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КІРОВОГРАДСЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ

кафедра іноземних мов

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Методичні вказівки до самостійної роботи
для студентів 1 курсу
123 «Комп'ютерна інженерія»
125 «Кібербезпека»

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Англійська мова

Методичні вказівки до самостійної роботи призначені для студентів 1 курсу комп'ютерних спеціальностей денної та заочної форми навчання.

Основна мета розробки – навчити студентів основним принципам та правилам роботи зі спеціальною англомовною літературою за фахом, розвивати стійкі навички читання та перекладу технічної літератури.

Закріплення тексту реалізується завдяки виконанню лексичних та граматичних вправ, які також спрямовані на розвиток навичок усного мовлення та письма.

Методичні вказівки можуть бути використані як для аудиторної роботи під керівництвом викладача, так і для самостійної позааудиторної роботи.

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TEXT 1

Generations of Computers

In the middle of our century, progress of nuclear physics, rocketry, and space technology called for solution of so huge problems that they could not be tackled with the aid of key-type and punched-card calculating machines. This demand resulted in design of digital electronic computers at the boundary between the 1940's and 50's.

The idea of using a programmed control for building a device which automatically performs arithmetic calculations was expressed for the first time back in 1833 by Charles Babbage, a professor of mathematics, England. However, his attempts to build a mechanical calculating device were not crowned with success.

Practically, this idea was realized only a century later, when Konrad Zuse from Germany in 1942, and Howard 11. Aiken from the USA in 1944 built calculating machines using mechanical relays. The machines were controlled from a punched tape.

The idea of programmed control of a computing process was essentially developed by John von Neumann (1904-1957), an American mathematician, who stated the concept of the program stored in a memory in 1945.

The first program-controlled computers with a program stored in the memory appeared practically at one and the same time in Great Britain, USA and USSR.

A fundamental contribution to the Soviet computer engineering was made by academician S.A. Lebedev. In the country, the first electronic calculating machine MESM was built under his guidance in the Ukrainian Academy of Sciences, Kiev, 1949-1951.

The second one — a high-speed electronic calculating machine BESM - was built at the Institute of Fine Mechanics and Computer Engineering of

the USSR Academy of Sciences, 1952-1954. It performed 8000 operations per second and was the fastest machine in the world. The successive years of academician S.A. Lebedev were dedicated to the technology of Soviet-made computers of higher throughput.

Soviet scientists, first of all academicians S.A. Lebedev, M.V. Keldysh, V.M. Glushkov, V.S. Semenikhin and their scientific followers greatly contributed to the development of the principles of construction and theory of computers and their software and the methods of utilizing computers in the national economy.

During more than three decades the electronic computer engineering was vigorously developing. Several generations of computers, superseding each other, appeared before our eyes. The appearance of new generations of computers was caused by the rapid growth of the new fields and methods of computer application which needed more efficient, cheaper, and more dependable machines.

A computer generation is defined by the set of interrelated and mutually stipulated special features and characteristics which are used to construct the machines of the structural and fabrication base (the basic components, first of all) and the architecture (logical organization) implemented in the machine.

The first generation of computers was based on vacuum tubes used as the components of logic elements. The industrial production of these machines started in the early 50's. These electronic tube computers were generally used for solution of scientific and engineering problems. They drew much power, were bulky, had low capacity of the main memory and, what is of special importance were unreliable mainly because of often faults of vacuum tubes.

In the second-generation computers that appeared in the late 50's, the vacuum tubes were replaced by transistors. This reduced the computer size and energy consumption, essentially increased their reliability, and hence, made it possible to build computers of greater logic features and higher output.

In addition to the computers for scientific calculations, there appeared the machines evolved for solution of economic-planning problems (data processing problems) and control of production processes.

The second-generation computers made it possible to materially enlarge the fields of computer application and proceed to designing automatic process control systems and management information systems (MIS).

The quest for higher reliability and speed, and lower costs led to development of a new basic component of the computer circuitry - the monolithic integrated circuit which gave rise to computers of the third generation. The third generation came into being in the second half of 60's when the IBM's System/360 was developed. This system effected the logic design of the third-generation computers engineered in other countries.

Realizing the program of socialist integration, the Soviet Union and other socialist countries, members of the CMEA, jointly developed in the early 70's the Unified System of Electronic Computers and System of Small Electronic Computers - third-generation computers employing integrated circuits and proceeded with their batch production.

In designing the computers of the third generation, special emphasis was laid on reducing the working hours of preparation of programs to solve problems on computers, improving the machine-to-operator communication, raising the efficiency of costly hardware, and on making the computer servicing easier, all being-achievable through proper operating systems.

Recent years have been marked by appearance of computers and computing devices which should be related to the fourth generation. To outline this generation precisely is rather difficult, as at the present time, it is represented mainly by quite new types of computer facilities and only in some aspects (such as, for example, the replacement of magnetic-core memory by solid-state memory) it has touched the general-purpose computers performing the main bulk of work at various computing centers.

Vocabulary

1. to crown with success - увінчатися успіхом
2. tape - стрічка
3. vigorously — сильно, енергійно
4. to supersede - витісняти
5. bulky - великий, важкий
6. rocketry - ракетна техніка
7. dependable - надійний
8. interrelated - взаємопов'язаний
9. mutually - взаємно, спільно
10. to stipulate - обумовлювати
11. to draw - спорожняти
12. quest – пошук

Mark the statements T(true) or F(false) according to the information given in the text

1. The idea of programmed control of a computing process was essentially developed by John von Neumann.
2. The first generation of computers was based on vacuum tubes.
3. The vacuum tubes were replaced by semiconductors.
4. The second-generation computers made it possible to materially enlarge the fields of computer application.
5. The third generation came into being in the second half of 60’s.
6. Nuclear power gave rise to computers of the third generation.
7. Recent years have been marked by appearance of computers and computing devices which should be related to the 7-th generation.

Questions to the text

1. What is the role of computers in our society?
2. Whose idea was it to create a computer?
3. Did USSR have own computers?
4. What was the reason that led to the development of a new basic component of the computer circuitry?
5. Did Ukrainian scientists take part in the computer creation?
6. How can we define computer generations?
7. Is it a new idea of programmed control of a computing process?
8. Are modem computers program controlled?
9. First computers were less powerful then modem but did they consume less electrical power?
10. Is it easy to outline 4-th generation of computers?

Key words and word combinations

1	Program-controlled computer	Machine that manipulates data according to a list of instructions.	Пристрій, який маніпулює даними згідно зі списком інструкцій.
2	Vacuum tubes	Devices used to amplify, switch, otherwise modify, or create an electrical signal by controlling the movement of electrons a low-pressure space.	Пристрій, який використовується для підсилення, переключення або іншої зміни електричного сигналу за допомогою контролю руху електронів в просторі з малим тиском.
3	Logic element	Mechanical or electrical element that has behavior similar to any logical function; the main building block of the programmable devices.	Механічний або електричний пристрій який поводиться так само як логічна функція; основний базовий елемент, який використовується при створенні програмованих пристроїв.
4	First-generation computers	First computers that were build using mechanical elements.	Покоління комп'ютерів, яке було збудоване на основі механічних елементів.

5	Second-generation computers	Generation of computers that was build using vacuum tubes.	Покоління комп'ютерів, яке було збудоване на основі вакуумних ламп.
6	Monolithic integrated circuit	Miniaturized electronic circuit (consisting mainly of semiconductor devices) that has been manufactured in the surface of a thin substrate of semiconductor material.	Зменшене електричне коло (яке складається в основному з напівпровідникових елементів), яке розміщується на малому за площею напівпровідниковому матеріалі.
7	Operating system	Software that manages the sharing of the resources of a computer and provides programmers with an interface used to access those resources.	Програма, яка керує ресурсами комп'ютера та надає інтерфейс для доступу до них.
8	Third-generation computers	Generation of computers that was build using monolithic integrated circuits.	Покоління комп'ютерів, яке було збудоване на основі інтегральних схем.

TEXT 2

Computer Applications and Types

The advancement of computer technology based on the achievements in the field of microelectronics, architecture of computers and their software has essentially enlarged the sphere of computer applications.

The development of computer facilities and the field and techniques of computer applications are interrelated and interdependent processes. On the one hand, the national economy and culture encourage scientists and designers to seek new ways of building the computers, and on the other hand, the appearance of electronic computers, computer systems and devices having greater functional

performances, essentially improved indices of output, cost, size, reliability, etc., creates necessary preconditions for ever widening the field of computer applications and development of computer usage techniques.

Originally, the comparatively narrow field of computer applications, mainly far scientific and engineering calculations, has considerably enlarged for a short period of time to cover practically all fields of science, technology, production planning and management, processes control, all spheres of human activity involving the processing of large body of information.

The variety of computer application fields and techniques has given rise to a wide range of requirements to the computer characteristics and to the computer design principles. As a result, the basic types of computers have been defined by now in compliance with their usage. Despite the basic fundamental principles have remained valid, these types of computers essentially differ not only in their quantitative characteristics, but also in the architecture, electronic components, and peripherals in use.

This principal facilities of modem computer technology may be classified into supercomputers of systems (having, extremely high speed and enormous memory), general -purpose computers, small computers, microcomputers, and microprocessors.

Since the boundaries between the machine types rapidly vary under the effect of progress in the field of microelectronics and computer architecture, especially as in some divisions of application the machines of different types are united into computing systems and complexes of different configurations.

At present, the supercomputers (systems) are machines (systems) performing more than 10 000 000 operations per second These machines find application in solution of especially complicated scientific and engineering problems, problems of the real-tune processing of huge files of data, in searching the optimum solution of economic-planning problems, and in computer-aided design (CAD).

The first computers were built for making scientific and engineering computations involving fixed-length words, relatively small body of input (initial data) and output (computation results) information and very large number of computations to be performed in the course of problem solution.

Another case is with the problems of economic planning, accounting, statistics, etc. These problems are associated with input and storage of a very large body of initial data. The data processing itself requires a relatively small number of logic and arithmetic operations. On completion of processing, a large amount of information is printed out (output), the processing results being printed in an edited form, in the form of tables, pay-rolls, etc.

The problems of the kind are known as data-processing problems, and the computers used for their solution are often called automatic data-processing systems. The automatic data-processing systems underlie the automatic control systems. With the data-processing systems, it is of importance to provide a possibility of input, storage, processing, and output of textual, i.e. alphameric, information represented by Liable-length words.

Characteristic of the date-processing systems is the use of many external or peripheral devices such as the magnetic-disk and tape-storage devices capable of storing a very large body of information (millions of numbers and other data), and the devices accomplishing date input and output, data recording and display.

About 20 years ago, it was a common opinion that electronic computers for data processing essentially differ from those designed to solve scientific and engineering problems whose most important characteristic is the speed of operation. The modem understanding of the methods of using computers to make scientific and engineering computations presupposes usage of algorithmic languages for programming purposes, entry of the program texts into the machines in these languages and their conversion, output of the computation results in the form of executed tables with headings and other inscriptions, and machine storage of large program arrays including various packages of

application programs. As a result, differences in the structure and information representation methods between these two types of machines became effaced with resultant appearance of general-purpose computers which now carry out the main bulk of computation work and machine processing of information in various computation centres and automatic control systems.

Modem general-purpose computers are versatile. They can be used both for solution of scientific and engineering problems by numerical methods and in the mode of automatic data processing in the automatic control system. Such machines have high speeds, a large-capacity memory, a flexible system of instructions, a wide set of peripherals, and an information coding method allowing for data processing requirements.

Vocabulary

1. compliance - відповідність
2. essentially - суттєво
3. boundary - границя, кордон
4. optimum - оптимальний
5. completion - завершення
6. pay-rolls - платіжна відомість
7. alphabetic - текстовий
8. liable - можливий
9. to accomplish - здійснювати
10. to presuppose - припускати
11. to efface - стирати
12. versatile - різносторонній

Mark the statements T(true) or F (false) according to the information given in the text

1. The development of computer facilities and the field and techniques of computer applications are independent and interdependent

processes.

2. The basic types of computers have been defined by now in compliance with their usage.
3. The boundaries between the machine types rapidly vary under the effect of progress.
4. The machines of different types can not be united into computing systems and complexes of different configurations.
5. At present, the supercomputers (systems) are machines (systems) performing moos than 10 000 000 operations per second.
6. The data processing itself requires a lot of small number of logic and

   arithmetic operations.
7. The automatic data-processing systems underlie the automatic control systems.

Questions to the text

1. What are the main spheres of computer applications?
2. What are the main functions of a computer?
3. When was the first computer built?
4. What are the main advantages of computers?
5. What capabilities should data-processing systems combine when designed?
6. What is the most effective computer data processing system?
7. What are the main principal facilities of modem computer technology?
8. What are the supercomputers?
9. Where do supercomputers find their applications?
10. What is the modern understanding of the methods of using computers?

Key words and word combinations

1	Supercomputers	Machines (systems) performing more than 10 000 000 operations per second.	Пристрої, які здатні виконувати понад 10 000 000 операцій за секунду.
2	General-purpose computer	A computer that is capable of performing, in a reasonably efficient manner, the functions required by both scientific and business applications.	Комп'ютер, розроблений для достатньо ефективного виконання функцій, необхідних як для наукових досліджень так і бізнес додатків.
3	Small computer	Often a general-purpose computer that can be easily hold by one hand and has small gabarites.	Часто це комп'ютер загального призначення, який має невеликі габарити.
4	Microcomputer	Computer with a microprocessor as its central processing unit. Another general characteristic of these computers is that they occupy physically small amounts of space when compared to mainframes and minicomputers.	Комп'ютер з мікропроцесором в якості центрального процесору, у порівнянні з міні комп'ютерами та мейнфреймами він займає мало місця.
5	Microprocessor	CPU physically placed on single silicon (or from other material) chip.	Центральний процесор, фізично розміщений на одному кристалі.
6	Real-time processing	Processing input data which has deadline from data input event to process respond.	Обробка даних, яка має певні часові обмеження на час, який необхідний системі для закінчення обробки даних.

TEXT 3

Kinds of computers

Computers vary widely in size, speed, and ability. They may be grouped into four categories: (1) personal computers, (2) mainframes, (3) dedicated computers, and (4) embedded computers.

Personal computers are used by one person at a time. The largest personal computers, or PCs, can fit on a desktop. Some of these machines have more than one microprocessor. Besides the primary processor, which is a general-purpose device, a PC may have one or more co-processors to handle special kinds of work. Some machines, for example, have math co-processors. Others have graphics co-processors to help process photographs and other illustrations. Still others have sound co-processors.

Large and middle-sized businesses commonly use PCs in client-server networks. A network consists of a group of computers connected by telephone fines or other communications cables. In a client-server network, a powerful central computer distributes information to a number of PCs. The central computer is called the server. The PCs are the clients but are usually referred to as workstations or simply PCs. The central computer may be a PC, a machine much like a PC with extra-large storage capacity, or an even larger type of computer.

The server also stores all the network's essential information. In a typical network, individuals operating the workstations obtain copies of information from the server. The workers process this information and then send copies of the processed information back to the server. In most cases, the workers are in the same office as the server. But a large company may have a network that connects its branch offices to the main office. In addition, many employees work on computers at home and send their processed data to the company server. This use of computers is known as telecommuting.

Office workers also use PCs that are not connected to a network. These machines are used for such tasks as word processing, performing financial calculations, and organizing and sorting bodies of information called databases. Home users of computers do some of the same kinds of work on personal data. They use word-processing programs for private correspondence, financial software for household budgets, and database management programs for address fists and redoes. Individuals also use their home computers to play games and to communicate over the Internet

Small, portable PCs are popular with people who often work away from their desks. The portables include laptop computers, which can be held on the lap; notebook computers, which are about the size of a loose-leaf notebook; and palmtop, or handheld, computers, which can be operated while held in the hand. Laptop and notebook computers have the same power as desktop computers. Palmtop computers have less power but still provide some advanced computing capabilities. For example, they can process household financial data.

Many users of personal computers do not use the term PC to refer to all such machines. Instead, they apply the term to only two groups of machines. The first group consists of machines made by International Business Machines Corporation (IBM). In the second group are IBM dories, similar machines produced by other companies using technology developed by IBM. This usage comes from the name of IBM's first personal computer, the PC, introduced in 1981. The usage distinguishes IBM machines and IBM clones from Macintosh personal computers, made by Apple Computer, Inc. Macintoshes are often referred to as Macs.

Mainframes are the fastest computers, and they use the largest storage systems. As a result, they can solve more complex problems and handle information than can any other category of computer. Mainframes are also the largest computers. Most of them are housed in several large cabinets.

Some mainframes do a single job, such as copying and storing

the information generated by a laboratory experiment. Others perform many different tasks.

Hundreds of people may be logged on (running programs on) a large mainframe at the same time. Such users are said to be timesharing. In this situation, the mainframe appears to be processing information for ad the users every instant However, the computer is actually switching rapidly from program to program, doing a small amount of work on one, then hurrying to another.

The fastest mainframes are called supercomputers. These machines are used for major projects, such as the design of aircraft, the study of weather systems, and the design and analysis of drug molecules. Supercomputers are few in number because they are extremely expensive. Supercomputer users-mostly scientists and engineers at large scientific installations-sometimes run programs by means of long-distance telephone networks.

The fastest supercomputers are parallel computers. They are fast because they have dozens or even hundreds of microprocessors that operate at the same time. Each processor works on a separate piece of a program. Minicomputers and super minis have many of the capabilities of mainframes, but they are smaller, less expensive, and less powerful.

Dedicated computers are special-purpose machines. They include video game units and word processors. Video game units come in a range of sizes. The smallest are handheld, battery-operated toys. A larger unit for home use sits on the floor or a table and is connected to a television set A player controls some of these home units through a lever called a joystick. The largest units stand on the floor in game rooms called arcades and other commercial establishments.

Word processors are computers that mainly type, edit, and print letters and other documents. Some of them can also run simple financial programs. Many word processors resemble electronic typewriters, with a small screen built

in above the keyboard. Word processors are much less expensive than PC.

Embedded computers are control units that are built into the devices they control. Virtually all embedded computers are single microprocessors. Such devices as digital wristwatches, telephones, videotape recorders, and the ignition systems of automobiles contain embedded computers.

Words produced in this manner are processed as pictures of words, rather than as individually encoded letters. These words therefore cannot be edited like words entered via a word-processing program. However, a computer equipped with handwriting-recognition software can translate hand printed characters into editable code. The code, in turn, produces characters that look as if they were typed. Pen-based computers use such software. These portable machines are used to record data in situations where typing would be difficult. For example, people who deliver packages by truck use them. A touch screen can produce the same results as an electronic pen and pad. A touch screen produces electric current underneath whatever areas of the screen are pressed. A microprocessor uses the current to produce an image. The object pressing the screen can be a pen, as with certain pen-based computers, or a finger, in the case of map kiosks in shopping marts.

Vocabulary

1. co-processor – співпроцесор
2. to obtain – отримувати
3. correspondence – відповідність
4. workstation - робоча станція
5. to dedicate – присвячувати
6. arcade – галерея
7. establishment – установа
8. to embed – вмонтовувати
9. build-in – вбудований
10. lever - важіль

Mark the statements T(true) or F (false) according to the information given in the text

1. Personal computers are used by several persons at a time.
2. A network consists of a group of computers connected by telephone files or other communications cables.
3. Office workers can not use PCs that are not connected to a network.
4. Small, portable PCs are popular with people who often work away from their desks.
5. Only one person may be logged on (running programs on) a large mainframe at the same time.
6. Word processors are computers that mainly type, edit and print letters and other documents.
7. Word processors are much less expensive than PC.

Questions to the text

1. How can we distinguish one computer from another?
2. What are the main computer categories?
3. What is the largest personal computer size?
4. Is it possible for PC to have more than one microprocessor?
5. What kind of co-processors do you know?
6. What is the name for the central computer in the network?
7. What is telecommuting?
8. What is time sharing?
9. What are the fastest supercomputers?
10. What is pen-based computer?

Key words and word combinations

1	Personal computer	A computer whose original sales price, size and capabilities make it useful for individuals intended to be operated directly by an end user.	Комп’ютер, виробництво якого орієнтовано на кінцевого користувача. Користувач може напряму ним користуватися без комп’ютерного оператора.
2	Mainframes	Computers used mainly by large organizations for critical applications, typically bulk data processing.	Комп'ютери, які здебільшого використовуються великими організаціями для критичних додатків.
3	Workstations	See personal computer.	Дивись personal computer.
4	Embedded computers	Embedded computers are general purpose CPUs that are a part of a machine or device.	Центральні процесори загального призначення, які являються частиною якогось пристрою.
5	Laptop	A small mobile computer which usually weighs 2-18 pounds.	Маленький мобільний комп'ютер, зазвичай від 2 до 18 фунтів.
б	Notebook	Laptop computers began to be called notebook when they reached a relatively small size in the 1990s.	Лептопи почали називати ноутбуками, коли вони досягли відносно малих розмірів у 1990 році.
7	Supercomputer	Computer that is focused on performing one task involving intense numerical emulations such as weather forecasting and solving scientific problems.	Комп'ютер, який спрямовано для виконання однієї задачі, яка включає надзвичайно важкі обчислення (такі як передбачення погоди та вирішення наукових проблем)

TEXT 4

Parts of computers

A computer is made up of many components (parts). There are five main types of components: (1) microprocessors, (2) memory chips, (3) input devices, (4) storage devices, and (5) output devices. The microprocessor, also known as the central processing unit (CPU), does the actual computing. Memory chips hold data and processing instructions for use by the microprocessor. The computer receives data through input devices, such as a keyboard. Storage devices, which include disks and tapes, hold data and instructions for transfer to memory. Output devices, such as a television like monitor, show results of the computer work.

Microprocessors control computer systems and process information. The information is encoded as units of electric charge that represent numbers.

The microprocessor consists of thousands, or even millions, of switches called transistors, other electronic devices, and wires. These parts are arranged in circuits and built into a chip, usually made of silicon that is no larger than a fingernail.

In the computer, different combinations of bit charges represent numbers, letters, and portions of pictures and sounds-all the data that the computer processes and all the instructions used to process the data. The computer uses combinations of eight bits, called bytes. For example, in a common code known as the American Standard Code for Information Interchange (ASCII), the byte 01000001 represents the letter A. Other bytes in ASCII represent tower-case and all the other letters, all the decimal digits, and certain punctuation marks and mathematical symbols.

The control unit directs and coordinates computer operations according to instructions stored in the memory. Each set of instructions is expressed as a binary operation code. This code also indicates where data for each processing

operation are stored in the memory. The control unit interprets the instructions and relays commands to the logic unit. The control unit also regulates the flow of data between the memory and the digital logic unit and routes processed information to output or storage devices.

The digital logic unit carries out the computer's mathematical and logical processes. In this unit, circuits called registers temporarily store data from the memory. To carry out an arithmetical calculation, a group of bit charges travels from a register through a wire to another circuit. The answer comes out on a wire at the other end of this circuit

The logic unit has a number of kinds of basic circuits. Various combinations of these circuits perform different mathematical and logical operations. For example, one combination of logic circuits performs addition. Another combination compares two numbers and then acts on the result of the comparison.

After completing an operation, the microprocessor may send the result to the memory until it is needed for another operation. In other cases, the result travels to an output device or a storage device.

Memory chips hold data and instructions inside the computer. Like microprocessors, memory chips consist of transistors, other electronic components, and wires arranged as circuits built into chips no larger than a fingernail.

There are two basic kinds of memory chips: (1) read-only memory (ROM), (2) random-access memory (RAM). A ROM chip holds its memory even when the computer is turned off. However, the computer user cannot change the memory. ROM chips are used to hold instructions that a computer runs repeatedly.

A RAM chip holds its memory as long as power is on, but the user can change the memory. Random-access memory is sometimes called internal memory or main memory. RAM chips receive information and instructions from

the microprocessor, an input device, or a storage device. RAM chips store only the information that is currently needed by the microprocessor.

Modem computers are designed so that a technician can change their capabilities by adding or removing components. In a typical PC, for example, many components are mounted on thin, rigid boards called circuit boards. The primary microprocessor and main memory are on a circuit board called the motherboard. Other components, such as sound and graphics co-processors, come on circuit boards called cards. These cards can be plugged into sockets called expansion slots inside the computer. Peripheral devices, such as printers and monitors, connect by wire or cable to sockets called ports.

Computer is a device that processes information with astonishing speed and accuracy. Computers process information by helping to create it and by displaying it, storing it, reorganizing it, calculating with it, and communicating it to other computers. Computers can process numbers, words, still pictures, moving pictures, and sounds. The most powerful computers can perform tens of billions of calculations per second

The computer has changed the way we work, learn, communicate, and play. Virtually every kind of organization throughout the world conducts business with computers. Students, teachers, and research scientists use the computer as a learning tool. Millions of individuals and organizations communicate with one another over a network of computers called the Internet. Computer games entertain people of all ages.

Almost all computers are electronic digital computers. They are electronic in their use of electric current (a flow of electric charge) to carry information. They are digital in that they process information as units of electric charge representing numbers. The word digital means having to do with numbers.

To enable a computer to process information that is not numerical-such as words, pictures, or sounds-the computer or some other device must first digitize that information. A device digitizes information by translating it into charges

that represent numbers. After the computer processes the digitized information by working with the charges, the computer or a device connected to the computer translates its results back into their original form.

Thus, an artist might use a machine called a scanner to digitize a photograph. The artist would next process the resulting electric charges in a computer to change the photograph-perhaps to add a border. The artist would then use a printer connected to the computer to produce a copy of the altered photo.

Digital computers are one of two general kinds of computers. The other kinds are calculating devices called analog computers. An analog computer represents amounts with physical quantities, such as distances along a scale, rather than with numbers.

The technology of computer hardware (the physical parts of computer systems) has advanced tremendously since 1946, when the first electronic digital computer was built. That machine filled a huge room. Today, a single microprocessor, a device the size of a fingernail, can do the same work as that pioneering machine.

The technology of software (programs, or sets of computer instructions and information) is also advancing rapidly. Early users of computers wrote their own software. Today, most users buy programs created by companies that specialize in writing software. Hundreds of thousands of different programs are available for businesses and individuals.

Because of advances in hardware and software, the price of computing has dropped sharply. As a result, the number of computers in operation has risen rapidly ever since the first commercial digital computers were manufactured in the 1950s. More than 10,000 computers were in operation worldwide by 1961. Ten years later, the number exceeded 100,000. By 1990, about 100 million computers were running. By the mid-1990's, the number had reached about 200 million.

Vocabulary

1. rigid — негнучкий
2. trackball — шароподібний маніпулятор
3. to conduct — проводити
4. switcher — перемикач
5. fingernail — ніготь
6. route — маршрут
7. to carry – нести
8. random – випадково
9. motherboard — материнська плата
10. to entertain – розважати

Mark the statements T(true) or F (false) according to the information given in the text

1. A computer is made up of one device.
2. Microprocessors control computer systems and process information.
3. A chip is usually made of silicon.
4. The computer uses combinations of 16 bits.
5. In a common code known as the American Standard Code for Information Interchange (ASCII), the byte 01000001 represents the letter A.
6. Each set of instructions is expressed as a binary operation code.
7. The digital logic unit carries out the computer's mathematical and logical processes.

Questions to the text

1. What are the main types of computer components?
2. What are the main advantages of computers?

3. What functions of computer systems perform?
4. Who designs computer software?
5. How do all units of the computer communicate with each other?
6. What does memory serve for?
7. What is the main purpose of control unit?
8. What are the two main types of storage units?
9. Where are data processed?
10. Where are data to be processed loaded into?

Key words and word combinations

1	Microprocessor	Single integrated circuit that incorporates most or all of the functions of a CPU.	Інтегральна схема, яка виконує більшість або всі функції центрального процесору.
2	Memory ship	Integrated circuit that hold data and instructions inside the computer.	Інтегральна схема, яка зберігає інформацію та інструкції.
3	Input device	Computer equipment used provide data and control signals to an information processing system.	Спеціальне обладнання, яке забезпечує введення інформації та команд до комп'ютерної системи.
4	Storage device	A device used for storing data.	Пристрій, який використовується для збереження інформації.
5	Output device	Computer hardware equipment used to communicate the results of data processing to the outside world.	Комп'ютерний пристрій, який забезпечує відображення результатів обробки даних для оточуючого світу.
6	Expansion slot	Special slot for adding new functional parts (boards) to computer.	Спеціальний паз/проріз для додавання нових функціональних частин (плат) до комп'ютера.

7	Peripheral device	Device connects to computer by wire or cable to sockets called ports.	Пристрій, який приєднується до комп'ютера за допомогою кабелю, який приєднується до портів.

TEXT 5

Database

A database is a collection of logically related data designed to meet the information needs of one or more users. The term originated within the computer industry, but its meaning has been broadened by popular use, to the extent that the European Database Directive (which creates intellectual property rights for databases) includes non-electronic databases within its definition. This article is confined to a more technical use of the term; though even amongst computing professionals, some attach a much wider meaning to the word than others.

A possible definition is that a database is a collection of records stored in a computer in a systematic way, so that a computer program can consult it to answer questions. For better retrieval and sorting, each record is usually organized as a set of data elements (facts). The items retrieved in answer to queries become information that can be used to make decisions. The computer program used to manage and query a database is known as a database management system (DBMS). The properties and design of database systems are included in the study of information science.

The central concept of a database is that of a collection of records, or pieces of knowledge. Typically, for a given database, there is a structural description of the type of facts held in that database: this description is known as a schema. The schema describes the objects that are represented in the database, and the relationships among them. There are a number of different ways of

organizing a schema, that is, of modeling the database structure: these are known as database models (or data models). The model in most common use today is the relational model, which in layman's terms represents all information in the form of multiple related tables each consisting of rows and columns (the true definition uses mathematical terminology). This model represents relationships by the use of values common to more than one table. Other models such as the hierarchical model and the network model use a more explicit representation of relationships.

Strictly speaking, the term database refers to the collection of related records, and the software should be referred to as the database management system or DBMS. When the context is unambiguous, however, many database administrators and programmers use the term database to cover both meanings.

Many professionals would consider a collection of data to constitute a database only if it has certain properties: for example, if the data is managed to ensure its integrity and quality, if it allows shared access by a community of users, if it has a schema, or if it supports a query language. However, there is no agreed definition of these properties.

Database management systems are usually categorized according to the data model that they support: relational, object-relational, network, and so on. The data model will tend to determine the query languages that are available to access the database. A great deal of the internal engineering of a DBMS, however, is independent of the data model, and is concerned with managing factors such as performance, concurrency, integrity, and recovery from hardware failures. In these areas there are large differences between products.

The earliest known use of the term 'data base' was in June 1963, when the System Development Corporation sponsored a symposium under the title Development and Management of a Computer-centered Data Base. Database as a single word became common in Europe in the early 1970s and by the end of the decade it was being used in major American newspapers. (Databank, a

comparable term had been used in the Washington Post newspaper, as early as 1966.)

The first database management systems were developed in the 1960s. A pioneer in the field was Charles Bachman. Bachman's early papers show that his aim was to make more effective use of the new direct access storage devices becoming available: until then, data processing had been based on punched cards and magnetic tape, so that serial processing was the dominant activity. Two key data models arose at this time: CODASYL developed the network model based on Bachman's ideas, and (apparently independently) the hierarchical model was used in a system developed by North American Rockwell, later adopted by IBM as the cornerstone of their IMS product.

The relational model was proposed by E. F. Codd in 1970. He criticized existing models for confusing the abstract description of information structure with descriptions of physical access mechanisms. For a long while, however, the relational model remained of academic interest only. While CODASYL systems and IMS were conceived as practical engineering solutions taking account of the technology as it existed at the time, the relational model took a much more theoretical perspective, arguing (correctly) that hardware and software technology would catch up in time. Among the first implementations were Michael Stonebraker’s Ingres at Berkeley, and the System R project at IBM. Both of these were research prototypes, announced during 1976. The first commercial products, Oracle and DB2, did not appear until around 1980. The first successful database product for microcomputers was dBASE for the CP/M and PC-DOS/MS-DOS operating systems.

During the 1980s, research activity focused on distributed database systems and database machines, but these developments had little effect on the market. Another important theoretical idea was the Functional Data Model, but apart from some specialized applications in genetics, molecular biology, and fraud investigation, the world took little notice.

In the 1990s, attention shifted to object-oriented databases. These had some success in fields where it was necessary to handle more complex data than relational systems could easily cope with, such as spatial databases, engineering data (including software engineering repositories), and multimedia data. Some of these ideas were adopted by the relational vendors, who integrated new features into their products as a result.

In the 2000s, the fashionable area for innovation is the XML database. As with object databases, this has spawned a new collection of startup companies, but at the same time the key ideas are being integrated into the established relational products. XML databases aim to remove the traditional divide between documents and data, allowing all of an organization's information resources to be held in one place, whether they are highly structured or not.

Vocabulary

1. database - база даних
2. amongst – серед
3. query – запит
4. layman - не фахівець
5. relational model - реляційна модель
6. unambiguous - однозначний, точно виражений
7. tend to – прагнути
8. concurrency - паралелізм, співпадіння
9. implementation – реалізація
10. fraud - шахрай, обман, афера
11. spatial - просторовий

Mark the statements T(true) or F (false) according to the information given in the text.

1. The term database originated within the computer industry.
2. This article is confined to a more public use of the term.
3. A database is a collection of records stored in a computer in a systematic way, so that a computer program can consult it to answer questions.
4. The central concept of a database is that of a collection of notes, or pieces of books.
5. The term database refers to the collection of related records, and the software should be referred to as the database management system or DBMS.
6. Database management systems are usually categorized according to the data model that they support.
7. The relational model was proposed by E. F. Codd.
8. XML databases aim to remove the traditional divide between instructions and data.

Questions to the text

1. What is database?
2. What is DBMS role?
3. What is the difference between database and DBMS?
4. Do any data collections can be database? Why?
5. What did data model determine?
6. What was the DBMS creation aim?
7. Why did Codd criticize existing models?
8. Is there any commercial database?
9. Did research activity focused on distributed database systems and database machines have effect on the market?

10.In what fields did object-oriented databases succeeded?

11.Are XML databases popular now? Why?

Key words and word combinations

1	Data	A collection of logically related data.	Збірка логічно пов'язаних даних.
2	Database management system (DBMS)	The computer program used to manage and query a database.	Система управління базою даних (СУБД).
3	Schema	Structural description of the type of facts held in that database.	Опис логічної або фізичної структури бази даних.
4	Multimedia data	The one that includes not only text information but audio, photo and video information as well.	Дані, які включають не лише текстову, а й аудіо, фото та відео інформацію.
5	Query language	Language with help of which it is possible to create queries to database.	Мова, за допомогою якої можливо створювати запити до бази даних.
6	Distributed database	Database that is physically exists on different storage devices or hosts on the network.	База даних, яка фізично розміщена на різних носіях або в різних вузлах мережі.

Text 6

Fundamental storage technologies

Semiconductor memory uses semiconductor-based integrated circuits store information. A semiconductor memory chip may contain millions of tiny transistors or capacitors. Both volatile and non-volatile forms of semiconductor memory exist. In modem computers, primary storage almost exclusively consists of dynamic volatile semiconductor memory or dynamic random access memory. Since the turn of the century, a type of non-volatile semiconductor memory known as flash memory has steadily gained share as off-line storage for

home computers. Nonvolatile semiconductor memory is also used for secondary storage in various advanced electronic devices and specialized computers.

Magnetic storage uses different patterns of magnetization on a magnetically coated surface to store information. Magnetic storage is non-volatile. The information is accessed using one or more read/write heads which may contain one or more recording transducers. A read/write head only covers a part of the surface so that the head or medium or both must be moved relative to another in order to access data. In modem computers, magnetic storage will take these forms:

- Magnetic disk
- Floppy disk, used for off-line storage
- Hard disk, used for secondary storage
- Magnetic tape data storage, used for tertiary and off-line storage

Optical storage, in the case of typical Optical discs, uses tiny pits etched on the surface of a circular disc to store information, and reads this information by illuminating the surface with a laser diode and observing the reflection. Optical disc storage is non-volatile and sequential access. The following forms are currently in common use:

- CD, CD-ROM DVD: Read only storage, used for mass distribution of digital information (music, video, computer programs)
- CD-R, DVD-R, DVD+R: Write once storage, used for tertiary and off-line storage
- CD-RW, DVD-RW, DVD+RW, DVD-RAM: Slow write, fast read storage, used for tertian' and off-line storage

Magneto-optical disc storage is optical disc storage where the magnetic state on a ferromagnetic surface stores information. The information is read optically and written by combining magnetic and optical methods. Magneto-optical disc storage is non-volatile, sequential access, slow write, fast read storage used for tertiary and off-line storage.

Paper tape and punch cards have been used to store information for automatic processing since the 1890s, long before general-purpose computers existed. Information was recorded by punching holes into the paper or cardboard medium, and was read by mechanically (or, later, optically) sensing whether a particular location on the medium was solid or contained a hole.

Vacuum tube memory used a cathode ray tube, and a Selectron tube used a large vacuum tube to store information. These primary storage devices were short-lived in the market, since Williams tube was unreliable and Selectron tube was expensive.

Delay line memory used sound waves in a substance such as mercury to store information. Delay line memory was dynamic volatile, cycle sequential read/write storage, and was used for primary storage.

Phase-change memory uses different mechanical phases of phase change material to store information, and reads the information by observing the varying electric resistance of the material. Phase-change memory would be non-volatile, random access read/write storage, and might be used for primary, secondary and off-line storage.

Holographic storage stores information optically inside crystals or photopolymers. Holographic storage can utilize the whole volume of the storage medium, unlike optical disc storage which is limited to a small number of surface layers. Holographic storage would be non-volatile, sequential access and either write once or read/write storage. It might be used for secondary and off-line storage. See Holographic Versatile Disc (HVD).

Molecular memory stores information in polymers that can store electric charge. Molecular memory might be especially suited for primary storage.

Vocabulary

1. capacitor- конденсатор
2. volatile – короткочасний
3. exclusively – виключно
4. coated – покритий
5. to etch – гравірувати
6. sequential – послідовний
7. tertiary – третьочерговий
8. versatile – багатосторонній
9. surface - поверхня

Mark the statements T(true) or F (false) according to the information given in the text.

1. A semiconductor memory chip may contain millions of tiny transistors or capacitors.
2. Both volatile and non-volatile forms of semiconductor memory exist.
3. Non-volatile semiconductor memory known as flash memory.
4. Magnetic storage is volatile.
5. Magneto-optical disc storage is non-volatile.
6. Paper tape and punch cards have been used to store information for automatic processing since 1890s.
7. Delay line memory was dynamic volatile, cycle sequential read/write storage.
8. Phase-change memory would be non-volatile, random access read/write storage.

Questions to the text

1. What are the main types of storage units?
2. What is the function of a primary storage?
3. What is the function of a magnetic storage?
4. What is the function of Optical storage?
5. What is Magneto-Optical disc storage?
6. What is the function of punch-cards?
7. What is the main disadvantage of William tubes?
8. How is storage capacity measured?

Key words and word combinations

1	Semiconductor memory	Semiconductor memory uses semiconductor-based integrated circuits to store information.	Пам'ять, яка використовує напівпровідникові інтегральні схеми для збереження інформації.
2	Magnetic storage	It uses different patterns of magnetization on a magnetically coated surface to store information.	Пристрій, який використовує різні шаблони намагнічування магнітної поверхні для збереження інформації.
3	Optical storage	Optical storage uses tiny pits etched on the surface of a circular disc to store information, and reads this information by illuminating the surface with a laser diode and observing the reflection.	Пристрій, який використовує рельєф поверхні для збереження інформації, яка зчитується за допомогою освітлення поверхні лазерним діодом та аналізу відображення.
4	Magneto-optical disc storage	Optical disc storage where the magnetic state on a ferromagnetic surface stores information. The information is read optically and written by combining magnetic and optical methods.	Пристрій, в якому магнітний стан феромагнітної поверхні зберігає інформацію. Інформація зчитується оптично, а записується за допомогою магнітно-оптичних технологій.

5	Punch cards	Information was recorded by punching holes into the paper or cardboard medium, and was read by mechanically (or, later, optically) sensing whether a particular location on the medium was solid or contained a hole.	Інформація в перфокартах і записується шляхом пробивання дірок в папері, і читається механічно за допомогою освітлення перфокарти та аналізу освітлення з іншого боку.
6	Vacuum tube memory	Vacuum tube memory used a cathode ray tube to store information.	Пам'ять, яка використовує електронно-променеву трубку для зберігання інформації.
7	Delay line memory	Delay line memory used sound waves in a substance such as mercury to store information.	Пам'ять, яка використовує звукові хвилі в матеріалі (такому як ртуть) для збереження інформації.
8	Molecular memory	Molecular memory stores information in polymers that can store electric charge.	Пам'ять, яка зберігає інформацію в полімері, який може зберігати електричний заряд.
9	Holographic storage	Holographic storage stores information optically inside crystals or photopolymers.	Пристрій, який зберігає інформацію оптично в середині кристалу або фотополімеру.

TEXT 7

Computer data storage

Computer data storage, computer memory, and often casually storage or memory refer to computer components, devices and recording media that retain digital data used for computing for some interval of time. Computer data storage provides one of the core functions of the modern computer, that of information retention. It is one of the fundamental components of all modern computers, and coupled with a central processing unit (CPU, a processor), implements the basic computer model used since the 1940s.

In contemporary usage, *memory* usually refers to a form of semiconductor storage known as random access memory (RAM) and sometimes other forms of fast but temporary storage. Similarly, *storage* today more commonly refers to mass storage - optical discs, forms of magnetic storage like hard disks, and other types slower than RAM, but of a more permanent nature. Historically, *memory* and *storage* were respectively called *primary storage* and *secondary storage*.

The contemporary distinctions are helpful, because they are also fundamental to the architecture of computers in general. As well, they reflect an important and significant technical difference between memory and mass storage devices, which has been blurred by the historical usage of the term storage.

Various forms of storage, divided according to their distance from the central processing unit. The fundamental components of a general-purpose computer are arithmetic and logic unit, control circuitry, storage space and input/output devices.

Primary storage, presently known as memory, is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them. Any data actively operated on is also stored there in uniform manner.

Historically, early computers used delay lines, Williams's tubes or rotating magnetic drums as primary storage. By 1954, those unreliable methods were mostly replaced by magnetic core memory, which was still rather cumbersome. Undoubtedly, a revolution was started with the invention of a transistor that soon enabled then-unbelievable miniaturization of electronic memory via solid-state silicon chip technology.

This led to a modern random access memory (RAM). It is small-sized light, but quite expensive at the same time. It also loses the stored information when not electrically powered—it is volatile.

Main memory is directly connected to the CPU via a memory bus, or

front side bus, a high-speed digital "superhighway". It is actually comprised of two buses (not on the diagram): an address bus and a data bus. The CPU firstly sends a number through an address bus, a number called memory address that indicates the desired location of data. Then it reads or writes the data itself using the data bus. Additionally, a memory management unit (MMU) is a small device between CPU and RAM recalculating the actual memory address, for example to provide an abstraction of virtual memory or other tasks.

Secondary storage, or storage in popular usage, differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfers desired data using intermediate area in primary storage. Secondary storage does not lose the data when the device is powered down—it is non-volatile. Per unit, it is typically also an order of magnitude less expensive than primary storage. Consequently, modem computer systems typically have an order of magnitude more secondary storage than primary storage and data is kept for a longer time these.

In modem computers, hard disks are usually used as secondary storage. The time taken to access a given byte of information stored on a hard disk is typically a few thousandths of a second, or milliseconds. By contrast, the time taken to access a given byte of information stored in random access memory is measured in thousand-millionths of a second, or nanoseconds. This illustrates the very significant access-time difference which distinguishes solid-state memory from rotating magnetic storage devices: hard disks are typically about a million times slower than memory. Rotating optical storage devices, such as CD and DVD drives, typically have somewhat longer access times than hard disks.

The secondary storage is often formatted according to a file system format, which provides the abstraction necessary to organize data into files and directories, providing also additional information (called metadata) describing

the owner of a certain file, the access time, the access permissions and other information.

Most computer operating systems use the concept of virtual memory, allowing utilization of more primary storage capacity than is physically available in the system. As the primary memory fills up, the system moves the least-used chunks (pages) to secondary storage devices (to a swap file or page file), retrieving them later when they are needed. As more of these retrievals from slower secondary storage are necessary, the more the overall system performance is degraded.

Tertiary storage or tertiary memory is a system where a robotic arm will mount (insert) and dismount removable mass storage media into a storage device

according to the system's demands. It is primarily used for archival of rarely accessed information, since it is much slower than secondary storage (e.g. 5-60 seconds vs. 1-10 milliseconds). This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes.

Off-line storage, also known as disconnected storage, is computer data storage on a medium or a device that is not under the control of a processing unit. The medium is recorded, usually in a secondary or tertiary storage device and then physically removed or disconnected. It must be inserted or connected by a human operator before a computer can access it again. Unlike tertiary storage, it cannot be accessed without human interaction.

Off-line storage is used to transfer information, since the detached medium can be easily physically transported. Additionally in case a disaster, for example a fire, destroys the original data, a medium in a remote location will be probably unaffected, enabling disaster recovery. Off-line storage increases a general information security, since it is physically inaccessible from a computer and data confidentiality or integrity cannot be affected by computer-

based attack techniques. Also, if the information stored for archival purposes is accessed seldom or never, off-line storage is less expensive than tertiary storage.

Vocabulary

1. core — головний
2. contemporary — сучасний
3. capacity – ємність
4. cumbersome — громіздкий
5. volatile – мінливий
6. extraordinary – незвичайний
7. interaction — взаємодія

Mark the statements T(True) or F (false) according to the information given in the text.

1. Computer data storage provides several of the core functions of the modern computer.
2. Storage today more commonly refers to mass storage.
3. The CPU continuously reads instructions stored in secondary storage and executes them.
4. Main memory is directly connected to the CPU.
5. The computer usually uses its input/output channels to access secondary storage.
6. In modern computers, hard disks are usually used as secondary storage.
7. Hard disks are typically about a million times faster than memory.
8. The secondary storage is often formatted according to a file system format.

Questions to the text

1. What are the fundamental components of a general-purpose computer?
2. What are the main types of storage units?
3. What is the function of primary storage?
4. What is secondary storage and what is it used for?
5. How long does it take to access a given byte of information stored on a hard disk?
6. What is virtual memory?
7. What is tertiary storage and what is it used for?
8. What is off-line storage and what is it used for?
9. How is the cost of storage devices expressed?

Key words and word combinations

1	Data storage	Memory, components, devices and media that retain digital computer date used for computing for some interval of time.	Пам'ять, компоненти та пристрої, які зберігають цифрові данні для комп'ютера протягом певного проміжку часу.
2	Primary storage	The only memory directly accessible to the CPU.	Єдина пам'ять, до якої центральний процесор має доступ.
3	MMU	A memory management unit is a small device between CPU and RAM recalculating the actual memory address.	Пристрій між CPU та RAM, який вираховує справжню фізичну адресу в пам'яті.
4	Secondary storage	Differs from primary storage. It is not directly accessible by the CPU. The computer uses its input/output channels to access secondary storage and transfers data using intermediate area in primary storage.	На відміну від основної пам'яті до цієї CPU не має прямого доступу. Зазвичай CPU копіює дані до основної пам'яті, а вже потім працює з ними.

5	File system	Method for storing and organizing computer files and the data they contain to make it easy to find and access them.	Метод зберігання та організації файлів та даних, які вони містять.
6	Tertiary storage	Tertiary storage or tertiary memory is a system where a robotic arm will mount (insert) and dismount removable mass storage media into a storage device according to the system's demands.	Система, в якій механічна рука під'єднує пристрої збереження даних на вимогу системи.
7	Off-line storage	Off-line storage is computer data storage on a medium or a device that is not under the control of a processing unit. The medium is recorded and then physically removed or disconnected It must be inserted or connected by a human operator before a computer can access it again. Unlike tertiary storage, it cannot be accessed without human interaction.	Пристрій, який не керується CPU, а під'єднується (від'єднується) людиною. До нього не можна отримати доступ без посередництва людини.

TEXT 8

Modern print technology

Toner-based printers work using the Xerographic principle that is at work in most photocopiers: by adhering toner to a light-sensitive print drum, then using static electricity to transfer the toner to the printing medium to which it is fused with heat and pressure.

The most common type of toner-based printer is the laser printer, which uses precision lasers to cause adherence. Laser printers are known for high quality prints, good print speed, and a low (Black and White) cost-per-copy; they are the most common printer for many general-purpose office applications. They are far less commonly used as consumer printers due to a high initial cost.

Laser printers are available in both color and monochrome varieties.

Another toner based printer is the LED printer which uses an array of LEDs instead of a laser to cause toner adhesion to the print drum.

Recent research has also indicated that Laser printers emit potentially dangerous ultrafine particles, possibly causing health problems associated with respiration. The degree of particle emissions varies with age, model and design of each printer but is generally proportional to the amount of toner required. Furthermore, a well ventilated workspace would allow such ultrafine particles to disperse thus reducing the health side effects.

Inkjet printers spray very small, precise amounts (usually a few picolitres) of ink onto the media. These droplets of ink will carry a slight electrical charge. The placement of the ink on the page is then determined by the charge of a cathode and electrode between which the ink moves towards the paper. Inkjet printing (and the related bubble-jet technology) are the most common consumer print technology; as high-quality inkjet printers are inexpensive to produce.

Virtually all modern inkjet printers are color devices; some, known as photo printers, include extra pigments to better reproduce the color gamut needed for high-quality photographic prints (and are additionally capable of printing on photographic card stock, as opposed to plain office paper).

Inkjet printers consist of nozzles that produce very small ink bubbles that turn into tiny droplets of ink. The dots formed are the size of tiny pixels. Ink-jet printers can print high quality text and graphics. They are also almost silent in operation. Inkjet printers have a much lower initial cost than do laser printers, but have a much higher cost-per-copy, as the ink needs to be frequently replaced.

In addition, consumer printer manufacturers have adapted a business model similar to that employed by manufacturers of razors; the printers themselves are frequently sold below cost, and the ink is then sold at a high markup.

Various legal and technological means are employed to try and force users to only purchase ink from the manufacturer (thus leading to vendor lock-in); however there is a thriving aftermarket for such things as third-party ink cartridges (new or refurbished) and refill kits.

Inkjet printers are also far slower than laser printers. Inkjet printers also have the disadvantage that pages must be allowed to dry before being aggressively handled; premature handling can cause the inks (which are adhered to the page in liquid form) to ran.

Solid Ink printers, also known as phase-change printers, are a type of thermal transfer printer. They use solid sticks of CMYK colored ink (similar in consistency to candle wax), which are melted and fed into a piezocrystal operated print-head. The print-head sprays the ink on a rotating, oil coated drum.

The paper then passes over the print drum, at which time the image is transferred or transfixed, to the page.

Solid ink printers are most commonly used as color office printers and are excellent at printing on transparencies and other non-porous media. Solid ink printers can produce excellent results. Acquisition and operating costs are similar to laser printers. Drawbacks of the technology include high power consumption and long warm-up times from a cold state.

Also, some users complain that the resulting prints are difficult to write on (the wax tends to repel inks from pens), and are difficult to feed through Automatic Document Feeders, but these traits have been significantly reduced in later models. In addition, this type of printer is only available from one manufacturer, Xerox, manufactured as part of their Xerox Phaser office printer line. Previously, solid ink printers were manufactured by Tektronix, but Tek sold the printing business to Xerox in 2001.

A dye-sublimation printer (or dye-sub printer) is a printer which employs a printing process that uses heat to transfer dye to a medium such as a plastic card, paper or canvas. The process is usually to lay one color at a time using

a ribbon that has color panels. Dye-sub printers are intended primarily for high-quality color applications, including color photography; and are less well-suited for text. While once the province of high-end print shops, dye-sublimation printers are now increasingly used as dedicated consumer photo printers.

Inkless printers use paper with colorless dye crystals embedded between the two outer layers of the paper. When the printer is turned on, heat from the drum causes the crystals to colorize at different rates and become visible. The technology was worked on by Zink Imaging and is now available. Because of the way it prints, the printer can be as small as a business card, the images are waterproof, and in fact, one product slated for release by Zink Imaging is a digital camera with a printer built into it. Xerox is also working on an inkless printer which will use a special reusable paper coated with a few micrometers of UV light sensitive chemicals. The printer will use a special UV light bar which will be able to write and erase the paper. As of early 2007 this technology is still in development and the text on the printed pages can only last between 16-24 hours before fading.

Vocabulary

1. Xerographic — ксерографічний
2. adhering – прилипання
3. precision – точність
4. adhesion — порозуміння
5. to emit – виділяти
6. ultra fine – ультраточний
7. particle – частинка
8. consumer – споживач
9. nozzles – насадки
10. razor – бритва
11. markup – націнка
12. non-porous - непористий

Mark the statements T(true) or F (false) according to the information given in the text.

1. Toner-based printers work using the Xerographic principle.
2. The most common type of toner-based printer is the typewriter.
3. Laser printers are known for high light effects.
4. Laser printers are available in both color and monochrome varieties.
5. Inkjet printing is the most common consumer print technology.
6. High-quality inkjet printers are inexpensive to produce.
7. Inkjet printers are also faster than laser printers.
8. Solid ink printers are most commonly used as color office printers.

Questions to the text

1. Why are laser printers less commonly used as consumer printers?
2. Are laser printers safe for users?
3. What is the inkjet printer work principle?
4. Why is inkjet printing the most common consumer print technology?
5. Is it possible to print color pictures with the help of inkjet printers?
6. What disadvantages do inkjet printers have?
7. Are there any drawbacks in solid ink printers?
8. What is dye-sublimation printer and what is it used for?

Key words and word combinations

1	Toner-based printer	Work, using the xerographic principle that is at work in most photocopiers.	Працює з використанням принципу роботи ксероксу (використовується в багатьох фотокопіювачах).
2	Inkjet printer	This printer sprays very small, precise amounts of ink onto the media. These	Такий принтер розпилює малу порцію чорнила на папір. Ці краплі мають

		droplets of ink will carry a slight electrical charge. The placement of the ink on the page is then determined by the charge of a cathode and electrode between which the ink moves towards the paper.	певний електричний заряд. Розміщення чорнила на сторінці визначається електромагнітним полем через яке проходить чорнило.
3	Solid Ink printers	Also known as phase-change printers are a type of thermal transfer printer.	Використовують теплообмін при фазовому переході.
4	Dye-sublimation printer	Is a printer which employs a printing process that uses heal to transfer dye to a medium such as a plastic card, paper or canvas.	Принтер, який використовує тепло для передачі фарби на носій, такий як пластикова картка, папір...
5	Inkless printer	Uses paper with colorless dye crystals embedded between the two outer layers of the paper. Heat from the drum causes the crystals to colorize at different rates and become visible.	Використовує папір з безкольоровими кристалами фарби, розташованими між 2 зовнішніми шарами паперу. Тепло з друкарської головки змушує кристали набути колір, якій залежить від рівня тепла.

TEXT 9

Obsolete and special-purpose printing technologies

The following technologies are either obsolete, or limited to special applications though most were, at one time, in widespread use. Among these types are impact printers and pen-based plotters.

Thermal printers work by selectively heating regions of special heat-sensitive paper. These printers are limited to special-purpose applications such as cash registers and the printers in ATMs and gasoline dispensers. They are also used in some older inexpensive fax machines.

Impact printers rely on a forcible impact to transfer ink to the media, similar to the action of a typewriter. All but the dot matrix printer rely on the use of formed characters, letterforms that represent each of the characters that the printer was capable of printing. In addition, most of these printers were limited to monochrome printing in a single typeface at one time, although holding and underlining of text could be done by over striking, that is, printing two or more impressions in the same character position. Impact printers varieties include Typewriter-derived printers, Teletypewriter-derived printers, Daisy wheel printers, Dot matrix printers and Line printers. Dot matrix printers remain in common use in businesses where multi-part forms are printed, such as car rental service counters.

Pen-based plotters were an alternate printing technology once common in engineering and architectural firms. Pen-based plotters rely on contact with the paper (but not impact, per se), and special purpose pens that are mechanically run over the paper to create text and images. Only plotters, dot matrix printers, and certain line printers were capable of printing graphics.

Daisy-wheel printers operate in much the same fashion as a typewriter. A hummer strikes a wheel with petals (the daisy wheel), each petal containing a letter form at its tip. The letter form strikes a ribbon of ink, depositing the ink

on the page and thus printing a character. By rotating the daisy wheel, different characters are selected for printing.

These printers were also referred to as letter-quality printers because, during their heyday, they could produce text which was as clear and crisp as a typewriter (though they were nowhere near the quality of printing presses). The fastest letter-quality printers printed at 30 characters per second.

In the general sense many printers rely on a matrix of pixels, or dots, that together form the larger image. However, the term dot matrix printer is specifically used for impact printers that use a matrix of small pins to create precise dots. The advantage of dot-matrix over other impact printers is that they can produce graphical images in addition to text; however the text is generally of poorer quality than impact printers that use letterforms (type),

Dot-matrix printers can be broadly divided into two major classes:

- Ballistic wire printers (discussed in the dot matrix printers article)
- Stored energy printers
- Dot matrix printers can either be character-based or line-based (that is, a single horizontal series of pixels across the page), referring to the configuration of the print head.

At one time, dot matrix printers were one of the more common types of printers used for general use - such as for home and small office use. Such printers would have either 9 or 24 pins on the print head. 24-pin print heads were able to print at a higher quality. Once the price of inkjet printers dropped to the point where they were competitive with dot matrix printers, dot matrix printers began to fall out of favor for general use.

Some dot matrix printers, such as the NEC P6300, can be upgraded to print in color. This is achieved through the use of a four-color ribbon mounted on a mechanism (provided in an upgrade kit that replaces the standard black ribbon mechanism after installation) that raises and lowers the ribbons as needed.

Color graphics are generally printed in four passes at standard resolution, thus slowing down printing considerably. As a result, color graphics can take up to four times longer to print than standard monochrome graphics, or up to 8-16 times as long at high resolution mode.

Dot matrix printers are still commonly used in low-cost, low-quality applications like cash registers, or in demanding, very high volume applications like invoice printing. The fact that they use an impact printing method allows them to be used to print multi-part documents using carbonless copy paper (like sales invoices and credit card receipts), whereas other printing methods are unusable with paper of this type. Dot-matrix printers are now (as of 2005) rapidly being superseded even as receipt printers.

Line printers, as the name implies, print an entire line of text at a time. Three principal designs existed. In drum printers, a drum carries the entire character set of the printer repeated in each-column that is to be printed. In chain printers (also known as tram printers), the character set is arranged multiple times around a chain that travels horizontally past the pint line. In other case, to print a line, precisely timed hammers strike against the back of the paper at the exact moment that the correct character to be printed is passing in front of the paper. The paper presses forward against a ribbon which then presses against the character form and the impression of the character form is printed onto the paper.

Comb printers represent the third major design. These printers were a hybrid of dot matrix printing and line printing. In these printers, a comb of hammers printed a portion of a row of pixels at one time (for example, every eighth pixel). By shifting the comb back and forth slightly, the entire pixel row could be printed (continuing the example, in just eight cycles). The paper then advanced and the next pixel row was printed. Because far less motion was involved than in a conventional dot matrix printer, these printers were very fast compared to dot matrix printers and were competitive in speed with formed-

character line printers while also being able to print dot-matrix graphics.

Line printers were the fastest of all impact printers and were used for bulk printing in large computer centers. They were virtually never used with personal computers and have now been replaced by high-speed laser printers.

Vocabulary

1. obsolete – застарілий
2. forcible - сильний, переконливий
3. petal – пелюстка
4. crisp – хрусткий
5. precise – чіткий
6. superseded – замінений
7. motion - рух

Mark the statements T(true) or F (false) according to the information given in the text

1. Impact printers rely on a forcible impact to transfer ink to the media.
2. Pen-based plotters were an alternate printing technology.
3. Pen-based plotters rely on contact with the air.
4. Only plotters, dot matrix printers, and certain line printers were capable of printing graphics.
5. The fastest letter-quality printers printed at 30 characters per second.
6. In the general sense many printers rely on a matrix of pixels, or dots.
7. Term dot matrix printer is specifically used for impact printers.
8. Dot matrix printers can either be only line-based.
9. Line printers were the fastest of all impact printers.

Questions to the text

1. Where can we use thermal printers?
2. Are there any limitations for thermal printers?
3. Where are pen-based plotters used?
4. How do daisy-wheel printers work?
5. What are letter-quality printers?
6. What is the advantage of dot-matrix over other impact printers?
7. Is it possible to upgrade dot matrix printers to print in color?
8. Where are dot matrix printers still used?
9. What are line printers?
10. Where do we use line printers?

Key words and word combinations

1	Thermal printers	Thermal printers work by selectively heating regions of special heat-sensitive paper.	Термальні принтери створюють зображення шляхом термічної обробки термочутливого паперу.
2	Impact printers	Impact printers rely on a forcible impact to transfer ink to the media, similar to the action of a typewriter.	Принтери, які використовують принцип контактного друку.
3	Pen-based plotters	Pen-based plotters rely on contact with the paper, and special purpose pens that are mechanically run over the paper to create text and images.	Принцип дії базується на контакті з папером спеціальних пер, які механічно рухаються по папері для створення зображення.
4	Daisy-wheel printers	Daisy-wheel printers operate in much the same fashion as a typewriter.	Принцип дії схожий із звичайною механічною друкарською машинкою.

5	Dot matrix printer	Dot matrix printer is specifically used for impact printers that use a matrix of small pins to create precise dots.	Контактний принтер, який використовує матрицю маленьких шпильок для створення точних точок.
6	Drum printers	In drum printers, a drum carries the entire character set of the printer repeated in each-column that is to be printed.	Принтери, в яких друк здійснюється барабаном, на якому є рельєфні зображення всього набору символів для кожної колонки.
7	Comb printers	Comb printers are a hybrid of dot matrix printing and line printing.	Принтери, які використовують комбінований метод друку.

TEXT 10

Computer viruses.

A computer virus is a self-replicating computer program written to alter the way a computer operates, without the permission or knowledge of the user. Though the term is commonly used to refer to a range of malware, a true virus must replicate itself, and must execute itself. The latter criterion is often met by a virus which replaces existing executable files with a virus-infected copy. While viruses can be intentionally destructive - destroying data, for example - some viruses are benign or merely annoying.

Malware is a broad category of software designed to infiltrate or damage a computer system. Types of malware include spyware adware, Trojan horses, Worms and true viruses. While modem anti-virus software works to protect computers from this range of threats, computer viruses make up only a small subset of malware.

A computer virus behaves in a way similar to a biological virus, which spreads by inserting itself into living cells. Extending the analogy, the insertion

of a virus into the program is termed as an "infection", and the infected file, or executable code that is not part of a file, is called a "host".

A computer virus will pass from one computer to another like a real life biological virus passes from person to person. For example, it is estimated by experts that the Mydoom worm infected a quarter-million computers in a single day in January 2004. In March 1999, the Melissa virus spread so rapidly that it forced Microsoft and a number of other very large companies to completely turn off their e-mail systems until the virus could be dealt with. Another example is the ILOVEYOU virus, which occurred in 2000 and had a similar effect. It stole most of its operating style from Melissa.

Viruses can be subdivided into a number of types, the main ones being:

- Boot sector viruses
- Companion viruses
- E-mail viruses
- Logic bombs and time bombs
- Macro viruses
- Cross-site scripting virus

Two other types of malware are often classified as viruses, even though they may not meet the standard criteria: Trojan horses, Worms.

A boot sector virus alters the boot sector, usually the 1st sector, of a bootable disk or hard drive. Boot sector viruses were prevalent in the 1980s.

A companion virus does not have host files per se, but exploits MS-DOS. A companion virus creates new files (typically .COM but can also use other extensions such as ".EXD") that have the same file names as legitimate .EXE files. When a user types in the name of a desired program, if a user does not type in ".EXE" but instead does not specify a file extension, DOS will assume he meant the file with the extension that comes first in alphabetical order and run the virus. If a user had "(filename).COM" (the virus) and "(filename).EXE" and the user typed "filename", he will run "(filename).COM" and run the virus. Use

of the word "virus". The virus will spread and do other tasks before redirecting to the legitimate file, which operates normally. Some companion viruses are known to run under Windows 95 and on DOS emulators on Windows NT systems. Path companion viruses create files that have the same name as the legitimate file and place new virus copies earlier in the directory paths. These viruses have become increasingly rare with the introduction of Windows XP, which doesn't use the MS-DOS command prompt.

E-mail virus is a virus which uses e-mail messages as a mode of transport. These viruses often copy themselves by automatically mailing copies to hundreds of people in the victim's address book.

A logic bomb employs code that lies inert until specific conditions are met. The resolution of the conditions will trigger a certain function (such as printing a message to the user and/or deleting files). An example of a logic bomb would be a virus that waits to execute until it has infected a certain number of hosts. A time bomb is a subset of logic bomb, which is set to trigger on a particular date and/or time.

A macro virus, often written in the scripting languages for Microsoft programs such as Word and Excel, is spread in Microsoft Office by infecting documents and spreadsheets.

A cross-site scripting virus (XSSV) is a type of virus that utilizes cross-site scripting vulnerabilities to replicate. A XSSV is spread between vulnerable web applications and web browsers creating a symbiotic relationship.

Trojan Horses are impostor files that claim to be something desirable but, in fact, are malicious. Rather than insert code into existing files, a Trojan horse appears to do one thing (install a screen saver, for example) when in fact it does something entirely different, and potentially malicious, such as erase files. Trojans can also open back doors so that computer hackers can gain access to passwords, and other personal information stored on a computer.

Although often referred to as such, Trojan horses are not viruses in

the strict sense because they cannot replicate automatically. For a Trojan horse to spread, it must be invited onto a computer by the user opening an e-mail attachment or downloading and running a file from the Internet, for example. Trojan.Vundo is an example of a Trojan horse.

A worm is a piece of software that uses computer networks and security flaws to create copies of itself. A copy of the worm will scan the network for any other machine that has a specific security flaw. It replicates itself to the new machine using the security flaw, and then begins scanning and replicating anew.

Worms are programs that replicate themselves from system to system without the use of a host file. This is in contrast to viruses, which requires the spreading of an infected host file. Although worms generally exist inside of other files, often Word or Excel documents, there is a difference between how worms and viruses use the host file. Usually the worm will release a document that already has the "worm" macro inside the document. The entire document will travel from computer to computer, so the entire document should be considered the worm.

Some viruses are programmed to damage the computer by damaging programs, deleting files, or reformatting the hard disk. Others are not designed to do any damage, but simply to replicate themselves and make their presence known by presenting text, video, and audio messages. Even these benign viruses can create problems for the computer user. They typically take up computer memory used by legitimate programs. As a result, they often cause erratic behavior and can result in system crashes. In addition, many viruses are bug-ridden, and these bugs may lead to system crashes and data loss.

Vocabulary

1. to infiltrate – проникати
2. spreadsheets - електронна таблиця
3. malicious – злісний
4. legitimate – законний
5. to exploit - використовувати в своїх цілях

Mark the statements T(true) or F (false) according to the information given in the text.

1. A computer virus is a self-creating computer program.
2. Computer viruses make up only half of malware.
3. A companion virus creates new files.
4. An E-mail virus is a virus which uses e-mail messages as a mode of transport.
5. An example of a logic bomb would be a virus that waits to execute until it has infected a certain number of hosts.
6. A macro virus is often written on assembler.
7. For a Trojan horse to spread, it must be invited onto a computer.

Questions to the text

1. What is the difference between malware and computer viruses?
2. Do computer viruses have something in common with biological viruses?
3. Is there any classification of computer viruses?
4. How do companion viruses work?
5. Do companion viruses work with Windows XP? Why?
6. What is the difference between logic bomb and time bomb?
7. Is Trojan horse a virus?
8. What is a macro virus?

9. What viruses create symbiotic relationship?
10. Do all viruses make damage to system?

Key words and word combinations

1	Boot sector	Part of hard drive data where information required for boot process stored.	Частина даних на жорсткому диску, де зберігається інформація, необхідна для процесу завантаження.
2	Bug-ridden	Bugs can appear there.	Підвержений помилкам.
3	Executable file	File which contains instructions (and some data as well) that can be executed by computer.	Файл, в якому містяться інструкції (та певні дані), які можуть бути виконані на комп'ютері.
4	Host	Computer that is a part of network.	Комп'ютер, який являється вузлом в мережі.
5	Infected file	File which contains virus.	Файл, в якому окрім корисної інформації міститься вірус.

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