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по английскому языку

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SECTION 1
COMPUTERS

UNIT 1
Mainframes

[1] Large computer systems, or mainframes**,** as they are referred to in the field of computer science, are those computer systems found in computer installations processing immense amounts of data. These powerful computers make use of very high-speed main memories into which data and programs to be dealt with are transferred for rapid access. These powerful machines have a larger repertoire of more complex instructions which can be executed more quickly. Whereas smaller computers may take several steps to perform a particular operation, a larger machine may accomplish the same thing with one instruction.

[2] These computers can be of two types: digital or analog. The digital computer or general-purpose computer, as it is often known, makes up about 90 per cent of the large computers now in use. It gets its name because the data that are presented to it are made up of a code consisting of digits – single-character numbers. The digital computer is like a gigantic cash register in that it can do calculations in steps, one after another at tremendous speed and with great accuracy. Digital computer programming is by far the most commonly used in electronic data processing for business or statistical purposes. The analog computer works something like a car speedometer, in that it continuously works out calculations. It is used essentially for problems involving measurements. It can simulate, or imitate different measurements by electronic means. Both of these computer types – the digital and the analog - are made up of electronic components that may require a large room to accommodate them. At present, the digital computer is capable of doing anything the analog once did. Moreover, it is easier to program and cheaper to operate. A new type of scientific computer system called the hybrid computer has now been produced that combines the two types into one.

[3] Really powerful computers continue to be bulky and require special provision for their housing, refrigeration systems, air filtration and power supplies. This is because much more space is taken up by the input/output devices - the magnetic tape and disk units and other peripheral equipment - than by the electronic components that do not make up the bulk of the machine in a powerful installation. The power consumption of these machines is also quite high, not to mention the price that runs into hundreds of thousands of dollars. The future will bring great developments in the mechanical devices associated with computer systems. For a long time these have been the weak link, from the point of view of both efficiency and reliability.

Exercises

1. Main idea

Which statement best expresses the main idea of the text? Why did you eliminate the other choices?

1. Hybrid computers are a combination of digital and analog computers.
2. Digital computers are used more than any other type of computer.
3. There are three types of mainframes.
4. Analog computers can do more varied work than digital or hybrid computers.

2. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. A mainframe is the type of computer that can sit on top of a desk.
2. Mainframes are very powerful and can execute jobs very rapidly and easily.
3. Digital computers are used more than analog computers.
4. The analog computer is far smaller than a digital computer and therefore occupies very little space.
5. The hybrid computer is a combination of both the digital and the analog computer.
6. The analog computer does its calculations one step at a time.
7. The digital computer continuously works out calculations.
8. Mainframes are huge powerful machines whose peripheral equipment takes up a lot of space.
9. Mainframes are expensive to buy and to operate.
10. Mainframe technology has reached the end of the road. No further development is needed.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. Smaller computers may take longer to perform an operation.
2. More technological development is necessary in the mechanical devices associated with computer systems.
3. Mainframes can operate quickly and execute more complex instructions.
4. The hybrid computer is a combination of both digital and analog computers.
5. Digital computers are used more than analog computers.
6. Mainframes are large powerful computers.
7. An analog computer is comparable to a car speedometer in the way it operates.
8. Digital computers do calculations, one after another, quickly and exactly.

4. Contextual reference

Look back at the text and find out what the words in **bold** typeface refer to.

1) **which** can be executed (6)
2) as **it** is often known (11)
3) **that** are presented to it (13)
4) in that **it** can do calculations (14)
5) in that **it** continuously works out (18)
6) **Both** of these computer types (21)
7) **that** may require a large room (22)
8) **that** combines the two types (26)
9) require special provision for **their** housing (28)
10) **that** runs into thousands of dollars (33)

5. Understanding words

Refer back to the text and find synonyms for the following words.

1) area (2)
2) acted on (6)
3) do (8)
4) composed of (13)
5) principally (19)

Now refer back to the text and find antonyms for the following words.

6) ignored (5)
7) seldom (11)
8) little (14)
9) small (27)
10) weak (32)

6. Word forms

First choose the appropriate form of the words to complete the sentences. Then check the differences of meaning in your dictionary.

1. permission, permit, permissible, permitted

1) It is usually not ... to smoke in a computer installation.
2) Computers ... people to use their time more effectively.
3) Building ... is usually required before starting any renovations to a building for a computer department.

2. continuation, continue, continuing, continuously

1) If microcomputer sales ... to increase, it won't be long before every household has one.
2) Computers can do repetitive operations ... without getting bored.
3) There is a ... interest in discovering new areas where computers can be used.

3. measurement, measure, measured, measurable

1) The analog computer is essentially used for problems involving … .

2) Because computer equipment is often bulky, the area used for a computer installation must be ... out carefully.
3) The number of employees a computer company has can be seen as a ... of its success in the business world.

4. association, associate, associated

1) Computers are … with speed and accuracy.
2) There are many computer … around the world to which computer professionals belong.
3) Business ... in different cities often communicate with each other via their computers.

5. efficiency, efficient, efficiently

1) Using a hand calculator to do simple mathematics is an ... way of working.
2) Computers can solve problems faster and more ... than humans.
3) ... is important in any service industry.

7. Content review

Try to think of a definition for each of these items before checking them in the Glossary. Then complete the following statements with the appropriate words. (Some can be used more than once.) Make sure you use the correct form, i.e. singular or plural.

mainframe hybrid computer digital	computer installation code analog	digit programming C++

1. The ... ... system is a computer which has combined the features of both the ... and ... computer. It is used mainly in scientific research.
2. ... ... computers get their name from the word ... . These are single character numbers that make up the ... in which the data are presented to the computer for processing.
3. ... are usually found in large ...
4. The most commonly used language of ... in the business community is ... .

8. Organizing information

On a separate sheet, organize the information in Unit 1, “Mainframes”, under *main idea(s)*, *major details* and *minor details*.

UNIT 2
Minicomputers

[1] Until the mid-1960s, digital computers were powerful, physically large and expensive. What was really needed though, were computers of less power, a smaller memory capacity and without such a large array of peripheral equipment. This need was partially satisfied by the rapid improvement in performance of the semi-conductor devices (transistors), and their incredible reduction in size, cost and power; all of which led to the development of the minicomputer or mini for short. Although there is no exact definition of a minicomputer, it is generally understood to refer to a computer whose mainframe is physically small, has a fixed word length between 8 and 32 bits and costs less than U.S. $100,000 for the central processor. The amount of primary storage available optionally in minicomputer systems ranges from 32-512 K[1] bytes; however, some systems allow this memory to be expanded even further.

[2] A large number of peripherals have been developed especially for use in systems built around minicomputers; they are sometimes referred to as miniperipherals**.** These include magnetic tape cartridges and cassettes, small disk units and a large variety of printers and consoles**.**

[3] Many minicomputers are used merely for a fixed application and run only a single program. This is changed only when necessary either to correct errors or when a change in the design of the system is introduced. Since the operating environment for most minis is far less varied and complex than large mainframes, it goes without saying that the software and peripheral requirements differ greatly from those of a computer which runs several hundred ever-changing jobs a day. The operating systems of minis also usually provide system access to either a single user or to a limited number of users at a time.

[4] Since many minis are employed in real-time processing**,** they are usually provided with operating systems that are specialized for this purpose. For example, most minis have an interrupt feature which allows a program to be interrupted when they receive a special signal indicating that any one of a number of external events, to which they are preprogrammed to respond, has occurred. When the interrupt occurs, the computer stores enough information about the job in process to resume operation after it has responded to the interruption. Because minicomputer systems have been used so often in real-time applications**,** other aspects of their design have changed; that is, they usually possess the hardware capability to be connected directly to a large variety of measurement instruments, to analog and digital converters, to microprocessors**,** and ultimately, to an even larger mainframe in order to analyze the collected data.

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[1] 1 K is defined as $2^{10} = 1024$; thus $32K = 32 \bullet 2^{10} = 2^5 \bullet 2^{10} = 2^{15} = 32{,}768$.

Exercises

1. Main idea

Which statement best expresses the main idea of the text? Why did you eliminate the other choices?

1. Minicomputers are not as effective as mainframes.
2. Minicomputers are as useful as mainframes.
3. Minicomputers are not as big and expensive as mainframes.
4. Minicomputers will not be of any use in the future.

2. Understanding the passage

Indicate whether the following ideas are stated or not stated (S/NS) in the text.

1. The rapid development of transistors led to the development of minicomputers.
2. A minicomputer is said to be very much the same as a mainframe.
3. Special peripheral devices have been developed to go with minicomputers.
4. Minicomputers can understand more than one computer language.
5. Mainframe operating systems usually provide access to a number of users at the same time.
6. Minicomputers have specialized features because of the operations they execute.
7. Minicomputers can be connected directly to various types of devices.
8. Microcomputers were developed after mainframes.
9. Minicomputers will be more popular in the future than mainframes.
10. Operating minicomputers cost less than operating mainframes.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. Various peripherals were developed to go with minicomputers.
2. Minicomputers were developed after the mid-1960s.
3. Minicomputers have specially built-in features that enable them to store information while responding to another operation.
4. The improved performance of transistors led to the development of minicomputers.
5. Minicomputers can be hooked up to larger mainframes if need be.
6. Minicomputers are usually used for single-purpose jobs.
7. Minicomputers are similar to mainframes except that they are smaller.
8. Fewer people can use minicomputers at one time than mainframes.

4. Contextual reference

Look back at the text and find out what the words in **bold** typeface refer to.

1. **This need** was partially satisfied (4)
2. **their** incredible reduction in size (5)
3. **they** are sometimes referred to (14)
4. **This** is changed only when necessary (18)
5. differ greatly from **those** of a computer (21-22)

6. **they** are usually provided with (25)
7. when **they** receive a special signal (28)
8. **to which** they are preprogrammed (29)
9. other aspects of **their** design (32-33)
10. **they** usually possess the hardware (33)

5. Understanding words

Refer back to the text and find synonyms for the following words.

1. range (3)
2. unbelievable (5)
3. purpose (17)
4. continue (31)
5. forms (33)

Now refer back to the text and find antonyms for the following words.

6. reduced (12)
7. non-specific (17)
8. unaltering (22)
9. not used (25)
10. not happened (30)

6. Word forms

First choose the appropriate form of the words to complete the sentences. Then check the differences of meaning in your dictionary.

1. power, powerful, powerfully, powerless, powered

1) There are many ways of producing ...
2) Battery ... calculators occupy less space than their predecessors.
3) A computer is a very ... machine.
4) Computers are rendered ... if there isn't an emergency supply system in case of power failure.

2. partiality, partial, partially, part

1) Some people are ... to certain computer companies because of the success rate.
2) Sometimes only a ... of the data is necessary to solve a problem.
3) The need for smaller memory capacity was ... satisfied by the improved performance of transistors.

3. generality, generalize, general, generally

1) ... purpose computers are larger than minicomputers.
2) It is the ... consensus of opinion that computers have improved the quality of life.
3) Minicomputers are ... cheaper than mainframes.
4) It is often easier to ... than to talk about specifics.

4. specialize, special, specially, specialist, specialization, specialized

1) Computer ... is a must for most large-scale companies today.

2) Magnetic tape cartridges are … peripheral devices used with minicomputers.
3) A computer processes … prepared items of information.

5. change, changeable, changeably, changing

1) Computer personnel often have to take refresher courses in the ... field of computer science.
2) Many ... have taken place in the computer industry in the last decade.
3) Memory and primary storage can be used inter-…

7. Content review

Match the words in column A with the words or statements in column B.

A	B
1. minicomputer	a. processing unit of microcomputer
2. primary memory	b. specialized secondary memory devices
3. miniperipherals	c. where operator can manually operate the computer
4. cartridges	d. internal storage
5. console	e. fixed word length of 8-32 bit
6. microprocessors	f. attached to minicomputers

8. Organizing information

On a separate sheet, organize the information in Unit 2, “Minicomputers”, under *main idea(s)*, *major details* and *minor details*.

UNIT 3
Microcomputers

[1] The early 1970s saw the birth of the microcomputer, or micro for short. The central processor of the micro, called the microprocessor, is built as a single semiconductor device; that is, the thousands of individual circuit elements necessary to perform all the logical and arithmetic functions of a computer are manufactured as a single chip. A complete microcomputer system is composed of a microprocessor, a memory and peripheral equipment. The processor, memory and electronic controls for the peripheral equipment are usually put together on a single or on a few printed circuit boards. Systems using microprocessors can be hooked up together to do the work that until recently only minicomputer systems were capable of doing. Micros generally have somewhat simpler and less flexible instruction sets than minis, and are typically much slower. Different micros are available with 4-, 8-, 12-, 16-bit word lengths, and some new ones use 32-bit chips. Similarly, minis are available with word lengths up to 32 bits. Although minis can be equipped with much larger primary memory sizes, micros are becoming more powerful and converging with minicomputer technology.

[2] The extremely low price of micros has opened up entirely new areas of application for computers. Only 30 years or so ago, a central processing unit of medium capability sold for a few hundred thousand dollars (U.S.), and now some microprocessors sell for as cheaply as $10. Of course, by the time you have a usable microcomputer system, the price will be somewhere between $200 and $5000 depending on the display unit, secondary storage, and whatever other peripherals are needed.

[3] The available range of microcomputer systems is evolving more rapidly than minicomputers. Because of their incredibly low price, it is now possible to use only a small fraction of the computer's capability in a particular system application and still be far ahead financially of any other way of getting the job done. For example, thousands of industrial robots are in use today, and the number is growing very rapidly as this relatively new industry improves the price and performance of its products by using the latest microcomputers.

[4] Microcomputer software is developing rapidly and it now covers a tremendous range of applications. As well as data processing, software can also be written for specialized tasks even as complex as navigating rockets. Some modern micros are even capable of multi-tasking**.** In addition to their extensive use in control systems of all types, they are destined for many new uses from more complex calculators to automobile engine operation and medical diagnostics. They are already used in automobile emission control systems and are the basis of many TV game attachments. There is also a rapidly growing market for personal computers whose application potential in education is only just beginning to be exploited.

[5] It would seem that the limits for microcomputer applications have by no means been reached. There are those who predict that the home and hobby computer markets, and the education market, will grow into multi-billion dollar enterprises within a decade or so. It would also appear that performance of microprocessors could well increase ten-fold in the future while prices for micros could decrease by as much.

Exercises

1. Main idea

Which statement best expresses the main idea of the text? Why did you eliminate the other choices?

1. Microcomputers will be everywhere in the future.
2. There is no limit to what microcomputers can do.
3. Microcomputers are cheap, reliable and efficient.
4. Microcomputers are far superior to minicomputers.

2. Understanding the passage

Indicate whether the following ideas are stated or not stated (S/NS) in the text.

1. Microcomputers were developed after minicomputers.
2. The processor of a microcomputer is printed on a chip.
3. A mainframe uses more power than a microcomputer.
4. Microcomputers can do the work done by minicomputers.
5. Microcomputers have the same memory capacity as minicomputers and can be hooked up to a variety of peripherals.
6. Microcomputers are cheaper than minicomputers.
7. Many different types of industries are using microcomputers to do their work.
8. Microcomputers are now used in sophisticated toys and games.
9. Because of microminiaturization, mainframes now occupy less space.
10. By the end of this century microcomputers will be cheaper, better and probably used in every aspect of life.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. Microcomputers can do work that until quite recently was done by minicomputers.
2. Microcomputers are mainly used for single-purpose jobs.
3. The integrated circuitry of a microcomputer has been reduced to a chip.
4. Microcomputer technology will continue to improve.
5. Microcomputers are smaller, simpler and less flexible than minicomputers.
6. Microcomputers are a recent development in computer technology.
7. Microcomputer systems are increasing faster than minicomputers.
8. In the future, microprocessors will be cheaper, and their capacity and performance will be greater.

4. Contextual reference

Look back at the text and find out what the words in bold typeface refer to.

1. **that** until recently (9)
2. Because of **their** incredibly low price (25)
3. **this** relatively new industry (29)
4. performance of **its** products (30)
5. **it** now covers (31)
6. In addition to **their** extensive use (34)
7. **they** are destined for many new uses (35)
8. **They** are already used (37)
9. **whose** application potential (39)
10. **who** predict that (42)

5. Understanding words

Refer back to the text and find synonyms for the following words.

1. individual (2)
2. connected (9)
3. moderate (17)
4. scope (24)
5. intended (35)

Now refer back to the text and find antonyms for the following words.

6. death (1)
7. in part (17)
8. worsens (29)
9. earliest (30)
10. increase (45)

6. Word forms

First choose the appropriate form of the words to complete the sentences. Then check the differences of meaning in your dictionary.

1. completion, complete, completely, completed

1) When you've ... this book, you should have a basic knowledge of computers and how they operate.
2) There are car manufacturing plants that are ... operated by robots.
3) A ... microcomputer system has a microprocessor, a memory and peripheral equipment.

2. simple, simplify, simply, simplest, simpler

1) Microcomputers are usually ... to operate.
2) A microcomputer may be... to operate than a minicomputer.
3) Using a computer to control the payroll will ... matters for many companies.

3. flexibility, flexible, flexibly, flex

1) Because of their ... microcomputers are becoming more popular than minicomputers.

2) Minicomputers have a more ... set of instructions than microcomputers.

4. finance, financial, financially

1) The … implications of leasing a computer may be less than owning one.
2) Companies often borrow huge sums of money to … large-scale projects to computerize their business.
3) … speaking, a microcomputer is more affordable than a minicomputer.

5. education, educational, educationally, educated

1) There are many … institutes that teach computer programming.
2) It is possible that by the year 2000, a well-… person will have to have a good knowledge of computer science.
3) There are many fields of … today that use computers as teaching tools.

7. Content review

Try to think of a definition for each of these items before checking them in the Glossary. Then complete the following statements with the appropriate words. (Some can be used more than once.) Make sure you use the correct form, i.e. singular or plural.

microcomputer microprocessor minicomputer	semiconductor circuit board micro	chip primary memory memory

1. ... are often referred to as ... for short.
2. A ... system is composed of a …, … and peripheral equipment.
3. The ... of a microcomputer is usually built as a single ... device known as a ... .
4. Microcomputers have small … … and cannot be hooked up to as many peripherals as …
5. A few … … are normally used for the processor, memory and electronic controls of peripherals for microcomputers.

8. Organizing information

On a separate sheet, organize the information in Unit 3, “Microcomputers”, under *main idea(s)*, *major details* and *minor details*.

SECTION 1. COMPUTERS
Comprehension check

Summarize the texts on "Mainframes", "Minicomputers" and "Microcomputers" (Units 1, 2, 3) by completing the following table.

Kinds of computers			
	MAINFRAMES	MINI-COMPUTERS	MICRO-COMPUTERS
When developed			developed in the 70s
Usage			used in fixed applications
Memory speed and capacity		most primary memory ranges from 32-512K bytes	
Electrical power method			consumes little electrical power
Price	extremely high prices		
Size			small portable size
Complexity of instructions	very complex instructions which can be executed quickly		
Number of users			single user-personal computer
Type of processing	allows batch as well as real-time processing		

Glossary

A

analog computer - a computer that can simulate different measurements by electronic means. It continuously works and calculates.

B

bit - binary digit which is either 0 or 1. Eight bits equal to 1 byte.

C

cartridge - a circular disk called a platter which is about the same size as a long-playing phonograph record, which can be magnetized on both sides.

central processing unit (**CPU**) - the brain of the computer which consists of three components: the memory, the arithmetic-logical unit and the control unit. It controls and carries out instructions given to the computer.

chip - a square or rectangular piece of semiconductor upon which several layers of an integrated circuit are etched. It is used in microcomputers.

circuit board - a board containing integrated circuits which make up the processor, memory and electronic controls for the peripheral equipment of microcomputers.

computer installation - a data processing center including the hardware, software, and the buildings and offices necessity for building input/output media.

computer system - the central processing unit with storage and associated peripherals working together as a useful whole.

console - a typewriter like a machine with a screen which allows the operator to communicate with the computer and get an up-to-date view of the jobs being processed.

D

data - the information that is input with the program, and on which mathematical and logical operations are to be performed.

database - a file of data which is structured in such a way as to satisfy the needs of various users and not only one specific application.

data base management - to structure and organize data so that the requirements of various users are met without the need to duplicate the data.

data processing - handling or manipulating information called data which is specially prepared to be understood by the computer. This involves clerical functions as well as arithmetic and logical operations performed by the computer.

digit - a number which has only one character: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.

digital computer - a computer in which information is represented by one or two electronic states: on or off. These are represented by the two digits 1 and 0 respectively.

F

fixed application - a program written to solve one specific problem.

H

hybrid computer - a scientific computer system which incorporates characteristics of the digital and analog computers.

I

interactive - also conversational: to be able to communicate with the computer on a question and answer basis.

interrupt feature - when a program is interrupted upon receiving a signal indicating that any one of a number of external events has occurred.

M

mainframe - a large computer system which is found in large installations processing immense amounts of data.

memory board - same as circuit board.

memory unit - refers to the backing store media such as magnetic tape or magnetic disk.

microcomputer - a microcomputer which is based upon an integrated circuit microprocessor; also called computer-on-a-chip.

microprocessor - the central processing unit of a microcomputer. It is built as a single semiconductor device.

minicomputer - a computer whose mainframe is physically small, has a fixed word length between 8 and 32 bits and costs less then $100,000 for the central processor.

miniperipheral - peripherals specially developed for minicomputers, e.g. magnetic tape cartridges and cassettes.

N

network - several computers each working independently, but connected together in order to share resources such as disks and printers.

O

operator - the person who is responsible for the manual control operations of the computer. He is mainly concerned with hardware.

output - the results of performing arithmetic and logical operations on data. It is transmitted by the computer to a physical medium such as cards, tapes or disks.

P

primary memory - the internal storage locations of a computer; also referred to as main memory or real storage.

programming - writing programs for the computer.

R

real time application - applications which require real time processing.

real time processing - processing of data as soon as they are generated and using these data to update the relevant files. The opposite is *batch processing*. Process control systems nearly always operate as real-time systems, because they must process the data arriving from the devices they are controlling quickly enough to feed back information affecting their operation.

S

semiconductor - a material which is neither a good nor a bad conductor of electricity. Its conductivity increases at high temperatures. Transistors are made of semiconductor materials.

SECTION 2
SOFTWARE

UNIT 4
The Characteristics of Software

[1] Software plays an important role in system development. It is the "driver" of the hardware. Accessing, modifying, and retrieving data are determined by the software in computer memory. Without software, obviously, there can be no computer processing.

[2] Software is an important component of an information system for two reasons: First, hardware won't run without software. Software gives the computer the "intelligence" it needs to do the job. This means that accessing, storing, retrieving, and modifying information are all determined by the programs in computer memory. Second, software controls virtually every activity affecting the database:

An effective program has four characteristics:

1. Accuracy
2. Good documentation
3. Flexibility
4. Performance

[3] Accuracy means that the software must be free of syntax and logic errors. A syntax error results from using an improper form of a command or misusing symbols. For example, misspelling the command PRINT would signal a syntax error. Syntax errors are identified by the software. Thus, they are easy to find and relatively easy to correct.

[4] A logic error results from improper use of syntactically correct statements. For example, a payroll program that withholds 80 percent rather than 20 percent of gross earnings for federal income tax contains a logic error. A program with logic errors will usually produce some output, but the output will not be correct in all cases. Logic errors can be very difficult to find. In some cases, programs run for years before all the logic errors are detected and corrected.

[5] Software requires documentation, which provides directions for using software. Good documentation describes procedures for operating the software in a clear and concise manner. This includes flowcharts, troubleshooting guidelines, and an index with cross references. More and more software packages include a condensed version of the manual built into the software. "Help" screens, menus, and the like allow the user to operate the software virtually without reference to manuals. These aids describe the major commands and function keys or specify solutions to common problems faced in using the software. In addition, templates that lie over function keys on the keyboards remove any need for having to memorize codes or procedures.

[6] Flexibility in a software system means that the software is capable of handling a large variety of transactions and responds to different situations. For example, the user may wish to display results on a screen, print the results only, or perhaps do both. In the case of display, the user may want to have a summary report on the screen or a detailed report displayed one screen at a time. These options also characterize the software as user friendly, stemming from its flexibility to adapt to various types of inquiries.

[7] The fourth characteristic of software is performance, or the efficiency with which the program responds to inquiries from the user. Much of the software's performance level is constrained by the nature of the inquiry and the way the files are organized as well as by the software itself. That is why an organization or business must test the software for performance before committing it to regular use.

Exercises

1. Main idea

Read the text through. Answer the following questions.

1. What is software?
2. Why is software an important component of an information system?
3. What characteristics does software require?

2. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. Organizations are becoming increasingly dependent on hardware rather than software to solve day-to-day problems.
2. Software is responsible for the computer operation.
3. Effective software has four characteristics.
4. Syntax errors can be very difficult to find.
5. Logic errors are identified by the software.
6. Documentation provides directions for using the software.
7. Thanks to flexibility the software is capable of handling a large variety of transactions and responds to different situations.
8. Performance is the rate at which the program responds to inquiries from the user.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. The driver of the hardware is the computer’s operating system and application programs produce the information for the end user.
2. Effective software has four characteristics.
3. Software must be free of syntax and logical errors.

4. Programs can run for years before all the logical errors are detected and corrected.
5. Software needs good documentation.
6. Flexibility characterizes the software.

4. Contextual reference

Look back at the text and find out what the words in bold typeface refer to.

1. **It** is the "driver" … (1)
2. … **it** needs to do the job. (7)
3. … **they** are easy to find … (19)
4. **This** includes … (30)
5. … or … do **both** (41)
6. … before committing **it.** (49-50)

5. Understanding words

Refer back to the text and find synonyms for the following words.

1. mistake (16)
2. is produced by (17)
3. discover (19)
4. customer (33)

Refer back to the text and find the terms for the following definitions:

5. The collection of programs and routines associated with a computer (1)
6. Physical equipment (2)
7. Giving much information in few words (28)
8. A distinguishing feature (45)

6. Word forms

First choose the appropriate form of the words to complete the sentences. Then check the differences of meaning in your dictionary.

1. Use, using, user, used

1) A syntax error results from … an improper form of a command.
2) The … may wish to display results on a screen.
3) An organization must test the software for performance before committing it to a regular … .

2. Results, results in, results from

1) He may wish to display … on a screen.
2) A logic error … improper use of syntactically correct statements.
3) An improper form of a command or missing symbols … a syntax error.

7. Content review

Try to think of a definition for each of these items. Then complete the following statements with the appropriate words. (Some can be used more than once.) Make sure you use the correct form.

software, processing, access, store, retrieve, modify, accuracy, documentation, flexibility, handling, performance, efficiency, respond

1. … plays an important role in system development.
2. …, …, …, … information are determined by the programs in computer memory.
3. Without … there can be no computer … .
4. … means that the … must be free of errors.
5. … requires …, which provides directions for using the … .
6. … in a … system means that the … is capable of … a large variety of transactions and responds to different situations.
7. The fourth characteristic of … is …, or the … with which the program … to inquiries from the user.

8. Organizing information

On a separate sheet, organize the information in Unit 4, "The Characteristics of Software", under *main idea(s)*, *major details* and *minor details*.

UNIT 5
Programming Languages

[1] A program is coded in a specific language. A programming language is a means by which a programmer communicates the design to the computer. In this section, we review four levels of programming languages: machine, assembly, high-level, and fourth-generation languages.

Assembly Languages

[2] The programming task of machine language was significantly simplified by the creation of assembler or translating programs in the early 1950s. Programs were written in easier-to-remember symbolic codes instead of numerical codes. Memory addresses were also referenced by symbols rather than addresses in machine language. An assembler translated assembler language programs into machine code for the computer.

[3] The program development cycle using assembly language consists of the following steps:

1. The program is written in symbolic language. This is called the source program.
2. The vendor-provided assembler reads the source program and converts it into machine language, or the object program.
3. Any syntax errors detected during assembly are printed for correction.
4. The object program is loaded into computer memory for processing.

High-Level or Procedural Languages

[4] Assembly and machine languages were machine dependent. A program worked on only one type of machine. The instructions had to be rewritten in a different assembly language to work on another type of computer. In addition, assembly and machine languages are difficult to learn, code, update, or maintain. As a result, a variety of machine-independent languages appeared in the 1960s. Known as high-level or procedural languages**,** these languages allow the programmer to specify at a higher level of abstraction than assembly languages how the computer is to perform tasks. Procedural languages must of course, like assembly languages, be translated into machine language for computer processing.

[5] High-level languages such as Fortran, Cobol, and many others introduced several new language features that were standard in their instructions. That is, the instructions were essentially the same for every computer. A special program for each computer, called a compiler, translated the standard instructions into the special machine language for a specific model computer. This meant the same instructions could be translated by different compilers (on different machines) without having to rewrite the original program.

[6] Another development was that the languages were designed for specific classes of applications; Fortran was designed for coding scientific problems, while Cobol was designed for business data transaction processing. In addition, these high-level languages were more like human languages. They were easier for people to use than assembly language.

[7] There is a variety of high-level languages in use today. Cobol is the premier business language, scientific languages include Fortran, Algol, Pascal, and general languages include Basic. Most of today's computer applications are written in high-level languages, although newer fourth-generation languages are also being used for developing today's applications.

[8] Compared to assembly languages, high-level languages have two distinct advantages:

1. The programming commands are problem oriented rather than machine oriented. This means that the programmer can focus on the problem solving.
2. A programming command is generally translated into a number of machine instructions rather than only one translation in assembly language. This obviously makes developing an application in a procedural language much faster.

Exercises

1. Main idea

Read the text through. Answer the following questions.

1. What is programming language?
2. What are the levels of programming languages?
3. What is a machine language?
4. What is the difference between machine and assembly languages?
5. What steps does the program development cycle using assembly language consist of?
6. What are the drawbacks of assembler and machine languages?
7. What language is a machine-independent one?
8. What are procedural languages?
9. What was Fortran designed for?
10. What was Cobol designed for?
11. What are the advantages of high-level languages over assembly languages?

2. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. There are three levels of programming languages.
2. Programs using assembly languages were written in easier-to-remember symbolic codes instead of numerical codes.
3. Assembly and machine languages were machine independent.
4. Machine-independent languages are Fortran and Cobol.
5. High-level languages were more like human languages.
6. Cobol and Fortran are business languages while Algol and Pascal are known to be scientific ones.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. A program goes through coding before it is ready to use.
2. Machine languages write programs in codes tied directly to the computer.
3. An assembler translates the symbolic codes into machine codes for processing.
4. High-level languages perform tasks at a much higher level than assembly languages.
5. High-level languages are compiled into special machine language for processing.
6. A compiler is a special program for each computer.
7. Today most of computer applications are written in high-level languages.

4. Contextual reference

Look back at the text and find out what the words in bold typeface refer to.

1. **This** is called … (13)
2. … converts **it** … (15)
3. … **these** languages allow … (24-25)
4. … and many **others** … (29)
5. **They** were easier … (39)

5. Understanding words

Refer back to the text and find terms for the following definitions.

1. A means by which a programmer communicates the design to the computer (1)
2. A means to translate the symbolic codes into machine codes for processing (6)
3. The program written in symbolic language (13-14)
4. The procedural languages (24)
5. A special program for each computer (32)
6. More like human languages (39)
7. Business and scientific languages (41-42)

6. Word forms

Choose the appropriate form of the words to complete the sentences.

1. Design, designer, designed, designing

1) Cobol was … for business data translation processing.
2) A programming language is a means by which a programmer communicates the … to the computer.
3) The ... is developing new program.

2. Have, having, has

1) The same instructions could be translated by different compilers without … to rewrite the original program.
2) High-level languages … two distinct advantages.
3) The instruction … to be rewritten.

3. Using, use, used, to use

1) The program development cycle … assembly language consists of four steps.
2) They were easier for people … than assembly language.
3) There is a variety of high-level languages in … today.

4. Program, programmer, programming, programmed

1) A … communicates the design to the computer.
2) A … is coded in a specific language.
3) There are four levels of ... languages.
4) This is called the source … .

7. Content review

Try to think of a definition for each of these items. Then complete the following statements with the appropriate words. (Some can be used more than once.)

program, assembler, programming languages, machine language, assembly language, high-level language, computer.

1. There are four levels of … .
2. Coding is the actual writing of … instructions.
3. … is writing … in codes tied directly to the …
4. … is writing programs in symbolic codes.
5. An … translates the symbolic codes into machine codes for processing.
6. … are translated into special … for processing.
7. … have two distinct advantages.

8. Organizing information

On a separate sheet, organize the information in Unit 5, “Programming Languages”, under *main idea(s)*, *major details* and *minor details*.

UNIT 6
Fourth-Generation Languages

[1] A move away from the emphasis on programming languages by professional programmers and toward user-oriented, easy-to-learn languages is what we call fourth-generation languages (4GL). They include a broad range of languages that have common features. These very high-level or nonprocedural languages differ from procedural languages in four ways:

1. They are easier to use and learn.
2. The translation software performs the processing logic. Thus the programmer specifies the task(s) to be performed, not how they are to be performed.
3. Screen design features make it easy to show what you want written on a monitor and easy-to-choose features like highlighting, blinking, reverse video, and other accents. Changes are easy to make and the results are seen instantly.
4. Fourth-generation languages can do report writing. The report is described by the user and the processor figures out how to produce it. For communications and networks, other features allow the user to specify who can access what information. Perhaps most important, fourth-generation language integrates all these features into one program.

[2] Although fourth-generation languages have features that make it possible to solve problems on computers much more quickly than with the traditional software and its standard high-level languages, some of the disadvantages of previous languages may reappear. For example, often the language is designed to run on software that must be run on one particular type of machine.

[3] As you can see, the aim of fourth-generation languages is to allow people to program easily, naturally, and more quickly. This is accomplished by having people specify what they want and letting the computer create the instructions it will use in the program. In the same way that changes to high-level languages influenced program design through the introduction of flowcharting and pseudocode, fourth-generation languages have influenced design techniques. The new technique, called prototyping, is quickly becoming a part of the programming cycle. It allows the user to see exactly what will be available in the final program and to refine the specifications at an early stage of the program development. This, in turn, can save a lot of time later on.

[4] Prototyping uses a fourth-generation language with its speed to create the first version of a program. Sometimes this version is used without further enhancement. Sometimes a faster production version is developed from the prototype using a traditional high-level language. The finished version may have additional parts not included in the prototype. Alternatively, the high-level language may prove faster in the finished version than the fourth-generation language would have been. Or the program may need a traditional language to fit together with previously developed programs.

Exercises

1. Main idea

Read the text through. Answer the following questions.

1. What are fourth-generation languages?
2. What's the difference between nonprocedural and procedural languages?
3. What is the aim of fourth-generation languages?
4. What is prototyping?
5. What languages does prototyping use?

2. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. Fourth-generation languages are nonprocedural languages.
2. 4GL are not easy to use and learn.
3. Using 4GL, the programmer specifies how the task(s) are to be performed.
4. Fourth-generation languages can do report writing.
5. Fourth-generation languages have some of the disadvantages of procedural languages.
6. Fourth-generation languages do not allow people to program easily, naturally and more quickly.
7. Prototyping can save a lot of time.

3. Locating information

Find the passages in the text where the following ideas are expressed. Give the line references.

1. Fourth-generation languages allow to program easily, naturally and more quickly.
2. Fourth-generation languages include a large range of languages.
3. Fourth-generation languages solve problems on computers much more quickly than high-level languages.
4. But the high-level languages may prove faster in the finished version than the fourth-generation languages.
5. Prototyping allows the user to refine the specifications at an early stage of the program development.
6. Fourth-generation languages are easy-to-learn languages.

4. Contextual reference

Look back at the text and find out what the words in bold typeface refer to.

1. **They** include … (3)
2. **These** very high–level … languages … (4)
3. **They** are to … (8)
4. … **its** standard high-level languages (20)
5. … what **they** want … (25)

6. … the instructions **it** will use… (25-26)
7. **It** allows the use… (30)

5. Understanding words

Refer back to the text and find synonyms for the following words.

1. term (3)
2. drawback (20)
3. purpose (23)
4. apply (26)
5. step (31)
6. rate (33)

6. Word formation – prefixes

Fill in the blanks with the correct prefix.

1. pseudo- 2. re- 3. non- 4. dis-	1. … procedural 2. … advantage 3. … appear 4. … code 5. … written

7. Word forms

First choose the appropriate form of the words to complete the sentences. Then check the differences of meaning in your dictionary.

1) Program, programming, (to) program, programmer

1) The aim of fourth-generation languages is to allow people … .
2) A more away from the emphasis on … languages by professional … and toward user-oriented, easy-to-learn languages is what we call fourth-generation languages.
3) They use this language to create the first version of … .
4) It was at an early stage of the … development.
5) Prototyping is quickly becoming a part of the … cycle.
6) The … specifies the task(s).

2) Processing, processor, processed, process

1) The translation software performs the … logic.
2) The report is described by the user and … figures.
3) This … is called coding.

8. Content review

Try to think of a definition for each of these items. Then complete the following statements with the appropriate words. (Some can be used more than once.)

programming, processing, prototyping, flowcharting, pseudocode, program, fourth generation languages, procedural languages, high-level languages, report writing.

1. … uses … to create the first version of a …
2. … differ from … in four ways.
3. … can do … .
4. The new technique called … is becoming a part of the … cycle.
5. … influence … design through the introduction of … and … .
6. … are known to be the types of … languages.

9. Organizing information

On a separate sheet, organize the information in Unit 6, "Fourth-Generation Languages", under *main idea(s)*, *major details* and *minor details*.

SECTION 2. SOFTWARE
Comprehension check

1. Answer the questions on the text given below.

There are four levels of programming languages:

1. ***Machine language:*** writing programs in codes tied directly to the computer.
2. ***Assembly language:*** writing programs in English-like (symbolic) codes rather than machine codes. An assembler, then, translates the symbolic codes into machine codes for processing.
3. ***High-level language****:* a procedural or problem-oriented language that performs tasks at a much higher level than assembly language. High-level languages such as Cobol and Fortran are compiled (translated) into special machine language for processing.
4. ***Fourth-generation language:*** a nonprocedural language that requires fewer lines of code than a high-level language. The programmer needs only to specify the task, not how it is performed. The translation software does the rest that has to do with processing.

1) How many levels of programming languages are there?
2) What are machine languages?
3) What are high-level languages?
4) What are fourth generation languages?

2 Speak on the third-generation and fourth-generation languages. Use the table given below.

A Comparison of Third- and Fourth-Generation Languages

Third-Generation Language	Fourth-Generation Language
1. Geared for experienced programmers 2. Originally developed for a batch environment 3. Deals with a file-related environment 4. Must specify how to perform a task 5. Generally requires many procedural instructions 6. Program code is not easy to learn or maintain	1. Users as well as programmers may use it 2. Ideal for on-line environment 3. Deals with a database-related environment 4. Must specify what results are desired; the information system decides on the "how" end of the process 5. Far fewer instructions are needed 6. Commands make the language easy to learn and maintain

Glossary

A

access - being allowed to use a computer and read or alter files stored in it.

accuracy - means that the software must be free of syntax and logic errors. ('Accurate' means correct, without any errors.)

address - 1) number allowing a central processing unit to reference a physical location in a storage medium in a computer system; 2) unique number that identifies a device on a network.

C

compile - to convert a high level language program into a machine code program that can be executed by itself.

compiler - computer program (piece of software) that converts an encoded program into a machine code program.

D

documentation - information, notes and diagrams that describe the function, use and operation of a piece of hardware and software.

E

error - mistake due to an operator; mistake caused by a hardware or software fault; mistake in a program that prevents a program or system running correctly. *Logical error* - fault in a program design causing incorrect branching or operation. *Syntax error* - error resulting from incorrect use of programming language syntax.

F

flexibility - ability of hardware or software to adapt to various conditions or tasks.

flowchart - a diagram representing a sequence of events or operations. The most commonly used flowcharting symbols are rectangles containing descriptive texts, used for processing operations, and diamonds, used to represent decisions or alternative courses of action.

function key - key or switch that has been assigned a particular task or sequence of instructions.

G

generation - 1) producing data or software or programs using a computer; 2) state or age of the technology used in the design of a system. *First generation computers* - original computers made with valve-based electronic technology, started around 1951. *Second generation computers* - computers which used transistors instead of valves. *Third generation computers* - computers which used integrated circuits instead of transistors. *Fourth generation computers* - computer technology using LSI (БИС) circuits, developed around 1970 and still in current use. *Fourth generation languages* - languages that are user-friendly and have been designed with the non-expert in mind. *Fifth generation computers* - next stage of computer system design

using fast VLSI (СБИС) circuits and powerful programming languages to allow human interaction.

H

hardware - physical units, components, integrated circuits , disks and mechanisms that make up a computer or its peripherals.

K

keyboard - number of keys fixed together in some order, used to enter information into a computer or to produce characters on a typewriter.

L

language - system of words or symbols which allows communication with computers (such as one that allows computer instructions to be entered as words which are easy to understand, and then translates them into machine code).

M

manual - document containing instructions about the operation of a system or piece of software.

P

performance - way in which someone or something works. Thus the phrase 'high performance equipment' means high quality equipment

procedure - 1) small section of computer instruction code that provides a frequently used function and can be called upon from a main program; 2) method or route used when solving a problem.

procedural language - high-level programming language in which the programmer enters the actions required to achieve the result wanted. *Non-procedural language* - programming language which does not execute statements one after another, nor calls subroutines; instead it defines a set of facts that can be queried.

prototype - first working model of a device or program, which is then tested and adapted to improve it.

prototyping - making a prototype.

R

report generator - software that allows data from database files to be merged with a document (in the form of graphs and tables) to provide a complete report.

retrieve - to extract information from a file or storage device.

S

software - any program or groups of programs which instructs the hardware on how it should perform, including operating systems, word processors and applications programs.

store - to save data, which can then be used again as necessary.

SECTION 3
INFORMATION SYSTEMS
UNIT 7
Overview

[1] In today's knowledge society information is a critical resource. The wide range of computer and communication technologies provides quality information for management and is the basis for the management information system, or MIS.

[2] MIS is an integrated, computer-based, interactive system that supports operations and decision-making functions at all levels. It serves the organization's functional areas through decision models. Models draw most of their inputs from the database and place the output into it.

[3] MIS, relatively unknown in the 1960s, had its foundations in the early 1970s. Today, having gone through several stages of technological change - from "isolated" computing to today's user-machine interface - it is a backbone for industry and commerce.

[4] Related to MIS are decision support systems (DSS) - the managerial use of computers. DSS represents a step away from the traditional terminal toward the personal computer linked to the mainframe. DSS incorporates expert systems that use rules of logic and a knowledge base to simulate the human expert's thought processes.

[5] By the end of this chapter you should know:

1. What MIS is and does.
2. The structure of MIS.
3. The development of MIS and problems in design.

Exercises

1. Main idea

Read the text through. Answer the following questions.

What is MIS?

What is DSS?

What are the main items to be discussed in connection with MIS?

2. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. Information is a critical resource in today's knowledge society.
2. The basis for the wide range of computer and communication technologies is the management information system (MIS).
3. MIS is an integrated, computer-based system used for decision-making functions and all kinds of operations.

4. The functioning of MIS is based on decision models contained in the database.
5. MIS was widely used in 1960s and 1970s.
6. MIS is a backbone for industry and commerce.
7. DSS is an independent decision-making system.
8. DSS contains the traditional terminal.

3. Locating information

Find in the text those passages where the following ideas are expressed: Give the passage references.

1. The description of decision models.
2. The development of MIS.
3. The logical structure of DSS.

4. Contextual reference

Look back at the text and find out what the words in bold type refer to.

1) … **that** supports … (5)
2) **It** serves … (6)
3) … into **it**. (8)
4) … **it** is … (11)
5) … **that** use … (16).

5. Word forms

Choose the appropriate form of the words to complete the sentences.

1) to manage, 2) manager, 3) management, 4) managerial

1. Quality information is necessary for … and decision making.
2. … of all levels use decision models drawn from the database.
3. DSS is the … use of computers.
4. … information system had its foundations in the early 1970s.
5. MIS helps to … a business.

6. Organizing information

Summarize the text by completing the table:

INFORMATION SYSTEMS		
	MIS	***DSS***
Definition	+	+
Development	+	–
Application	+	+
Structure	+	+

UNIT 8
Computers Nowadays

[1] The computer's vast popularity in recent years results from the fact that usable information is the backbone of industry in today's knowledge society. Information is a resource that must be managed and controlled. Two-thirds of the average executive's time is spent processing or communicating information, and well over half of the U.S. workforce is directly engaged in some form of information handling - reports, ad hoc inquiries, spreadsheet analysis, and other functions.

[2] Computers have become an integral part of a company's everyday activities because of the kind of information they generate and their speed of delivery. The use of computers in business dates back to the mid-1950s, when batch-processing applications such as payroll were once the mainstay of computer centers. The role of computers in such activities is now so routine that they are taken virtually for granted.

[3] Today's information resource is used not only for cost reduction but in pursuing business strategies. For example, consider Mobil Oil's strategy to market gasoline in California by installing point-of-sale terminals at gasoline stations for customers to use with the automated teller machines of two major banks. And what about airlines, car rental firms, and hotels working together to offer bonus programs for frequent flyers through computers that track bonus miles and issue awards?

[4] These examples illustrate today's emphasis on information and the value of information. The challenge of the 1980s is using information technology to gain competitive advantage and extending the limits of the computer to incorporate artificial intelligence as a revolutionary step for decision support. The wide range of computer and communication resources that provides information for decision making makes up today's management information systems, or MIS.

[5] In this text, we will focus on MIS as a practical approach to developing information systems in support of decision making. MIS is a broad category of systems. Some activities are highly integrated and “prespecified” for repetitive transaction processing, other activities are customized for specific decision making tasks. We will also emphasize office automation and the communication network that facilitates clerical support.

Exercises

1. Main idea
Arrange the following statements as they are used in the text:

1. The role of computers in business is being gradually increased since their primary use in 1950s.
2. Information technology extends the limits of computers incorporating artificial intelligence and providing decision support.
3. Computers are used to pursue business strategies realized in various programs for airlines, car rental firms, hotels.
4. Information is the main resource in our today's society.
5. Great attention is paid in the text to the management information system.

2. Understanding the passage
Decide whether the following sentences are true or false (T/F) by referring to the information in the text. Then make the necessary changes so that the false statements become true.

1. Computers are widely used nowadays because of the speed and cost savings of information processing.
2. A smaller part of companies' personnel is engaged in some form of information handling.
3. The use of computers is as long as 40-50 years.
4. Today's information resource is used primarily for cost reduction.
5. Computers and communication resources are joined into a management information system to provide information for decision making.
6. MIS is an individual system with highly specific tasks.
7. Office automation and communication networks facilitate clerical support.

3. Locating information
Find in the text those passages where the following ideas are expressed. Give the passage references.

1. What examples illustrate the use of information in pursuing business strategies?
2. What's MIS?
3. What's the role of computers in business nowadays?
4. What items does the text emphasize?
5. How much time is spent on processing and communicating information?
6. What's the challenge of the 1980s in using information technology?

4. Word forms
Fill in the missing words. Refer back to the text if necessary.

adj.	**v.**	***n.***
popular	-	+
+	use	+
+	execute	+
-	deliver	+
-	apply	+
-	reduce	+
-	emphasize	+
+	compete	-
intelligent	-	+
+	manage	+
+	repeat	-

5. Organizing information
Summarize the contents of the text by completing the following table.

Computers in business

When introduced	+
Application	+
Advantages	+
Points to be discussed	+

UNIT 9
What is MIS?

Just what is MIS? What does it do? There is no agreement on a common definition. Terms such as information systems, information services, or information processing systems, often used as synonyms for MIS, refer to an information system that supports transaction processing and management decision-making functions.

MIS, a field of over a quarter century's standing in practice and a subject of research since the late 1960s, is ***an integrated, computer-based***, ***user-machine system that provides information for supporting operations and decision-making functions***. Its key elements are:

1. ***Integrated system*** to serve many users.
2. ***Computer-based*** system that integrates a number of applications through a database.
3. ***User-machine interface*** that gives instant response to ad hoc inquiries.
4. ***Providing information*** to all managerial levels.
5. ***Support of operations*** and decision-making functions.

These elements tell us that MIS can be an important organizing medium. Developing a MIS means creating a new environment in which to manage a business. To clarify this point, we will elaborate on each element and discuss the activities that led to the development trends in MIS.

Integrated System

If MIS is to provide a new environment for decision making, the applications must be integrated to serve all authorized users. Integration means centralizing files for shared access to information across applications. It also means eliminating redundancies and inconsistencies that are common in traditional files. Individual applications designed with one user in mind are often incompatible with other applications that use the same data. In contrast, a single application integrating common data across users becomes the preferred approach in application design.

Integration in computer-based applications is usually based on a master plan that commits management to MIS development. The plan specifies actions to be taken, standards, and guidelines for installing an information system. Although users may develop their own applications on freestanding microcomputers, a master plan can require that such applications be compatible with the organization's mainframe. Providing diverse applications within integration standards is a trend that promotes user-machine interface and compatibility of files for use by multiple users.

Computer-Based System

A MIS depends heavily on the capabilities and power of the computer used for it. A computer system has four major components: input, processing, output, and secondary storage. Data are entered into the central processing unit (CPU) through an input device such as a keyboard. The CPU acts on the data based on an application program stored in the computer's main memory. The resulting information is produced through a printer in the form of a report.

Today's computer power makes MIS a reality. The question facing MIS designers, however, is not how much computer power is required, but what applications should be run on the computer. Choice of applications depends on how ready the user is to interface with the computer, cost/benefit aspects, and management support for change.

Because management information systems are computer-based, developing a MIS depends on the right choice of hardware, software, database, procedures for computer operation, and MIS personnel - analysts, database designers, programmers, computer operators, and support staff.

Using a database

A major component of MIS is the database. Before it became available, users operated in a conventional file environment. Programs handled data with no data sharing across applications. In a database environment, common data are available to multiple users. Instead of restricting each user or program to managing separate data, users share data across applications. The software, called the database management system (DBMS) manages the data as an entity and coordinates data sharing.

A database is critical for MIS operation. It stores information as an integrated entity. The goal is to make information access easy, quick, inexpensive, and flexible for the user. This is accomplished by controlling redundancy, making the system user friendly (easy to learn and use), and ensuring data independence (changing hardware or adding new data without having to rewrite existing programs), and data accuracy and integrity.

Managing databases requires a database administrator (DBA) to coordinate data activities and the database. Besides a background in management, the DBA is expected to have the technical knowledge to deal with database designers. For the success of this key role, MIS staff and senior management support is critical.

Using Models

MIS applies decision models for problem solving. A model is a near representation of reality. Decision models are oriented to a number of decision-making areas:

1. Evaluation of investment alternatives (e.g. net present value analysis).
2. Data analysis (e.g., sales analysis).
3. Scheduling (e.g., production scheduling).
4. Simulation (e.g., plant expansion planning). Today's modern manager uses models for studying decision situations. A database provides an interface with the models on a real-time basis, that is processing inquiries or data as they actually occur.

Despite a surge in popularity during the past decade, decision models have not been as effective as they should be. In many cases, they are used on an ad hoc basis. Model outputs stand alone rather than as inputs to other models. Most decision models are also not easily updated and lose their usefulness in a changing decision-making environment. One alternative is to have an integrated database that is compatible with the model.

User-Machine Interface

A critical element in MIS design is the user-machine **interface**, an environment that allows the user to enter a command into the computer and the computer displays the results on the screen. This face-to-face dialog improves the user's decision-making potential. Today's computers provide online interface between the user and the machine by means of screen, keyboard or "mouse", menu-driven software, and the physical design of the system to match human comfort. The last factor falls under the category of ergonomics because it is concerned with comfort, fatigue, ease of use, and issues that affect the welfare, satisfaction, and performance of people working with user-machine systems. For example, a built-in swivel under a monitor allows a user wearing bifocals to tilt the screen for easy reading angle. Similar features apply to the design of desks, chairs, lighting, etc.

The concept of user-machine interface is a major step away from the days when an end user got reports only through the computer center. The end user is anyone authorized to enter, access, or retrieve data from a computer facility. In an interface environment, the end user interfaces with the computer on a real-time basis. Instructions are entered through a keyboard. The computer may be a freestanding microcomputer or a mainframe serving multiple users through remote terminals. Response to inquiries is either displayed on a monitor or printed out in a matter of seconds. The user-machine interface has several implications:

1. The user is likely to support a computer if the language or procedure is easy to learn and use.
2. The hardware and software must produce results in time to be used for making decisions.
3. MIS designers must have knowledge of computer technology and the user's business requirements to ensure a successful user-machine interface.

Today's trend in MIS development suggests that the user need not be a computer "hacker" or an expert in information technology. The goal is to design a system that accepts user inquiries in English-like words, processes commands through a menu-driven format, and produces results accurately, quickly, and completely.

Exercises

1. Main idea

A. Answer the following questions.
   1. What is MIS?
   2. When was it developed?
   3. What was it created for?
   4. What are its key elements?

B. Arrange the following points in accordance with the logic of the text.
   1. Definition of MIS.
   2. Reliance on computers.
   3. Sort of integration in MIS.
   4. Description of software.

5. Model approach to decision making.
6. Implications of user-machine interface.
7. Aspect of human factor in the whole system.

2. Understanding the concept

A. Match the term and its definition.

1) user/machine interface
2) response
3) user
4) information system
5) information

1. By … is here meant a subsystem of a communication network for interaction between the computer terminal (or a command center of a network) and a human operator.
2. … is a person utilizing a terminal or a PC to provide inputs or obtain outputs from a database.
3. … is an information provided from databases on a visual display terminal.
4. Any system designed to perform operations upon data by some form of automatic processing and control is termed … .
5. Any signal transmitted or stored in a network is qualified as … .

B. Define the following terms (refer back to the text).

1) hardware
2) software
3) database
4) procedure
5) personnel
6) redundancy
7) user-friendly system
8) model
9) end user

3. Understanding the passage

Decide whether the following sentences are true or false (T/F) by referring to the information in the text (then make the necessary changes so that the false statements become true).

1. Such terms as information systems, information services, information processing system are synonymous to MIS.
2. MIS was put into service some 50 years ago.
3. MIS includes more than five key elements.
4. Integration in MIS differs from traditional approaches in several aspects, such as file organization, multiple access to databases.
5. A trend is to provide diverse applications within integration standards.
6. A computer system has three major components: input, processing and output.

7. Developing a MIS depends on the choice of hardware, software, database, procedures for computer operations, and a MIS personnel.
8. The database is a major component of MIS.
9. The role of database administrator in MIS is negligible.
10. There are three areas of models applications.
11. Models are used in the same way as during the past decade.
12. User-machine interface is an important element of the system.
13. Computers provide on-line interface between the user and the machine by means of hardware facilities, special software products and physical design of the terminals.
14. The concept of user-machine interface differs from the early days of computers.
15. Today's user of MIS is not supposed to be an expert in information technology.

4. Locating information

Find those passages in which the following ideas are expressed (give references to the titles of the parts).

1. The essential properties of MIS.
2. Problems of system designs.
3. Problems of information access.
4. Planning of installation and maintenance of MIS.
5. Comfort of an operator in the system design.
6. The category of ergonomics.
7. Real-time basis of operation.
8. Implications of user-machine interface.

5. Organizing information

Speak on the following (make up a plan or a diagram of each part).

1. MIS is an integrated system
2. MIS is a computer-based system
3. MIS is based on user-machine interface
4. MIS is a critical resource in information handling.
5. MIS is an important medium in decision making.

SECTION 3. INFORMATION SYSTEMS
Comprehension check

Read and translate the text.

MIS REVIEW

MIS is an integrated, computer-based, user-machine system that provides information for supporting operations and management decision-making functions. Integration means centralization of files across applications and elimination of redundancies.

MIS depends heavily on the computer's processing power. A computer consists of input, processing, output, and secondary storage components for supporting MIS activities. The operating elements are the hardware, software, database, procedures, and MIS personnel.

A major computer-based aspect of MIS is the database with common data shared by multiple users according to need and prior arrangements. The software that manages the database is the database management system or DBMS. The overall objective is to make access to information easy, quick, inexpensive, and flexible for the user.

MIS applies various decision models oriented to a number of decision-making areas such as evaluation of investment alternatives, data analysis, scheduling, and simulation. Database provides a constant interface with the models for analysis and solutions.

The user-machine interface represents the screen, the keyboard, user-friendly software, menus, and ergonomic features for human comfort. Through the keyboard, the user enters instructions for information access or retrieval. The implication of this interface is that the user can "live" with a user-friendly environment and a system that can produce results for decision-making.

The personal computer has introduced a new way of doing business. It started as a stand-alone for specific application processing; today it is being linked to the mainframe, allowing the user to interface with corporate databases for decision making.

DSS is a computational aid to help managers integrate judgment, experience, and insight with focus on management performance. It is used in planning and examines alternatives in relatively unstructured decision making situations.

The expert system, an extension of artificial intelligence, is one aspect of DSS with a knowledge base and decision rule for representing the “expert's” thought processes.

The trend in MIS is to get closer to the user and expand the information system network to allow transactions to be collected closer to their source. This goal is achieved by the availability of intelligent terminals and the personal computer.

Review Questions

1. What is MIS? Do you agree with the text's definition?
2. Describe briefly the operating elements of MIS. Which elements do you consider most critical?
3. “In a database environment, common data are available and used by several users.” Do you agree? Explain.
4. Distinguish between:
    - isolated and consolidated computing;
    - structured and unstructured decision making;
    - embedded and distributed computing.
5. What is DSS? Carefully discuss the relationship between MIS and DSS.
6. In what way is MIS changing business organizations? Explain in detail.

Glossary

A

application - a particular problem to which information technology is applied.

artificial intelligence (**AI**) - The goal of artificial intelligence work in information technology field is to develop computer systems that exhibit some of the intelligence characteristics of human beings. It is an intellectual hybrid built on the disciplines of philosophy, linguistics, mathematics, electrical engineering and computer science. There are several sub-areas within AI, of which the most important are expert systems, natural language understanding, computer vision, knowledge representation and learning systems.

automatic teller machine (**ATM**) - a device used to dispense cash and for other banking functions, popularly known as 'hole-in-the-wall' banking machine. Most ATM read plastic cards which identify the customer and perhaps carry details of credit limits. They are connected by data communication links to the computer system of banks and other financial service companies.

authorization - giving a user permission to access a system.

B

batch processing - computer processing of information that has been assembled into batches of transactions prior to input. Batch processing was the main method used in the early days of data processing.

C

compatibility - the ability of one component of a computer-based system to work with another. This can apply at a number of different levels:

Program compatibility means that a program that runs on one type of machine will also run on another.

Language compatibility means that a program written in that language can be compiled and run.

Plug compatibility means that a hardware component can replace another and plug into the same interface socket.

computer-based system - a computer system, plus the people and procedures within an organization that make use of it, interacting to meet some defined goal. In the field of information technology, the computer will be a digital computer and the goal will be to generate and/or handle information.

D

data administration - a role associated with data management and the concept of 'data as a resource', arising from database management. Data administration deals with the business and political issues arising from the sharing of data across organizational units.

data independence - the concept that data should be independent from the programs that use it and from how it is stored, so that either can be changed without affecting the other, and so that people (programmers, end-users) using the data do not

need to know things that are irrelevant to their particular tasks. Data independence can be divided into two broad categories: physical data independence and logical data independence.

data management - the formal collection, storage and preparation of data, to ensure that it is available and appropriate for the uses to which it may be applied within an organization. Data management uses techniques such as data analysis, and software tools such as data dictionaries and database management systems.

data terminal - 1) used within telecommunications to mean any device capable of sending or receiving digital information over a communications network; 2) used within computing to mean a device that operates under the control of a computer system and to which it is connected by means of a communications link.

database management system (DBMS) - a set of interrelated software tools designed to construct and provide access to a database held on a computer system, and to control the privacy, security and integrity of the data. The tools usually embody special programming languages for describing and manipulating the data, known as data description and data manipulation languages respectively. They may also include a data dictionary system - a means of recording the contents of a database and how it is used.

decision support system (DSS) - a computer system designed to help people to make decisions. It will normally provide some means of capturing and storing the data on which decisions depend, plus various tools that can be used to manipulate the data, in order to model alternatives and explore the consequences of different courses of action.

distributed data processing - data processing where a number of independent computer systems are installed at different locations to process and store data that originates locally.

E

embedded - integrated into another device or routine in such a way that the user of the latter is not aware of its presence.

end user - the ultimate user of a computer system, rather than the people that purchase it or develop applications programs for others to use.

H

hack - originally meant to program software or alter programming code, usually operating outside the formal business structure of the software industry, but is now associated with attempting unauthorized access to a computer than with programming. This breed of hackers has gained a bad name because of their much-publicized successes in breaking through the security procedures surrounding Government computers, but hackers have also been the source of a great deal of valuable public domain software for home and personal computers, distributed via bulletin boards and from user to user.

I

information management - a general term used to characterize any form of business or office management that considers information (data, text, images, etc.) and information resources (including personnel and information systems) as primary assets.

information processing - a term that superseded data processing when the application of computers widened beyond the basic operational systems of organizations that were the initial targets. Thus it includes the application of computers to tasks in the office, the warehouse, the sales outlet, the factory; and the processing of documents, images, etc. As well as structured data.

information technology (**IT**) - electronic technologies for collecting, storing, processing and communicating information. They may be separated into two main categories: 1) those which process information, such as computer systems, and 2) those which disseminate information, such as telecommunication systems. Increasingly, the term is used to describe systems that combine both.

integrated program support environment (**IPSE**) - a set of computer-based tools for specifying, designing, programming and testing computer applications. IPSEs are intended to provide a complete method for developing systems that is independent of the programming language used.

integrity - used of a set of data, such as one or more data files, to mean that it is internally consistent and represents what it is supposed to represent.

interface - the meeting of two components of a computer system or an information system that have differing characteristics. Thus they must be matched in order for the system as a whole to operate. The term is used both for the manner in which the matching takes place and for the device that executes it.

M

management information system (**MIS**) - This term was first coined when early data processing systems outgrew their original role of controlling basic business processes, and began to be adapted to meet managers' information needs. It is also used in a narrower sense to mean an application specifically designed to supply managers with information.

multi-user - of computer systems, able to be used by more than one person at the same time. This is achieved mainly via the operating system, which shares out the system resources, such as processor and memory, among the programs being run by different users.

O

on-line processing - processing carried out under the control of the main computer within a computer-based system.

R

redundancy - 1) the inclusion within a computer system or within its components, of additional capacity not required to meet normal demands. This additional capacity is brought into use when failures occur, thus achieving higher reliability.; 2) the

attachment of extra information to a data field, so that accuracy can be checked, for example after transmission or after being entered at a keyboard.

resource - 1) any part of a computer system that a program can request the use of, such as an area of memory, a printer or a data file. Normally the program must reserve the resource first, either implicitly when it is loaded or explicitly by issuing a request to the operating system. 2) On some computer systems, the term is used in a special sense to describe anything used by a program that is likely to change depending on the use made of the program. This is defined as a resource external to the program, rather than being included within it, so that it can easily be changed when needed.

resource-sharing network - a communication network used by computer systems at different geographical locations (commonly universities and other research institutions) to share one another's resources.

S

simulate - operate in the same manner as, in terms of the activities undertaken. This is normally achieved via software programmed to behave as nearly as possible like the device being simulated.

spreadsheet - an application program (usually a package) that helps users to build up two-dimensional tables of numeric and text information.

system analysis - the process of analysis used to decide how best to put a computer-based system to work in a particular area of an organization's operations. In the normal development life cycle of a computer-based system, the systems analysis stage follows the feasibility study, which decides whether a development is desirable and what its objectives should be, and precedes the system and program design stages, which are concerned with how the system should be constructed.

system implementation - the process of delivering to its intended users the programs that constitute a new computer-based system, and bringing into operation the new procedures required to use them.

system specification - a document that defines how a computer-based system will be expressed in hardware and software terms. It may also explain in detail how the system will operate, in terms of the clerical or other procedures that it affects. The system specification is the main product of the systems design stage of systems development, and it forms the basis on which equipment will be procured and programs will be designed.

T

transaction - all the processing activities - updating of files, returning an acknowledgement, etc. - that must be completed within a computer system to record an external transaction, such as the placing of an order by a customer or a purchase in a shop. Where the data for a transaction is entered via terminals (commonly called teleprocessing), a transaction might consist of a number of exchanges of messages between the terminal and the computer system containing the applications program.

Also used to mean the message or messages that are generated and sent to the computer system to record the transaction.

U

update - change the contents of a data file, a program or a variable to reflect the latest required values.

user-friendly - describes computer systems and applications that non-specialist users find easy to use.