MIS

Management Information Systems

***SYSTEM CONCEPTS***

*A system can be simply defined as a group of interrelated or*

*interacting elements forming a unified whole. Many examples of*

*systems can be found in the physical and biological sciences, in*

*modern technology, and in human society. Thus, we can talk of*

*the physical system of the sun and its planets, the biological*

*system of the human body, the technological system of an oil*

*refinery,*

*and*

*the*

*socioeconomic*

*system*

*of*

*a*

*business*

*organization.*

*A system is a group of interrelated components working*

*together toward a common goal by accepting inputs and*

*producing outputs in an organized transformation process. Such a*

*system (sometimes called a* dynamic system*) has three basic*

*interacting components or functions:*





***Input*** *involves capturing and assembling elements that*

*enter the system to be processed. For example, raw*

*materials, energy, data, and human efforts must be*

*secured and organized for processing.*

***Processing*** *involves transformation process that convert*

*input into output. Examples are a manufacturing process,*

*the*

*human*

*breathing*

*process,*

*or*

*mathematical*

*calculations.*

***1***



***Output*** *involves transferring elements that have been*

*produced by a transformation process to their ultimate*

*destination.*

*For*

*example,*

*finished*

*products,*

*human*

*services,*

*and*

*management*

*information*

*must*

*be*

*transmitted to their human users.*

***Example***

*A manufacturing system accepts raw materials as input and*

*produces finished goods as output. An information system also is*

*a system that accepts resources (data) as input and process them*

*into products (information) as output.*

***2***

***FEEDBACK AND CONTROL***

*A*

*system*

*with*

*feedback*

*and*

*control*

*components*

*is*

*sometimes called a* cybernetic system, *that is, a self-monitoring,*

*self-regulating system.*





***Feedback*** *is data about the performance of a system. For*

*example, data about sales performance is feedback to a*

*sales manager.*

***Control*** *involves monitoring and evaluating feedback to*

*determine whether a system is moving toward the*

*achievement of its goal. The control function then makes*

*necessary adjustments to a system’s input and processing*

*components to ensure that it produces proper output. For*

*example, a sales manager exercises control when he or*

*she reassigns salespersons to new sales territories after*

*evaluating feedback about their sales performance.*

*Feedback is frequently included as part of the concept of the*

*control function because it is such a necessary part of its*

*operation.*

***Example***

*A familiar example of a self-monitoring, self-regulating*

*system is the thermostat controlled heating system found in*

*many homes; it automatically monitors and regulates itself to*

*maintain a desired temperature. Another example is the human*

*body,*

*which*

*can*

*be*

*regarded*

*as*

*cybernetic*

*system*

*that*

*automatically monitors and adjusts many of its functions, such as*

*temperature, heartbeat, and breathing.*

***OTHER SYSTEM CHARACTERISTICS***

*A system does not exist in a vacuum; rather, it exists and*

*functions in and* environment *containing other systems. If a*

*system is one of the components of a larger system, it is a*

subsystem, *and the larger system in environment. Also, its*

*environment. Also, its* system boundary *separates a system from*

*its environment and other systems.*

***Example***

*Organizations such as businesses and government agencies*

*are good examples of the systems in society, which is their*

*environment. Society contains a multitude of such systems,*

*including individuals and their social, political, and economic*

*institutions.*

*Organizations*

*themselves*

*consist*

*of*

*many*

*subsystems, such as departments, divisions, process teams, and*

*other workgroups. Organizations are examples of open systems*

*because they interface and interact with other systems in their*

*environment. Finally, organizations are examples of adaptive*

***4***

*systems, since they can modify themselves to meet the demands*

*of a changing environment.*

***COMPONENTS OF AN INFORMATION SYSTEM***

*An information system is a system that accepts data*

*resources as input and processes them into information products*

*as output.*

*An information system depends on the resources of people*

*(end users and IS specialists), hardware (machines and media),*

*software (programs and procedures), data (data and knowledge*

*basis), and networks (communications media and network*

*support) to perform input, processing, output, storage, and*

*control activities that convert data resources into information*

*products.*

*This information system model highlights the relationships*

*among the components and activities of information systems. It*

*provides a framework that emphasizes four major concepts that*

*can be applied to all types of information systems:*

 *People, hardware, software, data, and networks are the*

*five basic resources of information systems.*

 *People resources include end users and IS specialists,*

*hardware resources consist of machines and media,*

*software*

*resources*

*include*

*both*

*programs*

*and*

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*procedures,*

*data*

*resources*

*can*

*include*

*data*

*and*

*knowledge*

*bases,*

*and*

*network*

*resources*

*include*

*communications media and networks.*

 *Data resources are transformed by information processing*

*activities into a variety of information products for end*

*users.*

 *Information processing consists of input, processing,*

*output, storage, and control activities.*

***INFORMATION SYSTEM RESOURCES***

***(i)***

***PEOPLE RESOURCES***

*People are required for the operation of all information*

*systems. These people resources include end users and*

*IS specialists.*





***End users*** *(also called users or clients) are people*

*who use an information system or the information it*

*produces. They can be accountants, salespersons,*

*engineers, clerks, customers, or managers. Most of*

*us are information system end users.*

***IS Specialists*** *are people who develop and operate*

*information systems. They include systems analysts,*

*programmers,*

*computer*

*operators,*

*and*

*other*

*managerial technical, and clerical IS personnel.*

*Briefly, systems analysts design information systems*

*based on the information requirements of end uses,*

*programmers prepare computer programs based on*

*the specifications of systems analysts, and computer*

*operators operate large computer systems.*

***(ii) HARDWARE RESOURCES***

*The concept of* ***Hardware resources*** *includes all*

*physical devices and materials used in information*

*processing. Specially, it includes not only* ***machines,***

*such as computers and other equipment, but also all*

*data* ***media,*** *that is, all tangible objects on which data*

*is recorded, from sheets of paper to magnetic disks.*

*Example of hardware in computer-based information*

*systems are:*



***Computer***

***systems,***

*which*

*consist*

*of*

*central*

*processing units containing microprocessors, and*

*variety*

*of*

*interconnected*

*peripheral*

*devices.*

*Examples are microcomputer systems, midrange*

*computer systems, and large mainframe computer*

*systems.*



***Computer peripherals,*** *which are devices such as*

*a keyboard or electronic mouse for input of data and*

***7***

*commands, a video screen or printer for output of*

*information, and magnetic or opticaldisks for*

*storage of data resources.*

***(iii) SOFTWARE RESOURCES***

*The concept of* ***Software Resources*** *includes all sets*

*of information processing instructions. This generic*

*concept of software includes not only the sets of*

*operating instructions called* ***programs,*** *which direct*

*and control computer hardware, but also the sets of*

*information processing instructions needed by people,*

*called* ***procedures****.*

*It is important to understand that even information*

*systems that don’t use computers have a software*

*resource*

*component.*

*This*

*is*

*true*

*even*

*for*

*the*

*information systems of ancient times, or the manual*

*and machine-supported information systems still used*

*in the world today. They all require software resources*

*in the form of information processing instructions and*

*procedures in order to properly capture, process, and*

*disseminate information to their users.*

*The following are the examples of software resources:*

***8***





***System Software,*** *such as an operating system*

*program, which con controls and supports the*

*operations of a computer system.*

***Application Software,*** *which are programs that*

*direct processing for a particular use of computers*

*by*

*end*

*users.*

*Examples*

*are*

*a*

*sales*

*analysis*

*program, a payroll program, and a work processing*

*program.*



***Procedures,*** *which are operating instructions for*

*the people who will use an information system.*

*Examples are instructions for filling out a paper form*

*or using a software package.*

***(iv) DATA RESOURCES***

*Data is more than the raw material of information*

*systems. The concept of data resources has been*

*broadened by managers and information systems*

*professionals. They realize that data constitutes a*

*valuable organization resource. Thus, you should view*

*data*

*as*

*data*

*resources*

*that*

*must*

*be*

*managed*

*effectively to benefit all end users in an organization.*

*Data*

*can*

*take*

*many*

*forms,*

*including*

*traditional*

*alphanumeric*

*data,*

*composed*

*of*

*numbers*

*and*

*alphabetical*

*and*

*other*

*characters*

*that*

*describe*

***9***

*business transactions and other events and entities.*

*Text data, consisting of sentences and paragraphs used*

*in written communications; image data, such as graphic*

*shapes and figures; and audio data, the human voice*

*and other sounds, are also important forms of data.*

*The data resources of information systems are typically*

*organized into:*

 *Database that hold processed and organized data.*

 *Knowledge bases that hold knowledge in variety of*

*forms such as facts, rules, and case examples about*

*successful business practices.*

*For*

*example,*

*data*

*about*

*sales*

*transactions*

*may*

*be*

*accumulated and stored in a sales database for subsequent*

*processing that yields daily, weekly, and monthly sales analysis*

*reports*

*for*

*management.*

*Knowledge*

*bases*

*are*

*used*

*by*

*knowledge management systems and expert systems to share*

*knowledge and give expert advice on specific subjects.*

***DATA VERSUS INFORMATION***

*The word data is the plural of datum, though data commonly*

*represents both singular and plural forms. Data are raw facts or*

*observations, typically about physical phenomena or business*

*transactions. For example, a spacecraft launch or the sale of an*

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*automobile would generate a lot of data describing those events.*

*More specifically, data are objective measurements of the*

*attributes (the characteristics) of entities (such as people, places,*

*things, and events).*

***Example***

*A spacecraft launch generates vast amounts of data.*

*Electronic transmissions of data (telemetry) form thousands of*

*sensors are converted to numeric and text data by computers.*

*Voice and image data are also captured through video and radio*

*monitoring of the launch by mission controllers. Of course, buying*

*a car or an airline ticket also produces a lot of data. Just think of*

*the hundreds of facts needed to describe the characteristics of*

*the car you want and its financing, or the details for even the*

*simplest airline reservation.*

*Peoples*

*often*

*use*

*the*

*terms*

*data*

*and*

*information*

*interchangeably. However, it is better to view data as raw*

*material resources that are processed into finished information*

*products. Then we can define* ***information*** *as data that have*

*been converted into a meaningful and useful context for specific*

*end users. Thus, data are usually subjected to a value-added*

*process (we call data processing or information processing) where*

*(1) its form is aggregated, manipulated, and organized; (2) its*

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*content is analyzed and view information as processed data*

*placed in a context for human user. So you should view*

*information as processed data placed in a context that gives it*

*value for specific end users.*

***Example***

*Names, quantities, and dollar amounts recorded on sales*

*forms represent data about sales transactions. However, a sales*

*manager may not regard these as information. Only after such*

*facts are properly organized and manipulated can meaningful*

*sales information be furnished, specifying, for example, the*

*amount of sales by product type, sales territory, or sales persons.*

***NETWORK RESOURCES***

*Telecommunications networks like the Internet, intranets,*

*and extranets have become essential to the successful operations*

*of all types of organizations and their computer-based information*

*systems. Telecommunications networks consist of computers,*

*communications processors, and other devices interconnected by*

*communications*

*media*

*and*

*controlled*

*by*

*communications*

*software. The concept of* ***Network resources*** *emphasizes that*

*communications*

*networks*

*are*

*a*

*fundamental*

*resource*

*component of all information systems. Network resources include:*

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 ***Communication media,*** *Examples include twisted pair*

*wire, coaxial cable, fiber-optic cable, microwave systems,*

*and communication satellite systems.*

 ***Network Support,*** *This generic category includes all of*

*the people, hardware, software, and data resources that*

*directly*

*support*

*the*

*operation*

*and*

*use*

*of*

*a*

*communications*

*network.*

*Examples*

*include*

*communications*

*control*

*software*

*such*

*as*

*network*

*operating systems and Internet packages.*

***INFORMATION SYSTEM ACTIVITIES***

*You should be able to recognize input, processing, output,*

*storage and control activities taking place in any information*

*system you are studying.*

***(i)***

***INPUT OF DATA RESOURCE***

*Data about business transactions and other events*

*must be captured and prepared for processing by the*

*input activity. Input typically takes the form of* **data**

**entry** *activities such as recording and editing. End*

*uses typically record data about transactions on some*

*type of physical medium such as paper form, or enter it*

*directly into a computer system. This usually includes a*

*variety of editing activities to ensure that they have*

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*recorded data correctly. Once entered, data may be*

*transferred onto a machine-readable medium such as a*

*magnetic disk until needed for processing.*

*For example, data about sales transactions can be*

*recorded on source documents such as paper sales*

*order forms. (A source document is the original formal*

*record of a transaction). Alternately, salespersons can*

*capture sales data using computer keyboards or optical*

*scanning devices; they are visually prompted to enter*

*data correctly by video displays. This provides them*

*with a more convenient and efficient* ***user interface,***

*that is, methods of end user input and output with a*

*computer system. Methods such as optical scanning*

*and displays of menus, prompts, and fill-in-the-blanks*

*formats make it easier for end users to enter data*

*correctly into an information system.*

***(ii) PROCESSING OF DATA INTO INFORMATION***

*Data is typically subjected to processing activities such*

*as calculating, comparing, sorting, classifying, and*

*summarizing. These activities organize, analyze and*

*manipulate data, thus converting them into information*

*for end users. The quality of any data stored in an*

*information system must also be maintained by a*

*continual process of correcting and updating activities.*

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*For example, data received about a purchase can be*

*(1) added to a running total of sales results, (2)*

*compared to a standard to determine eligibility for a*

*sales discount, (3) sorted in numerical order based on*

*product*

*identification*

*numbers,*

*(4)*

*classified*

*into*

*product categories (such as food and nonfood items),*

*(5) summarized to provide a sales manager with*

*information about various product categories, and*

*finally, (6) used to update sales records.*

***(iii) OUTPUT OF INFORMATION PRODUCTS***

*Information in various forms is transmitted to end-users*

*and made available to them in the output activity. The*

*goal of information systems is the production of*

*appropriate*

*information*

*products*

*for*

*end*

*users.*

*Common*

*information*

*products*

*messages,*

*reports,*

*forms, and graphic images, which may be provided by*

*video displays, audio responses, paper products, and*

*multimedia. For example, a sales manager may view a*

*video display to check on the performance of a*

*salesperson,*

*accept*

*a*

*computer-produced*

*voice*

*message by telephone, and receive a printout of*

*monthly sales results.*

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***(iv) STORAGE OF DATA RESOURCE***

*Storage is a basic system component of information*

*systems. Storage is the information system activity in*

*which*

*data*

*and*

*information*

*are*

*retained*

*in*

*an*

*organized manner for later use. For example, just as*

*written*

*text*

*material*

*is*

*organized*

*into*

*words,*

*sentences, paragraphs, and documents, stored data is*

*commonly organized into fields, records, files, and*

*database. This facilitates its later use in processing or*

*its retrieval as output when needed by users of a*

*system.*

***(v)***

***CONTROL OF SYSTEM PERFORMANCE***

*An important information system activity is the control*

*of its performance. An information system should*

*produce feedback about its input, processing, output,*

*and the system is meeting established performance*

*standards. Then appropriate system activities must be*

*adjusted so that proper information products are*

*produced for end users.*

*For example, a manager may discover that subtotals of*

*sales amounts in a sales report do not add up to total*

*sales. This might mean that data entry or processing*

*procedures need to be corrected. Then changes would*

*have to be made to ensure that all sales transactions*

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*would be properly captured and processed by a sales*

*information system.*

***RECOGNIZING INFORMATION SYSTEM***

*There are many kinds of information systems in the real*

*world. All of them use hardware, software, network, and people*

*resources to transform data resources into information products.*

*Some are simple manual information systems, where people use*

*simple tools such as pencils and paper, or even machines such as*

*calculators*

*and*

*typewriters.*

*Others*

*are*

*computer*

*based*

*information systems that rely on a variety of networked computer*

*systems to accomplish their information processing activities.*

*As business end user, you should be able to recognize the*

*fundamental components of information systems you encounter*

*in the real world. This means that you should be able to identify:*

 *The people, hardware, software, data, and network*

*resources they use.*

 *The type of information products they produce.*

 *The way they perform input, processing, output, storage*

*and control activities.*

 *How they support the business operations, managerial*

*decision-making, or competitive advantage of a business.*

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*This kind of understanding will help you be a better*

*user, developer, and manager of information system.*

***THE EXPANDING ROLES OF INFORMATION SYSTEM***

*You will also see that the roles given to the information*

*systems functions have expand significantly over the years.*

***TRENDS INFORMATION SYSTEMS***

*Until the 1990s, the role of information systems was simple,*

*transaction processing, record-keeping, accounting, and other*

*electronic data processing (EDP) applications. Then another role*

*was added, as the concept of management information system*

*(MIS) was conceived. This new role focused on providing*

*managerial end users with predefined management reports that*

*would give managers the information they needed for decision-*

*making purposes.*

*By the 1970s, it was evident that the pre-specified*

*information products produced by such management information*

*systems were not adequately meeting many of the (DSS) was*

*born. The new role for information systems was to provide*

*managerial end users with ad hoc and interactive support of their*

*decision-making processes.*

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*In the 1980s, several new roles for information systems*

*appeared.*

*First,*

*the*

*rapid*

*development*

*of*

*microcomputer*

*processing*

*power,*

*application*

*software*

*packages,*

*and*

*telecommunications networks give birth to the phenomenon of*

*end user computing. Now, end users can use their own computing*

*resources to support their job requirements instead of waiting for*

*the*

*indirect*

*support*

*of*

*corporate*

*information*

*services*

*departments.*

*Second,*

*it*

*became*

*evident*

*that*

*most*

*top*

*corporate*

*executives did not directly use either the reports of information*

*reporting systems or the analytical modeling capabilities of*

*decision*

*support*

*systems,*

*so*

*the*

*concept*

*of*

*executive*

*information systems (EIS) was developed. These information*

*systems attempt to give top executives an easy way to get the*

*critical information they want, when they want it, tailored to the*

*formats they prefer.*

*Third, breakthrough s occurred in the development and*

*application of artificial intelligence (AI) techniques to business*

*information systems. Expert systems can serve as consultants to*

*users by providing expert advice in limited subject areas.*

*An important new role for information systems appeared in*

*the 1980s and continues into the 1990s. This is the concept of a*

*strategic role for information systems, sometimes called strategic*

*information systems (SIS). In this concept, information technology*

*becomes an integral component of business processes, products,*

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*and services hat help a company gain a competitive advantage in*

*the global marketplace.*

*Finally, the rapid growth of the Internet, intranets, extranets,*

*and other interconnected global networks in the 1990s is*

*dramatically changing the capabilities of information systems in*

*business as we move into the next century. Such enterprise and*

*global internetworking is revolutionizing end user, enterprise, and*

*inter*

*organizational*

*computing,*

*communications,*

*and*

*collaboration*

*that*

*supports*

*the*

*business*

*operations*

*and*

*management of successful global enterprises.*

***TYPES OF INFORMATION SYSTEM***

*Conceptually, information systems in the real world can be*

*classified in several different ways. For example, several types of*

*information systems can be classified conceptually as either*

*operations or management information systems.*

***(i)***

***OPERATIONS SUPPORT SYSTEMS***

*Information systems have always been needed to*

*process data generated by, and used in, business*

*operations. Such operations support systems produce a*

*variety of information products for internal and external*

*use. However, they do not emphasize producing the*

*specific information products that can best be sued by*

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*managers.*

*Further*

*processing*

*by*

*management*

*information systems is usually required. The role of a*

*business firm’s operations support systems is to*

*efficiently*

*process*

*business*

*transactions,*

*control*

*industrial*

*processes,*

*support*

*enterprise*

*communications*

*and*

*collaboration,*

*and*

*update*

*corporate databases.*

***(ii) TRANSACTION PROCESSING SYSTEMS***

*Operations support systems include the major category*

*of transaction processing systems (TPS). Transaction*

*processing systems record and process data resulting*

*fro*

*business*

*transactions.*

*Typically*

*examples*

*are*

*information systems that process sales, purchases, and*

*inventory changes. The results of such processing are*

*sued*

*to*

*update*

*customer,*

*inventory,*

*and*

*other*

*organizational*

*databases.*

*These*

*databases*

*then*

*provide the data resources that can be processed and*

*used by management information systems, decision*

*support systems, and executive information systems.*

*Transaction processing systems process transactions in*

*two basic ways. In batch processing, transactions data*

*is accumulated over a period of time and processed*

*periodically. In real-time (or online) processing, data is*

*processed immediately after a transaction occurs. For*

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*example, point of sale (POS) systems at retail stores*

*may use electronic cash register terminals to capture*

*and transmit sales data over telecommunication links*

*to regional computer centers for immediate (real-time)*

*or nightly (batch) processing.*

***(iii) PROCESS CONTROL SYSTEMS***

*Operation support systems also make routine decisions*

*that*

*control*

*operational*

*processes.*

*Examples*

*are*

*automatic inventory reorder decisions and production*

*control*

*decisions.*

*This*

*includes*

*a*

*category*

*of*

*information systems called process control systems, in*

*which decisions adjusting a physical production process*

*are automatically made by computers. For example, a*

*petroleum refiner uses electronic sensors linked to*

*computers to continually monitor chemical processes.*

*The computers monitor a chemical process, capture*

*and process data detected by sensors, and make*

*instant (real-time) adjustments to appropriate refinery*

*processes.*

***(iv) ENTERPRISE COLLABORATION SYSTEMS***

*Enterprise*

*collaboration*

*systems*

*are*

*information*

*systems that use a variety of information technologies*

*to help people work together. Enterprise collaboration*

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*systems help us collaborate to communicate ides,*

*share resources, and coordinate our cooperative work*

*efforts as members of the many formal and informal*

*process and project teams and other workgroups that*

*are a vital part of today’s organizations. Thus, the goal*

*of*

*enterprise*

*collaboration*

*systems*

*is*

*to*

*use*

*information technology to enhance the productivity and*

*creativity of teams and workgroups in the modern*

*business enterprise.*

***(v)***

***MANAGEMENT SUPPORT SYSTEMS***

*When*

*information*

*systems*

*focus*

*on*

*providing*

*information and support for effective decision making*

*by managers, they are called management support*

*systems.*

***MANAGEMENT INFORMATION SYSTEMS***

*Management information systems (MIS) are the most*

*common form of management support systems. They provide*

*managerial end users with information products that support*

*much of their day-to-day decision-making needs. Management*

*information systems provide a variety of reports and displays to*

*management. The contents of these information products are*

*specified*

*in*

*advance*

*by*

*managers*

*so*

*that*

*they*

*contain*

*information*

*that*

*managers*

*need.*

*Management*

*information*

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*systems retrieve information about internal operations from*

*database that have been updated by transaction processing*

*systems. They also obtain data about the business environment*

*from external source.*

*Information products provided to managers include displays*

*and reports that can be furnished (1) on demand, (2) periodically,*

*according to a predetermined schedule.*

***(i)***

***DECISION SUPPORT SYSTEMS***

*Decision*

*support*

*systems*

*(DSS)*

*are*

*a*

*natural*

*progression from information reporting systems and*

*transaction*

*processing*

*systems.*

*Decision*

*support*

*systems are interactive, computer-based information*

*systems that use decision models and specialized*

*database to assist the decision making process of*

*managerial end users.*

***(ii) EXECUTIVE INFORMATION SYSTEMS***

*Executive information systems (EIS) are management*

*information*

*systems*

*tailored*

*to*

*the*

*strategic*

*information needs of top management. Top executives*

*get the information they need from many sources,*

*including letters, memos, periodicals, and reports*

*produced manually as well as by computer systems.*

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*Other sources of executive information are meetings,*

*telephone calls, and social activities. Thus, much of a*

*top executive’s information comes from non-computer*

*services. Computer generated information ahs not*

*played a primary role in meeting many top executives’*

*information needs.*

***OTHER CLASSIFICATIONS OF INFORMATION SYSTEMS***

***(i)***

***EXPERT SYSTEMS***

*An expert system is a knowledge-based information*

*systems; that is, it uses its knowledge about a specific*

*area to act as an expert consultant to users. The*

*components of an expert system are a knowledge base*

*and software modules that perform inferences on the*

*knowledge and offer answers to a user’s questions.*

*Expert systems are being used in many different fields,*

*including medicine, engineering, the physical sciences,*

*and business. For example, expert systems now help*

*diagnose*

*illnesses,*

*search*

*for*

*minerals,*

*analyze*

*compounds, recommend repairs, and do financial*

*planning. Expert systems can support either operations*

*or management activities.*

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***(ii) KNOWLEDGE MANAGEMENT SYSTEMS***

*Knowledge*

*Management*

*systems*

*(KMS),*

*Workers*

*create,*

*organize,*

*and*

*share*

*important*

*business*

*knowledge wherever and whenever it is needed. For*

*example, many knowledge management systems rely*

*on Internet and intranet Web sites, knowledge bases,*

*and*

*discussion*

*forums*

*as*

*key*

*technologies*

*for*

*gathering,*

*storing,*

*and*

*disseminating*

*business*

*knowledge.*

*In*

*this*

*way,*

*knowledge*

*management*

*systems facilitate organization learning and knowledge*

*creation*

*and*

*dissemination*

*within*

*the*

*business*

*enterprise.*

***(iii) STRATEGIC INFORMATION SYSTEMS***

*The strategic role of information systems involves using*

*information technology to develop products, services,*

*and*

*capabilities*

*that*

*give*

*a*

*company*

*strategic*

*advantages over the competitive forces it faces in the*

*global marketplace. This creates strategic information*

*system, information systems that support or shape the*

*competitive position and strategies of an enterprise. So*

*a strategic information system can be any kind of*

*information systems (TPS, MIS, DSS, etc.) that helps an*

*organization gain a competitive advantage, reduce a*

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*competitive disadvantage, or meet other strategic*

*enterprise objectives.*

***(iv) BUSINESS INFORMATION SYSTEMS***

*As a future managerial end user, it is important for you*

*to realize that information systems directly support*

*both operations and management activities in the*

*business functions of accounting, finance, human*

*resource*

*management,*

*marketing,*

*and*

*operations*

*management. Such business information systems are*

*needed by all business functions.*

*For example, marketing managers need information*

*about sales performance and trends provided by*

*marketing information systems. Financial managers*

*need*

*information*

*concerning*

*financing*

*costs*

*and*

*investment returns provided by financial information*

*systems.*

***(v)***

***INTEGRATED INFORMATION SYSTEM***

*It is also important to realize that information systems*

*in the real world are typically integrated combinations*

*of several types of information systems we have just*

*mentioned. That’s because conceptual classification of*

*information systems are designed to emphasize the*

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*many*

*different*

*roles*

*of*

*information*

*systems.*

*In*

*practice, these roles are integrated into composite or*

*cross-functional information systems that provide a*

*variety of functions. Thus, most information systems*

*are designed to produce information and support*

*decision making for various levels of management and*

*business functions, as well as do record keeping and*

*transaction processing systems.*

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***THE SYSTEMS APPROACH***

*The systems approach to problem solving used a systems*

*orientation to define problems and opportunities and develop*

*solutions. Studying a problem and formulating a solution involve*

*the following interrelated activities:*

*1.*

*2.*

*3.*

*4.*

*5.*

*Recognize and define a problem or opportunity using*

*systems thinking.*

*Develop and evaluate alternative system solutions.*

*Select the system solution that best meets your*

*requirements.*

*Design the selected system solution.*

*Implement and evaluate the success of the designed*

*system.*

***DEFINING PROBLEMS AND OPPORTUNITIES***

*Problems and opportunities are identified in the first step of*

*the systems approach. A problem can be defined as a basic*

*condition that is causing undesirable results. An opportunity is a*

*basic condition that presents the potential for desirable results.*

*Symptoms must be separated from problems. Symptoms are*

*merely signals of an underlying cause or problem.*

***Example***

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*Symptom: Sales of a company’s products are declining.*

*Problem: Sales persons are losing orders because they cannot get*

*current*

*information*

*on*

*product*

*prices*

*and*

*availability.*

*Opportunity: We could increase sales significantly if sales persons*

*could receive instant responses to requests for price quotations*

*and product availability.*

***SYSTEMS THINKING***

*Systems thinking is to try to find systems, subsystems, and*

*components of systems in any situation your are studying. This*

*viewpoint*

*ensures*

*that*

*important*

*factors*

*and*

*their*

*interrelationships are considered. This is also known as using a*

*systems context, or having a systemic view of a situation. I*

*example, the business organization or business process in which*

*a problem or opportunity arises could be viewed as a system of*

*input, processing, output, feedback, and control components.*

*Then to understand a problem and save it, you would determine if*

*these basic system functions are being properly performed.*

***Example***

*The sales function of a business can be viewed as a system.*

*You could then ask: Is poor sales performance (output) caused by*

*inadequate selling effort (input), out-of-date sales procedures*

*(processing),*

*incorrect*

*sales*

*information*

*(feedback),*

*or*

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*inadequate sales management (control)? Figure*

*illustrates this*

*concept.*

*Incorrect*

*Feedback*

*Inadequate*

*Selling*

*Effort*

*Input*

***Poor***

*Sales*

*Out-of-Date*

*Sales*

*Procedure*

*Processing*

*Sales Information?*

*Poor*

*Sales*

*Performance*

*Output*

***DEVELOPING ALTERNATIVE SOLUTIONS***

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*There are usually several different ways to solve any*

*problem or pursue any opportunity. Jumping immediately from*

*problem definition to a single solution is not a good idea. It limits*

*your options and robs you of the chance to consider the*

*advantages and disadvantages of several alternatives. You also*

*lose the chance to combine the best points of several alternative*

*solutions.*

*Where do alternative solutions come from/ experience is*

*good source. The solutions that have worked, or at least been*

*considered in the past, should be considered again. Another good*

*source of solutions is the advice of others, including the*

*recommendations of consultants and the suggestions of expert*

*systems. You should also use your intuition and ingenuity to come*

*up with a number of creative solutions. These could include what*

*you think is an ideal solution. The, more realistic alternatives that*

*recognize the limited financial, personnel, and other resources of*

*most organizations could be developed. Also, decision support*

*software packages can be used to develop and manipulate*

*financial,*

*marketing,*

*and*

*other*

*business*

*operations.*

*This*

*simulation process can help you generate a variety of alternative*

*solutions. Finally, don’t forget that “doing nothing” about a*

*problem or opportunity is a legitimate solution, with its own*

*advantages and disadvantages.*

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***EVALUATING ALTERNATIVE SOLUTIONS***

*Once alternative solutions have been developed, they must*

*be evaluated so that the best solution can be identified. The goal*

*of evaluation is to determine how well each alternative solution*

*meets*

*your*

*business*

*and*

*personal*

*requirements.*

*These*

*requirements are key characteristics and capabilities that you*

*feed are necessary for your personal or business success.*

***Example***

*If you were the sales manager of a company, you might*

*develop very specific requirements for solving the sales-related*

*information problems of your salespeople. You would probably*

*insist that any computer-based solution for your sales force be*

*very reliable and easy to use. You might also require that any*

*proposed solution have low start-up costs, or have minimal*

*operating costs compared to present sales processing methods.*

*Then you would develop evaluation criteria and determine*

*how well each alternative solution meets these criteria. The*

*criteria you develop will reflect how you previously defined*

*business and personal requirements. For example, you will*

*probably develop criteria for such factors as start-up costs,*

*operating costs, ease of use, and reliability.*

*Criteria may be ranked or weighted, based on their*

*importance in meeting your requirements.*

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***SELECTING THE BEST SOLUTION***

*Once all alternative solutions have been evaluated, you can*

*being the process of selecting the best solution. Alternative*

*solutions can be compared to each other because they have been*

*evaluated using the same criteria.*

***Example***

*Alternatives with a low accuracy evaluation (an accuracy*

*score less than 10), or a low overall evaluation (an overall score*

*less than 70) should be rejected.*

*Therefore, alternative B for sales data entry is rejected, and*

*alternative A, the use of laptop computers by sales reps, is*

*selected.*

***DESIGNING AND IMPLEMENTING A SOLUTION***

*Once a solution has been selected, it must be designed and*

*implemented. You may have to depend on other business end*

*users technical staff*

*to help you develop design specifications*

*and an implementation plan. Typically, design specifications*

*might describe the detailed characteristics and capabilities of the*

*people, hardware, software, and data resources and information*

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*system activities needed by a new system. An implementation*

*plan specifies the resources, activities, and timing needed for*

*proper implementation. For example, the following items might*

*be included in the design specifications and implementation plan*

*for a computer-based sales support system:*

 *Types and sources of computer hardware, and software to*

*be acquired for the sales reps.*

 *Operating procedures for the new sales support system.*

 *Training of sales reps and other personnel.*

 *Conversion*

*procedures*

*and*

*timetable*

*for*

*final*

*implementation.*

***POST IMPLEMENTATION REVIEW***

*The final step of the systems approach recognizes that an*

*implemented solution can fail to solve the problem for which it*

*was developed. The real world has a way of confounding even the*

*most*

*well-designed*

*solutions.*

*Therefore,*

*the*

*results*

*of*

*implementing a solution should be monitored and evaluated. This*

*is called a postimple-implemented. The focus of this step is to*

*determine if the implemented solution has indeed helped the firm*

*and selected subsystems meet their system objectives. If not, the*

*systems approach assumes you will cycle back to a previous step*

*and make another attempt to find a workable solution.*

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***THE SYSTEMS DEVELOPMENT CYCLE.***

*When the systems approach to problem solving is applied to*

*the development of information system solutions to business*

*problems, it is called information systems development or*

*application*

*development.*

*Most*

*computer-based*

*information*

*systems are conceived, designed, and implemented using some*

*form of systematic development process. In this process, end*

*users and information specialists design information systems*

*based on an analysis of the information requirements of an*

*organization. Thus, a major part of this process is known as*

*systems analysis and design.*

*Using the systems approach to develop information system*

*solutions involves a multistep process called the information*

*systems*

*development*

*cycle,*

*also*

*know*

*as*

*the*

*systems*

*development life cycle (SDI,C).*

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***Understand the***



***Determine whether a business***

***problem or opportunity exists.***

***Business Problem or***

***Opportunity***

***Systems***

***Investigatio***

***n***



***Conduct a feasibility study to***

***determine whether a new or***

***improved information system is a***

***feasible solution.***

***Develop an***

***Information System***

***Solution***

***Systems***

***Analysis***

***Product***

***Systems***

***Design***







***Analyze the information needs of***

***end users, the organizational***

***environment, and any system***

***presently used.***

***Develop the functional***

***requirements of a system that can***

***Develop specifications for the***

***hardware, software, people,***

***network, and data resources, and***

***the information products that will***

***satisfy the functional requirements***

***of the proposed system.***

***Implement the***

***Information System***

***Solution***

***Systems***

***Implementa***

***tion***







***Acquire (or develop) hardware and***

***software.***

***Test the system, and train people to***

***operate and use it.***

***Convert to the new system.***

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***Systems***

***Maintenanc***

***e***



***Use a post implementation review***

***process to monitor, evaluate, and***

***modify the system as needed.***

***STARTING THE SYSTEMS DEVELOPMENT PROCESS.***

*Do we have business problem (or opportunity)? What is*

*causing the problem? Would a new or improved information*

*system help solve the problem? What would be a feasible*

*information system solution to our problem? These are the*

*questions that have to be answered in the system investigation*

*stage-the first step in the systems development process. This*

*stage may involve consideration of proposals generated by an*

*information systems planning process.*

***FEASIBILITY STUDIES.***

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*The process of developing a major information system can*

*be costly, the systems investigation stage frequently requires a*

*preliminary study called a feasibility study. A feasibility study is a*

*preliminary study which investigates the information needs of*

*prospective users and determines the resource requirements,*

*costs, benefits, and feasibility of proposed project. You would use*

*the methods of gathering information to collect data for a*

*feasibility study. Then you might formalize the findings of this*

*study in written report that includes preliminary specifications*

*and a development plan for the proposed system. If management*

*approves the recommendations of the feasibility study, the*

*development process can continue.*

*The goal of feasibility studies is to evaluate alternative*

*systems and to propose the most feasible and desirable systems*

*for development. The feasibility of a proposed system can be*

*evaluated in terms of four major categories.*

*The focus of organizational feasibility is on how well a*

*proposed information system supports the objectives of the*

*organization and its strategic plan for information systems. For*

*example, projects that do not directly contribute to meeting an*

*organization’s strategic objectives are typically not funded.*

*Economic feasibility is concerned with whether expected cost*

*savings, increased revenue, increased profits, reductions in*

*required investment, and other types of benefits will exceed the*

*costs of developing and operating a proposed system. For*

*example, if a project can’t cover its development costs, it won’t*

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*be approved, unless mandated by government regulations or*

*other considerations.*

*Technical*

*feasibility*

*can*

*be*

*demonstrated*

*if*

*reliable*

*hardware and software capable of meeting the needs of a*

*proposed system can be acquired or development by the*

*business in the required time. Finally, operational feasibility is the*

*willingness*

*and*

*ability*

*of*

*the*

*management,*

*employees,*

*customers, suppliers, and others to operate, use, and support a*

*proposed system. For example, if the software for a new system*

*is too difficult to use, employees may make too many errors and*

*avoid using it. Thus , it would fail to show operational feasibility.*

***Cost/Benefit Analysis.*** *Feasibility studies typically involve*

*cost/benefit analysis. If costs and benefits can be quantified, they*

*are called tangible costs are the costs of hardware and software,*

*employee salaries, and other quantifiable costs needed to*

*develop and implement an IS solution. Intangible costs are*

*difficult to quantity; they included the loss of customer goodwill*

*or employee morale caused by errors and disruptions arising from*

*the installation of a new system.*

***Tangible.***

*Benefits are favorable results, such as the*

*decrease in payroll costs caused by a reduction in personnel or a*

*decrease in inventory carrying costs caused by a reduction in*

*inventory.* ***Intangible benefits*** *are harder to estimate. Such*

*benefits as better customer service or faster and more accurate*

*informations for management fall into this category.*

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***SYSTEMS ANALYSIS.***

*It is an in-depth study of end user information needs that*

*produces functional requirements that are used as the basis for*

*the design of a new information system. Systems analysis*

*traditionally involves a detailed study of:*







*The information needs of the organization and end users*

*like yourself.*

*The activities, resources, and products of any present*

*information systems.*

*The information system capabilities required to meet your*

*information needs, and those of other end users.*

***ORGANIZATIONAL ANALYSIS.***

*An organization analysis is an important first step in systems*

*analysis. How can anyone improve an information system if they*

*know very little about the organizational environment in which*

*that system is located? They can’t. That’s why the members of a*

*development*

*team*

*have*

*to*

*know*

*something*

*about*

*the*

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*organization, its management structure, its people, its business*

*activities, the environmental systems I must deal with, and its*

*current information system. Someone on the team must know*

*this information in more detail for the specific business units or*

*end user workgroups that will be affected by the new or improved*

*information*

*system*

*being*

*proposed.*

*For*

*example,*

*a*

*new*

*inventory control system for a chain of department stores cannot*

*be designed unless someone on a development team knows a*

*lost about the company and the types of business activities that*

*affect its inventory.*

***ANALYSIS OF THE PRESENT SYSTEM.***

*Before you design a new system, it is important to study the*

*system that will be improved or replaced (if there is one). You*

*need to analyze how this system uses hardware, software,*

*network, and people resources to convert data resources, such as*

*transactions data, into information products, such as reports and*

*displays. Then you should document how the information system*

*activities of input, processing, output, storage, and control are*

*accomplished.*

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*For example, you might evaluate the format, timing, volume,*

*and quality of input and output activities. Such user interface*

*activities are vital to effective interaction between end users and*

*computers. Then, in the systems design stage, you can specify*

*what the resources, products, and activities should be to support*

*the user interface in the system you are designing.*

***FUNCTIONAL REQUIREMENTS ANALYSIS.***

*This step of systems analysis is one of the most difficult.*

*Your may need to work as a team with systems analysis and other*

*end users to determine your specific business information needs.*

*For example, you need to determine what type of information*

*your work requires; what its format, volume, and frequency*

*should be; and what response times are necessary. Second, you*

*must try to determine the information processing capabilities*

*required for each system activity (input, processing, output,*

*storage, control) to meet these information needs. Your main goal*

*is to identity what should be done, not bow to do it.*

*Functional*

*requirements*

*are*

*end*

*user*

*information*

*requirements that are not tied to the hardware, software,*

*network, data, and people resources that end users presently use*

*or might use in the new system.*

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***SYSTEMS DESIGN.***

*Systems analysis describes what a system should do to*

*meet the information needs of users. Systems design specifies*

*how the system will accomplish this objective. Systems design*

*consists of design activities that produce system specifications*

*satisfying the functional requirements developed in the systems*

*analysis stage.*

*Systems design consists of three activities: user interface,*

*data, and process design.*

***User Interface Design.*** *The user interface design activity*

*focuses on supporting the interactions between end users and*

*their computer-based applications. Designers concentrate on the*

*design of attractive and efficient forms of user input and output,*

*such as easy-to-use Internet or intranet Web pages. Or they may*

*design methods of converting human-readable documents to*

*machine-readable input, such as optical scanning of business*

*forms.*

*For example, here are some design tips to keep in mind*

*when you are designing a Web site for a business application:*



*Keep it simple. Avoid complex jargon, overwrought*

*explanations, and confusing tangents. Always keep the*

*customer’s point-of-vie in focus. Ask yourself, “What have*

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*they come here to do? “Then design a site that matches*

*the answer.*





*Keep is clean. Image isn’t everything on the Net, but is*

*certainly counts for a lot. A functional Web site should*

*avoid gratuitous displays of techno-tricks that cluter up*

*the site.*

*Organize logically. Go with the three-click rule: It users*

*can’t get to the core of the information they’re looking for*

*in three clicks, they’ll abandon the search.*

***Data Design.***

*The data design activity focuses on the*

*design of the structure of databases and files to be used by*

*proposed information system.*

*The product of data design is detailed descriptions of:-*

o *The attributes or characteristics of the entities (objects,*

*people, places, events) about which the proposed*

*information system needs to maintain information.*

o *The relations these entities have to each other.*

o *The specific data elements (databases, files, records*

*etc.) that need to be maintained for each entity tracked*

*by the information system.*

o *The integrity rules that govern how each data element*

*is specified and used in the information system.*

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***Process Design:***

*The process design activity focuses on*

*the design of software resources, that is the programs and*

*procedures*

*needed*

*by*

*the*

*proposed*

*information*

*systems.*

*Designers concentrate on developing detailed specifications for*

*the software that will have to be purchased or developed by*

*custom programming to meet user interface and data design*

*specification, and the functional requirements developed in the*

*analysis stage.*

*Because of the widespread use of client/server systems,*

*software process design is frequently expressed as a “there-tier”*

*architecture of processing services:*

o ***User Services:***

*Front-end*

*client*

*software*

*that*

*communicates with users through a graphical user*

*interface.*

o ***Application Services:***

*Software*

*modules*

*that*

*enforce*

*business*

*rules,*

*process*

*information,*

*and*

*manage transactions. Application services may reside*

*on the client and server.*

o ***Data Services:***

*Data is made available to the*

*application services software for processing. This is*

*typically*

*accomplished*

*through*

*a*

*database*

*management system.*

***SYSTEM SPECIFICATIONS .***

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***System Specifications:****Formalize*

*the*

*design*

*of*

*an*

*application’s user interface methods and products, database*

*structures, and processing and control procedures. Therefore,*

*systems designers will frequently develop hardware, software,*

*network, data and personnel specifications for a proposed*

*system. Systems analysts work with you so they can use your*

*knowledge of your own work activities and their knowledge of*

*computer bases systems to specify the design of a new of*

*improved information system.*

*The final system design must specify what types of*

*hardware resources (machines and media), software resources*

*(programs and procedure), network resources ( communications*

*media and networks), and [people resources (end users and*

*information systems staff) will be needed. It must specify how*

*such resources will convert data resources (stores in files and*

*databases they design) into information products (displays,*

*responses, reports, and documents). These specification are the*

*final product of the systems design stage.*

o ***User Interface Specifications***

*Use handheld optical scanning wands to automatically*

*capture product data on bar-coded tags. Use data entry*

*screens with key data highlighted for better readability.*

o ***Database Specifications***

*Develop databases that use a relational structure to*

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*organize access to all necessary customers and merchandise*

*data.*

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o ***Software Specifications***

*Develop or acquire a sales processing program that can*

*accept*

*entry*

*of*

*optically*

*scanned*

*bar*

*codes,*

*retried*

*necessary [product data, and compute sales amounts In less*

*than one second. Acquire a rational database management*

*package to manage stores databases.*

o ***Hardware and Network Specifications***

*Install POS terminals at each checkout station connected to*

*a system of network station connected to a system of*

*networked micro computers in each store that are also*

*connected to the corporate headquarters network.*

o ***Personnel Specifications:***

*All hardware and software must be operatable by regular*

*store personnel. IS personnel should be available for*

*hardware and software maintenance as needed.*

***PROTOTYPING.***

*Prototyping is the repaid development and testing of*

*working models, or prototypes, of new applications in an*

*interactive, iterative process can be used by both systems*

*analysts and end users. Prototyping makes the development*

*process faster and easier for systems analysts, especially for*

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*projects where end user requirements are hard to define. Thus,*

*prototyping is sometimes called rapid application design (RAD)*

*Prototyping has also opened up the application development*

*process to end users because it simplifies and accelerates*

*systems design. These developments are changing the roles of*

*end users and information systems specifications in systems*

*development.*

***THE PROTOTYPING PROCESS.***

*Prototyping*

*can*

*be*

*used*

*for*

*both*

*large*

*and*

*small*

*applications. Typically, large systems still require using the*

*traditional systems development approach, but parts of such*

*systems can frequently by prototyped. A [prototype of a business*

*application needed by an end user is developed quickly using a*

*variety of application development packages. The prototype*

*system is then repeatedly refined until it is acceptable to an end*

*user*

*Identify an End*

*User’s Information*

*Requirements*

o ***Investigation/Analysis:*** *End*

*Users identify their information*

*needs and assess the feasibility*

*of several alternative*

*information system solutions*

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o ***Analysis/Design:***

*End users*

*and/or systems analysts use*

*application development*

*Develop*

*Information*

*Revise the*

*Prototypes to*

*Better*

*Use and Maintain*

*the Accepted*

*packages to interactively design*

*and test prototypes of*

*information system components*

*that meet end user information*

*needs.*

o ***Design/Implementation:*** *The*

*information system prototypes*

*are tested, evaluated and*

*modified repeatedly until need*

*users find them acceptable.*

o ***Implementation/Maintenance:***

*The acceptable information*

*system can be modified easily*

*since most system*

*documentations stores on disk.*

*Prototyping is an iterative, interface process that combines*

*steps of the traditional systems development cycle. End users*

*with sufficient experience with application development packages*

*can be prototyping themselves. Alternatively, an end user can*

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*work with a systems analyst to develop a prototype system in a*

*series of interactive sessions. For example, they could be*

*develop, test and refine prototypes of management reports or*

*data entry screens.*

*The Prototype is usually modified several times until the end*

*user finds it acceptable. Any program modules that are not*

*generated by the application development software can then be*

*codes*

*by*

*programmers*

*using*

*conventional*

*programming*

*languages. The final version of the application system is then*

*turned over to the end user for operational use.*

*\** ***Team****. A few end users and IS developers form a team to develop a*

*business application.*

*\** ***Schematic****. The initial prototype schematic design is developed*

*\** ***Prototype****. The schematic is converted into a simple point-and-click*

*prototype using prototyping tools.*

*\** ***Presentation****. A few screens and routine/linkages are presented to users.*

*\** ***Feedback****. After the team gets feedback from users, the prototype is*

*reiterated.*

*\** ***Reiteration****. Further presentations and reiterations are made.*

*\**

***Consultation****. Consultations are held with central IT*

*developers/consultants to identify potential improvements and conformance*

*to existing standards of the organization.*

*\** ***Completion.*** *The prototype is converted into a finished application.*

*\** ***Acceptance.*** *Users review and sign of on their acceptance of the new*

*system.*

*\** ***Installation.*** *The new application software is installed on network servers.*

*Once a new information system has been designed, it must be implemented.*

*Figure 3.27 illustrates that the systems implementation stage involves*

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*hardware and software acquisition, software development, testing of*

*programme and procedures, development of documentation, and a variety*

*of installation activities. It also involves the education and training of end*

*users and specialists who will operate a new system.*

*Implimentation*

*Acitivities*

*Acquisitio*

*n of*

*Hardware*

*Software*

*develop*

*ment*

*End user*

*Training*

*System*

*Docume*

*ntation*

*Conversi*

*on*

*\* Parallel*

*Pilot*

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*Finally , implementation involves a conversion process from the use of a*

*present system to the operation of a new or improved application.*

*Conversion methods can soften the impact of introducing new technology*

*into an organization. Thus, conversion may involve operating both new and*

*old systems in parallel for a trial period, or operation of a pilot system on a*

*trial basis at one location. Phasing in the new system in one application or*

*location at a time is another popular conversion method. However, a plunge*

*or immediate cutover to a new information system is also a widely used*

*conversion method.*

*Maintenanc*

***Systems maintenance*** *is the final stage of the system*

*e of development cycle. It involves the monitoring, evaluation, and*

*information*

*Systems*

*Computer-*

*Aided*

*Systems*

*Engineering*

*CASE Software Tools*

*\* The Planning Toolset*

*egins the development*

*process with information*

*modifying of a system to make desirable or necessary*

*improvements. This may include a post-implementation*

*review process to ensure that the newly implemented system*

*is meeting the functional business requirements that were*

*established for it when it was designed. Errors in the*

*development of a system are corrected by the maintenance*

*activity. Systems maintenance also includes modifying a*

*system due to internal changes in a business or external*

*changes in the business environment. For example,*

*development of new products or services, or change in the tax*

*laws might require making changes to a company ’s marketing*

*and accounting systems.*

***Computer-aided systems engineering*** *(CASE), which also*

*stands for computer-aided software engineering, involves*

*using software packages, called CASE tools, to perform many*

*of the activities o the systems development life cycle. For*

*example, software packages are available to help do business*

*planning, project management, user interface prototyping,*

*database design, and software development. Thus, CASE tools*

*make a computer-aided systems development process*

*possible.*

*strategy planning from a*

*vantage point*

*The components of CASE. This is an example of the variety of*

*software tools and repositories in an integrated CASE products.*

*\* The Analyst Toolset*

*locuses on*

*correctly*

*capuring detailed*

*business requirements*

*early in the development*

*process*

*Plannin*

*g*

*Toolset*

*Server*

*\* The Design Toolset*

*CASE*

*Repositories*

***54***

*provides detailed*

*specifications of the*

*system solution*

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*Analysi*

*s*

*Toolset*

*Design*

*Toolset*

*Informati*

*on*

*Workstatio*

*n*

*Code*

*Generatio*

*n Toolset*

*Databas*

*e*

*Generati*

*System*

*Interla*

*ce*

*Integrato*

*\* Workstation repositories*

*Using*

*Tools*

*CASE*

*and a server repository*

*Figure documentemphasizes that CASE packages provide*

*many computer-based tools for both the front end of*

*in use*

*analysis, and design) and the back end o systems*

*development (implementation and maintenance).*

*Note that server and workstation repositories help*

*integrate the use of tools at both ends of the*

*development cycle. The system repository is a*

*computerized database for all of the details of a*

*system generated with other systems development*

*tools. The repository helps to ensure consistency and*

*compatibility in the design of the data elements,*

*processes, user interfaces, and other aspects of the*

*system being developed.*

*Integrated CASE tools (called-I-CASE) are now*

*available that can assist all of the stages of systems*

*development. Some of these CASE tools support joint*

*application design (JAD) , where a group of systems*

***55***

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*3.9 information*

*beingsystems*

*the systems ordevelopment life cycle. (planning,*

MIS

*analysts, programmers, and end users can jointly and*

*interactively design new applications. Finally, if the*

*development of new system can be called forward*

*engineering, some CASe tools support backward*

*engineering. That is, they allow systems analysts to*

*inspect the logic of a programme code for old*

*applications, and convert it automatically into more*

*efficient programs that significantly improve system*

*effectiveness.*

*End*

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***TRENDS IN COMPUTER SYSTEMS.***

*Today’s computer systems come in a variety of sizes,*

*shapes, and computing capabilities . Rapid hardware and software*

*developments and changing end user needs continue to drive the*

*emergence of new models of computers, from the smallest hand-*

*held personal digital assistant for end users, to the largest*

*multiple-CPU mainframe for the enterprise.*

*Categories such as mainframes, midrange computers,*

*and microcomputers are still used to help us express the relative*

*processing power and number of end users that can be supported*

*by different types of computers.*

*In addition, experts continue to predict the mergin g or*

*disappearance of several computer categories. They feel, for*

*example, that many midrange and mainframe systems have been*

*made obsolete by the power and versatility of client/server*

*networks of end user microcomputers and servers.*

***COMPUTER GENERATIONS.***

*It is important to realize that major changes and trends*

*in computer systems have occurred during the major stages-or*

*generations-of computing, and will continue into the future. The*

*first generation of computers developed in the early 1950s, the*

*second generation blossomed during the late 1960s, the third*

*generation took computing into the 1970s, and the fourth*

*generation has been the computer technology of the 1980s and*

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*1990s. A fifth generation of computers that accelerates the*

*trends of the previous generations is expected to evolve as we*

*enter the 21st century. Notice that computers continue to become*

*smaller, faster, more reliable, less costly to purchase and*

*maintain, and more interconnected within computer networks.*

***First-generation***

***computing***

*involved*

*massive*

*computers using hundreds or thousands of vacuum tubes for their*

*processing*

*and*

*memory*

*circuitry.*

*These*

*large*

*computers*

*generated enormous amounts of heat; their vacuum tubes had to*

*be replaced frequently. Thus, they had large electrical power, air*

*conditioning, and maintenance requirements. First-generation*

*computers had main memories of only a few thousand characters*

*and millisecond processing speeds. They used magnetic drums or*

*tape for secondary storage and punched cards or paper tape as*

*input and output media.*

***Second-generation computing*** *used transistors and*

*other solid-state, semiconductor devices that were wired to circuit*

*boards in the computers. Transistorized circuits were much*

*smaller and much more reliable, generated little heat, were less*

*expensive, and required less power than vacuum tubes. Tiny*

*magnetic cores were used for the computer’s memory, or internal*

*storage. Many second-generation computers had main memory*

*capacities of less than 100 kilobytes and microsecond processing,*

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*speeds. Removable magnetic disk packs were introduced, and*

*magnetic tape merged as the major input, output, and secondary*

*storage medium for large computer installations.*

***Third-generation computing*** *saw the development*

*of computers that used integrated circuits, in which thousands of*

*transistors and other circuit elements are etched on tiny chips of*

*silicon. Main memory capacities increased to several megabytes*

*and processing speeds jumped to millions of instructions per*

*second*

*(MIPS)*

*as*

*telecommunications*

*capabilities*

*became*

*common. This made it possible for operating system programs to*

*come into widespread use that automated and supervised the*

*activities of many types of peripheral devices and processing by*

*mainframe computers of several programs at the same time,*

*frequently involving networks of users at remote terminals.*

*Integrated circuit technology also made possible the development*

*and widespread use of small computers called minicomputers in*

*the third computer generation.*

***Fourth-generation computing*** *relies on the use of*

*LSI*

*(large-scale*

*integration)*

*and*

*VLSI*

*(very-large-scale*

*integration) technologies that cram hundreds of thousands or*

*millions of transistors and other circuit elements on each chip.*

*This enabled the development of* ***microprocessors,*** *in which all*

*of the circuits of a CP are contained on a single chip with*

*processing speeds of millions of instructions per second. Main*

*memory capacities ranging from a few megabytes to several*

*gigabytes can also be achieved by memory chips that replaced*

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*magnetic*

*core*

*memories.*

***Microcomputers,***

*which*

*use*

*microprocessor CPUs and a variety of peripheral devices and*

*easy-to-use software packages to form small personal computer*

*(PC), systems or client/server networks of linked PCs and servers,*

*are a hallmark of the fourth generation of computing, which*

*accelerated the* ***downsizing*** *of computing systems.*

*Whether we are moving into a* ***fifth generation*** *of*

*computing is a subject of debated since the concept of*

*generations may no longer fit the continual, rapid changes*

*occurring in computer hardware, software, data, and networking*

*technologies. But in any case, we can be sure that progress in*

*computing will continue to accelerate, and that the development*

*of Internet-based technologies and applications will be one of the*

*major forces driving computing into the 21st century.*

***MICROCOMPUTER SYSTEMS.***

***Microcomputers*** *are the most important category of*

*computer systems for end users. Though usually called a personal*

*computer, or PC, a microcomputer is much more than a small*

*computer for use by an individual. The computing power of*

*microcomputers now exceeds that of the mainframes of previous*

*computer generations at a fraction of their cost. Thus, they have*

*become powerful networked professional work stations for end*

*users in business .*

***Microcomputers*** *come in a variety of sizes and*

*shapes for a variety of purposes. For example, PCs are available*

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*as handhled, notebook, laptop, portable, desktop, and floor-*

*standing models. Or, based on their use, they include home,*

*personal, professional, workstation, and multi-user systems. Most*

*microcomputers are desktops designed to fit on an office desk, or*

*notebooks for those who want a small, portable PC for their work*

*activities.*

*Some*

*microcomputers*

*are*

*powerful*

*workstation*

*computers (technical work-stations) that support applications*

*with*

*heavy*

*mathematical*

*computing*

*and*

*graphics*

*display*

*demands such as computer-aided design (CAD) in engineering, or*

*investment and portfolio analysis in the securities industry. Other*

*microcomputers are used as* ***network servers.*** *They are usually*

*more*

*powerful*

*microcomputers*

*that*

*coordinate*

*telecommunications and resource sharing in small local area*

*networks (LANs), and Internet and intranet Web sites. Another*

*important*

*microcomputer*

*category*

*includes*

*handheld*

*microcomputer devices known as* ***personal digital assistants***

***(PDAs)****, designed for convenient mobile communications and*

*computing. PDAs use touch-screens, pen-based handwriting*

*recognition of keyboards to help mobile workers send and receive*

*E-mail and exchange information such as appointments, to do*

*lists, and scales contacts with their desktop PCs or Web servers.*

***MULTIMEDIA SYSTEMS.***

***Multimedia*** *PCs are designed to present you with*

*information in a variety of media, including text and graphics*

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*displays, voice and other digitized audio, photographs, animation,*

*and video clips. Mention multimedia, and many people think of*

*computer video games, multimedia encyclopedias, educational*

*videos, and multimedia home pages on the World Wide Web.*

*However, multimedia systems are widely used in business for*

*training*

*employees,*

*educating*

*customers,*

*making*

*sales*

*presentations,*

*and*

*adding*

*impact*

*to*

*other*

*business*

*presentations .*

*The basic hardware and software requirements of a*

*multimedia computer system depend on whether you wish to*

*create as well as enjoy multimedia presentations. Owners of low-*

*cost multimedia PCs marketed for home used do not need*

*authoring software or high-powered hardware capacities in order*

*to enjoy multimedia games and other entertainment*

*and*

*educational*

*multimedia*

*products.*

*These*

*computers*

*come*

*equipped with a CD-ROM drive, stereo speakers, additional*

*memory, a high-performance processor, and other multimedia*

*processing capabilities .*

*People who want to create their own multimedia*

*production may have to spend several thousand dollars to put*

*together a high-performance multimedia authoring system. This*

*includes a high-resolution color graphics monitor, sound and*

*video capture boards, a high-performance microprocessor with*

*multimedia capabilities, additional megabytes of memory, and*

*several gigabytes of hard disk capacity. Sound cards and video*

*capture boards are circuit boards that contain digital signal*

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*processors (DSPs) and additional megabytes of memory for digital*

*processing of sound and video. A digital camera, digital video*

*camcorder, optical scanner, and software such as authoring tools*

*and programs for image editing and graphics creation can add*

*several thousand dollars to the star-up costs of a multimedia*

*authoring system.*

***MIDRANGE COMPUTER SYSTEM***

*Midrange Computers, including minicomputers and*

*high-end network servers, are multi-user systems that can*

*manage network of PCs and terminals. Though not as powerful as*

*mainframe computers, they are less costly to buy, operate, and*

*maintain than mainframe systems, and thus meet the computing*

*needs of many organizations.*

*Midrange*

*computers*

*first*

*became*

*popular*

*as*

***minicomputers*** *for scientific research, instrumentation systems,*

*and industrial process monitoring and control. Minicomputers*

*could easily handle such uses because these applications are*

*narrow in scope and do not demand the processing versatility of*

***63***

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*mainframe*

*systems.*

*Thus,*

*midrange*

*computers*

*serve*

*as*

*industrial process-control and manufacturing plant computers,*

*and they still play a major role in computer-aided manufacturing*

*(CAM). They can also take the form of powerful technical*

*workstations*

*for*

*computer-aided*

*design*

*(CAD)*

*and*

*other*

*computation*

*and*

*graphics-intensive*

*applications.*

*Midrange*

*computers are also used as* front-end computers *to assist*

*mainframe computers in telecommunication processing and*

*network management.*

*Midrange computers have become popular as powerful*

***network servers*** *to help manage large Internet Web sites,*

*corporate intranets and extranets, and client/server networks.*

*Electronic commerce and other business uses of the Internet are*

*popular high-end server applications, as are integrated enterprise*

*wide manufacturing, distribution and financial applications. Other*

*applications, like data warehouse management, data mining, and*

*online analytical processing.*

***MAINFRAME COMPUTER SYSTEMS***

***Mainframe computes*** *are large, fast, and powerful*

*computer*

*systems.*

*For*

*example,*

*mainframes*

*can*

*process*

*hundreds of million instructions per second (MIPS). Mainframes*

*also have large primary storage capacities. Their main memory*

*capacity can range from hundreds of megabytes to many*

*gigabytes of primary storage. And mainframes have slimmed*

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*down drastically in the last few years, dramatically reducing their*

*air-conditioning needs, electrical power consumption, and floor*

*space requirements, and thus their acquisition and operating*

*costs. Most of these improvements are the result of a move from*

*water-cooled mainframes to a new CMOS air-cooled technology*

*for mainframe systems.*

*Thus, mainframe computers continue to handle the*

*information*

*processing*

*needs*

*of*

*major*

*corporations*

*and*

*government agencies with many employees and customers or*

*with complex computational problems. For example, major*

*international banks, airlines, oil companies, and other large*

*corporations process millions of sales transactions and customer*

*inquiries each day with the help of large mainframe systems.*

*Mainframes are still used for computation-intensive applications*

*such as analyzing seismic data from oil field explorations or*

*simulating flight conditions in designing aircraft. Mainframes are*

*also widely used as* super server *for the large client/server*

*network and high-volume Internet Web sites of large companies.*

***SUPERCOMPUTER SYSTEMS***

*The term* ***supercomputer*** *describes a category of*

*extremely powerful computer systems specifically designed for*

*scientific*

*,engineering,*

*and*

*business*

*applications*

*requiring*

*extremely high speeds for massive numeric computations. The*

*market*

*for*

*supercomputers*

*includes*

*government*

*research*

*agencies, large universities, and major corporations. They use*

***65***

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*supercomputers*

*for*

*applications*

*such*

*as*

*global*

*weather*

*forecasting, military defense systems, computational cosmology*

*and astronomy, microprocessor research and design, large-scale*

*data mining and so on.*

*Supercomputers*

*use*

*parallel*

*processing*

*architectures*

*of*

*interconnected*

*microprocessors*

*(which*

*can*

*execute*

*many*

*instructions at the same time in parallel). They can perform*

*arithmetic calculations at speeds of billions of floating-point*

*operations per second (gigaflops). Teraflop (1 trillion floating-point*

*operations per second) supercomputers, which use advanced*

*massively parallel processing (MPP) designs of thousands of*

*interconnected*

*microprocessors,*

*are*

*becoming*

*available.*

*Purchase prices for large supercomputers are in the $5 million to*

*$50 million range.*

*However, the use of symmetric multiprocessing (SMP)*

*and distributed shared memory (DSM) designs of smaller*

*numbers of interconnected microprocessors has spawned a breed*

*of minisuper computers with prices that start in the hundreds of*

*thousands of dollars.*

***COMPUTER SYSTEM CONCEPTS AND COMPONENTS.***

***The Computer System Concept.***

*A computer is more than a high-powered collection of*

*electronic devices performing a variety of information processing*

*chores. A computer is a system, an interrelated combination of*

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*components that performs the basic system functions of input,*

*processing, output, storage, and control, thus providing end users*

*with a powerful information processing tool. Understanding the*

*computer as a computer system is vital to the effective use and*

*management of computers.*

*A computer is system of hardware devices organized*

*according to the following system functions.*

 ***Input.*** *The input devices of a computer system*

*include keyboards, touch screens, pens, electronic*

*mice, optical scanners, and so on.*

 ***Processing.*** *The central processing unit( CPU) is the*

*main processing component of a computer system.*

*(In microcomputers, it is the main microprocessor.) In*

*particular, the electronic circuits of the arithmetic-*

*logic unit one of the CPU’s major components,*

*perform the arithmetic and logic functions required*

*in computer processing.*

 ***Output.*** *The output devices of a computer system*

*include video display units, printers, audio response*

*units , and so on, They convert electronic information*

*produced by the computer system into human*

*intelligible form for presentation to end users.*

 ***Storage.*** *The storage function of a computer system*

*takes place in the storage circuits of the computer’s*

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*primary storage unit, or memory, and in secondary*

*storage devices such as magnetic disk and tape*

*units.*

*These*

*devices*

*store*

*data*

*and*

*program*

*instructions needed for processing.*

 ***Control.*** *The control unit of the CPU is the control*

*component*

*of*

*a*

*computer*

*system.*

*Its*

*circuits*

*interpret*

*computer*

*program*

*instructions*

*and*

*transmit directions to the other components of the*

*computer system.*

***The Central Processing Unit.***

*The central processing unit is the most important*

*hardware component of a computer system. It is also known as*

*the CPU, the central processor or instruction processor, and the*

*main microprocessor in a microcomputer. Conceptually, the*

*circuitry of a CPU can be subdivided into two major subunits the*

*arithmetic-logic unit and the control unit. The CPU also includes*

*circuitry for devices such as registers and cache memory for high*

*–speed,*

*temporary*

*storage*

*of*

*instruction*

*operations,*

*input/output, and telecommunications support.*

*The control unit obtains instructions from software*

*segments stored in the primary storage unit and interprets them.*

*Then it transmits electronic signals to the other components of*

*the computer system to perform required operations. The*

*arithmetic-logic unit performs required arithmetic and comparison*

*operations .A computer can make logical changes from one set of*

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*program instructions to another (e.g, overtime pay versus regular*

*pay calculations) based on the results of comparisons made in*

*the ALU during processing.*

***Main Memory and Primary Storage Unit.***

*A computer’s primary storage unit is commonly called*

*main memory, and holds data and program instructions between*

*processing steps and supplies them to the control unit and*

*arithmetic-logic unit during processing. Most of a computer’s*

*memory consists of microelectronic semiconductor memory chips*

*known as RAM (random access memory ). The contents of these*

*memory chips can be instantly changed to store new data. Other,*

*more permanent memory chips called ROM (read only memory)*

*may also be used.*

***Secondary storage*** *devices like magnetic disks and*

*optical disks are used to store data and programs and thus*

*greatly enlarge the storage capacities of computer system. Also,*

*since memory circuits typically lose their contents when electric*

*power is turned off, most secondary storage media provide a*

*more permanent type of storage. However the contents of hard*

*disk drives floppy disks, CD-ROM disks, and other secondary*

*storage media cannot be processed without first being brought*

*into memory. Thus secondary storage devices play a supporting*

*role to the primary storage of a computer system.*

***Multiple Processors.***

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*Many current computers, from microcomputers to large*

*mainframes,*

*use*

*multiple*

*processors*

*for*

*their*

*processing*

*functions. Instead of having one CPU with a single control unit*

*and arithmetic-logic unit, the CPUs of these computers contain*

*several type of processing units. Let’s briefly look at the major*

*types of such multiprocessor designs.*

***A support processor*** *design relies on specialized*

*microprocessors to help the main CPU perform a variety of*

*functions. These microprocessors may used for input/output,*

*memory*

*management,*

*arithmetic*

*computations,*

*multimedia*

*processing, and telecommunications, thus freeing the main*

*processor to do the primary job of executing program instructions*

*For*

*example,*

*many*

*microcomputers*

*rely*

*on*

*support*

*microprocessors such as arithmetic co-processing load on their*

*main microprocessors. A large computer may use support*

*microprocessors called channels to control the movement of data*

*between*

*the*

*CPU*

*and*

*input/output*

*devices.*

*Advanced*

*microprocessor designs integrate the functions of several support*

*processors on a single main microprocessor.*

***A coupled processor*** *design uses multiple CPUs or*

*main microprocessors to do multiprocessing, that is, executing*

*more than one instruction at the same time. Some configurations*

*provide a fault-tolerant capability in which multiple CPUs provide*

*a built-in backup to each other should one of them fail.*

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***A***

***parallel***

***processor***

*design*

*uses*

*a*

*group*

*of*

*instruction processors to execute several program instructions at*

*the same time. Some times, hundreds or thousands of processors*

*are organized in clusters or networks in massively parallel*

*processing (MPP) computers. Other parallel processor designs are*

*based on simple models of the human brain called neural*

*networks. All of these systems can execute many instructions at a*

*time in parallel. This is a major departure from the traditional*

*design of current computers, called the Von Neuman design,*

*which executes instructions serially (one at a time). Though*

*difficult to program, many experts consider parallel processor*

*systems the key to providing advanced capabilities to future*

*generations of computers.*

***RISC Processors****. Many*

*advanced*

*technical*

*workstations and other computers rely on a processor design*

*called RISC (reduced instruction set computer). This contrasts*

*with most current computers that use CISC (complex instruction*

*set computer) processors. RISC processor designs optimize a*

*CPU’s processing speed by using a smaller instruction set. That is,*

*they use a smaller number of the basic machine instruction that a*

*processor is capable of executing. By keeping the instruction set*

*simpler than CISC processors and using more complex software, a*

*RISC processor can reduce the time needed to execute program*

*instructions.*

***Computer Processing Speeds.***

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*Computer*

*operating*

*speeds*

*that*

*were*

*formerly*

*measured*

*in*

*milliseconds*

*(thousands*

*of*

*a*

*second)*

*and*

***microseconds*** *(millionths*

*of a second) are now in the*

***nanosecond*** *(billionth of a second) range, with* ***picosecond***

*(trillionth of a second) speed being attained by some computers.*

*Such speeds seem almost incomprehensible. For example, an*

*average person taking one step each nanosecond would circle the*

*earth above 20 times in one second. Many microcomputers and*

*midrange computers, and most mainframe computers, operate in*

*the*

*nanosecond*

*range,*

*and*

*can*

*thus*

*process*

*program*

*instructions at million instructions per second (MIPS) speeds.*

*Another measure of processing speed is megahertz (MHs), or*

*millions of cycles per second. It is commonly called the clock*

*speed of a microprocessor, sine it is used to rate microprocessors*

*by the speed of their timing circuits or internal clock.*

*However,*

*megahertz,*

*ratings*

*can*

*be*

*misleading*

*indicators of the effective processing speed of microprocessors as*

*measured in MIPS and other measures. That’s because processing*

*speed depends on a variety of factors besides a microprocessor’s*

*clock speed. Important examples include the size of circuitry*

*paths, or busses, that interconnect microprocessor components,*

*the capacity of instruction processing registers, the use of high-*

*speed*

*memory*

*caches,*

*and*

*the*

*use*

*of*

*specialized*

*microprocessors such as a math co-processor to do arithmetic*

*calculations faster. For example, Intel’s Pentium microprocessor*

*runs at 66 to 200 MHz and is rated at over 100 MIPS, which the*

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*Pentium Pro microprocessor has a top processing rating of over*

*200 MIPS at similar megahertz speeds.*

***INPUT TECHNOLOGY TRENDS:***

*You can now enter data and commands directly and*

*easily into a computer system through pointing devices like*

*electronic mice and touch pads, and technologies like political*

*scanning, handwriting conviction, and voice recognition. These*

*developments have made it unnecessary to always record data*

*on paper source documents (such as sales order forms, for*

*example) and then keyboard the data into a computer in an*

*additional data entry step. Further improvements in voice*

*recognition and other technologies should enable an even more*

*natural user interface in the future.*

***POINTING DEVICES:***

*Keyboards are still the most widely used devices for*

*entering data and text into computer systems. However, pointing*

*devices are a better alternative for issuing commands, making*

*choices, and responding to prompts displays on your video*

*screen. They work with you operating systems graphical user*

*interface (GUI), which presents you with icons, menus, windows,*

*buttons, bars, and so on, for your selection. For example, pointing*

*devices such as electronic mice and touch pads allow you to*

*easily choose from menu selections and icon displays using point-*

*and-click or point-and-drag methods. See Figure 4.24.*

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*The electronic mouse is the most popular pointing*

*device used to move the cursor on the screen, as well as to issue*

*commands and make icon and menu selections. By moving the*

*mouse on a desktop or pad, you can move the cursor onto and*

*icon displayed on the screen. Pressing buttons on the mouse*

*activates various activities representation by the icon selected.*

*The trackball, pointing stick, and touch pad are other*

*pointing devices most often used in place of the mouse. A*

*trackball is a stationary device related to the mouse. You turn a*

*roller ball with only its top exposed outside its case to move the*

*cursor on the screen. A pointing stick (also called a track point ) is*

*a small button like device, sometimes likened to the eraser head*

*of pencil. It is usually centered one row above the space bar of a*

*keyboard. The cursor moves in the direction of the pressure you*

*place on the stick. The touch pad is a small rectangular touch-*

*sensitive surface usually placed below the keyboard. The cursor*

*moves in the direction your finger moves on the pad. Trackballs,*

*pointing sticks, and touch pads are easier to use than a mouse for*

*portable computer users and are thus built into most notebook*

*computer keyboards.*

*Touch screens are devices that allow you to use a*

*computer by touching the surface of its video display screen.*

*Some touch screens emit a grid of infrared beams, sound waves,*

*or a slight electric current that is broken when the screen is*

*touched. The computer senses the point in the grid where the*

*break occurs and responds with an appropriate action. For*

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*example, you can indicate your selection on a menu display by*

*just touching the screen next to that menu item.*

***PEN-BASED COMPUTING:***

*Pen-based computing technologies are being used in*

*many hand-held computers and personal digital assistants. These*

*small PCs and PDA’s contain fast processors and software that*

*recognizes and digitizes handwriting, hand printing, and hand*

*drawing. They have a pressure sensitive layer like a graphics pad*

*under their slate like*

*liquid crystal display (LCD) screen. So*

*instead of writing on paper form fastened to a clipboard or using*

*a keyboard device, you can use a pen to make selections, send E-*

*Mail, and enter handwritten data directly into a computer.*

*A variety of other pen like devices are available. One*

*example is the digitizer pen and graphics tablet. You can use the*

*digitizer pen as a [pointing device, or use it to draw or write on*

*the pressure-sensitive surface of the graphics table. Your*

*handwriting or drawing is digitized by the computer, accepted as*

*input, displayed on its video screen, and entered into your*

*application.*

***VOICE RECOGNITION AND RESPONSE:***

*Voice recognition promises to be the easiest method for*

*data entry, word processing, and conversational computing, since*

*speech*

*is*

*the*

*easiest,*

*most*

*natural*

*means*

*of*

*human*

*communication. Voice input has now become technologically and*

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*economically feasible for a variety of applications. Early voice*

*recognition products used discrete speech recognition, where you*

*had to pause each spoken word. New continuous speech*

*recognition*

*(CSR)*

*software*

*recognizes*

*continuous,*

*conversationally paced speech.*

*Voice recognition systems analyze and classify speech*

*or vocal tract patterns and convert them into digital codes for*

*entry into a computer system. Typically, voice recognition*

*systems with large vocabularies require training the computer to*

*recognize your voice in order to achieve a high degree of*

*accuracy. Training such system involves repeating a variety of*

*words and phrases in a training session and using the system*

*extensively. Trained systems regularly achieve a 95 to 99 percent*

*word recognition rate.*

*Two*

*example*

*of*

*continuous*

*speech*

*recognition*

*software for word processing are Naturally Speaking by Dragon*

*Systems and Via Voice by IBM. Minimum requirements are a 133*

*MHz Pentium class microprocessor,32 MB*

*of RAM, an industry*

*standard sound card, and 50 MB of available hard disk capacity.*

*The products have 30,000-word vocabularies expandable to*

*60,000 words, and sell for less than $200.Training to 95 percent*

*accuracy takes only a few hours. Longer use, faster processors,*

*and more memory make 99 percent accuracy possible.*

*Speaker-independent voice recognition systems, which*

*allow a computer to under stand a few words from a voice it has*

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*never heard before, are being built into products and used in a*

*growing*

*number*

*of*

*applications.*

*Examples*

*include*

*voice-*

*messaging computers, which use voice recognition and voice*

*response software to verbally guide an end user through the*

*steps of a task in many kinds of activities. Typically, they enable*

*of applications include computerized telephone call switching,*

*telemarketing surveys, bank pay-by-phone bill-paying services,*

*stock quotations services, university registration systems, and*

*customer credit and account balance inquiries.*

*Voice recognition devices in work situations allow*

*operators to perform data entry without using their hands to key*

*in data or instructions and to provide faster and more accurate*

*input. For example, manufacturers use voice recognition systems*

*for the inspection, inventory, and quality control of a variety of*

*products; and airlines and parcel delivery companies use them for*

*voice-directed sorting of baggage and parcels. Voice recognition*

*can also help you operate your computer’s operating systems and*

*software packages through voice input of data and commands. In*

*addition, some internet browsers can be voice-enabled so you*

*can send E-mail and surf the World Wide Web via voice*

*recognition.*

***OPTICAL SCANNING :***

*Optical scanning devices read text or graphics and*

*convent them into digital input for your computer. Thus, optical*

*scanning enables the direct entry of data from source documents*

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*into a computer system. For example, you can use a com[pact*

*desktop scanner to scan pages of text and graphics into your*

*computer for desktop publishing and Web publishing applications.*

*Or you can scan documents of all kinds into your system and*

*organize them into folders as part of a document management*

*library system for east reference or retrieve.*

*There are many types of optical scanners, but they all*

*employ photoelectric devices to scan the characters being read.*

*Reflected light patterns of the data are converted into electronic*

*impulses that are then accepted as input into the computer*

*system. Compact desktop scanners have become very popular*

*due to their low cost and ease of use with personnel computer*

*systems. However, larger, more expensive* flatbed scanners *are*

*faster and provide higher resolution color scanning.*

*The credit card billing operations of credit card*

*companies, banks, and oil companies use a form of optical*

*scanning called* ***optical character recognition*** *(OCR). OCR*

*scanners read the characters and codes on credit card receipts,*

*utility bills, insurance premiums, airline tickets, and other*

*documents. OCR scanners are also used to automatically sort*

*mail, score tests, and process a wide variety of forms in business*

*and government.*

*Devices such as handheld optical scanning wands are*

*frequently used to read OCR coding on merchandise tags and*

*other media. Many business applications involve reading bar*

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*coding, a code that utilizes bars to represent characters. One*

*common example is the Universal Product Code (UPC bas coding*

*that you see on packages of food items and many other products.*

*For*

*example,*

*the*

*automated*

*checkout*

*scanners*

*found*

*in*

*supermarkets read UPC bar coding. Supermarket scanners emit*

*laser beams that are reflected off a UPC bar code. The reflected*

*image is converted to electronic impulses that are sent ot the in-*

*store computer, where they are matched with pricing information.*

*Pricing information is returned to the terminal, visually displayed,*

*and printed on a receipt for the customer.*

***OTHER INPUT TECHNOLOGIES:***

***Magnetic stripe*** *technology is a familiar form of data*

*entry that helps computers read credit cards. The dark magnetic*

*stripe on the back of such cards is the same iron oxide coating as*

*on magnetic tape. Customer account numbers can be recorded*

*on the mag stripe so it can be read by bank ATMs, credit card*

*authorization terminals, and many other types of magnetic stripe*

*readers.*

***Smart cards*** *that embed a microprocessor chip and*

*several kilobytes of memory into debit, credit, and other cards*

*are popular in Europe, and becoming available in the United*

*States. One example is Holland, where over 8 million smart debit*

*cards have been issued by Dutch banks. Smart debit cards enable*

*you to store a cash balance on the card and electronically*

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*transfer some of it to others to pay for small items and services.*

*The balance on the card can be replenished in ATMs or other*

*terminals.*

*The smart debit cards used in Holland feature a*

*microprocessor and either 8 or 16 kilobytes of memory, plus the*

*usual 200 byte magnetic stripe. The smart cards are widely used*

*to make payments in parking meters, vending machines,*

*newsstands, pay telephones, and retail stores.*

***Digital cameras*** *represent another fast growing set of*

*input technologies. Digital still cameras and digital video cameras*

*(digital camcorders) enable you to shoot, store, and download still*

*photos or full motion video with audio into your PC. Then you can*

*use image-editing software to edit and enhance the digitized*

*images and include them in new letters, reports, multimedia*

*presentations, and Web pages.*

*The computer systems of the banking industry can*

*magnetically read checks and deposit slips using magnetic ink*

*character recognition (MICR) technology. Computers can thus sort*

*and*

*post*

*checks*

*to*

*the*

*proper*

*checking*

*accounts.*

*Such*

*processing is possible because the identification numbers of the*

*bank and the customer’s account are preprinted on the bottom*

*of the checks with an iron oxide-based ink. The first bank*

*receiving a check after it has been written must en-code the*

*amount of the check in magnetic ink on the check’s lower right-*

*hand corner. The MICR system uses 14 characters (the 10 decimal*

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*digits and 4 special symbols) of a standardized design. Equipment*

*known as reader-sorters read a check by first magnetizing the*

*magnetic ink characters and then sensing the signal induced by*

*each character as it passes a reading head. In this way, data are*

*electronically captured by the bank’s computer system.*

***OUTPUT TECHNOLOGIES AND TRENDS:***

*Computers provide information to you in a variety of*

*forms. Figure 4.30 shows you the trends in output media and*

*methods that have developed over the generations of computing.*

*As you can see, video displays and printed documents have been,*

*and still are, the most common forms of output from computer*

*systems. But other natural and attractive output technologies*

*such as voice response systems and multimedia output are*

*increasingly*

*found*

*alongwith*

*video*

*displays*

*in*

*business*

*applications.*

***VIDEO OUTPUT:***

*Video displays are the most common type of computer*

*output. Most desktop computers rely on video monitors that use a*

*cathode ray tube (CRT) technology similar to the picture tubes*

*used in home TV sets. Usually, the clarity of the video display*

*depends on the type of video monitor you use and the graphics*

*circuit board installed in your computer. These can provide a*

*variety of graphics modes of increasing capability. A high-*

*resolution, flicker-free monitor is especially important if you*

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*spend a lot of time viewing multimedia on CDs, or the Web, or*

*complex graphical displays of many software packages.*

*The biggest use of liquid crystal displays (LCDs) is to*

*provide a visual display capability for portable microcomputers*

*and PDAs. LCD displays need significantly less electric current*

*and provide a thin, flat display. Advances in technology such as*

*active matrix and dual scan capabilities have improved the clarity*

*of LCD displays.*

***PRINTED OUTPUT:***

*Printing information on paper is still the most common*

*form of output after video displays. Thus, most personal*

*computer systems rely on an inkjet or laser printer to produce*

*permanent (hard copy) output in high-quality printed form.*

*Printed*

*output*

*is*

*still*

*a*

*common*

*form*

*of*

*business*

*communications,*

*and*

*is*

*frequently*

*required*

*for*

*legal*

*documentation.*

*Thus, computers can produce printed reports and*

*correspondence, documents such as sales invoices, payroll*

*checks, bank statements, and printed versions of graphics*

*displays.*

***Inkjet printers,*** *which spray ink onto a page one line*

*at a time, have become the most popular, low-cost printers for*

*microcomputer systems. They are quiet, produce several pages*

*per minute of high-quality output, and can print both black-and-*

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*white and high-quality color graphics.* ***Laser printers*** *use an*

*electrostatic process similar to a photocopying machine to*

*produce many pages per minute of high-quality black-and-white*

*output. More expensive color laser printers and multifunction*

*inkjet and laser models that print, fax, scan, and copy are other*

*popular choices for business offices.*

***STORAGE TRENDS AND TRADE-OFFS:***

*Data and information must be stored until needed*

*using a variety of storage methods. There are many types of*

*storage media and devices.*

***Computer Storage Fundamentals***

*Data are processed and stored in a computer system*

*through the presence or absence of electronic or magnetic*

*signals in the computer’s circuitry or in the media it uses. This is*

*called a “two-state” or* ***binary representation*** *of data, since the*

*computer and the media can exhibit only two possible states or*

*conditions. For example, transistors other semiconductor circuits*

*are either in a conducting or nonconducting state. Media such as*

*magnetic disks and tapes indicate these two states by having*

*magnetized spots whose magnetic fields have one of two*

*different directions, or polarities. This binary characteristic of*

*computer circuitry and media is what makes the binary number*

*system the basis for representing data in computers. Thus, for*

*electronic circuits, the conducting (ON) state represents the*

*number one, while the nonconducting (OFF) state represents the*

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*number zero. For magnetic media, the magnetic field of a*

*magnetized sport in one direction represents a one, while*

*magnetism in the other direction represents a zero.*

*The smallest element of data is called a bit, which can*

*have a value of either zero or one. The capacity of memory chips*

*is usually expressed in terms of bits. A byte is a basic grouping of*

*bits that the computer operates as a single unit. Typically, it*

*consists of eight bits and represents one character of data in*

*most computer coding schemes. Thus, the capacity of a*

*computer’s memory and secondary storage device is usually*

*expressed in terms of bytes. Computer codes such as ASCII*

*(American Standard Code for Information Interchange) use*

*various arrangements of bits to form bytes that represent the*

*numbers zero through nine, the letters of the alphabets, and*

*many other characters.*

*Storage capacities are frequently measured in kilobytes*

*(KB),*

*megabytes*

*(MB),*

*gigabytes*

*(GB),*

*or terabytes*

*(TB).*

*Although kilo means 1,000 in the metric system, the computer*

*industry uses K to represents 1,024 or (210) storage positions.*

*Therefore, a capacity of 10 megabytes, for example, is really*

*10,485,760 storage positions, rather than 10 million positions.*

*However, such differences are frequently disregarded in order to*

*simplify descriptions of storage capacity. Thus, a megabyte is*

*roughly 1 million bytes of storage, while a gigabyte is roughly 1*

*billion bytes and a terabyte represents about 1 trillion bytes.*

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***Direct and Sequential Access***

*Primary storage media such as semiconductor memory*

*chips are called direct access or random access memories (RAM).*

*Magnetic disk devices are frequently called direct access storage*

*devices (DASDs). On the other hand, media such as magnetic*

*tapes are known as sequential access devices.*

*The term direct access and random access describe the*

*same concept. They mean that an element of data or instructions*

*(such as a byte or word) can be directly stored and retrieved by*

*selecting and using any of the locations on the storage media.*

*They also mean that each storage position (1) has a unique*

*address and (2) can be individually accessed in approximately the*

*same length of time without having to search through other*

*storage*

*positions.*

*For*

*example,*

*each*

*memory*

*cell*

*on*

*a*

*microelectronic semiconductor RAM chip can be individually*

*sensed or changed in the same length of time. Also any data*

*record stored on a magnetic or optical disk can be accessed*

*directly in approximately the same time period.*

*Sequential access storage media such as magnetic*

*tape do not have unique storage addresses that can be directly*

*addressed. Instead, data must be stored and retrieved using a*

*sequential or serial process. Data are recorded one after another*

*in a predetermined sequence (such as in numeric order) on a*

*storage medium. Locating an individual item of data requires*

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*searching much of the recorded data on the tape until the desired*

*item is located.*

***Semiconductor Memory***

*The primary storage (main memory) of your computer*

*consists of microelectronic* ***semiconductor memory*** *chips.*

*Memory chips with capacities of 4 million bits (4 megabits) and*

*16 megabytes or more of memory chips can be added to your PC*

*to increase its memory capacity. Specialized memory can help*

*improve your computer’s performance. Examples include external*

*cache*

*memory*

*of*

*256*

*or*

*512*

*kilobytes*

*to*

*help*

*your*

*microprocessor work faster, or a video graphics accelerator card*

*with 2 megabytes or more of RAM for faster and clearer video*

*performance. Removable credit-card-size and smaller “flash*

*memory” RAM cards can also provide several megabytes of*

*erasable direct access storage for PDAs or handheld PCs.*

*Some*

*of*

*the*

*major*

*attractions*

*of*

*semiconductor*

*memory are its small size, great speed, and shock and*

*temperature*

*resistance.*

*One*

*major*

*disadvantage*

*of*

*most*

*semiconductor memory is its volatility. Uninterrupted electric*

*power must be supplied or the contents of memory will be lost.*

*Therefore, emergency transfer to other devices or standby*

*electrical power (through battery packs or emergency generators)*

*is required if data are to be saved. Another alternative is to*

*permanently “burn in” the contents of semiconductor devices so*

*that they cannot be erased by a loss of power.*

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*Thus, there are two basic types of semiconductor*

*memory: random access memory (RAM) and read only memory*

*(ROM).*

 ***RAM:*** *random access memory. These memory chips are the*

*most widely used primary storage medium. Each memory*

*position can be both sensed (read) and changed (written), so it*

*is also called read/write memory. This is a volatile memory.*

 ***ROM:*** *read only memory. Nonvolatile random access memory*

*chips are used for permanent storage. ROM can be read but*

*not erased or overwritten.*

*Frequently used control instructions in the control unit*

*and programs in primary storage (such as parts of the operating*

*system) can be permanently burned in to the storage cells during*

*manufacture. This is sometimes called firmware. Variations*

*include PROM (programmable read only memory) and EPROM*

*(erasable*

*programmable*

*read*

*only*

*memory)*

*that*

*can*

*be*

*permanently or temporarily programmed after manufacture.*

***Magnetic Disk Storage***

*Magnetic*

*disks*

*are*

*the*

*most*

*common*

*form*

*of*

*secondary storage for your computer system. That’s because*

*they provide fast access and high storage capacities at a*

*reasonable cost. Magnetic disk drives contain metal disks that are*

*coated on both sides with an iron oxide recording material.*

*Several disks are mounted together on a vertical shaft, which*

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*typically rotates the disks at speeds of 3,600 to 7,600 revolutions*

*per*

*minute*

*(rpm).*

*Electromagnetic*

*read/write*

*heads*

*are*

*positioned by access arms between the slightly separated disks*

*to read and write data on concentric, circular tracks. Data are*

*recorded on tracks in the form of tiny magnetized spots to form*

*the binary digits of common computer codes. Thousands of bytes*

*can be recorded on each tracks, and there are several hundred*

*data tracks on each disk surface, thus providing you with billions*

*of storage positions for your software and data.*

***Types of Magnetic Disks***

*There*

*are*

*several*

*types*

*of*

*magnetic*

*disk*

*arrangements, including removable disk cartridges as well as*

*fixed disk units. Removable disk devices are popular because*

*they are transportable and can be used to store backup copies of*

*your data offline for convenience and security.*

 ***Floppy disks*** *or magnetic diskettes, consist of*

*polyester film disks covered with an iron oxide*

*compound. A single disk is mounted and rotates*

*freely inside a protective flexible or hard plastic*

*jacket, which has access openings to accommodate*

*the read/write head of a disk drive unit. The 31/2 inch*

*floppy disk, with capacities of 1.44 megabytes, is the*

*most widely used version, with a newer LS-120*

*technology offering 120 megabytes of storage.*

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 ***Hard disk drives*** *combine magnetic disks, access*

*arms, and read/write heads into a sealed module.*

*This allows higher speeds, greater data-recording*

*densities, and closer tolerances within a sealed,*

*more stable environment. Fixed or removable disk*

*cartridge versions are available. Capacities of hard*

*drives range from several hundred megabytes to*

*gigabytes of storage.*

 ***RAID.*** *Disk arrays of interconnected microcomputer*

*hard*

*disk*

*drives*

*have*

*replaced*

*large-capacity*

*mainframe disk drives to provide many gigabytes of*

*online storage. Known as RAID (redundant arrays of*

*independent disks), they combine from 6 to more*

*than 100 small hard disk drives and their control*

*microprocessors into a single unit. RAID units provide*

*large capacities with high access speeds since data*

*are accessed in parallel over multiple paths from*

*many disks. RAID units also provide a fault tolerant*

*capability,*

*since*

*their*

*redundant*

*design*

*offers*

*multiple copies of data on several disks. If one disk*

*fails, data can be recovered from backup copies*

*automatically stored on other disks.*

***Magnetic Tape Storage***

*Magnetic tape is still being used as a secondary storage*

*medium in business applications. They read/write heads of*

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*magnetic tape drives record data in the form of magnetized spots*

*on the iron oxide coating of the plastic tape. Magnetic tape*

*devices include tape reels and cartridges in mainframes and*

*midrange systems, and small cassettes or cartridges for PCs.*

*Magnetic tape cartridges have replaced tape reels in many*

*applications, and can hold over 200 megabytes.*

*One growing business application of magnetic tape*

*involves the use of 36-track magnetic tape cartridges in robotic*

*automated drive assemblies that can hold hundreds of cartridges.*

*These devices serve as slower, but lower cost, storage to*

*supplement magnetic disks to meet massive data warehouse and*

*other business storage requirements. Other major applications for*

*magnetic tape includes long-term archival storage and backup*

*storage for PCs and other systems.*

***Optical Disk Storage***

*Optical disks are a fast-growing storage medium. The*

*version for use with micro computers is called CD-ROM (compact*

*disk- read only memory). CD-ROM technology use 12-centimeter*

*(4.7 inch) compact disks (CDs) similar to those used in stereo*

*music systems. Each disk can store more than 600 megabytes.*

*That’s the equivalent of over 400 1.44 megabyte floppy disks or*

*more than 300,000 double-spaced pages of text. A laser records*

*data by burning permanent microscopic pits in a spiral track on a*

*master disk from which compact disks can be mass produced.*

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*Then CD-ROM disk drives use a laser device to read the binary*

*codes formed by those pits.*

*CD-R (compact disk – record able) is another optical*

*disk technology. It enables computers with CD-R disk drive units*

*to record their own data once on a CD, then be able to read the*

*data indefinitely. The major limitation of CD-ROM and CD-R disks*

*is that recorded data cannot be erased. However, CD-RW*

*(CD-rewritable) optical disk systems have now become available*

*which record and erase data by using a laser to heat a*

*microscopic point on the disk’s surface. In CD-RW versions using*

*magneto optical technology, a magnetic coil changes the spot’s*

*reflective properties from one direction to another, thus recording*

*a binary one or zero. A laser device can then read the binary*

*codes on the disk by sensing the direction of reflected light.*

*Optical disk capacities and capabilities have increased*

*dramatically with the emergence of an optical disk technology*

*called DVD (digital video disk or digital versatile disk), which can*

*hold from 3.0 to 8.5 gigabytes of multimedia data on each side of*

*a compact disk. The large capacities and high quality images and*

*sound of DVD technology are expected to eventually replace CD-*

*ROM and CD-RW technologies for data storage, and promise to*

*accelerate the sue of DVD drives for multimedia products that*

*can be used in both computers and home entertainment systems.*

***Software Trends***

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*Several major software trends. First, there has been a*

*major trend away from custom-designed programs developed by*

*the professional programmers of an organization. Instead, the*

*trends is toward the use of off-the-shelf software packages*

*acquired by end users from software vendors. This trend*

*dramatically in creased with the development of relatively*

*inexpensive and easy-to-use application software packages and*

*multipurpose software suites for microcomputers. The trend has*

*accelerated recently, as software packages are designed with*

*networking capabilities and collaboration features that optimize*

*their usefulness for end users and work grounds on the Internet*

*and corporate intranets and extranets.*

*Second, there has been a steady trend away from (1)*

*technical, machine-specific programming language using binary-*

*based or symbolic codes, or (2) procedural languages, which use*

*brief statements and mathematical expressions to specify the*

*sequence of instructions a computer must perform. Instead, the*

*trend is toward the use of a visual graphic interface for object-*

*oriented*

*programming,*

*or*

*toward*

*non*

*procedure*

*natural*

*languages*

*for*

*programming*

*that*

*are*

*closer*

*to*

*human*

*conversation. This trend accelerated with the creation of easy-to-*

*use,*

*non*

*procedural*

*forth-generation*

*languages*

*(4GLs).*

*It*

*continues to grow as developments in object technology,*

*graphics, and artificial intelligence produce natural language and*

*graphical user interfaces that make both programming tools and*

*software packages easier to use.*

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*In addition, artificial intelligence features are now being*

*built into a new generation of expert-assisted software packages.*

*For example, many software suites provide intelligent help*

*features called wizards that help you perform common software*

*functions like graphing parts of a spreadsheet or generating*

*reports*

*from*

*a*

*database,*

*Other*

*software*

*packages*

*use*

*capabilities called intelligent agents to perform activities based*

*on instructions from a user. For example, some electronic mail*

*packages can use an intelligent agent capability to organize,*

*send, and screen E-mail messages fro your.*

*These major trends seem to be converging to produce*

*a fifth generation of powerful, multipurpose, expert-assisted, and*

*network enabled software package with natural language and*

*graphical interfaces to support the productivity and collaboration*

*of both end users IS professionals.*

***Application Software for End Users***

*Application software includes a variety of programs*

*that can be subdivided into general-purpose and application-*

*specific categories. Thousands of* ***application-specific*** *software*

*package are available to support specific applications of end*

*users in business and other fields. For example, application-*

*specific packages in business support managerial, professional,*

*and business uses such as transaction processing, decision*

*support, accounting, sales management, investment analysis,*

*and*

*electronic*

*commerce.*

*Application-specific*

*software*

*for*

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*science and engineering plays a major role in the research and*

*development programs of industry and the design of efficient*

*production processes for high-quality product. Other software*

*packages help end users with personal fiancé and home*

*management, provide a wide variety of entertainment and*

*educational products.*

***General-purpose*** *application programs are programs*

*that perform common information processing jobs for end users.*

*For example, word processing programs, spreadsheet programs,*

*database management programs, and graphics programs are*

*popular with microcomputer users for home, education, business,*

*scientific, and many other purposes. Because they significantly*

*increase the productivity of end users, they are sometimes known*

*as productivity packages. Other examples include Web browsers,*

*electronic*

*mail,*

*and*

*groupware,*

*which*

*help*

*support*

*communication and collaboration among workgroups and teams.*

***Software Suites and Integrated Packages***

*Let’s begin our discussion of popular general-purpose*

*application software by looking at software suites. That’s because*

*the most widely used productivity package come bundled*

*together as software suites such as Microsoft Office, Lotus*

*SmartSuite, and Corel WordPerfect Office. Examining their*

*components gives us an overview of the important software tools*

*that you can use to increase your productivity, collaborate with*

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*your colleagues, and access intranets, extranets, and the*

*Internet.*

*Compares the component programs that make up the*

*tope three software suites. Notice that each suite integrates*

*software*

*packages*

*for*

*Web*

*browsing,*

*word*

*processing,*

*spreadsheets, presentation graphics, database management,*

*personal in formation management, and more. These packages*

*can be purchased as separate stand-alone products. However, a*

*software suite costs a lot less than the total cost of buying its*

*individual package separately.*

*Another advantage of software suites is that all*

*programs use a similar* ***graphical user interface (GUI)*** *of icons,*

*tool and status bars, menus, and so on, which gives them the*

*same look and feel, and makes them easier to learn and use.*

*Software suites also share common tools, such as spell checkers*

*and help wizards to increase*

*their efficiency. Another big*

*advantage of suites is that their programs are designed to work*

*together seamlessly, and import each other’s files easily, no*

*matter which program you are using at the time. These*

*capabilities make them more efficient and easier to use than*

*using a variety of individual package versions.*

***Programs***

***Microsoft***

***Lotus***

***SmartSuite***

***Corel***

***WordPerfect***

***Office***

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*Web Browser*

*Internet Explorer*

*N/A*

*Netscape*

*Navigator*

*Word Procedure*

*Spreadsheet*

*Presentation*

*Word*

*Excel*

*Power Point*

*Word Pro*

*1-2-3*

*Freelance*

*Word Perfect*

*Quattro Pro*

*Presentations*

*Graphics*

*Database*

*Access\**

*Approach*

*Paradox*

*Manager*

*Personal*

*Outlook*

*Organize*

*Corel Central*

*Information*

*Manager*

*Others*

*Camcorder\**

*ScreenCam*

*CorelDraw\*\**

*\*Access not included in the standard edition. Microsoft Publisher,*

*Bookshelf, etc., available depending on the suite edition.*

*\*\*CorelFlow, TimeLine, Dashboard, etc., available in all versions.*

*Of course, putting so many programs and features*

*together*

*in*

*one*

*super-size*

*package*

*does*

*have*

*some*

*disadvantages. Industry critics argue that many software suite*

*features are never used by most end users. The suites take up a*

*lot of disk space, from over 100 megabytes to over 150*

*megabytes, depending on which version or functions you install.*

*So such software is sometimes derisively called bloatware by its*

*critics. The cost of suites can vary from as low as $100 for a*

*competitive upgrade to over $700 for a full version of some*

*editions of the suites.*

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*These drawbacks are one reason for the continued use*

*of integrated packages like Microsoft Works, Lotus Works, Claris*

*Works, and so on. Integrated packages combine some of the*

*functions of several programs word processing, spreadsheets,*

*presentation graphics, database management, and so on into one*

*software package.*

*Because Works programs leave out many features and*

*functions that are in individual packages and software suites,*

*they cannot do as much as those packages do. However, they use*

*a lot less disk space (less than 10 megabytes), and cost less than*

*a hundred dollars. So integrated packages have proven that they*

*offer enough functions and features for many computer users,*

*while providing some of the advantages of software suites in a*

*smaller package.*

***Web Browsers and More***

*The most important software component for many*

*computer users today is the once simple and limited, but now*

*powerful and feature rich,* ***Web browser****. A browser like*

*Netscape Navigator or Microsoft Explorer is the key software*

*interface you use to point and click your way through the*

*hyperlinked resources of the World Wide Web and the rest of the*

*Internet, as well as corporate intranets and extranets. Once*

*limited to surfing the Web, browsers are becoming the universal*

*software platform on which end users launch into information*

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*searches, E-mail, multimedia file transfer, discussion groups, and*

*many other Internet, intranet, and extranet applications.*

*Industry experts are predicting that the Web browser*

*wil be the model for how most people will use networked*

*computers into the next century. So now, whether you want to*

*watch a video, make a phone call, download some software, hold*

*a video conference, check your E-mail, or work on a spreadsheet*

*of your team’s business plan, you can use your browser to launch*

*and host such applications. That’s why browsers are being called*

*the universal client, that is, the software component installed on*

*the workstations of all the clients (users) in client/server networks*

*throughout an enterprise.*

*The web browser has also become only one component*

*of a new suite of communications and collaboration software that*

*Netscape and other vendors are assembling in a variety of*

*configurations.*

***Electronic Mail***

*The first thing many people do at work all over the*

*world is check their E-mail. Electronic mail has changed the way*

*people work and communicate. Millions of end users now depend*

*on E-mail software to communicate with each other by sending*

*and receiving electronic messages via the Internet or their*

*organizations’ intranets or extranets. E-mail is stored on network*

*servers until you are ready. Whenever you want to your can read*

*your E-mail by displaying it on your workstations. So, with only a*

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*few minutes of effort (and a few microseconds or minutes of*

*transmission time), a message tone or many individuals can be*

*composed, sent, and received.*

*As we mentioned earlier, E-mail software is now a*

*component of top software suites and some Web browsers. E-mail*

*packages like Eudora and Pine are typically provided to Internet*

*users by Internet service providers and educational institutions.*

*Full-featured E-mail software like Microsoft change E-mail or*

*Netscape Messenger can route messages to multiple end users*

*based on predefined mailing lists and provide password security,*

*automatic message forwarding, and remote user access. They*

*also allow you to store messages in folders with provisions for*

*adding attachments to messages files. E-mail packages may also*

*enable you to edit and send graphics and multimedia as well as*

*text, and provide bulletin board and computer conferencing*

*capabilities. Finally, your E-mail software may automatically filter*

*and sort incoming messages (even news items from online*

*services) and route them to appropriate user mailboxes and*

*folders.*

***Word Processing and Desktop Publishing***

*Software for work processing has transformed the*

*process of writing. Word processing packages computerize the*

*creation, editing, revision, and printing of documents (such as*

*letters, memos. And reports) by electronically processing your*

*text data (words, phrases, sentences, and paragraphs). Top word*

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*processing packages like Microsoft Word, Lotus WordPro, and*

*Corel WordPerfect can privide a wide variety of attractively*

*printed documents with their desktop publishing capabilities.*

*These packages can also convert all documents to HTML format*

*for publication as Web pages on corporate intranets or the World*

*Wide Web.*

*Word processing packages also provide advanced*

*features. For example, a spelling checker capability can identify*

*and correct spelling errors, and a thesaurus feature helps you find*

*a better choice of words to express ideas. Or you can identify and*

*correct grammar and punctuation errors, as well as suggest*

*possible improvements in your writing style, with grammar and*

*style checker functions. Another text productivity tool is an idea*

*processor or outliner function. It helps you organize and outline*

*your thoughts before you prepare a document or develop a*

*presentation. Besides converting documents to HTML format, you*

*can also use the top packages to design and create Web pages*

*from scratch for an Internet or intranet Web site.*

*End*

*users*

*and*

*organizations*

*can*

*use*

***desktop***

***publishing***

***(DTP)*** *software to produce their own printed*

*materials that look professionally published. That is, they can*

*design and print their own newsletters, brochures, manuals, and*

*books with several type styles, graphics, photos, and colors on*

*each page. Word processing packages and desktop publishing*

*packages like Adobe PageMaker and QuarkXPress are used to do*

*desktop publishing. Typically, text material and graphics can be*

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*generated by word processing and graphics packages*

*and*

*imported as text and graphics files. Optical scanners may be used*

*to input tex and graphics from printed material. You can be also*

*use files of* ***clip art****, which are predrawn graphic illustrations*

*provided by the software package or available from other*

*sources.*

*The heart of desktop publishing is page design process*

*called page makeup or page composition. Your video screen*

*becomes an electronic pastcup board with rulers, column guides,*

*and other page design aids. Text material and illustrations are*

*then merged into the page format your design. The software will*

*automatically move excess text to another column or page and*

*help size and place illustrations and headings. Most DTP packages*

*provide WYSIWYG (What You See Is What You Get) displays so you*

*can see exactly what the finished document will look like before it*

*is printed.*

***Electronic Spreadsheets***

*Electronic spreadsheet packages like Lotus 1-2-3,*

*Microsoft Excel, and Corel QuattroPro are used for business*

*analysis, planning, and modeling. They help you develop an*

*electronic spreadsheet, which is a worksheet of rows and columns*

*that can be stored on your PC or a network server, or converted*

*to HTML format and stored as a Web page or websheet on the*

*World Wide Web. Developing a spreadsheet involves designing its*

*format and developing the relationships (formulas) that will be*

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*used in the worksheet. In response to your input, the computer*

*performs necessary calculations based on the relationships*

*(formulas) you defined in the spreadsheet, and displays results*

*immediately, whether at your workstation or Web site. Most*

*packages also help you develop graphic displays of spreadsheet*

*results.*

*For example, you could develop a spreadsheet to*

*record and analyze past and present advertising performance for*

*a business. Your could also develop hyperlinks to a similar*

*websheet at your marketing team’s intranet Web site. Now you*

*have a decision support tool to help you answer what-if questions*

*you may have about advertising. For example, “What would*

*happen to market share if advertising expense increased by 10*

*percent?” To answer this question, you would imply change the*

*advertising expense formula on the advertising performance*

*worksheet your developed. The computer would recalculate the*

*affected figures,*

*producing new market share figures and*

*graphics. You would then have a better insight on the effect of*

*advertising decisions on market share. Then you could share this*

*insight with a note on the websheet at your team’s intranet Web*

*site.*

***Database Management***

*Microcomputer*

*versions*

*of*

*database*

*management*

*programs have become so popular that they are now viewed as*

*general-purpose*

*application*

*software*

*packages*

*like*

*work*

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*processing and spreadsheet packages. Database management*

*packages such as Microsoft Access, Lotus Approach, or Corel*

*Paradox allow you to set up and manage databases on your PC,*

*network server, or the World Wide Web. Most database managers*

*can perform four primary tasks, which we will discuss further in*

*Chapter 7.*

 ***Database development.*** *Define and organize the*

*content, relationships, and structure of the data*

*needed to build a database, including any hyperlinks*

*to data on Web pages.*

 ***Database***

***interrogation.***

*Access*

*the*

*data*

*in*

*database to display information in a variety of*

*formats. End users can selectively retrieve and*

*display information and produce forms, reports, and*

*other documents, including Web pages.*

 ***Database maintenance.*** *Add, delete, update, and*

*correct the data in a database, including hyperlinked*

*data on Web pages.*

 ***Application development.*** *Develop prototypes of*

*Web pages, queries, forms, reports, and labels for a*

*proposed business application. Or use a built-in 4GL*

*or application generator to program the application.*

***Presentation Graphics and Multimedia***

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***Presentation graphics*** *packages help you convert*

*numeric data into graphics displays such as line charts, bas*

*graphs, pie charts, and many other types of graphics. Most of the*

*top package also help you prepare multimedia presentations of*

*graphics, photo, animation, and video clips, including publishing*

*to the World Vide Web. Not only are graphics and multimedia*

*displays earlier to comprehend and communicate than numeric*

*data but multiple-color and multiple media displays also can more*

*early emphasize key points, strategic differences, and important*

*trends in the data. Presentation graphics has proved to be much*

*more effective than tabular presentations of numeric data for*

*reporting and communicating in advertising media, management*

*reports, or other business presentations.*

*Presentation graphics software packages like Microsoft*

*PowerPoint, Lotus Freelance, or Corel Presentations give you*

*many easy-to-use capabilities that encourage the use of graphics*

*presentations. For example, most packages help you design and*

*manage computer generated and orchestrated slide shows*

*containing many integrated graphics and multimedia displays. Or*

*you can select from a variety of predesigned templates of*

*business presentations, prepare and edit the outline and notes for*

*a presentation, and manage the use of multimedia files of*

*graphics, photos, sounds, and video clips. And of course, the top*

*packages*

*help*

*you*

*tailor*

*your*

*graphics*

*and*

*multimedia*

*presentation for transfer in HTML format to Web sites on*

*corporate intranets or the World Wide Web.*

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***Multimedia Technologies***

*Hypertext and hypermedia are foundation technologies*

*for multimedia presentations. By definition hypertext contains*

*only text and a limited amount of graphics. Hypermedia are*

*electronic documents that contain multiple forms, of media,*

*including text, graphics, video, and so on. Key terms and topics in*

*hypertext or hypermedia documents are indexed by software*

*links so that they can be quickly searched by the reader. For*

*example, if you click your mouse button on an underlined term on*

*a hypermedia document displayed on your computer video*

*screen, the computer instantly brings up a display of a passage of*

*text and graphics related to that term. Once you finish viewing*

*that pop-up display, you can return to what you were reading*

*originally, or jump to another part of the document.*

*Hypertext*

*and*

*hypermedia*

*are*

*developed*

*using*

*specialized programming languages like Java and the Hypertext*

*Markup. Language (HTML), which create hyperlinks to other parts*

*of the document, or to other documents and media. Hypertext*

*and hypermedia documents can thus be programmed to let a*

*reader navigate through a multimedia database by following a*

*chain of hyperlinks through various documents. The Web sites on*

*the World Wide Web of the Internet are a popular example of this*

*technology. Thus, the use of hypertext and hypermedia provides*

*an*

*environment*

*for*

*online*

*interactive*

*presentations*

*of*

*multimedia.*

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*Multimedia technologies allow end users to digitally*

*capture, edit, and combine video with text, picture, and sound*

*into multimedia business and educational presentations. For*

*example, an interactive video session for training airline flight*

*attendants can be produced on CD-ROM disks. It can combine*

*animated graphics displays of different airplane configuration,*

*presentations graphics of airline statistics, lists of major topics*

*and facts,*

*video clips of flight attendants working on various*

*airplanes, and various announcements and sounds helpful in*

*managing emergencies.*

***Personal Information Managers***

*The personal information manager (PIM) is a popular*

*software package for end user productivity and collaboration.*

*PIMs such as Lotus Organizer, Sidekick by Starfish Software, and*

*Microsoft Outlook help end users store, organize, and retrieve*

*information about customers, clients, and prospects, or schedule*

*and manage appointments, meetings, and tasks. The PIM*

*package will organize data you enter and retrieve information in a*

*variety of forms, depending on the style and structure of the PIM*

*and the information you want. For example, information can be*

*retrieved as an electronic calendar or list of appointments,*

*meetings, or other things to do; the timetable for a project; or a*

*display of key facts and financial data about customers, clients, or*

*sales prospects.*

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*Personal information managers are sold as independent*

*programs or are included in software suites, and vary widely in*

*their style, structure, and features. For example, Lotus Organizer*

*uses a notebook with tabs format, while Microsoft Outlook*

*organizes data about people as a continuous A-to-Z list. Most*

*PIMs emphasize the maintenance of contact lists, that is,*

*customers, clients, or prospects. Scheduling appointments and*

*meetings and task management are other top PIM applications.*

*PIMs are now changing to include the ability to access the World*

*Wide Web as Sidekick does, or provide E-mail capability, as in*

*Microsoft Outlook. Also, some PIMs use Internet and E-mail*

*features to support team collaboration by sharing information*

*such as contact lists, task lists, and schedules with other*

*networked PIM users.*

***Groupware***

*Groupware is collaboration software, that is, software*

*that helps workgroups and teams work together to accomplish*

*group assignments. Groupware is a fast-growing category of*

*general-purpose application software that combines a variety of*

*software features and functions to facilitate collaboration. For*

*example, groupware products like Lotus Notes, Novell GroupWise,*

*Microsoft Exchange, and Netscape Communicator and Collabra*

*support collaboration through electronic mail, discussion groups*

*and databases, scheduling, task management, data, audio and*

*videoconferencing, and so on.*

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*Groupware products are changing in several ways to*

*meet the demand for better tools for collaboration. Groupware is*

*now designed to use the Internet and corporate intranets and*

*extranets to make collaboration possible on a global scale by*

*virtual teams located anywhere in the world. For example, team*

*members might use the Internet for global E-mail, project*

*discussion forums, and joint Web page development. Or they*

*might use corporate intranets to publish project news and*

*progress reports, and work jointly on documents stored on Web*

*servers. Collaborative capabilities are also being added to other*

*software to give them groupware features. For example, in the*

*Microsoft Office software suite, Microsoft Word keeps track of who*

*made revisions to each document, Excel tracks all changes made*

*to spreadsheet, and Outlook lets you keep track of tasks you*

*delegate to other ream members.*

***SYSTEM SOFTWARE: COMPUTER SYSTEM MANAGEMENT***

***System Software Overview***

*System software consists of programs that manage and*

*support a computer system and its information processing*

*activities. These programs serve as a vital software interface*

*between*

*computer*

*system*

*hardware*

*and*

*the*

*application*

*programs of end users.*

 ***System management programs.*** *Programs that*

*manage the hardware, software, network, and data*

*resources*

*of*

*the*

*computer*

*system*

*during*

*its*

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*execution of the various information processing jobs*

*of*

*users.*

*Examples*

*of*

*important*

*system*

*management*

*programs*

*are*

*operating*

*systems,*

*network*

*management*

*programs,*

*database*

*management systems, and system utilities.*

 ***System development programs.*** *Programs that*

*help users develop information system programs and*

*procedures and prepare user programs for computer*

*processing.*

*Major*

*development*

*programs*

*are*

*programming language translators and editors, other*

*programming*

*tools,*

*and*

*CASE*

*(computer-aided*

*software engineering) packages.*

***Operating Systems***

*The most important system software package for any*

*computer is its operating system. An operating system is an*

*integrated system of programs that manages the operations of*

*the CPU, controls the input/output and storage resources and*

*activities of the computer system, and provides various support*

*services as the computer executes the application programs of*

*users.*

*The primary purpose of an operating system is to*

*maximize the productivity of a computer system by operating it in*

*the most efficient manner. An operating system minimizes the*

*amount of human intervention required during processing. It*

*helps your application programs perform common operations*

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*such as accessing a network, entering data, saving and retrieving*

*files, and printing or displaying output. If you have any hands-on*

*experience on a computer, you know that the operating system*

*must be loaded and activated before you can accomplish other*

*tasks. This emphasized the fact that operating systems are the*

*most indispensable component of the software interface between*

*users and the hardware of their computer systems.*

***Operating System Functions***

*An operating system performs five basic functions in*

*the operation of a computer system: providing a user interface,*

*resource management, task management, file management, and*

*utilities and support services.*

***The User Interface.*** *The user interface is the part of*

*the operating system that allows you to communicate with it so*

*you can load program , access files, and accomplish other tasks.*

*Three main types of user interfaces are the command driven,*

*menu driven, and graphical user interfaces. The trend in user*

*interfaces for operating systems and other software is moving*

*away from the entry of brief end user commands, or even the*

*selection of choices from menus of options. Instead, the trend is*

*toward an easy-to-use graphical user interface (GUI) that uses*

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*icons, bars, buttons, boxes, and other images. GUIs rely on*

*pointing devices like the electronic mouse or trackball to make*

*selections that help you get things done.*

***Resource Management.*** *An operating system uses a*

*variety of resource management programs to manage the*

*hardware and networking resources of a computer system,*

*including*

*is*

*CPU,*

*memory,*

*secondary*

*storage*

*devices,*

*telecommunications processors, and input/output peripherals, For*

*example, memory management programs keep track of where*

*data and programs are stored. They may also subdivide memory*

*into a number of sections and swap parts of programs and data*

*between memory and magnetic disks or other secondary storage*

*devices. This can provide a computer system with a virtual*

*memory capability that is significantly larger than the real*

*memory capacity of its primary storage unit. So a computer with*

*a virtual memory capability can process larger programs and*

*greater amounts of data than the capacity of its memory circuits*

*would normally allow.*

***File Management.*** *An operating system contains file*

*management programs that control the creation, deletion, and*

*access of files of data and programs. File management also*

*involves keeping track of the physical location of files on*

*magnetic*

*disks*

*and*

*other*

*secondary*

*storage*

*devices.*

*So*

*operating systems maintain directories of information about the*

*location and characteristics of files stored on a computer*

*system’s secondary storage-devices.*

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***Task Management.*** *The task management programs*

*of an operating system manage the accomplishment of the*

*computing tasks of end users. They give each task a slice of a*

*CPU’s time and interrupt the CPU operations to substitute other*

*tasks. Task management may involve a multitasking capability*

*where several computing tasks can occur at the same time.*

*Multitasking may take the form of multiprogramming, where the*

*CPU can process the tasks of several programs at the same time,*

*or time sharing, where the computing tasks of several users can*

*be processed at the same time. The efficiency of multitasking*

*operations depends on the processing power of a CPU and the*

*virtual memory and multitasking capabilities of the operating*

*system it uses.*

*New*

*microcomputer*

*operating*

*systems*

*and*

*most*

*midrange*

*and*

*mainframe*

*operating*

*systems*

*provide*

*a*

*multitasking capability. With multitasking, end users can do two*

*or*

*more*

*operations*

*(e.g.,*

*keyboarding*

*and*

*printing)*

*or*

*applications*

*(e.g.,*

*word*

*processing*

*and*

*financial*

*analysis)*

*concurrently,*

*that*

*is,*

*at*

*the*

*same*

*time.*

*Multitasking*

*on*

*microcomputers*

*has*

*also*

*been*

*made*

*possible*

*by*

*the*

*development of more powerful microprocessors (like the Intel*

*Pentium-II) and their ability to directly address much larger*

*memory capacities (upto 4 gigabytes). This allows an operating*

*system to subdivide primary storage into several large partitions,*

*each of which can be used by a different application program.*

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*In effect, a single computer can act as if it were several*

*computers, or virtual machines, since each application program is*

*running independently at the same time. The number of*

*programs that can be run concurrently depends on the amount of*

*memory that is available and the amount of processing each job*

*demands. That’s because a microprocessor (or CPU) can become*

*overloaded with too many jobs and provide unacceptably slow*

*response times. However, if memory and processing capacities*

*are adequate, multitasking allows end users to easily switch from*

*one application to another, share data files among applications,*

*and process some applications in a background mode typically,*

*background*

*tasks*

*include*

*large*

*printing*

*jobs,*

*extensive*

*mathematical computation, or unattended telecommunications*

*sessions.*

***Popular Operating Systems.***

*MS-DOS (Microsoft Disk Operating System), along with*

*the Windows operating environment, has been the most widely*

*used microcomputer operating system. It is a single-user, single-*

*tasking operating system, but was given a graphical user*

*interface and limited multitasking capabilities by combining it*

*with*

*Microsoft*

*Windows.*

*Microsoft*

*began*

*replacing*

*its*

*DOS/Windows*

*combination*

*in*

*1995*

*with*

*the*

*Windows*

*95*

*operating system. Windows 95 is an advanced operating system*

*featuring*

*a*

*graphical*

*user*

*interface,*

*true*

*multitasking,*

*networking, multimedia, and many other capabilities. Microsoft*

*plans to ship a Windows 98 version during 1998.*

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*Microsoft*

*introduced*

*another*

*operating*

*system,*

*Windows NT (New Technology), in 1995. Windows NT is a*

*powerful, multitasking, multi-user operating system that is being*

*installed on network servers to manage local area networks and*

*on desktop PCs with high-performance computing requirements.*

*New Server and Workstation versions were introduced in 1997.*

*Some*

*industry*

*experts*

*are*

*predicting*

*that*

*Windows*

*NT*

*Workstation will supplant Windows 95 and 98 in a few years.*

*OS/2*

*(Operating*

*System/2)*

*is*

*a*

*microcomputer*

*operating system from IBM. Its latest version, OS/2 Warp 4, was*

*introduced in 1996 and provides a graphical user interface, voice*

*recognition, multitasking, virtual memory, telecommunications,*

*and many other capabilities. A version for network servers, OS/2*

*Warp Server, is also available. Originally developed by AT&T, UNIX*

*now is also offered by other vendors, including Solaris by Sun*

*Microsystems and AIX by IBM. UNIX is a multitasking, multiuse,*

*network-managing operating system whose portability allows it to*

*run on mainframes, midrange computers, and microcomputers.*

*UNIX is a popular choice for network servers in many client/server*

*computing networks. The Macintosh System is an operating*

*system from Apple for Macintosh microcomputers. Now in version*

*8.0, the system has a popular graphical user interface as well as*

*multitasking and virtual memory capabilities.*

***Network Management Program.***

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*Today’s*

*information*

*systems*

*rely*

*heavily*

*on*

*the*

*Internet, intranets, extranets, local area networks, and other*

*telecommunications*

*networks*

*to*

*interconnect*

*end*

*user*

*workstations, network servers, and other computer systems. This*

*requires a variety of system software for network management,*

*including network operating systems, network performance*

*monitors,*

*telecommunications*

*monitors,*

*and*

*so*

*on.*

*These*

*programs are used by network servers and other computers in*

*network to manage network performance. Network management*

*programs perform such functions as automatically checking client*

*PCs and video terminals for input/output activity, as signing*

*priorities to data communications requests from clients and*

*terminals, and detecting and correcting transmission errors and*

*other network problems. In addition, some network management*

*programs function as middleware to help diverse networks*

*communicate with each other.*

*Examples of network management programs include*

*Novell NetWare, the most widely used network operating system*

*for complex interconnected local area networks. Microsoft’s*

*Windows NT Server and IBM’s OS/2 Warp Server are two other*

*popular network operating systems. IBM’s telecommunication*

*monitor CICS (Customer Identification and Control System) is an*

*example of a widely used telecommunications monitor for*

*mainframe-based*

*wide*

*area*

*networks.*

*IBM’s*

*NetView*

*and*

*Hewlett-Packard’s*

*Open*

*View*

*are*

*examples*

*of*

*network*

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*management programs for managing several mainframe-based or*

*midrange-based computer networks.*

***Database Management Systems.***

*A*

*DBMS*

*program*

*helps*

*organization*

*use*

*their*

*integrated collections of data records and files known as*

*databases. It allows different user application programs to easily*

*access the same database. For example, a DBMS makes it easy*

*for an employee database to be accessed by payroll, employee*

*benefits, and other human resource programs. A DBMS also*

*simplifies the process of retrieving information from databases in*

*the form of displays and reports. Instead of having to write*

*computer programs to extract information, end users can ask*

*simple questions in a query language. Thus, many DBMS*

*packages provide fourth-generation language (4GLs) and other*

*application*

*development*

*features.*

*Examples*

*of*

*popular*

*mainframe and midrange packages are DB2 by IBM and Oracle 8*

*by Oracle Corporation.*

***Other System Management Programs.***

*Several other types of system management software*

*are marketed as separate programs or are included as part of an*

*operating system. Utility programs, or utilities, are an important*

*example. Programs like Norton Utilities perform miscellaneous*

*housekeeping and file conversion functions. Examples include*

*data backup, data recovery, virus protection, data compression,*

*and file defragmentation. Most operating systems also provide*

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*many utilities that perform a variety of helpful chores for*

*computer users.*

*Other examples of system support programs include*

*performance*

*monitors*

*and*

*security*

*monitors.*

*Performance*

*monitors are programs that monitor and adjust the performance*

*and usage of one or more computer systems to keep them*

*running efficiently, Security monitors are packages that monitor*

*and control the use of computer systems and provide warning*

*messages and record evidence of unauthorized use of computer*

*resources. A recent trand is to merge both types of programs into*

*operating systems like Microsoft’s Windows NT Server, or into*

*system management software like Computer Associates’ CA-*

*Unicenter, that can manage both mainframe systems and servers*

*in a data centre.*

***PROGRAMMING LANGUAGES.***

*A programming language allows a programmer to*

*develop the sets of instructions that constitute a computer*

*program. Many different programming languages have been*

*developed, each with its own unique vocabulary; grammar, and*

*use.*

***Machine Languages:***

*Machine Languages (or first-generation languages) are*

*the most basic level of programming languages. In the early*

*stages of computer development, all program instructions had to*

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*be written using binary codes unique to each computer. This type*

*of programming involves the difficult task of writing instructions*

*in the form of strings of binary digits (ones and zeros) or other*

*number systems. Programmers must have a detailed knowledge*

*of the internal operations of the specific type of CPU they are*

*using. They must write long series of detailed instructions to*

*accomplish even simple processing tasks. Programming in*

*machine language requires specifying the storage locations for*

*every instruction and item of data used. Instructions must be*

*included for every switch and indicator used by the program.*

*These requirements make machine language programming a*

*difficult and error-prone task.*

***Assembler Languages.***

*Assembler languages (or second-generation languages)*

*are the next level of programming languages. They were*

*developed to reduce the difficulties in writing machine language*

*programs. The use of assembler languages requires language*

*translator programs called* assemblers *that allow a computer to*

*convert*

*the*

*instructions*

*of*

*such*

*languages*

*into*

*machine*

*instructions. Assembler languages are frequently called symbolic*

*languages because symbols are used to represent operation*

*codes and storage locations. Convenient alphabetic abbreviations*

*called mnemonics (memory aids) and other symbols represent*

*operation codes, storage locations, and data elements.*

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***Advantages***

***and***

***Disadvantages.***

*An*

*assembler*

*language uses alphabetic abbreviations that are easier to*

*remember in place of the actual numeric addresses of the data.*

*This greatly simplifies programming, since the programmer does*

*not need to know the exact storage locations of data and*

*instructions. However, assembler language is still machine*

*oriented, because assembler language instructions correspond*

*closely to the machine language instructions of the particular*

*computer model being used. Also, note that each assembler*

*instruction corresponds to a single machine instruction, and that*

*the same number of instructions are required in both illustrations.*

*Assembler languages are still widely used as a method*

*of programming a computer in a machine oriented language.*

*Most computer manufactures provide an assembler language that*

*reflects the unique machine language instruction set of a*

*particular line of computers. This feature is particularly desirable*

*to system programmers, who program system software (as*

*opposed to application programmers, who program application*

*software), since it provides them with greater control and*

*flexibility in designing a program for a particular computer. They*

*can then produce more efficient software, that is, programs that*

*require a minimum of instructions, storage, and CPU time to*

*perform a specific processing assignment.*

***High-level Languages.***

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*High-level Languages (or third-generation languages)*

*use instructions, which are called statements, that use brief*

*statements*

*or*

*arithmetic*

*expressions.*

*Individual*

*high-level*

*language statements are actually* macroinstructions; *that is, each*

*individual statement generates several machine instructions*

*when translated into machine language by high-level language*

*translator programs called* compiler *or* interpreters. *High-level*

*language statements resemble the phrases or mathematical*

*expressions required to express the problem or procedure being*

*programmed.*

*The*

syntax

*(vocabulary,*

*punctuation,*

*and*

*grammatical rules) and the semantics (meanings) of such*

*statements do not reflect the internal code of any particular*

*computer.*

*For*

*example,*

*the*

*computation*

*X= Y + Z would be programmed in the high-level languages of*

*BASIC and COBOL.*

***Advantages***

***and***

***Disadvantages.***

*A*

*high-level*

*language is obviously easier to learn and understand than an*

*assembler language. Also, high-level languages have less-rigid*

*rules, forms, and syntaxes, so the potential for errors is reduced.*

*However, high-level languages programs are usually less efficient*

*than assembler language programs and require a greater amount*

*of computer time for translation into machine instructions. Since*

*most high-level languages are machine independent, programs*

*written in a high-level language do not have to be reprogrammed*

*when a new computer is installed, and computer programmers do*

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*not have to learn a new language for each computer they*

*program.*

***Fourth Generation Languages.***

*The*

*term*

*fourth-generation*

*language*

*describes*

*a*

*variety of programming languages that are more nonprocedural*

*and conversational than prior languages. These languages are*

*called fourth generation languages (4GLs) to differentiate them*

*from machine languages (first generation), assembler languages*

*(second generation), and high-level languages (third generation).*

*Most fourth-generation languages are nonprocedural*

*languages that encourage users and programmers to specify the*

*results they want, while the computer determines the sequence*

*of instructions that will accomplish those results. Users and*

*programmers no longer have to spend a lot of time developing*

*the sequence of instructions the computer must follow to achieve*

*a result. Thus, fourth-generation languages have helped simplify*

*the programming process. Natural languages are 4GLs that are*

*very close to English or other human languages.*

***Advantages & Disadvantages.*** *There are major*

*difference sin the case of use and technical sophistication of 4GL*

*products, INTELLECT and English Wizard are examples of natural*

*query languages that impose no rigid grammatical rules, while a*

*query language like SQL requires concise structured statements.*

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*However, the ease of use of 4GLs is gained at the expense of*

*some loss in flexibility. It is frequently difficult for an end user to*

*override some of the pre-specified formats or procedures of 4GLs.*

*Also, the machine language code generated by a program*

*developed by a 4GL is frequently much less efficient (in terms of*

*processing speed and amount of storage capacity needed) than a*

*program written in a language like COBOL. Major failures have*

*occurred in some large transactions processing applications*

*programmed in a 4GL. These applications were unable to provide*

*reasonable response times when faced with a large amount of*

*realtime transaction processing and end user inquiries. However,*

*4GLs have shown great success in business applications that do*

*not have a high volume of transaction processing.*

***Object-Oriented Languages.***

*Object Oriented programming (OOP) languages have*

*been around since Xerox developed Smalltalk in the 1960s.*

*However, object-oriented languages like Visual Baisc, C++, and*

*Java have become major tools of software development. Briefly,*

*while most other programming languages separate data elements*

*from the procedures or actions that will be performed upon them,*

*OOP languages tie them together into objects. Thus, and object*

*consists of data and the actions that can be performed on the*

*data. For example, an object could be a set of data about a bank*

*customer’s saving account, and the operations (such as interest*

*calculations) that might be performed upon the data. Or an object*

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*could be data in graphic form such as a video display window,*

*plus the display actions that might be used upon it.*

*In*

*procedural*

*languages,*

*a*

*program*

*consists*

*of*

*procedures to perform actions on each data element. However, in*

*object-oriented systems, objects tell other objects to perform*

*actions on themselves. For example, to open a window on a*

*computer video display, a beginning menu object could send a*

*window object a message to open and a window will appear on*

*the screen. That’s because the window object contains the*

*programs code for opening itself.*

*Object-oriented languages are easier to use and more*

*efficient for programming the graphics-oriented user interfaces*

*required*

*by*

*many*

*applications.*

*Also,*

*once*

*objects*

*are*

*programmed, they are reusable. Therefore, reusability of objects*

*is a major benefit of object-oriented programming. For example,*

*programmers can construct a user interface for a new program by*

*assembling standard objects such as windows, bars, boxes,*

*buttons, and icons. Therefore, most object-oriented programming*

*packages provide a GUI that supports a “point and click”, “drag*

*and*

*drop”*

*visual*

*assembly*

*of*

*objects*

*known*

*as*

*visual*

*programming.*

***HTML and Java***

*HTML and Java are two relatively new programming*

*languages that have become vital tools for building multimedia*

*Web pages, Web sites, and Web-based applications.*

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*HTML*

*(Hypertext*

*Markup*

*Language)*

*is*

*a*

*page*

*description language that creates hypertext or hypermedia*

*documents. HTML inserts control codes within a document at*

*points you can specify that create links (hyperlinks) to other parts*

*of the document or to other documents anywhere on the World*

*Wide Web. HTML embeds control codes in the ASCII text of a*

*document*

*that*

*designate*

*titles,*

*headings,*

*graphics,*

*and*

*multimedia*

*components,*

*as*

*well*

*as*

*hyperlinks*

*within*

*the*

*document.*

*Several of the programs in the top software suites will*

*automatically convert documents into HTML formats. These*

*include*

*Web*

*browsers,*

*word*

*processing*

*and*

*spreadsheet*

*programs,*

*database*

*managers,*

*and*

*presentation*

*graphics*

*packages. These and other specialized HTML editor programs*

*provide a range of features to help you design and create*

*multimedia Web pages without formal HTML programming.*

*Java is an object-oriented programming language*

*created*

*by*

*Sun*

*Microsystems*

*that*

*is*

*revolutionizing*

*the*

*programming of applications for the World Wide Web and*

*corporate intranets and extranets. Java is related to the C++ and*

*Objective C programming languages, but is much simpler and*

*secure, and is computing platform independent. Java is also*

*specifically*

*designed*

*for*

*real-time,*

*interactive,*

*Web-based*

*network applications. So Java applications consisting of small*

*application programs, called applets, can be executed by any*

*computer and any operating system anywhere in a network.*

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*The case of creating Java apples and distributing them*

*from network servers to client PCs and network computers is a*

*major reason for Java’s popularity. Apples can be small special*

*purpose*

*application*

*programs*

*or*

*small*

*modules*

*of*

*larger*

*application programs. Applets can reside at Web sites on a*

*network server until needed by client systems, and are easy to*

*distribute over the Internet or intranets and extranets. Applets*

*are platform independent too—they can run on Windows, OS/2,*

*UNIX, and Macintosh systems without modification. So Java is*

*becoming the programming language alternative to Microsoft’s*

*Active X language for many organizations internet on capitalizing*

*on the business potential of the Internet, as well as their own*

*intranets and extranets.*

***PROGRAMMING PACKAGES***

*A variety of software packages are available to help*

*programmers*

*develop*

*computer*

*programs.*

*For*

*example,*

*programming language translators are programs that translate*

*other programs into machine language instruction codes that*

*computers can execute. Other software packages, such as*

*programming language editors, are called programming tools*

*because they help programmers write programs by providing a*

*variety of program creation and editing capabilities.*

***Language Translator Programs.***

*Computer programs consist of sets of instructions*

*written in programming languages that must be translated by a*

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*language translator into the computer’s own machine language*

*before they can be processed, or executed, by the CPU.*

*Programming*

*language*

*translator*

*programs*

*(or*

*language*

*processors) are known by a variety of names. An assembler*

*translates the symbolic instruction codes of programs written in*

*an assembler language into machine language instructions, while*

*a compiler translates high-level language statements.*

*An interpreter is a special type of compiler that*

*translates and executes each statement in a program one at a*

*time, instead of first producing a complete machine language*

*program, like compilers and assemblers do. Java is an example of*

*an interpreted language. Thus, the program instruction in Java*

*applets are interpreted and executed on-the-fly as the applet is*

*being executed by a client PC.*

***Programming Tools.***

*Many language translator programs are enhanced by a*

*graphical*

*programming*

*interface*

*and a*

*variety*

*of*

*built-in*

*capabilities or add-on packages. Language translators have*

*always provided some editing and diagnostic capabilities to*

*identify programming errors or bugs. However, many language*

*translator programs now include powerful graphics-oriented*

*programming editors and debuggers. These programs help*

*programmers identify and minimize errors while they are*

*programming. Such programming tools provide a computer-aided*

*programming environment or workbench. Their goal is to*

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*decrease the drudgery of programming while increasing the*

*efficiency and productivity of programmers. Other programming*

*tools include diagramming packages, code generators, libraries or*

*reusable objects and program code, and prototyping tools. Many*

*of these same tools are part of the toolkit provided by computer-*

*aided software engineering (CASE) packages.*

***Business Applications of Telecommunications.***

*Telecommunications is the sending of information in*

*any form (e.g., voice, data, text, and images) from one place to*

*another*

*using*

*electronic*

*or*

*light-emitting*

*media.*

*Data*

*communications is a more specific term that describes the*

*transmitting and receiving of data over communication links*

*between one or more computer systems and a variety of*

*input/output terminals. The terms teleprocessing, telematics, and*

*telephony may also be used since they reflect the integration of*

*computer-based information processing with telecommunications*

*and*

*telephone*

*technology.*

*However,*

*all*

*forms*

*of*

*telecommunications*

*now*

*rely*

*heavily*

*on*

*computers*

*and*

*computerized*

*devices.*

*For*

*this*

*reason,*

*the*

*broader*

*term*

*telecommunications can be used as a synonym for data*

*communications activities.*

*Figure 6.2 illustrates some of the many possible*

*business*

*applications*

*of*

*telecommunications.*

*It*

*groups*

*telecommunications applications into the major categories of*

*enterprise collaboration systems, electronic commerce systems,*

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*and internal business systems. Figure 6.2 also emphasized that*

*these applications rely on the telecommunications capabilities of*

*the Internet, intranets, extranets, and other types of enterprise*

*and inter organizational networks.*

*Enterprise*

*collaboration*

*applications*

*use*

*telecommunications*

*networks*

*to*

*support*

*communications,*

*coordination, and collaboration among the members of business*

*teams and workgroups. For example, employees and external*

*consultants on a project team may use the Internet, intranets,*

*and extranets to support electronic mail, video conferencing,*

*electronic discussion groups, and multimedia Web pages to*

*communicate and collaborate on business projects. Electronic*

*commerce*

*applications*

*support*

*the*

*buying*

*and*

*selling*

*of*

*products, services, and information over the Internet and other*

*computer networks. For example, a business could use the*

*Internet to give customers access to multimedia product catalogs*

*on the World Wide Web, use extranets so large customers can*

*access the company’s inventory databases, and use a corporate*

*intranet so employees can easily look up customer records stored*

*on intranet servers.*

*Internal business applications of telecommunications*

*depend on a variety of compute networks to support a company’s*

*business operations. For example, employees may use an*

*intranet to access benefits information on a human resource*

*department server. Or a company may link wide area and local*

*area networks so managers can make inquiries and generate*

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*reports from corporate databases stored on network servers and*

*mainframe systems.*

***Figure 6.2***

*Some of the business*

*Applications of*

*Business*

*tlecommunications. Note*

*the many types of applications*

*for enterprise collaboration,*

*electronic commerce,*

*and internal business*

*Telecommunicat*

*ions*

*Telecommunicat*

*ions Networks*







*The Internet*

*Intranets*

*Extranets*

*operations.*

*Internal*

*Business*

*Enterprise*

*Collaboration*

*Electronic*

*Commerce*













*Electronic Mail*

*Voice Mail*

*Discussion Forums*

*Data Conferencing*

*Video*

*Conferencing*

*Electronic Meeting*









*Online Point-of*

*Sale Transaction*

*Processing*

*Web Retailing and*

*Wholesaling*

*Electronic Data*

*Interchange*

*Electronic Funds*

*Transfer*











*Internal*

*Transaction*

*Processing*

*Inquiry Processing*

*Intranet Web*

*Publishing*

*Workflow Systems*

*Activity Monitoring*

*Systems*



*Electronic Banking*



*Process Control*

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***The Business Value of Telecommunications.***

*What business value is created by the business*

*applications of telecommunications shown in Figure 6.2? That’s*

*what you need to know as a manager, entrepreneur, or business*

*professional. A good way to answer this question is shown in*

*Figure*

*6.3.*

*Information*

*technology,*

*especially*

*in*

*telecommunications-based*

*business*

*applications,*

*helps*

*a*

*company*

*overcome*

*geographic,*

*time,*

*cost,*

*and*

*structural*

*barriers to business success. Figure 6.3 outlines examples of the*

*business*

*value*

*of*

*these*

*four*

*strategic*

*capabilities*

*of*

*telecommunications and other information technologies. This*

*figure*

*emphasizes*

*how*

*several*

*applications*

*of*

*electronic*

*commerce can help a firm capture and provide information*

*quickly to end users at remote geographic locations at reduced*

*cost, as well as supporting its strategic organizational objectives.*

*For example, traveling salespeople and those at*

*regional sales offices can use the internet, extranets, and other*

*networks to transmit customer orders from their laptop or*

*desktop PCs, thus breaking geographic barriers. Point-of-sale*

*terminals and an online sale transaction processing network can*

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*break time barriers by supporting immediate credit authorization*

*and sales processing. Teleconferencing can be used to cut costs*

*by reducing the need for expensive business trips since it allows*

*customers, suppliers, and employees to participate in meetings*

*and*

*collaborate*

*on*

*joint*

*projects.*

*Finally,*

*electronic*

*data*

*interchange systems are used by the business to establish*

*strategic relationships with their customers and suppliers by*

*making the exchange of electronic business documents fast,*

*convenient, and tailored to the needs of the business partners*

*involved. We will discuss the strategic business value of*

*telecommunications applications in Chapter12, for electronic*

*commerce in Chapter 8, and for enterprise collaboration in*

*Chapter 9.*

***Trends in Telecommunications.***

*Major*

*trends*

*occurring*

*in*

*the*

*field*

*of*

*telecommunications have a significant impact on management*

*decisions in this area. You should thus be aware of major trends in*

*telecommunications industries, technologies, and applications*

*that significantly increase the decision alternatives confronting*

*the managers of business organizations. See Figure 6.4.*

***Industry Trends.***

*The competitive arena for the telecommunications*

*service has changed dramatically in the United States and several*

*other countries, from a few government-regulated monopolies to*

*many*

*fiercely*

*competitive*

*suppliers*

*of*

*telecommunications*

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*services. This telecommunications revolution began in the United*

*States with the breakup of AT&T and the Bell System in 1984,*

***Figure 6.4***

*Major trends in telecommunications.*

*Industry trends Toward a greater number of*

*competitive vendors, carriers,*

*alliance, and network services,*

*accelerated by deregulation and the*

*growth of the Internet.*

*and accelerated with the passage of the Telecommunications Act*

*of 1996, and the tidal wave of Internet users and uses in the*

*1990s. Now telecommunications networks and services are*

*available from numerous large and small telecommunications*

*companies.*

*Thousands*

*of*

*companies*

*offer*

*businesses*

*and*

*consumers a choice of everything from local and global telephone*

*services to communications satellite channels, mobile radio, cable*

*TV, cellular phone servers, and Internet access. See Figure 6.5.*

*The explosive growth of the Internet and the World*

*Wide Web has spawned a host of new telecommunications*

*products, services, and providers. Driving and responding to this*

*growth, business firms have dramatically increased their use of*

*the*

*Internet*

*and*

*the*

*Web*

*for*

*electronic*

*commerce*

*and*

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*collaboration. Thus, the service and vendor options available to*

*meet a company’s telecommunications needs have increased*

*significantly, as have a business manager’s decision-making*

*alternatives.*

*The U.S. Telecommunications Deregulation and Reform*

*Act of 1996 has promoted few exceptions, the law overturns*

*virtually all U.S. federal regulations that*

*governed which*

*companies could enter which communications businesses. This*

*encourages the creation of even more telecommunications*

*companies, telecommunications mergers and alliances, and*

*telecommunications services. Key changes in the law include:*

 *Local telephone companies, including the regional*

*Bell operating companies, can provide long distance*

*telecommunications services.*

 *Long-distance telephone companies can enter local*

*telephone service markets.*

 *Local and long-distance telephone companies can*

*expand into the cable TV business.*

 *Cable TV companies can provide local telephone*

*services.*

***Technology Trends.***

*Open systems with unrestricted connectivity, using*

*Internet networking technologies as their technology platform,*

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*are the primary telecommunications technology drivers of the*

*late 1990s. This trend is self-evident in the rapid and continually*

*changing development of thousands of hardware, software, and*

*networking products and services. Their primary goal is to*

*promote easy and secure access by business end users and*

*consumers to the resources of the Internet, especially the World*

*Wide Web, and corporate intranets and extranets. Web browser*

*suites, HTML Web page editors, Internet and intranet servers and*

*network*

*management*

*software,*

*TCP/IP*

*Internet*

*networking*

*products, and network security fire walls are just a few examples.*

*These technologies are being applied in many types of business*

*networks*

*and*

*applications,*

*especially*

*those*

*for*

*electronic*

*commerce and collaboration. This trend has reinforced previous*

*industry and technical moves toward building client/server*

*networks based on an open systems architecture.*

*Open*

*systems*

*are*

*information*

*systems*

*that*

*use*

*common standards for hardware, software, applications, and*

*networking. Open systems, like the Internet and corporate*

*intranets and extranets, create a computing environment that is*

*open to easy access by end users and their networked computer*

*systems. Open systems provide great connectivity, that is, the*

*ability of networked computers and other devices to easily access*

*and communicate with each other and share information. Any*

*open systems architecture also provides a high degree of network*

*interoperability. That is, open systems enable the many different*

*applications of end users to be accomplished using the different*

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*varieties of computer systems, software packages, and databases*

*provided by a variety of interconnected networks. Frequently,*

*software known as middleware may be used to help diverse*

*systems work together. Network architectures like the Open*

*Systems*

*Interconnection*

*(OSI)*

*model*

*of*

*the*

*International*

*Standards Organization and the Internet’s TCP/IP protocol suite*

*promote*

*open,*

*flexible,*

*and*

*efficient*

*standards*

*for*

*the*

*development of open telecommunications networks.*

*Telecommunications is also being revolutionized by a*

*change*

*from*

*analog*

*to*

*digital*

*network*

*technologies.*

*Telecommunications has always depended on voice-oriented*

*analog transmission systems designed to transmit the variable*

*electrical frequencies generated by the sound waves of the*

*human voice. However, local and global telecommunications*

*networks*

*are*

*rapidly*

*converting*

*to*

*digital*

*transmission*

*technologies that transmit information in the form of discrete*

*pulses, as computers do. This provides (1) significantly higher*

*transmission speeds, (2) the movement of larger amount of*

*information, (3) greater economy, and (4) much lower error rates*

*than analog systems. In types of communications (data, voice,*

*video) on the same circuits.*

*Another major trend in telecommunications technology*

*is a change in communications media. Many telecommunications*

*networks are switching from reliance on copper wire-based media*

*(such as coaxial cable) and land-based microwave relay systems*

*to fiber optic lines and communications satellite transmissions.*

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*Fiber optic transmission, which user pulses of laser-generated*

*light, offers significant advantages in terms of reduced size and*

*installation effort, vastly greater communication capacity, much*

*faster*

*transmission*

*speeds,*

*and*

*freedom*

*from*

*electrical*

*interference, Satellite transmission offers significant advantages*

*for organizations that need to transmit massive quantities of*

*data, audio, and video over global networks, especially to isolated*

*areas. These trends in technology give organizations more*

*alternatives in overcoming the limitations of their present*

*telecommunications systems.*

***Application Trends.***

*The changes in telecommunications industries and*

*technologies just mentioned are causing a significant change in*

*the business use of telecommunications. The trend toward more*

*vendors, services, Internet technologies, and open systems, and*

*the rapid growth of the Internet, the World Wide Web, and*

*corporate intranets and extranets, dramatically increases the*

*number*

*of*

*feasible*

*telecommunications*

*applications.*

*Thus,*

*telecommunications networks are now playing vital and pervasive*

*roles in electronic commerce, enterprise collaboration, and*

*internal business applications that support the operations,*

*management, and strategic objectives of both large and small*

*companies.*

*An organization’s telecommunications function is no*

*longer relegated to office telephone systems, long-distance*

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*calling*

*arrangements,*

*and*

*a*

*limited*

*amount*

*of*

*data*

*communications in local area networks and with corporate*

*mainframes. Instead, it has become an integral part of local and*

*global computer networks that are used to dramatically cut costs,*

*shorten*

*business*

*lead*

*times*

*and*

*response*

*time,*

*support*

*electronic commerce, improve the collaboration of workgroups,*

*develop online operational processes, share resources, lock in*

*customers and suppliers, and develop new products and services.*

*This makes telecommunications a more complex and important*

*decision area for businesses that must increasingly find new ways*

*to compete in both domestic and global markets.*

***The Internet Revolution.***

*The*

*explosive*

*growth*

*of*

*the*

*Internet*

*is*

*the*

*revolutionary technology phenomenon of the 1990s. The Internet*

*has become the largest and most important network of networks*

*today, and is evolving into the information superhighway of*

*tomorrow. The Internet is constantly expanding, as more and*

*more businesses and other organizations and their users,*

*computers, and networks join its global web. Thousands of*

*business, educational, and research networks now connect*

*millions of computer systems and users in more than 200*

*countries to each other. The Internet has also become a key*

*platform*

*for*

*a*

*rapidly*

*expanding*

*list*

*of*

*information*

*and*

*entertainment services and business applications, including*

*enterprise collaboration and electronic commerce systems.*

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*The Internet evolved from a research and development*

*network (ARPANET) established in 1969 by the U.S. Defence*

*Department to enable corporate, academic, and government*

*researchers to communicate with E-mail and share data and*

*computing resources. The Net doesn’t have a central computer*

*system or telecommunications center. Instead, each message*

*sent has a unique address code so any Internet server in the*

*network can forward it to its destination. Also, the Internet does*

*not have a headquarters or governing body. The Internet Society*

*in Reston, Virginia, is one of several volunteer groups of individual*

*and corporate members who promote use of the Internet and the*

*development of new communications standards. These common*

*standards are the key to the free flow of messages among the*

*widely different computers and networks in the system.*

*The Internet is growing rapidly. For example, the*

*Internet is more than doubling in size each year, growing to over*

*30 million host computers and more than 100million users in*

*early 1998. The monthly rate of growth of the Internet was*

*estimated at between 7 to 10 percent. Some industry experts*

*expect the Internet to eventually interconnect more than 1 billion*

*networks.*

***Internet Applications.***

*The most popular Internet applications are E-mail,*

*browsing the sites on the World Wide Web, and participating in*

*special-interest newsgroups. Internet E-mail is faster than many*

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*public networks. Messages usually arrive in seconds or a few*

*minutes anywhere in the world, and can take form of data, text,*

*fax, and video files. Internet browser software like Netscape*

*Navigator and Microsoft Explorer enables millions of users to surf*

*the World Wide Web by clicking their way to the multimedia*

*information resources stored on the hyperlinked pages of*

*business, government, and other Web sites. Web sites offer*

*information and entertainment, and are the launch sites for*

*electronic commerce transactions between business and their*

*suppliers and customers.*

*The Internet also provides electronic discussion forums*

*and bulletin board systems formed and managed by thousands of*

*special-interest*

*newsgroups.*

*Anyone*

*can*

*participate*

*in*

*discussions or post messages on thousands of topics for other*

*users with the same interests to read and respond to. Other*

*popular*

*applications*

*include*

*downloading*

*software*

*and*

*information files and accessing databases provided by thousands*

*of business, government, and other organizations. Logging on to*

*other*

*computers*

*on*

*the*

*Internet*

*and*

*holding*

*real*

*time*

*conversations with other Internet users are also popular uses of*

*the Internet. We will discuss business uses of the Internet,*

*including electronic commerce.*

*One of the most important and popular uses of the*

*Internet is gathering information. You can make online searches*

*for information in a variety of ways, using your Web browser and*

*search engines such as Alta Vista, Excite, and directories like*

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*Yahoo! Thousands of Web sites, business and government*

*databases, and catalogs from university libraries to the Library of*

*Congress are available, as are electronic versions of numerous*

*consumer, business, and academic publications. You can point*

*and click your way to thousands of Web sites and their databases,*

*downloading everything from the latest satellite weather photos*

*from NASA to world almanac excerpts from the U.S. Central*

*Intelligence Agency.*

***THE INFORMATION SUPERHIGHWAY.***

*The trends toward open, high-speed, digital networks*

*with fiber optic and satellite links and the widespread use of the*

*Internet and its technologies have made the concept of an*

***information superhighway*** *technically feasible and captured*

*the interest of both business and government. In this concept,*

*local, regional, nationwide, and global networks will be integrated*

*into a vast network of networks, with more advanced interactive*

*multimedia*

*capabilities*

*than*

*the*

*Internet.*

*The*

*information*

*superhighway system would connect individuals, households,*

*businesses,*

*news*

*and*

*entertainment*

*media,*

*government*

*agencies, libraries, universities, and all other institutions, and*

*would support interactive voice, data, video, and multimedia*

*communications.*

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