, and that is where the company set up shop. Despite the many business publications on the market, TheStreet.com has quickly risen as a leading provider of financial information by being both cheaper and more timely. It is one of the few information providers that have been able to provide subscription service solely through the Internet. This is one form of the so-called Internet cottage industry whereby new businesses are springing up on the net to provide unique services.

Case 2
Wal-Mart is one of many retailers setting up electronic storefronts on the Internet to sell its goods directly to customers. Wal-Mart takes the customer’s order and credit card number over the Internet, electronically processes the business event, and sends the order directly to the manufacturer, who ships the product to the customer. Hence, the company’s Web site becomes little more than a for-fee electronic interface between the customer and the manufacturer. In an effort to broaden the scope of products offered via the Web site, Wal-Mart shut down its site during the fall of 2000 to completely overhaul it. Wal-Mart re-opened the site on October 31, 2000, in hopes of enlarging its share of online Christmas season sales.

Assurance Providers (Circles 4 and 6)
A major concern with participating in Internet commerce for most organizations and individuals has been Internet security. This is the single most critical factor that has hampered the growth of Internet commerce to date. One early survey showed that 90 percent of Internet users felt increased security was necessary before they should transmit personal information (e.g., credit card information) across the Internet.\textsuperscript{10} As security technology has increased, so has the public’s willingness to participate in Internet commerce. A recent survey indicates 52 percent of Internet users feel comfortable providing their credit card numbers to a secure Web site.\textsuperscript{11} Many stories exist about credit card numbers being stolen from Internet computers, including one incident involving the unauthorized access to 8 million accounts!\textsuperscript{12} Additionally, the Internet has spawned a whole array of cottage industries that have no physical store fronts, but rather are operated completely from Internet server-supported Web pages. Many Internet users are rightfully concerned about the possibility that a company may be fictitious, with the electronic store front merely being a means by which to gather credit card and debit

\textsuperscript{11} The 2002 Privacy Values Survey, \url{http://www.theprivacyplace.org}, April 2003.
\textsuperscript{12} “Root of massive credit card theft found,” \url{http://www.cnn.com}, February 20, 2003.
PART 1 Understanding Information Systems

card information for illicit use. In Chapter 9, you will be introduced to technologies such as encryption and SSL that provide organizations and their customers a protected environment in which to transact business.

Concerns over security have spurred the development of a new line of business—Internet assurance services. **Internet assurance** is a service provided for a fee to vendors in order to provide limited assurance to users of the vendor’s Web site that the site is in fact reliable and event data security is reasonable. Technology Application 3.4 provides a more detailed discussion of Internet certification programs and assurance services.

### Technology Application 3.4

#### Internet Security Certification

**Case 1: WebTrust Certification**

WebTrust Seal of Assurance is the product of a joint venture between the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA). It is designed to provide comfort and assurance that a Web site is reasonably safe for users participating in business-to-consumer Internet commerce. Upon receiving an unqualified opinion from an accounting practitioner, a seal is placed on the client’s Web page. A user of the Web page can click on the seal to receive verification of the rights for the symbol to be displayed on the given Web page. If a user selects the link provided with the seal, he or she can view the practitioners’ actual report on the client’s Web site. The WebTrust seal provides assurances that a CA or CPA has evaluated the business practices and controls of the given client to determine whether its Web page is in accordance with WebTrust criteria. Once a site receives WebTrust certification, it should be reviewed periodically by the practitioner to assure adequate standards have remained in place and the site remains reasonably secure. Basically, a Web site must meet the following principles:

- **Security.** The system is protected against unauthorized access (both physical and logical).
- **Availability.** The system is available for operation and use as committed or agreed.
- **Processing integrity.** System processing is complete, accurate, timely, and authorized.
- **Online privacy.** Personal information obtained as a result of e-Business is collected, used, disclosed, and retained as committed or agreed.
- **Confidentiality.** Information designated as confidential is protected as committed or agreed.

**Case 2: TruSecure Certification**

As the AICPA/CICA has moved forward on recommendations for alternative areas beyond financial statement audits for which CPAs/CAs could provide assurance services, they have often noted that these other areas would not be protected from competition by non-CPA organizations. Web certification is certainly one of these areas where non-CPA competition already exists. TruSecure Certification is designed to provide reduced risk to both the customer and the vendor by providing, verifying, and improving the use of appropriate security standards. The TruSecure standards revolve around six primary concerns: electronic threats and vulnerabilities, malicious code, privacy, human factors, physical environment, and downtime, standards that overlap with the goals and objectives to the WebTrust certification. Similar to WebTrust, TruSecure certification is also displayed through a seal, the TruSecure Certified Seal, placed on the client’s Web page.

In Figure 3.7 (page 97) we demonstrate how one common type of assurance provider operates using the WebTrust program as discussed in Technology Application 3.4. The vendor (circle 7) will display the WebTrust certification seal and a reference to the assurance provider on its server Web page. When the customer accesses the vendor’s Web page, he or she can click on the WebTrust symbol to determine that it continues to be applicable. Clicking on the WebTrust symbol executes a link to the VeriSign server (circle 4) for verification of the authorized use of the symbol. VeriSign, which simply operates as a verification company, will verify the symbol’s appropriate use by sending a message to the customer (circle 1). The customer also can get a report on the level of assurance provided with the certification by clicking on the Web link (contained on the vendor’s Web page) for the accounting firm. Clicking on this link will connect the customer with the accounting firm’s (circle 6) server—provided by its network provider in this case (circle 5)—and the auditor’s Internet assurance report for the vendor will be displayed on the customer’s computer (circle 1).

In addition to concerns regarding event data, many customers have apprehensions over the protection and use of their personal information. To address this issue, the AICPA/CICA Privacy Framework has recently been issued. The framework includes the AICPA/CICA Trust Services Privacy Principle and Criteria to be used in all assurance engagements.

Internet Connection (Circle 3)
We briefly note here how the Internet connection is provided between two or more entities. The network diagram displayed at circle 3 pictorially presents a representation of how the Internet operates. First, you must have a link to one of the network providers that are connected to the Internet (as discussed earlier). The client machine provides an Internet address indicating the Internet site with which the client wants to connect. A connection is then made between the client and the desired site—the server. This connection is made by working a path between the network provider (circle 2) and the server connection (circle 7). The path chosen will differ from one time to the next based on what links in the Internet may not be working at a given time and based on how busy the “traffic” is on various network connections between the client and the server. The amount of “traffic” also influences the speed of connection and is the reason why the Internet is slower than at other times.

A couple of other issues related to the organization of the Internet and its impact on such commerce should be noted. First, by the nature of the Internet being a “public network-based infrastructure,” it has greatly leveled the field in e-Business. With traditional EDI, only fairly large businesses could afford the communications hardware and software to effectively use e-Business as a competitive weapon. The creation of a public network and the subsequent creation of relatively inexpensive (or even free) software for using the network have brought the costs of e-Business within the threshold of economic feasibility for most small- and medium-sized entities. This change in cost structure and ease of use are the two forces driving the strong growth in Internet commerce.

The other phenomenon that has arisen from the new economic feasibility of e-Business is an explosion in cottage industries and electronic store fronts. These cottage industries that have sprung up to support Internet commerce include companies that provide one or more of the following: Internet access, Web page development, interface software for linking between Web pages and application programs, e-mail, and related goods and services. Electronic store fronts represent the creation of Internet-located
resources for displaying goods and services for sale and for conducting related sales events. For many emerging small companies, these electronic store fronts are the only store fronts and no sales staff or physical store fronts need to be maintained. Even better, you can run your operation from that ski chalet in Vermont or the beach condominium in Florida regardless of where your potential customers live. Further, the world is now your marketplace!

Other Internet Uses for E-Business
Before leaving this chapter on e-Business, we should discuss other ways in which the Internet is being used to support commerce. While we have focused in this chapter on the most common forms of Internet commerce and the direct linkages between customer and vendor, a number of intermediaries are evolving that promise to reduce costs for organizations. The two forms that seem most likely to have long-term success are auction markets and market exchanges. These are explained in greater detail in Technology Summaries 3.5 and 3.6.

The Internet is not only a place for completing sales, but is also an environment for improving customer support for non-Internet-based commerce. Probably the biggest use for the Internet at this point in time is to support the providing of goods and services for customers. In its simplest form, a Web page may simply be one more venue in which to advertise and market an organization’s goods and services. At the next level, it may be an arena for providing ongoing customer support. For instance, Symantec is one of many companies that provide software upgrades over the Internet—in this case, providing monthly updates for their anti-virus software. For many courier companies (such as Federal Express), the Internet has become a means for allowing customers to instantly access information to track their packages at any given point and to know when they have reached their destination. These latter examples of customer support have become a huge new market for major software vendors. These systems fall under the broader category of customer relationship management (CRM) and customer self-service (CSS) systems, both introduced in Chapter 2. These systems provide customer self-service capabilities (i.e., let the customer inspect his or her account or get product help through a Web interface rather than through interaction with a support person), electronic catalogues, and shipment update information. They aid the salesperson by storing an ana-

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**Technology Summary 3.5**

**Internet Auction Markets**

Internet auction markets provide an Internet base for companies to place products up for bid or for buyers to put proposed purchases up for bid. In the first case, a scenario common to the eBay exchange, a market participant puts an item up for bid, sets a minimum bid price, and awaits completion of the bidding process. While this market is fairly successful for business-to-consumer Internet commerce, it is not so effective for business-to-business Internet commerce. For business-to-business Internet commerce, a company may put specifications for a product out on the marketplace as a request for proposals (RFPs). Participating organizations in the market can then bid on the sales by providing a proposal that includes details on product specifications, costs, availability (i.e., timing of delivery), and logistics. The buying organization can then select the proposal that seems most desirable for meeting the organization’s needs at a minimal cost and risk.
lyzable history of the customer and the customer’s past business interactions. One of the bigger challenges has been to get the CRM systems to interact with the ERP system to share data between the two systems and enhance the power and capability. In an effort to improve the integration, all the major software firms are involved in initiatives to further empower CRM extensions to their ERP systems.

**SUMMARY**

The future of e-Business will see an increased merging of technologies as the lines between EDI and Internet commerce become less defined. The major impediment to most organizations (and individuals) conducting business over the Internet is the concern about security. However, advances in Internet security have been significant in the past few years, with the potential major beneficiaries of Internet commerce pushing the charge. For instance, software companies such as Microsoft and Netscape along with financial providers MasterCard and Visa have been on the forefront of development efforts to assure safe use of the Internet in commerce.

The evolution of EDI practices toward the Internet will initially be facilitated by increased use of corporate extranets. Moving EDI applications to an extranet environment can help simplify the processing while maintaining higher levels of control and security. These extranets will be open to business partners using programs that limit access to selected business partners—hence the corporate networks will not be accessible by unintended Internet users. As Internet security increases, extranets will lose their appeal and...
the Internet will increasingly become a viable alternative as the communication infrastructure of choice.

These same increases in security will help fuel the growth of Internet commerce. As Internet commerce becomes an increasingly acceptable way of doing business, companies will experience newfound opportunities for reaching customers; for many companies, a new globalization of their customer base will occur. On the other hand, new competition also will arise from distant companies that now have access to the same customers.

Entering the e-Business domain is not simply a matter of switching on the connection. E-Business is nothing less than a fundamental change in the way organizations do business and, as such, is a driver of organizational change. To succeed in an e-Business environment, an organization must recognize the need to embrace change and must effectively plan and manage change. Management must take a proactive stance and lead the change.

It is thought to be an ancient curse to wish upon someone “may you live in interesting times.” We are certainly not wishing this upon you, but the reality is that we are all living in interesting times. Success will rely heavily on your understanding of how to manage and control change. In Chapters 7 through 9 you will learn about ways in which to implement and maintain effective organizational and information systems control structures. While these are interesting times, they are also exciting times.

**REVIEW QUESTIONS**

**RQ 3-1** Briefly define e-Business.

**RQ 3-2** Explain the relationship between the periodic mode and batch processing.

**RQ 3-3** List and describe the four basic subprocesses completed in processing business event data using batch processing.

**RQ 3-4** Explain how the use of online transaction entry (OLTE) can increase efficiency when using batch processing.

**RQ 3-5** Explain the relationship between online real-time (OLRT) and immediate mode processing.

**RQ 3-6** List and describe the three basic subprocesses completed in processing business event data using online real-time processing.

**RQ 3-7** How does the use of online transaction processing (OLTP) improve the timeliness of online real-time processing?

**RQ 3-8** Describe how technology has supported Amazon.com’s growth.

**RQ 3-9** Explain the concept of Internet assurance services.

**RQ 3-10** Explain the difference between wide area networks and local area networks.

**RQ 3-11** How can e-mail be adapted to a more structured form to aid in capturing business event data?

**RQ 3-12** Explain the advantages of using electronic document management rather than traditional paper-based document systems.

**RQ 3-13** Explain how electronic data interchange is used to link two companies’ business processes together.

**RQ 3-14** Explain how value-added networks (VANs) are used to simplify electronic data interchange between two or more companies.
RQ 3-15 How does Internet commerce simplify the world of e-Business?
RQ 3-16 What role do network providers play in the Internet commerce environment?
RQ 3-17 What types of assurances are provided by Internet assurance services?

**Discussion Questions**

**DQ 3-1** The business environment is increasingly demanding the use of online real-time systems for more up-to-date information. Identify one business process, and the environment in which it would be used, as an example of why immediate mode processing is so critical. Be prepared to explain your answer to the class.

**DQ 3-2** Consider your favorite fast food chain restaurant. How do you think this restaurant might use online transaction entry to improve its business event data processing activities? Explain.

**DQ 3-3** We noted during the chapter discussion that banks are one of the earliest adopters of online transaction processing systems. Discuss why OLTP would be desirable for use in ATM systems.

**DQ 3-4** How could (and/or is) your university bookstore use technology to improve customer interactions with students, faculty, and staff?

**DQ 3-5** What do you perceive to be the advantages and disadvantages of conducting business on the Internet? Be prepared to explain your answer.

**DQ 3-6** Why has the Internet caused such an explosion in e-Business when electronic data interchange has been available for decades?

**DQ 3-7** One of Amazon.com’s marketing strengths is the ability to collect and analyze customer purchase data. How does this add value to the company? From the customer’s perspective, is value added?

**DQ 3-8** Some potential e-Business customers have security concerns regarding online purchases. How do Internet security certifications attempt to address these concerns?

**Problems**

**P 3-1** Find a merchandising business on the Internet (other than the Lands’ End or Amazon.com examples used in this chapter). Explore its Web page and how the order processing system works.

a. Is there any information provided on how secure the Web page is? What level of comfort do you feel with its security? Explain.

b. Does the business provide information regarding delivery time/stockouts on purchases?

c. What methods of payment does it accept?

d. Analyze the design of the Web page in terms of usability and completeness of information content. Write a brief critique of your company’s page.
P 3-2  Think about a business you might want to start on the Internet using e-mail to communicate with customers and capture business data. Explain why e-mail would be a good approach for your business. Draft a brief business plan evaluating the advantages and disadvantages of e-mail-based commerce in your business, and how you plan to get your business rolling (your professor will tell you how long the report should be).

P 3-3  Identify a business venture that you believe could be successful using only Internet commerce. Explain how you would design your Web page, how you would capture business event data, and the mode of processing you would use. Provide a report detailing support for your design decisions (your professor will tell you how long the report should be).

P 3-4  Develop a research paper on the emerging use of the Internet to support electronic data interchange (EDI) between companies. Your paper should consider how companies set up communications over the Internet to maintain the same security and standardization that are achieved using value-added networks for non-Internet EDI (your professor will tell you how long the paper should be).

P 3-5  Explain how electronic document management could be used in your accounting information systems class to eliminate all paper flow between the students and professor. Include in your explanation what technologies would be necessary to facilitate your plan (your professor will tell you how long the paper should be).

P 3-6  Using the Internet, find and describe an Internet market exchange or Internet auction market. Your discussion should include the products and/or services available and the type buyers and sellers you expect to participate. If you choose a private market, also identify the owner/sponsor of the exchange.

P 3-7  Use the Internet to locate http://www.cia.gov and http://www.Amazon.com. Find the privacy and security policies for each. Compare and contrast the use of privacy statements, encryption, SSL, and cookie policies.

**KEY TERMS**

- electronic business (e-Business)
- periodic mode
- batch processing
- offline
- online transaction entry (OLTE)
- online
- online real-time (OLRT) systems
- immediate mode
- online transaction processing (OLTP)

- client server technology
- local area networks (LANs)
- wide area networks (WANs)
- Internet
- Web browsers
- extranet
- electronic mail (e-mail)
- public database service
- electronic document management (EDM)

- electronic data interchange (EDI)
- value-added network (VAN)
- Internet commerce
- network providers
- Internet assurance
- electronic store fronts
- Internet auction markets
- Internet market exchanges