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**Англійська мова для студентів спеціальності «Розробка програмного забезпечення»**

**Збірник вправ**

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**Даний збірник вправ передбачено для студентів денної форми навчання. Включає спеціалізовані технічні тексти по сучасним інформаційним технологіям і спеціально створений комплекс завдань, направлених на вдосконалення навичок читання і говоріння на англійській мові. Зміст мовного матеріалу підібрано в повній відповідності до програми немовних вузів і включає мовні явища, призначені для активного засвоєння.**

**Збірник вправ включає теми для читання, оволодіння активною лексикою і обговорення в аудиторії. Передбачається, що даний матеріал може стати базою для формування удосконалення мовних навичок читання аутентичних текстових матеріалів зі спеціальності і навичок ведення бесіди по професійній тематиці.**

***Unit 1.***  **COMPUTER BASICS**

**Text A**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***A COMPUTER***

The word “computer” has been part of the English language since 1646, but if you look in a dictionary printed before 1940, you might be surprised to find a computer defined as a *person* who performs calculations! Prior to 1940, machines designed to perform calculations were referred to as calculators and tabulators, not computers. The modern definition and use of the term “computer” ***emerged*** in the 1940s, when the first electronic computing devices were developed.

Most people can formulate a mental picture of a computer, but computers do so many things and come in such a ***variety*** of shapes and sizes that it might seem difficult to distill their common characteristics into an all-***purpose*** definition. At its core, a **computer** is a ***device*** that ***accepts*** input, ***processes*** data, ***stores*** data, and produces output, all according to a series of stored instructions.

Computer **input** is whatever is typed, ***submitted***, or transmitted to a computer system. Input can be ***supplied*** by a person, the environment, or another computer. Examples of the kinds of input that a computer can accept include words and symbols in a document, numbers for a calculation, pictures, temperatures from a thermostat, audio signals from a microphone, and instructions from a computer program. An input device, such as a keyboard or mouse, gathers input and ***transforms*** it into a series of electronic signals for the computer to store and manipulate.

In the context of computing **data** refers to the symbols that represent facts, objects, and ideas. Computers manipulate data in many ways, and this manipulation is called **processing**. The series of instructions that tell a computer how to ***carry out*** processing tasks ***is referred to******as*** a **computer program**, or simply a “program”. These programs form the **software** that ***sets up*** a computer to do a specific task. Some of the ways that a computer can process data include ***performing*** calculations, sorting lists of words or numbers, modifying documents and pictures, ***keeping******track*** of your score in a fact-action game, and drawing graphs. In a computer, most processing takes place in a component called the **central processing unit** (CPU), which is sometimes described as the computer’s “brain”.

A computer stores data so that it will be ***available*** for processing. Most computers have more than one place to put data, depending on how the data is being used. **Memory** is an area of a computer that ***temporarily*** holds data waiting to be processed, stored, or output. **Storage** is the area where data can be left on a ***permanent*** basis when it is not immediately needed for processing. **Output** is the result produced by a computer. Some examples of computer output include reports, documents, music, graphs, and pictures. An output device displays, prints, or ***transmits*** the results of processing.

Take a moment to think about the way you use a simple handheld calculator to balance your checkbook each month. You’re forced to do the calculations in stages. ***Although*** you can ***store*** data from one stage and use it in the next stage, you cannot store the sequence of formulas – the program – required to balance your checkbook. Every month, therefore, you have to perform a similar set of calculations. The process would be much simpler if your calculator remembered the sequence of calculations and just asked you for this month’s checkbook entries.

Early “computers” were really no more than calculating devices, designed to carry out a specific mathematical task. To use one of these devices for a different task, it was necessary to rewire its circuits. In a modern computer, the idea of a **stored program** ***means*** that a series of instructions for a computing task can be ***loaded*** into a computer’s memory. These instructions can easily be replaced by a different set of instructions when it is time for the computer to perform another task.

The stored program concept ***allows*** you to use your computer for one task, such as ***word******processing***, and then easily ***switch*** to a different type of computing task, such as ***editing*** a photo or sending an e-mail message. It is the single most important characteristic that ***distinguishes*** a computer from other simpler and less ***versatile*** devices, such as calculators and pocket-sized electronic dictionaries.

***Comprehension check.*** *Mark the following statements as True or False.*

1. A computer can be defined by its ability to perform different mathematical and logical operations according to a set of instructions.

2. Computers had already been used before WWII.

3. There is no any significant difference between memory and storage.

4. Computer programs and software mean the same.

5. CPU is a part of a computer that controls all other parts of the system.

6. Computers and calculators are very similar devices which are based on the stored program concept.

***Vocabulary practice***

***1. Match the words with their synonyms.***

supply unit

distinguish appear

purpose but

device open

emerge goal

available differentiate

although provide

***2. Which word does not belong to the group?***

a) input carry out output process

b) hold store keep perform

c) edit data transmit set up

d) software storage supply memory

e) accept refer input load

f) unit device software equipment

***3. Complete the following sentences choosing one out of the variants given.***

1. If you don’t back up regularly, you can lose all your … .

a) CPU b) programs c) data d) storage

2. A computer … input, processes and stores data, produces output according to a series of instructions.

a) accepts b) submits c) emerges d) transmits

3. Reports, documents, graphs and pictures can be … to as computer output.

a) performed b) supplied c) transformed d) referred

4. A computer can perform various tasks such as word processing or sending messages that … it from any calculator.

a) set up b) distinguish c) keep track d) mean

5. Memory is the part of a computer where data and instruction are stored … .

a) permanently b) available c) temporarily d) versatile

6. Data is processed in the … according to the instructions that have been loaded into the computer memory.

a) CPU b) variety c) storage d) output

***4. Make two-word expressions connected with computing by combining words from two lists: A and B. Then match each expression with the appropriate phrase.***

A: stored B: processing

permanent device

word output

handheld storage

input calculator

computer program

1. A small electronic instrument allowing you to do mathematical functions.

2. A set of instructions understood by a computer and kept in its memory.

3. A piece of equipment, such as a mouse or keyboard.

4. A form of volume in which information can be stored for a long time.

5. The use of a computer to edit, format, store or print a piece of text.

6. Reports, music, documents and pictures produced by a computer.

***5. Restore the instructions for switching a computer by matching the beginnings with the endings and put them into the correct order.***

Beginnings Endings

1. if a message asks a) for your computer and turn it on.

2. locate the power switch b) desktop to appear.

3. then press the Enter key c) for your user ID or password,

type them in.

4. wait for the Windows d) connected to your computer and turn them on.

5. locate the power switch e) on your computer’s keyboard.

for any devices

***6. Fill in the gaps in the text.***

A computer is a \_\_\_ that accepts input, \_\_\_ data, stores data, and produces out put according to a series of stored instructions. Before a computer processes data, it is temporarily held in \_\_\_. This data is processed in the \_\_\_. The idea of \_\_\_ program means that a series of instructions for a computing task can be loaded into a computer’s memory.

***Speaking.*** *Discuss the following questions*.

1. How old is the word “computer”?
2. What is a computer?
3. What can be called “computer input”?
4. What input devices can you name?
5. Why do we need software?
6. What is the purpose of the CPU?
7. How do memory and storage differ?
8. What computer output can we get?
9. What’s so significant about a computer’s ability to store instructions?
10. What does a stored program mean?

**Text B**

***Pre-reading.*** *Match the terms with the appropriate definitions.*

|  |  |
| --- | --- |
| a **desktop computer** | a) this computer is especially suited for storing and distributing data on a network; these machines do not include features such as sound cards, DVD players, and other fun accessories; they don’t require specific hardware and just about any computer can be configured to perform such work; |
| a **notebook** | b) these are powerful desktop computers designed for specialized tasks; they can tackle tasks that require a lot of processing speed, most have circuitry specially designed for creating and displaying three-dimensional and animated graphics and often dedicated to design tasks; |
| a **tablet computer** | c) it’s a large and expensive computer capable of ***simultaneously*** processing data for hundreds or thousands of users; used by businesses or governments to provide centralized storage, processing and management for large amount of data in situations where reliability, data security and centralized control are necessary; |
| a **handheld computer** | d) it fits on a desk and runs on power from an electrical wall outlet; its keyboard is typically a separate component, connected to the main ***unit*** by a cable; |
| a **workstation** | e) it’s a portable computing device featuring a touch-sensitive screen that can be used as a writing or drawing pad; |
| a **mainframe computer** | f) it’s one of the fastest computers in the world; can tackle complex tasks such as breaking codes, modeling worldwide weather systems and simulating nuclear explosions; |
| a **supercomputer** | g) it ***features*** a small keyboard or touch-sensitive screen and is designed to fit into a pocket, run on batteries and be used while you are holding it; also called a **PDA** (personal digital assistant), it can be used as an electronic appointment book, address book, calculator and notepad; |
| a **server** | h) it’s a small lightweight personal computer that incorporates screen, keyboard, storage and processing components into a single portable unit, also referred to as a “laptop”. |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***PERSONAL COMPUTER SYSTEMS***

The term “computer system” usually refers to a computer and all the input, output, and storage devices that are ***connected*** to it. A personal computer system usually includes the following equipment:

- *System unit*. The **system unit** is the case that holds the ***main circuit boards***, microprocessor, power supply, and storage devices. The system unit of the notebook computer holds a built-in keyboard and speakers, too.

- *Display device*. Most desktop computers use a separate **monitor** as a display device, ***whereas*** notebook computers use a ***flat*** panel **LCD screen** (liquid crystal display screen) ***attached*** to the system unit.

- *Keyboard*. Most computers are ***equipped*** with a **keyboard** as the ***primary*** input device.

- *Mouse*. A **mouse** is an input device designed to manipulate on-screen graphical objects and controls.

- *Hard disk drive*. A **hard disk drive** can store billions of characters of data. It is usually mounted inside the computer’s system unit. A small ***external*** light indicates when the drive reading or writing data.

- *CD and DVD drives*. A **CD drive** is a storage device that uses laser technology to work with data on computer or audio CDs. A **DVD drive** can work with data on computer CDs, audio CDs, computer DVDs, or DVD movie disks. Some CD and DVD drives are classified as “read only” devices that cannot be used to write data onto disks. They are typically used to ***access*** data from commercial software, music, and movie CDs or DVDs. “Writable” CD and DVD drives, ***however***, can be used to store and access data.

- *Floppy disk drive*. A **floppy disk drive** is a storage device that reads and writes data on floppy disks.

- *Sound card and speakers*. Desktop computers have a rudimentary ***built-in*** speaker that’s mostly limited to playing beeps. A small circuit board, called a **sound card**, is required for high-quality music, narration, and sound effects. A desktop computer’s sound card sends signals to external **speakers**. A notebook’s sound card sends signals to speakers that are built into the notebook system unit.

- *Modem and network cards*. Many personal computer systems include a built-in **modem** that can be used to ***establish*** an Internet ***connection*** using a standard telephone line. A **network card** is used to connect a computer to a network or cable Internet connection.

- *Printer*. A computer **printer** is an output device that produces computer-generated text or graphical images on paper.

The term **peripheral device** ***designates* *equipment*** that might be added to a computer system to ***enhance*** its functionality. Popular peripheral devices include printers, digital cameras, scanners, joysticks, and graphics tablets.

The word “peripheral” is a relatively old part of computer jargon that dates back to the days of mainframes when the CPU was housed in a giant box and all input, output, and storage devices were housed separately. Technically, a peripheral is any device that is not housed within the CPU.

Although a hard disk drive seems to be an integral part of a computer, by the strictest technical definition, a hard disk drive would be classified as a peripheral device. The same goes for other storage devices and the keyboard, monitor, LCD screen, sound card, speakers, and modem. In the world of personal computers, however, the use of the term “peripheral” varies and is often used to refer to any components that are not housed inside the system unit.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text.*

1. When the drive is being used a small light indicator is on.
2. Sound characteristics of different computers vary.
3. This device is most suitable for controlling the position of the cursor.
4. It’s a device to use Internet via a phone line.
5. This system is represented by different interlinked input, output and storage

devices.

1. There is a storage device that uses laser technology.

***Vocabulary practice***

***1. In the text find the opposites to the given words.***

internal rough unfasten secondary reduce successively

***2. Put the letters in the following words into correct order.***

peroayrtilm netmipqeu literesav hpelarepir afuteer beroadyk

***3. Complete the following sentences choosing one out of the variants given.***

1. Which of the following statements about hard disk is not true?

a) it stores data b) it’s not a peripheral

c) it’s a magnetic device d) it’s placed inside a computer

2. This storage format is used to store digital video or computer data.

a) a floppy disk b) CD c) a sound card d) DVD

3. What are the elements of a computer system?

a) disk drives b) a monitor

c) a central processor d) all of the above

4. These portable computers are ideal for mobile users. They are easy to carry and can be used outdoors without the need for an electrical outlet.

a) mainframes b) notebooks c) workstations d) servers

5. Which of the following functions can a floppy disk drive perform?

a) store data b) read data c) write data d) all of the above

6. This electronic device has a special pen and acts like an electronic piece of paper transferring images to the computer screen.

a) a laptop b) PDA c) a tablet computer d) a mainframe

***4. Make three-word expressions connected with computing combining words from three lists: A, B and C. Then match each expression with the appropriate phrase.***

A: central B: circuit C: disk

liquid video network

hard processing drive

main crystal unit

digital area display

local disk board

1. This computer network is located within a limited geographical area such as a small business or a university lab.

2. The part of a computer that controls all the other parts of the system.

3. An electronic device that is used to display information in many calculators and portable computers.

4. A central flat card used as a base on which electronic components are placed and then connected together by wires.

5. A type of volume used for storing movies.

6. A disk drive that passes data to or from the hard disk and the computer.

***5. Transform the following sentences without any change in meaning. Use the prompts as they are given (words in brackets, parts of sentences).***

1. The factory is equipped for computer controlled production.

The factory has … for … .

2. This is our system for storing client records (*provides*).

3. Only privileged users can access this information.

Only privileged users have … .

4. This device is primarily used to connect different peripherals (*establish*).

5. This device can perform a huge variety of functions.

The functions … greatly.

6. Almost any equipment that can be attached to a computer to enhance its functionality is called a peripheral (*designates*).

***6. Fill in the gaps in the text.***

Computers are grouped into categories, such as \_\_\_ computers, handhelds, mainframes, supercomputers, servers, workstations, and videogame \_\_\_. A \_\_\_computer is a type of microcomputer designed to \_\_\_ the needs of an individual while \_\_\_ are very expensive and used for very specific and complex \_\_\_.

***Speaking.*** *Discuss the following questions.*

1. What are the characteristics of desktop computers?
2. How do notebook computers differ from desktops?
3. What is a tablet computer?
4. What is a hand held and what is it used for?
5. What type of computers can be classified as workstations?
6. What’s so special about a mainframe computer?
7. How powerful is a supercomputer?
8. What makes a computer a “server”?
9. What does a personal computer system include?
10. What’s a peripheral device and can a hard disk be called so?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Digital Rights Management**

Suppose you purchase a music CD of your favorite recording group. Now you want to transfer the file to your computer, rip the best tracks, and transfer them to your portable audio player. But wait! That CD is copy protected and your computer CD drive won’t read it. You purchased the disk. Can’t you listen to the music on any device you choose? The answer is “yes” and “no”. Yes, copyright law gives you the right to make copies for your personal use and transfer works into a format that works on your equipment. However, the growing pervasiveness of digital rights management may curtail your ability to exercise these rights.

It is easy to copy digital material. Before the dawn of the digital age, copies produced by analog equipment, such as photocopiers and audio tape dubbing machines, were of considerably poorer quality than the originals. Copies of digital materials, however, are indistinguishable from the originals, and that factor has encouraged an alarming increase in software, music, and movie piracy.

The battle against piracy took shape as a concept called digital rights management (DRM), vigorously supported by Microsoft and backed by a host of industry leaders.

Today, digital rights management encompasses a variety of technologies implemented by copyright holders, such as record companies and software publishers, which restrict the usage of digital material. DRM systems address piracy by using a variety of technologies for manipulating data, media, devices, and transactions.

Software copy protection techniques include reading data written to places on a disk or CD-ROM that the drive cannot normally access, using hardware that must be plugged into the computer when the software is run, requiring a serial number during the installation process, and using Internet product activation that checks the validity of an installation. Most software copy protection schemes have proved to be costly for publishers or inconvenient for consumers.

Many consumers are not aware that they pay a surcharge for every blank audio tape or CD they purchase. Collected revenues from this surcharge go to music publishers to compensate recording artists for the fact that many people duplicate works without authorization.

Most of today’s music download sites encrypt music files and embed codes that limit the number of times they can be copied and the devices on which they can be played. Various formats used by different sites are not compatible with each other and require different players. Music from several different download sites cannot be compiled into a single playlist. It is becoming more common for music CDs to use play-protection technology designed to make the CD unusable in devices, such as computer CD-R drives, that can also be conveniently used for duplicating CDs. Consumers who purchase these protected CDs find that they cannot be copied to a computer hard disk, then ripped to produce an MP3 file for a portable audio player.

Commercial movie DVDs use CSS (Content-Scrambling System) encryption to make DVDs playable only on authorized DVD players equipped with decryption key circuitry. Movies purchases in the United States and Canada cannot be played on devices manufactured for the European or Asian markets.

Despite DRM technologies and the inconveniences imposed on consumers, digital piracy remains rampant. According to an article about digital rights management posted on Wikipedia, “To date, all DRM systems have failed to meet the challenge of protecting the rights of the rights holder while also allowing the use of the rights of the purchaser. None have succeeded in preventing criminal copyright infringement by organized, unlicensed, commercial pirates.”

Current DRM technologies do not seem able to distinguish between pirates and legitimate consumers. As a result, DRM technologies essentially pose restrictions on consumers that go beyond the intended limitations of copyright law.

The current status of DRM seems to conflict with the original intent of copyright law to allow consumers to manipulate and copy works for their own use. Can technology eventually offer a solution that prevents piracy, but allows individuals to exercise their rights to fair use of copyrighted materials?

**What do you think?**

1. Have you had trouble using software or music CDs because of copy protection?
2. In your opinion, do sites like the iTunes Music Store provide consumers with enough flexibility for copying files and creating playlists?
3. Are DRM technologies justified because of the high rate of piracy?

***Final Test.*** *Do the tasks in the following test.*

1. The process of transferring a file from a remote computer to your personal computer is called \_\_\_.

2. Personal computer systems typically include the following devices EXCEPT \_\_\_.

a) a mouse b) a hard disk drive c) a CD-ROM d) a PDA

3. The stored program concept on a computer is the single most important characteristic that distinguishes a computer from other simpler devices such as a calculator. (*True/False*)

4. Which of the following tasks might you perform with application software?

a) locating data b) starting programs c) both a) and b)

d) creating and editing documents

5. Most computer systems use a(n) \_\_\_ as the primary input device.

a) monitor b) keyboard c) mouse d) floppy disk drive

6. Computers can be categorized by type, such as personal computers, handhelds and supercomputers. (*True/False*)

7. The computer system unit is the case that holds the main circuit boards, microprocessor, power supply and \_\_\_ devices.

8. A floppy disk drive is not considered a storage device. (*True/False*)

9. The \_\_ is often referred to as the “brain” of the computer.

a) keyboard b) monitor c) central processing unit d) software

10. \_\_\_ refers to the symbols that represent facts, objects and ideas.

***Projects.*** *Choose and perform one of the projects given.*

1. Although the Internet provides a global communications network, communication between people still depends on finding a common language. For this project, explore the Web and experiment with ways in which technology is being used to close the language gap. You might start at Google or Wikipedia and look at the selection of languages they offer. Chronicle your exploration, making sure to document the sites you visited. Present your conclusions about Internet use by non-English speakers in writing.

2. Whether you’re taking this course to fulfill a graduation requirement or to improve your career options take a few minutes to evaluate what you expect to gain from this course. Look though the units of this textbook and select the section that you think will be the most useful, interesting and the section that seams to be the least relevant to you. Incorporate your thoughts in two or three paragraphs.

***Unit 2.* *COMPUTER HARDWARE***

**Text A**

***Pre-reading.*** *Match the meaning of the following English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. digital device | a) напівпровідниковий матеріал |
| 2. analog device | b) заголовок файлу |
| 3. binary digit | c) інтегральна схема |
| 4. numeric data | d) цифровий пристрій |
| 5. character data | e) представлення даних |
| 6. extended | f) визначати кількість |
| 7. digitize | g) розширений |
| 8. file header | h) символ, знак |
| 9. quantify | i) переводити в цифрову форму, оцифровувати |
| 10. integrated circuit | j) цифрові дані; числові дані |
| 11. semiconducting material | k) двійкова цифра |
| 12. data representation | l) аналоговий (моделюючий) пристрій |

***Reading.*** *Read the text and try to guess the meaning of the words in bold face. Check your variants in the dictionary.*

***DATA REPRESENTATION AND DIGITAL ELECTRONICS***

**Data representation**

People use computers to work with many kinds of data, ***including*** numbers, text, music, photos, and videos. Data representation is the process of ***transforming*** this ***diverse*** data into form (today digital) that computers can use for processing.

Most computers are **digital devices** which work with discrete – distinct and separate – data, such as the digits 1 and 0. In contrast, an **analog device** works with continuous data. As an analogy, a traditional light switch has two discrete states – “on” and “off” – so it is a digital device. A dimmer switch, on the other hand, has a ***rotating*** dial that controls a continuous ***range*** of brightness. It is, therefore, an analog device. Most computers use the simplest type of digital technology – their circuits have only two possible states. For convenience, let’s say that one of those states is “on” and the other state is “off”. When discussing these states, we usually indicate the “on” state with 1 and the “off” state with 0. These 1s and 0s ***are referred to as*** **binary digits**. It is from this term that we get the word “bit” – ***binary digit***. Computers use sequences of bits to digitally represent numbers, letters, punctuation marks, music, picture, and videos.

**Numeric data** consists of numbers that might be used in arithmetic operations. Computers represent numeric data using the binary number system, also called “base 2”. The binary number system has only two digits: “0” and “1”. No numeral like “2” exists in this system, so the number “two” is represented in binary as “10” (pronounced “ one zero“). In binary you count 0 (”zero”), 1 (“one”), 10 (“one zero”), instead of counting 0, 1, 2 in decimal. The important point to understand is that the binary number system ***allows***computers to represent virtually any number simply by using 0s and 1s, which conveniently translate into electrical “on” and “off” signals.

**Character data** is composed of letters, symbols, and numerals that are not used in arithmetic operations. A digital computer uses a series of bits to represent letters, characters, and numerals. Computers ***employ*** several types of codes to represent character data, including ASCII, EBCDIC, and Unicode. **ASCII** (pronounced“ASK ee”, American Standard Code for Information Interchange,) ***requires*** only seven bits for each character. ASCII requires codes for 128 characters.

A superset of ASCII, called **Extended ASCII,** uses eight bits to represent each character. Using eight bits instead of seven bits allowsExtended ASCII to ***provide*** codes for 256 characters. **Unicode** (pronounced ‘YOU ni code’) uses sixteen bits and provides codes for 65,000 characters.

To work with music and pictures, they must be digitized. The term **to** **digitize** means ***to convert*** raw, analog data into digital format represented by 0s and 1s. A photograph or drawing can be digitized by treating it as a series of colored dots. Each dot is ***assigned*** a binary number according to its color. A digital image is simply a list of color numbers for all the dots it contains. In a similar way, music can be digitized by ***assigning*** binary codes to notes.

All the “stuff” that your computer works with is stored in files as a long series of 1s and 0s. Your computer needs to know whether ***to interpret*** those 1s and 0s as ASCII code, binary numbers, or the code for a picture or sound. To ***avoid*** confusion, most computer files contain a **file header** with information about the code used to represent the file data. A file header can be read by the computer, but never appears on the screen. By reading the header information, a computer can tell how a file’s contents were coded.

**Quantifying Bits and Bytes**

Even though the word ***“bit”*** is an abbreviation for “binary digit”, it can be further abbreviated, usually as a lowercase “b”. A ***byte*** is composed of eight bits and usually abbreviated as an uppercase “B”. ***Transmission*** speeds are typically expressed in bits, whereas storage space is typically expressed in bytes.

When working with computers, you’ll frequently encounter ***references*** such as “50 kilobits per second”. In common usage, “kilo”, abbreviated as “K”, means a thousand. In the decimal number system we use on a daily basis, the number 1,000 is 10 to the 3rd power, or 10³. In the world of computers where base 2 is the norm, a “kilo” is precisely 1,024, or 2¹º. A kilobit (Kb or Kbit) is 1,024 bits, a megabit is 1,048,576 or 2²º bits, a gigabit is 1,073,741,824 bits or 2³º bits.

**Digital Electronics**

Because most computers are electronic devices, bits take the form of electrical pulses that can travel over circuits, in much the same way that electricity flows over a wire when you turn on a light switch. All the circuits, chips, and mechanical components that form a computer are ***designed*** to work with bits. Most of these ***essential*** components are housed within the computer’s system unit. A computer’s system unit typically contains circuit boards, storage devices, and a power supply that converts current from an AC wall outlet into the DC current used by computer circuitry.

The terms “computer chip”, “microchip” and “chip” originated as technical jargon for “integrated circuit”. An **integrated circuit** (**IC**) is a super-thin slice of semiconducting material packed with microscopic circuit elements, such as wires, transistors, ***capacitors***, logic gates, and resistors. **Semiconducting materials** are substances with properties between those of a conductor and an insulator. The assortment of chips inside a computer includes the microprocessor, memory modules, and support circuitry. The computer’s main board, called a **system board**, “motherboard”, or ”main board”, houses all essential chips and provides connecting circuitry between them.

***Comprehension сheck.*** *Mark the following statements as True or False.*

1. Both analog and digital devices work with continuous data.

2. The binary system allows computers to represent any number or symbol.

3. The more bits are used for representing a character data – the more is the number of characters provided by a certain code.

4. To know the code used to represent data a computer has to read the file header.

5. The process of digitizing is used to transform digital data into analog ones.

6. The DC is transformed into the AC for the computer to be able to work.

7. An integrated circuit is often referred to as Unicode.

***Vocabulary practice***

***1. Match up the words that are similar in meaning.***

|  |  |
| --- | --- |
| 1. rotate 2. allow 3. employ  4. require 5. provide 6. interpret | a) permit b) understand c) spin  d) ensure e) need f) apply |

***2. Fill in the blanks choosing from the variants given.***

1. Main memory … only a small amount of storage area for the data and instructions required by the CPU.

a) allows b) transforms c) provides d) rotate

2. To fabricate a chip, the conductive properties of selective parts of the … can be enhanced.

a) electrical pulses b) semiconducting mater c) digital devices d) binary numbers

3. Some chips on the motherboard are plugged into special sockets and connectors that … chips to be removed for repairs.

a) allow b) assign c) avoid d) include

4. Even embedded computers … maintenance by people.

a) transform b) range c) employ d) require

5. The most powerful computer systems with the fastest processing speed … supercomputers.

a) rotate b) are referred to as c) avoid d) include

6. Every key stroke on a keyboard … a letter symbol into a digital code that the machine can understand.

a) converts b) requires c) allows d) provides

7. Most computers … the simplest type of digital technology – their circuits have only two possible states.

a) assign b) employ c) require d) range

***3. Make two-word expressions combining words from two lists. Then fill in the gaps in the following sentences. Some words can be used more than once.***

A: data B: data

diverse digit

integrated header

binary circuit

file representation

character

numeric

1. The binary number system represents … as a series of 1s and 0s.

2. An … contains microscopic elements such as wires, transistors, and capacitors, that are packed onto a very small square of semiconducting material.

3. The process of transforming data into form that computers can use for processing is referred to as … .

4. Today computers typically represent … digitally.

5. A computer treats the letters and symbols in a word as … which can be represented by a string of 0s and 1s.

6. All the material your computer works with is stored in files as long strings of … .

7. A … is stored along with the file and contains information about the code used to represent the file data.

***4. Fill in the gaps in the text.***

Most of today’s computers are electronic, digital devices that work with data coded as binary digits, also known as \_­\_\_. To represent numeric data, a computer can use the \_\_\_ number system. To represent character data, a computer uses Extended \_\_\_, EBCDIC, or Unicode. These codes also provide digital representations for the numerals 0 through 9 that are distinguished from numbers by the fact that they are not typically used in mathematical operations. Computers also \_\_\_sounds, pictures, and videos into 1s and 0s.

A \_\_\_ is a single 1 or 0, whereas a \_\_\_ is a sequence of eight 1s and 0s. Transmission speeds are usually measured in \_\_\_, but storage space is usually measured in \_\_\_ or gigabytes.

***Speaking.*** *Discuss the following questions.*

1. What is data representation?

2. How do computers represent data digitally?

3. How can a computer represent words and letters using bits?

4. How does a computer convert music and pictures into codes?

5. When a computer works with a series of 1s and 0s, how does it know which

code to use?

6. How can you tell the difference between bits and bytes?

7. What do the prefixes *kilo-*, *mega-* and *giga-* mean?

8. How does a computer store and transport all those bits?

9. What’s a computer chip?

10. What provides connectivity between all the constituent parts of the computer?

**Text B**

***Pre-reading.*** *Match the English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. cache memory | a) внутрішній генератор тактових або синхронізуючих імпульсів |
| 2. CMOS | b) конвеєрний режим; конвеєрна обробка |
| 3. benchmark | c) постійно змонтований; з фіксованим монтажем |
| 4. internal clock | d) над оперативна пам’ять |
| 5. pipelining | e) еталонний тест для перевірки продуктивності комп’ютера |
| 6. hard-wired | f) комплементарний металооксидний напівпровідник (КМОП) |

***Reading*.** *Read the text and try to guess the meaning of the words in bold font. Check your variants in the dictionary.*

***MICROPROCESSORS AND MEMORY***

**Microprocessor Basics**

A microprocessor (or a “processor”) is an integrated circuit designed to ***process*** instructions. It is the most importantcomponent of a computer. It can be referred to as “a computer on a chip” or “a CPU on a chip” because it ***contains*** – on a single chip – circuitry that ***performs*** essentially the same tasks as the central processing unit (CPU) of a classic mainframe computer.

A microprocessor is a very complex integrated circuit, ***containing*** as many as 400 million miniaturized electronic components. The miniaturized circuitry in a microprocessor is grouped into important functional areas, such as the ALU and the control unit. The **ALU (arithmetic logic unit)** is the part of the microprocessor that performsarithmetic operations, such as addition and subtraction. It also performs logical operations, such as ***comparing***two numbers to see if they are the same. The ALU uses **registers** to hold data that is being processed, and the microprocessor’s **control** **unit** fetches the necessary instructions. After the computer loads data into the ALU’s registers, the control unit allows the ALU to begin processing.

A microprocessor ***executes*** instructions providedby a computer program. The list of instructions that a microprocessor can perform is called its **instruction** **set**. These instructions are ***hard-wired*** into the processor’s circuitry and include basic arithmetic and logical operations, fetching data, and clearing registers. A computer can performvery complex tasks, but it does so by performing a combination of simple tasks from its instruction set.

**Microprocessor Performance Factors**

A microprocessor’s performance is ***affected*** by several factors, including clock speed, word size, cache size, instruction set, and processing techniques.

The **microprocessor clock** is a timing device that sets the pace for ***executing*** instructions. The speed of a microprocessor is usually specified **in** **megahertz** (MHz) **gigahertz**. A cycle is the smallest unit of time in a microprocessor’s universe. Every action a processor performsis measured by these cycles. The clock speed is not equal to the number of instructions a processor can ***execute*** in one second. In many computers, some instructions occur within one cycle, but other instructions might requiremultiple cycles. Some processors can execute several instructions in a single clock cycle.

**Word** **size** refers to the number of bits that a microprocessor can ***manipulate*** at one time. Word size is based on the size of registers in the ALU and the ***capacity*** of circuits that lead to those registers. A processor with a 32-bit word size, for example, has 32-bit registers, processes 32 bits at a time, and is referred to as a “32-bit processor”. Processors with a larger word size can process more data during each processor cycle that leads to increased computer ***performance.***

**Cache** or “RAM cache” or “cache memory” is special high-speed memory that allows a microprocessor to **access** data more rapidly than from memory located elsewhere on the system board. Cache capacity is usually measured in kilobytes.

As chip designers ***developed*** various instruction sets for microprocessors, they tendedto add increasingly complex instructions, each ***requiring*** several clock cycles for execution. A microprocessor with such an instruction set uses **CISC** (**complex instruction set computer)** technology. A microprocessor with a limited set of simple instructions uses **RISC** (**reduced instruction set computer**) technology. A RISC processor performs most instructions faster than a CISC processor. It might, however, require more of these simple instructions to complete a task than a CISC processor requires for the same task. Most processors in today’s personal computer use CISC technology.

Some processors execute instruction “serially” – that is, one instruction at a time. With **serial processing**, the processor must complete all steps in the instruction cycle before it begins to execute the next instruction. However, using a technology called **pipelining**, a processor can begin executing an instruction before it completes the previous instruction. Many of today’s microprocessors also perform **parallel processing**, in which multiple instructions are executed at the same time. Pipelining and parallel processing enhance processorperformance.

Some computers have a single chip containingthe circuitry for two microprocessors. A **dual core processor** is faster than one with a single core.

Various testing laboratories run a series of tests to gauge the overall speed of a microprocessor. The results of these tests – called **benchmarks** – can then be comparedto the results for other microprocessors.

**Random Access Memory**

**RAM** (**random access memory**) is a temporary ***holding*** area for data, application program instructions, and the operating system. RAM is usually several chips or small circuit boards that plug into the system board within the computer’s system unit. RAM is the “waiting room” for the computer’s processor. It holds raw data waiting to be processed as well as the program instructions for processing that data.

RAM also holds the results of processing until they can be stored more permanently on disk or tape, it also holds data and application software instructions, operating system instructions that control the basic functions of a computer system. These instructions are loaded into RAM every time you start your computer, and they remain there until you turn off your computer.

People sometimes tend to confuse RAM and hard-disk storage, maybe because both components hold data, because they typically are “hidden” inside the system unit, or because they can both be measured in gigabytes. To differentiate between RAM and hard-disk storage, remember that RAM holdsdata in circuitry that’s directly connected to the system board, whereas hard-disk storage places data on magnetic media. RAM is temporary storage; hard-disk storage is more permanent. Besides, RAM usually has less storage capacity than hard-disk storage.

In RAM, microscopic electronic parts, called **capacitors** hold the bits that represent data. You can visualize the capacitors as microscopic lights that can be turned on and off. A charged capacitor is “turned on” and represents a”1” bit. A discharged capacitor is “turned off” and represents a “0” bit. Each bank of capacitors holds eight bits – one byte of data. A RAM address on each bank helps the computer locate data as needed, for processing.

Each RAM location has an address and uses eight capacitors to hold the eight bits that represent a byte. See Figure 1:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *■* | **1** | *■* | *■* | *■* | *■* | *■* | **1** |  | *The two charged capacitors at the RAM address represent the letter “A”* |
| *■* | **1** | *■* | *■* | *■* | *■* | **1** | *■* | *A different sequence of charged capacitors represents the letter “B”* |
| *■* | **1** | *■* | *■* | *■* | *■* | **1** | **1** | *Another sequence of charged capacitors represents the letter “C”* |

Fig. 1: The way RAM represents different characters

In some respects, RAM is similar to a chalkboard. You can use a chalkboard to write mathematical formulas, erase them, and then write an outline for a report. RAM contents can be changed just by changing the charge of the capacitors.Unlike disk storage, most RAM is **volatile**, which means it requires electrical power to hold data. If the computer is turned off or the power goes out, all data stored in RAM instantly and permanently disappears.

Today’s personal computer operating systems are quite adept at ***allocation*** RAM ***space*** to multiple programs. If a program ***exceeds*** its ***allocated*** space, the operating system uses an area of the hard disk, called **virtual memory,** to store parts of programs or data files until they are needed. By selectively ***exchanging*** the data in RAM with the data in virtual memory, your computer effectively ***gains*** almost unlimited memory capacity.

RAM components vary in speed, technology, and configuration. RAM speed is often expressed in nanoseconds or megahertz. One **nanosecond** (**ns**) is 1 billionth of a second. RAM speed can also be expressed in MHz (millions of cycles per second). Most of today’s personal computers use **SDRAM (synchronous dynamic RAM**), fast and relatively inexpensive, it is typically available on a small circuit board called a DIMM (dual inline memory module) or **RDRAM (Rambus dynamic RAM**), first developed for a game system and then adapted for use in personal computers.

**Read-Only Memory**

**ROM** (**read-only memory**) is a type of memory circuitry that holds the computer’s startup routine. Whereas RAM is temporary and volatile, ROM is permanent and non-volatile. ROM circuitryholds ***“hard-wired”*** instructions that are a permanent part of the circuitry and remain in place even when the computer power is turned off.

When you turn on your computer, the microprocessor receives electrical power and is ready to begin executing instructions. As a result of the power being off, however, RAM is empty and doesn’t containany instructions for the microprocessor to execute. Now ROM plays its part. ROM containsa small set of instruction called the **ROM BIOS** (**basic input/output system**).These instructions tell the computer how to access the hard disk, find the operating system, and load it into RAM. After the operating system is loaded, the computer can understand your input, display output, run software, and access your data.

**CMOS Memory**

To operate correctly, a computer must have some basic information about storage, memory, and display configurations. The information is held in CMOS (pronounced “SEE moss”), a type of chip that requires very little power to holddata. It can be powered by a small battery that is integrated into the system board and automatically recharges while your computer power is on. The battery trickles power to the CMOS chip so that it can retain vital data about your computer system configuration even when your computer is turned off. When you change the configuration of your computer system, the data in CMOS must be updated.

The more data and programs that can fit into RAM, the less time your computer will spend moving data to and from virtual memory.

***Comprehension check.***  *Find the paragraph where the following ideas are found in the text.*

1. It is the most significant component of the computer.

2. It executes logical operations, as well as arithmetic operations.

3. With this type of processing the processor performs one instruction at a time.

4. The results of the tests must match the results for model microprocessors.

5. If the allotted space is surpassed, the operating system employs an area of the hard disk.

6. The chip can hold the vital data about the configuration of your computer even when there is no energy supply.

***Vocabulary practice***

***1. In the text, find the opposites to the given words.***

fall short of reduce fail lose

***2. Fill in the blanks choosing from the variants given.***

1. CMOS memory is a type of chip that requires very little power to … data.

a) affect b) compare c) hold d) execute

2. As a result of the power being off RAM does not … any instructions for the microprocessor to execute*.*

a) contain b) allocate c) develop d) provide

3. The ALU uses registers to hold data as the microprocessor …arithmetic and logical operations.

a) gains b) compares c) performs d) exchanges

4. When the microprocessor receives electrical power, it is ready to begin … instructions.

a) executing b) exchanging c) allocating d) holding

5. Microprocessor instruction sets can be classified as … or … .

a) RAM or ROM b) CISC or RISC c) ROM BIOS d) CMOS memory

6. The instructions for loading the operating system into RAM when a computer is first turned on are stored in …memory.

a) RAM b) CMOS c) RISC d) ROM

7. A microprocessor (sometimes simplyreferred to as a “processor”) is an integrated circuit … to process instructions.

a) affected b) performed c) held d) designed

***3. Make three-word expressions connected with computing combining words from three lists: A, B and C. Then fill in the gaps in the following sentences.***

A: random B: system C: processor

read-only access configuration

computer core circuitry

dual memory memory

1. A … is faster than one with a single core.

2. The battery trickles power to the CMOS chip so that it can retain vital data about your … .

3. … holds the results of processing until they can be stored more permanently on disk or tape.

4. … holds “hard-wired” instructions that are a permanent part of the circuitry and remain in place even when the computer power is turned off.

***4. Fill in the gaps in the text.***

The microprocessor and memory are two of the most important components in a computer. The microprocessor is an integrated circuit, which is \_\_\_ to process data based on a set of instructions. The microprocessor’s ALU \_\_\_ arithmetic and logical operations. The control unit fetches each instruction, \_\_\_ it, loads data into the ALU registers, and directs all the processing activities within the microprocessor. Microprocessor performance is measured in \_\_\_ – the number of cycles per second, or clock rate. Other factors \_\_\_ overall processing speed include word size cache size, instruction set complexity, and \_\_\_.

***Speaking.*** *Discuss the following questions.*

1. What exactly is a microprocessor? How does it work?

2. Where does the microprocessor get its instructions?

3. What impact does word size have on performance?

4. How does the cache size affect performance?

5. How does the instruction set affect performance?

6. What is the difference between serial processing and parallel processing?

7. How is it possible to compare microprocessor performance?

8. How does RAM differ from hard-disk storage?

9. If a computer has RAM, why does it need ROM?

10. Where does a computer store its basic hardware settings?

**Text C**

***Pre-reading.*** *Match the meaning of the following English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. storage | a) жорсткий диск |
| 2. medium | b) резервування; резервна копія |
| 3. read-write head | c) темна, пляма на поверхні CD-ROM, яка не відбивається |
| 4. pit | d**)** пляма на поверхні CD-ROM, яка відбивається |
| 5. solid state storage | e**)** універсальна головка зчитування – запису |
| 6. land | f**)** аварія (плаваючих) голівок |
| 7. platter | g) контролер, пристрій керування |
| 8. head crash | h) запам’ятовуючий пристрій на монолітному носії |
| 9. backup | i) пам’ять, запам’ятовуючий пристрій |
| 10. controller | j) носій; засіб |

***Reading.*** *Read the text and try to guess the meaning of the words in bold font. Check your variants in the dictionary.*

***STORAGE DEVICES***

**Storage Basics**

A data storage system has two main components: a storage medium and a storage device. A **storage medium** (storage **media** is the plural) is the disk, tape, CD, DVD, or other substances that contains data. A **storage device** is the mechanical apparatus that records and ***retrieves*** data from a storage medium. Storage devices include hard disk drives, tape drives, CD drives, and DVD drives. The term “storage technology” refers to a storage device and the media it uses.

You can think of your computer’s storage devices as having a direct pipeline to RAM. Data is copied from a storage device into RAM, where it waits to be processed***.*** After data is processed, it is held temporarily in RAM, but it is usually copied to a storage medium for more permanent safekeeping. A computer works with data that has been coded into bits that can be represented by 1s and 0s. Obviously, the data is not literally written as “1” or “0”. Instead, the 1s and 0s must be ***transformed*** into changes in the ***surface*** of a storage medium. Exactly how this ***transformation*** happens depends on the storage technology. Three types of storage technologies are used for personal computer: **magnetic**, **optical**, and **solid** ***state***.

Hard disk, floppy disk, and tape storage technologies can be classified as **magnetic storage**, which stores data by magnetizing microscopic particles on the disk or tape surface. Before data is stored, particles on the surface of the disk are scattered in random patterns. The disk drive’s **read-write head** magnetizes the particles, and orients them in a positive (north) or negative (south) direction to represent 0 and 1 bits. Data stored magnetically can be easily changed or deleted. This feature of magnetic storageprovides lots of flexibility for editing data and reusing areas of a storage medium containing unneeded data. Data stored on magnetic media such as floppy disks can be altered by magnetic fields, dust, mould, smoke particles, heat, and mechanical problems with a storage device. Magnetic media gradually lose their magnetic charge, resulting in lost data. Some experts estimate that the reliable life span of data stored on magnetic media is about three years. They recommend that you refresh your data every two years by recopying it.

CD and DVD storage technologies can be classified as **optical storage**, which stores data as microscopic light and dark spots on the disksurface. The dark spots are called **pits**. The lighter, non-pitted surface areas of the disk are called **lands**. Optical storage gets its name because data is read using a laser light. The transition between pitsand lands is interpreted as the 1s and 0s that represent data. An optical storage device uses a low-power laser light to read the data stored on an optical disk. The surfaceof an optical disk is coated with clear plastic, making the disk quite durable and less ***susceptible*** to environmental damage than data recorded on magnetic media. An optical disk, such as a CD, is not susceptible to humidity, fingerprints, dust, magnets, or spilled soft drinks, and its useful life is estimated at more than 30 years.

A variety of compact storage cards can be classified as **solid state storage**, which stores data in a non-volatile, reusable, low-power chip. The chip’s circuitry is arranged as a grid, and each cell in the grid contains two transistors that act as ***gates***. When the gates are open, current can flow and the cell has a ***value*** that represents a “1” bit. When the gates are closed**,** the cell has a value that represents a “0” bit. Very little power is required to open or close the gates, which makes solid state storage ideal for battery-operated devices. Once the data is stored, it is non-volatile – the chip retains the data without the need for an external power source.

**Floppy Disk Technology**

Floppy disks are classified as magnetic storage because data is stored by magnetizing microscopic particleson the disk surface. A **floppy disk** is a round piece of flexible mylar plastic covered with a thin layer of magnetic oxide and sealed inside a protective casing.

**Hard Disk Technology**

Hard disk technology is the preferred type of main storage for most computer systems. A hard disk is one or more platters and their associated read-write heads. A **hard disk platter** is a flat, rigid disk made of aluminum or glass and coated with magnetic iron oxide particles***.*** Hard disk platters are sealed inside the drive case or cartridge to screen out dust and other contaminants. The sealed case contains disk platters and read-write heads. Each platter has a read-write head that hovers over the surface to read data. The drive spindle supports one or more hard disk platters. Both sides of the platter are used for data storage. More platters mean more data storage capacity*.* Hard disk platters rotate as a unit on the spindle to position **read-write heads** over specific data. The platters spin continuously, making thousands of rotations per minute. Each data storage surface has its own read-write head, which moves in and out from the center of the disk to locate data. The head hovers only a few microinches above the disk surface, so the magnetic field is more compact than on a floppy disk. As a result, more data is packed into a smaller area on a hard disk platter. The ***density*** of particles on the disk surface provides hard disks with capacities far greater than floppy disks. Also, the access time for a hard disk is significantly faster than for a floppy disk.

A hard disk drive stores data at the same locations on all platters before moving the read-write heads to the next location. A vertical stack of storage locations is called a “cylinder” – the basic ***storage bin*** for a hard disk drive. A hard drive mechanism includes a circuit board called a **controller** that positions the disk and read-write heads to locate data. The storage technology used on many PCs transfers data from a disk, through the controller, to the processor, and finally to RAM before it is actually processed.

Hard disks are not as durable as many other storage technologies. The read-write heads in a hard disk hover a microscopic distance above the disk surface. If a read-write head runs into a dust particle or some other contaminant on the disk, it might cause a **head crash**, which damages some of the data on the disk. To help prevent contaminants from contacting the platters and causing head crashes, a hard disk is sealed in its case. A head crash can also be triggered by jarring the hard disk while it is in use. Although hard disks have become considerably more rugged in recent years, you should still ***handle*** and ***transport*** them with care. You should make a backup copy of the data stored on your hard disk in case of a head crash.

**Tape Storage**

A head crash can easily destroy hard disk data. A **tape backup** is a copy of the data on a hard disk, which is stored on magnetic tape and used to restore lost data. A tape backup device can simplify the task of reconstructing lost data. A backup tape can hold the entire contents of a hard disk.

**CD and DVD Technology**

Today, most computers are equipped with some type of optical drive – a CD drive or a DVD drive. The underlying technology for CD and DVD drives is similar, but storage capacities differ. CD and DVD drives contain a spindle that rotatesthe disk over a laser lens. The laser directs a beam of light toward the underside of the disk. Dark “pits” and light “lands” on the disk surface reflect the light differently. As the lens reads the disk, these differences are translated into the 0s and 1s that represent data. Optical drives use several technologies to write data on CD and DVD disks: **Recordable technology (R)** uses a laser to change the color in a dye layer sandwiched beneath the clear plastic disk surface. The laser creates dark spots in the dye that are read as pits. The change in the dye is permanent, so the data cannot be changed once it has been recorded. **Rewritable technology (RW)** uses “phase change” technology to alter a crystal structure on the disk surface. Altering the crystal structure creates patterns of light and dark spots similar to the pits and lands on a CD. The crystal structure can be changed from light to dark and back again many times, making it possible to record and modify data much like on a hard disk. Most CD drives can read CD-ROM, CD-R, and CD-RW disks, but cannot read DVDs. Most DVD drives can read CD and DVD formats

**Solid State Storage**

**Solid state storage** is portable, provides fast access to data, and uses very little power, so it is an ideal solution for storing data on mobile devices and transporting data from one device to another. It is widely used in portable consumer devices, such as digital cameras, MP3 music players, notebook computers, PDAs, and cell phones. A **USB flash drive** is a portable storage device. It is durable and requires no card reader, making it easily ***transportable*** from one computer to another. You can open, edit, delete, and run files stored on a USB flash drive just as though those files were stored on your computer’s hard disk.

***Comprehension check.*** *Choose the ending for each sentence from the two versions given.*

|  |  |
| --- | --- |
| 1. A storage device is the mechanical apparatus | a) that hovers over thesurface to read data. |
| b) that records andretrieves data from a storage medium. |
| 2. After data is processed, it is held temporarily in RAM, | a) you should still handle andtransport them with care. |
| b) but it is usually copied to a storage medium for more permanent safekeeping. |
| 3. Before data is stored, | a)particles on thesurface of the disk are scattered in random patterns. |
| b) dark spots in the dye that are read as pits. |
| 4. Hard disk, floppy disk, and tape storage technologies can be classified as magnetic storage, | a) making it easily transportable from one computer to another. |
| b) which stores data by magnetizing microscopic particleson the disk or tape surface*.* |
| 5. The surface of an optical disk is coated with clear plastic, | a) which damages some of the data on the disk. |
| b) making the disk less susceptible to environmental damage than data recorded on magnetic media. |
| 6. An optical disk, such as a CD, is not susceptible to magnets, dust, humidity, | a) and transfers data from a disk to RAM before it is actually processed. |
| b) and its useful life is estimated at more than 30 years. |

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) transportable, optical, susceptible, particle;

b) gates, retrieves, provides, handles;

c) storage, medium, magnetic, device;

d) converted, changed, transformed, stored;

e) transport, process, estimate, access;

f) disk, tape, drive, DVD;

***2. Fill in the missing words choosing from the variants given.***

1. A magnetic storage device uses a read-write head to magnetize … that represent data.

a) lens b) particles c) contents d) platters

2. Data on an optical storage medium, such as DVD, is stored as … and lands.

a)lands b) bits c) bytes d) pits

3. … time is the average time it takes a computer to locate data on a storage medium and read it.

a) revolution b) transporting c) valuable d) access

4. The laser creates dark spots in the dye layer that are read as … .

a) areas b) plates c) pits d) particles

5. Higher disk density provides increased storage … .

a) transformation b) capacity c) flexibility d) data

6. Hard disks are … to head crashes, so it is important to make backup copies.

a) susceptible b) optical c) retrievable d) transportable

***3. Transform the following sentences without any change in meaning. Use the prompts as they are given (words in brackets, parts of sentences).***

1. A storage device is the mechanical apparatus for recording and restoring data from a storage medium (*retrieve*).

The user … .

2. Hard disks should be operated and moved with care (*handle*, *transport*).

One … .

3. The translation of the differences between pits and lands into binary numbers is provided by the lens (*translated*).

The … between pits and lands into binary numbers … .

4. Revolving hard disk platters on the spindle allows the disk drive to position read-write heads over specific data (*rotated*).

To position read-write heads over specific data … .

5. High capacities of hard disk are available due to the high density of particles on the disk surface. (*provides*)

High density of particles … .

6. You can gauge hard disk drive speed in revolution per minute (pm). (*to* *measure*)

Revolution per minute … .

7. On many computers before data is actually processed, it is moved from a disk to RAM using the storage technology (*processed*, *transfer*).

Before data is actually …, … .

***4. Fill in the gaps with appropriate words.***

Personal computers use a variety of *\_\_\_* technologies, including hard drives, CDs, DVDs, and flash drives. Each storage device essentially has a direct pipeline to a computer’s \_\_\_ so that data and instructions can move from a more permanent storage area to a temporary holding area and vice versa. Magnetic storage technology stores data by magnetizing microscopic \_\_\_ on the surface of a disk or tape. Optical storage technologies store data as a series of \_\_\_ and lands on the surface of a CD or DVD. ­­­­­­­\_\_\_ \_\_\_ storage technology stores data by activating electrons in a microscopic grid of circuitry. A standard 3.5" floppy disk for a PC stores \_\_\_ MB of data. A hard disk provides multiple*\_\_\_* for data storage. Optical storage technologies, such as CD- and DVD- \_\_\_, provide good data storage capacity.

***Speaking.*** *Discuss the following questions.*

1. What are the basic components of a data storage system?

2. How does a storage system interact with other computer components?

3. How does magnetic storage work?

4. How does optical storage work?

5. What are the advantages of solid state storage?

6. What is floppy disk technology?

7. How does a hard disk work?

8. What’s the downside of hard disk storage?

9. What’s the purpose of a tape drive?

10. What is the difference between CD and DVD technology?

**Text D**

***Pre-reading.*** *Match the meaning of the following English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. CRT (cathode ray tube) display | a) рідкокристалічний дисплей |
| 2. dot pitch | b) плата розширення |
| 3. viewing angle | c) вказівний пристрій |
| 4. width | d) кульовий покажчик; кульовий маніпулятор |
| 5. expansion card | e) клавіатура |
| 6. expansion slot | f) кут огляду |
| 7. keyboard | g) частота регенерації; частота оновлення |
| 8. LCD (liquid crystal display) | h) кінескоп, електронно-променева трубка |
| 9. pixel | i) крок розташування точок |
| 10. pointing device | j) піксель, мінімальний елемент зображення |
| 11. refresh rate | k) ширина; горизонтальний розмір |
| 12. trackball | l) контактний майданчик, трекпэд |
| 13. trackpad | m) гніздо для плати |
| 14. PnP | n) включай і працюй |

***Reading.*** *Read the text and try to guess the meaning of the words in bold font. Check your variants in the dictionary.*

***INPUT AND OUTPUT DEVICES***

**Basic Input Devices**

Most computer systems include a keyboard and pointing device, such as a mouse, for basic data input. Additional input devices, such as scanners, digital cameras, and graphics tablets, are handy for working with graphical input. Microphones and electronic instruments provide input capabilities for sound and music. A **keyboard** allows the user to key in programs and data and to control the computer system. Letters, numbers, symbols and blank spaces are known as characters. Thedesign of most computer keyboards is based on the typewriter’s QWERTY layout (because these are the first six letters on the top left of the keyboard), which was engineered to keep the typewriter’s mechanical keys from jamming. In addition to the basic typing keypad**,** computer keyboards include a collection of function keys designedfor computer-specific tasks, a calculator-style numeric keypad, and an editing keypad with keys such as End, Home, and Page Up.

A **pointing device** allows you to manipulate an on-screen pointer and other screen-based graphical controls. The most popular pointing devices for personal computers include mice, trackballs, pointing sticks, **trackpads**, and joysticks. A standard desktop computer includes a **mouse** as its primary pointing device. A mouse includes one or more buttons that can be “clicked” to input command selections. To track its position**,** a computer mouse uses one of two technologies: mechanical or optical. A **mechanical mouse** reads its position based on the movement of a ball that rolls over a mouse pad placed on a desk. An **optical mouse** uses an onboard chip to track a light beam as it bounces off a surface, such as a desk, clipboard, or mouse pad. An optical mouse provides more ***precise*** tracking, greater durability, less ***maintenance***, and more flexibility to use the mouse on a wide variety of surfaces without a mouse pad. A **pointing stick,** looks like the top of an eraser embedded in the keyboard of a notebook computer. A trackpad is a touch-sensitive surfaceon which you can slide your fingers to move the on-screen pointer. A **trackball** looks like a mechanical mouse turned upside down. A **joystick** looks like a small version of a car’s stick shift and is used mostly for playing games.

**Display Devices**

A computer display screen is usually classified as an output device because it typically shows the results of a processing task. Some screens, however, can be classified as both input and output device because they include touch-sensitive technology that accepts input. Display devices used for output offer three technology options: CRT, LCD, and plasma. Gun-like mechanisms in the **CRT** (**cathode ray tube**) spray beams of electrons toward the screen and activate individual dots of color that form an image. CRT display devices often simply called “monitors”, are bulky, however, and consume a fair amount of power. An **LCD** (**liquid crystal display**) produces an image by manipulating light within a layer of liquid crystal cells. Modern LCD technology is compact in size and lightweight, andprovides an easy-to-read display. The advantages of LCD monitors (or “flat panel displays”) include display clarity, low radiation emission, portability, and compactness. **Plasma screen** technology creates an on-screen image by illuminating miniature colored fluorescent light arrayed in a panel-like screen. The name “plasma” comes from the type of gas that fills fluorescent lights and gives them their luminescence. Like LCD screens, plasma screens are compact, lightweight, and more expensive than CRT monitors. They are rather energy consuming, too.

Image quality is a factor of **screen size**, **dot pitch**, **width of viewing angle,** **refresh rate,resolution**, and color depth. **Screen size** is the measurement in inches from one corner of the screen diagonally across to the opposite corner.The quality of a screen is often measured by the number of horizontal and vertical pixels used to create it. A **pixel**is a dot of color on a photo image or a point of light on a display screen. It can be in one of two modes: *“*on” or “off”. A larger number of pixels per square inch means a higher **res­olution,** or clarity and sharpness of the image. The distance between one pixel on the screen and the next nearest pixel is known as **dot pitch**. **Dot pitch (dp)** is a measure of image clarity. A smaller dot pitch means a clearer image. Greater pixel den­sities and smaller dot pitches yield sharper images of higher resolution. A monitor’s **viewing angle width** indicates how far to the side you can still clearly see the screen image. A wide viewing angle indicates that you can view the screen from various positions without compromising image quality. CRT and plasma screens offer the widest viewing angles. A CRT’s **refresh rate** (also referred to as“vertical scan rate”) is the speed at which the screen is repainted. The faster the refresh rate, the less the screen flickers. Refresh rate is measured in cycles per second, or Hertz (Hz). The number of colors a monitor can display is referred to as **color depth** or “bit depth”. Most PC display devices have the capability to display millions of colors. The number of horizontal and vertical pixels that a device displays on a screen is referred to as its **resolution**. The resolution for many early PC displays was referred to as **VGA (Video** **Graphics Array).** Higher resolutions were later provided by **SVGA (SuperVGA),** **XGA (eXtended Graphics Array**), **SXGA** (**Super XGA),** and **UXGA** (**Ultra XGA**).

**Printers**

Printers are one of the most popular output devices, they usually use ink jet or laser technology. An **ink jet printer** has a nozzle-like print head that sprays ink onto paper to form characters and graphics. A **laser printer** uses the same technology as a photocopier to paint dots of light on a light-sensitive drum. Laser technology is more complex than ink jet technology, which accounts for the higher price of laser printers. A ***recurring cost*** of using a printer is the ink-jet or laser cartridge that must be replaced every few thousand pages of output.Printers differ in resolution, speed, duty cycle, operating costs, duplex capability, and memory. Printer **resolution** – the density of the gridwork of dots that create an image – is measured by the number of dots printed per linear inch, abbreviated as **dpi**, normally 900 dpi is enough. **Printer speeds** are measured either by pages per minute (**ppm)** or character per second (**cps**). A **printer’s duty cycle** determines how many pages a printer is able to process, usually measured per month (ppm). A printer with **duplex capability** can print on both sides of the paper, though it will slow down the print process. A computer sends data for a printout to the printer along with a **set of instructions** on how to print that data. **Printer Control Language (PCL)** is the most widely used language for communication between computers and printers, but **PostScript** is an alternative printer language that many publishing professionals prefer. The data that arrives at a printer along with its printer language instructions requires **memory**.

**Installing Peripheral Devices**

Today, many peripheral devices connect to an external **USB** **(universal serial bus)** port and Windows automatically loads their service drivers, making installation as simple as plugging in a table lamp. USB is currently the most popular technology for connecting peripherals.

USB ports are conveniently located on the front of the system unit for easy access. When you install a peripheral device, you are creating a connection for data to flow between the device and the computer. Within a computer, data travels from one component to another over circuits called a **data bus**. One part of the data bus runs between RAM and the microprocessor. Other parts of the data bus connect RAM to various storage and peripheral devices. The segment of the data bus that extends between RAM and peripheral devices is called the **expansion bus**. As data moves along the expansion bus, it can travel through **expansion slots, cards, ports,** and cables. An **expansion slot** is along, narrow socket on the system board into which you can plug an expansion card. An **expansion card** is a small circuit board that gives a computer the capability to control a storage device, an input device, or an output device. Expansion cards are also called “expansion boards”, “controller cards”, or “adapters”. Expansion cards are built for only one type of slot. An **expansion port** is any connector that passes data in and out of a computer or peripheral device. Built in ports supplied with a computer usually include a mouse port, keyboard port, serial port, and USB ports. Most notebook computers are equipped with several USB ports.

Some devices require software, called a **device driver,** to set up communication between your computer and the device. The directions supplied with your peripheral device include instructions on how to install the device driver. Typically, you use the device driver disk or CD one time to get everything set up, and then you can put the disk away in a safe place. Installing a peripheral device you should remember that the cable you use must match the peripheral device and a port on the computer. If the right type of port is not available, you might have to add an expansion card. Once the connection is made, **PnP** should recognize the new device. If not, you will probably have to install driver software.

***Comprehension check.*** *Match the beginnings of the sentences in the first column with the endings in the second.*

|  |  |
| --- | --- |
| A | B |
| 1. In addition to the basic typing keypad, computer keyboards include a collection of function keys | a) it can travel through expansion slots, cards, ports, and cables. |
| 2. A pointing device allows you | b) to use the mouse on a wide variety of surfaces without a mouse pad. |
| 3. A recurring cost of using a printer is the ink-jet or laser cartridge | c) designed for computer-specific tasks. |
| 4. An optical mouse provides more precise tracking, less maintenance, and more flexibility | d) to manipulate an on-screen pointer and other screen-based graphical controls. |
| 5. As data moves along the expansion bus, | e) that offers an inexpensive and dependable way of output. |
| 6. A CRT (cathode ray tube) display is a device | f) that must be replaced every few thousand pages of output. |

***Vocabulary practice***

***1. Fill in the blanks in the sentences with the necessary word(s); all the letters of the word(s) are given on the right.***

|  |  |
| --- | --- |
| 1. Some … are designed to avoid wrist and injures caused by hours of keyboarding. | OAYEDSBKR |
| 2. Certain input devices record and … the sound of the human voice into … signals. | TRNVOEC  TIIGDLA |
| 3. Some input systems … a computer to understand a voice it has never heard. | WOLLA |
| 4. The first generation of digital cameras could create photos with … of 650 x 480 pixels. | ULOOESRNTI |
| 5. An optical mouse requires less …; you can … it on any kind of surface. | EANEACINNTM  EANALMPIUT |
| 6. Even a steady image on a monitor is constantly regenerated, or …*,* from top to bottom. | DEEFHRRES |

***2. Fill in the missing words choosing from the variants given.***

a) viewing angle b) pixel c) resolution d) surface

e) allows f) pitches g) display

1. A keyboard … the user to key in programs and data and to control the computer system.

2. An optical mouse uses an onboard chip to track a light beam as it bounces off a …, such as a desk, clipboard, or mouse pad.

3. Some … screens, can be classified as both input and output devices.

4. Greater … densities and smaller dot … yield sharper images of higher resolution.

5. A wide … indicates that you can view the screen from various positions without compromising image quality.

6. Printer … is measured by the number of dots printed per linear inch.

***3. Match the beginnings and the endings of the statements given and put the sentences you get into the correct order.***

|  |  |
| --- | --- |
| 1. Once the connection is made, | a) you’ll probably have to install driver software. |
| 2. You have to use the expansion bus | b) must match the peripheral device and a port on the computer. |
| 3. If you want to install a peripheral device | c) to recognize just any peripheral device automatically. |
| 4. If it does not, | d) PnP will recognize the new device. |
| 5. If the right type of port is not available, | e) you need PnP. |
| 6. PnP is a feature that allows the computer | f) you might have to add an expansion card. |
| 7. The cable you use | g) to make a connection between the system board and a peripheral device. |

***4. Fill in the gaps in the text with appropriate words.***

Most computer systems include a keyboard and some type of \_\_\_ device for basic data input. A mouse is standard equipment with most desktop computer systems. For output, most computers include a display device. A \_\_\_ produces an image by spraying electrons toward the screen. \_\_\_ technology produces an image by manipulating light within a layer of liquid crystal cells. \_\_\_ screen technology creates an on-screen image by illuminating miniature fluorescent lights arrayed in a panel-like screen. Image quality for a display device is a factor of screen size, \_\_\_ \_\_\_, \_\_\_ of viewing angle, resolution, refresh rate, and color \_\_\_.

***Speaking.*** *Discuss the following questions.*

1. What devices are used to get data into a computer?

2. What does a pointing device do?

3. What options are for output devices?

4. Which display technology produces the best image?

5. What printer technologies are most popular with personal computer users?

6. What are the operating characteristics of a printer?

7. How does a computer move data to and from peripheral devices?

8. What is an expansion slot? What is an expansion card used for?

9. What is an expansion port? What are other names for it?

10. Why do some peripheral devices include a disk or CD?

***Critical Thinking.*** *Read the article and express your opinion on the problem.*

**Computers and the Environment**

According to a United Nations study, producing a computer is more materials-intensive than manufacturing an automobile. Extending the lifespan of your computer might be environmentally friendly, but keeping up with technology probably means replacing your computer every few years. When it is time to replace your computer, is there a way to do it in an environmentally safe way? In this world of rapidly changing technology, disposal of computers and other electronic equipment has created a new and growing waste stream. In the United States alone, almost eight printer cartridges are discarded every second. Landfills hold millions of tons toxic substances such as lead, cadmium and mercury.

Is it worth recycling obsolete computers? Then the question arises: Who pays? Should it be the taxpayer, the individual consumer, the retailer, or the computer manufacturer? Consumers buying computers in California, have to pay a recycling fee at the time of purchase. Maryland requires computer manufacturers to ante up an annual fee for electronic waste disposal. Some manufacturers provide their customers with a postage-paid shipping box so they can return the product for recycling. In Europe, legislation proposes to make manufacturers accept returns of their old equipment free of charge and take appropriate steps to recycle it.

Having no or vague laws, consumers are often confused about how to dispose of their unwanted computers, monitors, CDs, and ink cartridges.

**What do you think?**

1. Have you ever thrown away an old computer or other electronic device?

2. Are you aware of any option for recycling electronic equipment in your area?

3. Would it be fair for consumers to pay a recycling tax on any electronic

equipment that they purchase?

***Final Test.*** *Do the tasks in the following test.*

1. \_\_\_ is permanent, non-volatile, typically used to store a computer’s startup routine.

a) RAM b) ROM c) CMOS d) SDRAM

2. \_\_\_ storage devices store data in a non-volatile, erasable, low-power chip.

a) optical b) magnetic c) solid state d) none of the above

3. RAM is considered to be volatile memory because \_\_\_.

a) it sporadically loses information b) it requires electrical power to hold data

c) data stored in it can randomly duplicate itself d) it’s measured in GB

4. Data stored in a special high-speed memory, called \_\_\_, can be accessed more rapidly than data from memory located elsewhere on the system board.

a) clock speed b) word size c) cache d) instruction set

5. All of the following are examples of storage medium except \_\_\_.

a) a CD b) paper c) a keyboard d) a DVD

6. Storage device that stores data as pits and lands is referred to as \_\_\_.

a) tape b) floppy disk c) CD-ROM d) hard drive

7. 1s and 0s are referred to as \_\_\_ digits.

8. An expansion \_\_\_ is any connector that passes data in and out of a computer or peripheral device.

9. Many of today’s microprocessors use \_\_\_ processing, which allows them to execute multiple instructions at the same time.

10. A \_\_\_ circuit is also known as a computer chip or microchip. It is a very thin slice of semi-conducting material packed with microscopic circuit elements.

11. Prior to processing data is copied from a storage device into \_\_\_.

12. Every action that is performed by a microprocessor is measured in \_\_\_, the smallest unit of measurement used by microprocessors.

13. \_\_\_ in RAM are microscopic electronic parts that hold the bits that represent data.

14. The word “bit” and the lowercase letter “b” are abbreviations for “binary\_\_\_”.

15. The ROM \_\_\_ is a set of instructions which tells the computer how to access the hard disk, find the operating system, and load the operating system into RAM.

16. The \_\_\_ for a machine code instruction specify the data for the operation.

17. Data travels from one component to another over circuits called a data \_\_\_.

18. The process of retrieving data from a storage medium is referred to as “\_\_\_ data” or “opening a file”*.*

19. Data which is composed of letters, symbols, and numerals that is not used in arithmetic operations is called \_\_\_ data.

20. The two main components of a storage system are a storage device and a \_\_\_.

***Projects.*** *Choose and perform one of the projects given.*

1. Write a two- to five-page paper about recycling computers. To begin this project, consult the text from Critical Thinking. Then determine the specific aspect of the issue you will present in your paper. You might, for example, decide to focus on toxic materials that end up in landfills or barriers that discourage shipping old computers across national borders. Whatever aspect of the issue you present, make sure you can back up your discussion with facts and references to authoritative articles and Web pages.

2. Work in groups of three or four. Select a digital device (e.g. a printer, scanner, digital camera, digital music player, etc.), and create promotional materials for a tradeshow booth featuring your “product”. You might include a product photo, list of specifications, a short instruction manual. Present your sales pitch or demonstration to the rest of the class.

***Unit 3****.* **COMPUTER SOFTWARE**

**Text A**

***Reading****. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***SOFTWARE BASICS***

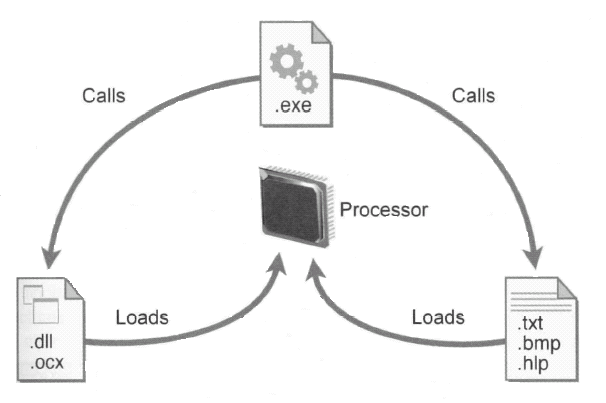
**Software: the inside story**

Computer software ***determines*** the types of tasks a computer can help you ***accomplish.*** Some software helps you create documents; while other software helps you edit home videos, prepare your tax return or design the floor plan for a new house.

The instructions that tell a computer how to carry out a task are referred to as a computer program. These programs form the software that prepares a computer to do a specific task, such as document production, video editing, graphic design or Web browsing. In popular usage the term “software” refers to one or more computer programs and any additional files that are ***provided*** to carry out a specific type of task. Whether it’s on a CD or downloaded from the Web, today’s software is typically ***composed******of*** many files. You might be surprised by the number of files that are necessary to make software work. At least one of the files included in a software package contains an executable program designed ***to be launched***, or started, by users. On PCs, these programs ***are stored***in files that typically have .exe file extensions and are referred to as “executable files”. Other files ***supplied with*** a software package contain programs that are not designed to ***be run*** by users. These “support programs” contain instructions for the computer to use in conjunction with the main user-executable file. A support program can be activated by the main program as needed. Support programs often have file extensions such as .dll and .ocx.

In addition to program files, many software packages also include data files. As you might expect, these files contain any data that is necessary for a task, but not supplied by the user, such as Help documentation. The data files supplied with a software package sport files extensions such as .txt, .bmp, and .hlp. (see fig. 2):

The use of a main user-executable file plus several support programs and data files offers a great ***flexibility*** and ***efficiency*** for software developers. Support programs and data files from existing programs can usually be modified by developers for other programs without changing the main executable file. This modular ***approach***can ***reduce*** the time required to create and test the main executable file, which usually contains a long and fairly complex program. This modular approach also allows software developers to reuse their support programs in multiple software products and adapt preprogrammed support modules for use in their own software. Modular programming techniques are of interest mainly to people who create computer programs; however these techniques affect the process of installing and uninstalling software. It is important, therefore, to remember that computer software consists of many files that contain user-executable programs, support programs, and data.



**Programmers and programming languages**

**Computer programmers** write computer programs that become the components of a computer software product. The finished software product is then distributed by the programmers or by **software publishers**– companies that specialize in marketing and selling software. Today most businesses and organizations purchase commercial software to avoid the time and expense of writing their own.

Most software provides a task-related environment, which includes a screen display, a means of collecting commands and data from the user, the specifications for processing data, and a method for displaying or outputting data. To create a software environment, a programmer must ***define*** **properties** for each element in the environment, such as where the objects appear, its shape, color and behavior.

A **programming language** provides the tools a programmer uses to create software and produce a ***lengthy*** list of instructions, called **source code**, which defines the software environment in every detail – what it looks like, how the user enters commands, and how it manipulates data. Most programmers today prefer to use a high-level language, such as C++, Java, Ada, COBOL, or Visual Basic. These languages have some similarities to human languages and produce programs that are fairly easy to test and modify.

A computer’s microprocessor understands only **machine language** – the instruction set that is “hard wired” within the microprocessor’s circuits. Therefore, instructions written in a high-level language must be translated into machine language before a computer can use them. The process of translating instructions can be accomplished by two special types of programs: compilers and interpreters. A **compiler** translates all the instructions in a program as a single batch, and the resulting machine language instructions, called **object code**, are placed in a new file. Most of the program files on a distribution CD for commercial software are compiled so that they contain machine language instructions that are ready for the processor to execute. As an alternative to a compiler, an **interpreter** ***converts*** one instruction ***at a time*** while the program is running*.* An interpreter reads the first instruction, converts it into machine language, and then sends it to the microprocessor. After the instruction ***is executed***, the interpreter converts the next instruction, and so on.

Software is categorized as application software or system software. The primary ***purpose***of **application software** is to help people ***carry out*** tasks using a computer. In contrast, the primary purpose of **system software** – your computer’s operating system, device drivers, programming languages, and utilities – is to help the computer to carry out its basic operating functions.

Software can be classified into categories (see fig. 3):

Video

Music

Graphics

Data Management

Entertainment

Statistical

Mathematical Modeling

Accounting Finance

Spreadsheet Software

Document Production

Mac OS

Windows

Unix

Linux

Programming Languages

Utilities

Device Software

Operation System

Application Software

System Software

Software

DOS

Educational

Reference

Fig. 3: Software categories

***Comprehension check.*** *Mark the following statements as True or False.*

1. Computer software typically consists of many files that contain user-executable programs, support programs and data files.

2. The main executable file provides the primary set of instructions for the computer to execute and calls various support programs and data files as needed.

3. Support programs often have file extensions such as .txt, .bmp, and .hlp.

4. Individuals often write software for their personal computers.

5. High-level languages are fairly easy to test and modify.

6. A compiler converts high-level instructions into a new file containing machine language instructions.

***Vocabulary practice***

***1. In the text find the synonyms to the given words.***

start a program objective define method decrease provide perform

***2. Fill in the blanks choosing from the variants given.***

1. The instructions that tell a computer how to … a task are referred to as a computer program.

a) require b) create c) carry out d) define

2. A programming language … tools for creating a lengthy list of instructions called source code.

a) prefer b) refer to c) avoid d) provide

3. As a program is running an interpreter converts one instruction… into machine language.

a) at a time b) at the same time c) all the time

4. eVidpro.exe is a compiled program, so its instructions are immediately … by the processor.

a) provided b) modified c) executed d) adapted

5. Software includes menus, buttons, and other control objects that are … by a programmer, who designates their properties.

a) converted b) defined c) reduced d) purchased

6. The software that provides the computer with … for each use is called application software.

a) approaches b) efficiency c) utilities d) instructions

***3. Make two-word expressions by combining words from two lists: A and B. Then fill in the gaps in the following sentences.***

A: executable B: language

application code

machine file

source extensions

file software

high-level instructions

1. When using a Windows PC, you can start an … by clicking its icon, selecting it from a Start menu, or entering its name in the Run dialog box.

2. Computer software can be divided into two major categories: … software and system software.

3. The data files supplied with a software package sport … such as .txt, .bmp, .hlp.

4. A programming language provides tools for creating a lengthy list of instructions called … .

5. A simple instruction to add two numbers becomes a long series of 0s and 1s in a… .

6. A compiler converts … into a file containing machine language instructions.

***4. Fill in the gaps in the text.***

Software consists of computer \_\_\_ (programs/utilities) and data files that work together to provide a computer with the \_\_\_ (instructions/approaches) and \_\_\_ (data/tools) necessary for carrying out a specific type of task, such as document production, video editing, graphic design, or Web browsing.

To create a software \_\_\_ (efficiency/environment), a programmer must define the \_\_\_ (approaches/properties) for each element in the environment, such as where an object appears, its shape, its color, and its behavior. Most programmers today prefer to use \_\_\_ (high-level/machine) languages. A computer’s microprocessor understands only \_\_\_ (machine/high-level) language, however, so a program that is written in a high-level language must be \_\_\_ (avoided/compiled) or interpreted before it can be \_\_\_ (processed/modified).

***Speaking.*** *Discuss the following questions.*

1. What is software?

2. What kinds of files are included in a typical software product?

3. Why does software require so many files?

4. How does a programmer “write” software?

5. How does a computer process a program?

6. How is software categorized?

**Text B**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***OPERATING SYSTEMS AND UTILITIES***

**Operating system overview**

An operating system (abbreviated OS) is a type of system software that acts as a mast controller for all the activities that take place within a computer system. It is one of the factors that determine your computer ***compatibility*** and platform. The operating system ***interacts*** with application software, device drivers, and hardware to ***manage*** a computer’s resources. The term **resource** refers to any component that is required to perform work. For example, the processor is a resource. RAM, storage space, and peripherals are also resources.

Operating system manages different tasks:

**- *Manage*** memory. OS allocates a specific area of RAM for each program that is open and running. OS is itself a program, so it requires RAM space too. A microprocessor works with data and executes instructions stored in RAM – one of your computer’s most important resources. When you want to run more than one program at a time, the OS has to allocate specific areas of memory for each program. When multiple programs are running, the OS must ***ensure*** that instructions and data from one area of memory do not “leak” into an area allocated to another program. If an OS falls down on the job and ***fails*** to protect each program’s memory area, data can get corrupted, programs can “crash”, and your computer displays error messages.

- Manage processor resources. The operating system also controls the microprocessor – just at a slightly higher level. Every cycle of a computer’s microprocessor is a resource for accomplishing tasks. Many activities – called “processes” – ***compete*** for the attention of your computer’s microprocessor. OS must ensur*e* that each activity “process” receives its share of microprocessor cycles. A computer can take advantage of performance-enhancing technologies such as multitasking*,***multithreading,****multiprocessing,** dual coreormultiple processors*.*

- Keep track of storage resources. OS stores and ***retrieves*** files from your disks and CDs. It remembers the names and locations of all your files and keeps track of empty spaces where new files can be stored.

- ***Ensure*** that input and output proceed in an orderly manner. OS communicates with device driver software so that data can travel ***smoothly***between the computer and these peripheral resources. OS uses ‘buffers’ to collect and hold data while the computer is busy with other tasks.

- Establish basic elements of the user interface. A user interface can be ***defined*** as the combination of hardware and software that helps people and computers communicate with each other. Your computer’s user interface includes a display device, mouse, and keyboard that allow you to view and manipulate your computer environment. It also includes software elements, such as menus and toolbar buttons. ***A* graphical user interface*****(GUI)* *features*** menus and icons that you can manipulate with the click of a mouse. **A command-line** interface requires you to memorize and type commands.

For nearly all PCs, servers, workstations, mainframes, and supercomputers, the operating system program is quite large, so most of it is stored on a hard disk. The operating system’s small **bootstrap program** is stored in ROM and supplies the instructions needed to load the operating system’s core into memory when the system boots. This core part of OS called the **kernel** provides the most essential operating system services, such as memory management and file access. The kernel always stays in RAM all the time your computer is on. Other parts of OS, such as customization utilities, are loaded into RAM as they are needed.

Many operating systems provide helpful tools, called operating system utilities, that you can use to control and ***customize*** your computer equipment and work environment. They are typically accessed by using a GUI, such as the familiar Windows desktop. The most popular are: launch programs, manage files, get help, customize the user interface, and configure equipment.

One operating system might be better suited to some computing tasks than others. To provide clues to their ***strengths*** and weaknesses, operating systems are informally categorized using one or more of the following terms:

A **single-user operating system** expects to ***deal with*** one set of input devices – those that can be controlled by one user only.

A **multiuser operating system** allows a single computer to deal with ***simultaneous*** input, output, and processing requests from many users. One of its most difficult responsibilities is to ***schedule*** all the processing ***requests*** that a centralized computer must perform.

A **network operating system** provides communications and routing services that allow computers to ***share*** data, programs, and peripheral devices. The main difference between network OS and multiuser OS is that multiuser operating systems schedule requests for processing on a centralized computer, whereas a network operating system simply routes data and programs to each user’s local computer, where the actual processing takes place.

A **desktop operating system** is one that is designed for a personal computer. Typically, these operating systems are designed to ***accommodate*** a single user, but might also provide network capability.

Windows is the best-selling operating system. The number and variety of programs that run on Windows are unmatched by any other operating system, a fact that contributes to its dominant position as the most widely used desktop operating system.

**Utility software** is a type of system software that is designed to perform a specialized task, such as system ***maintenance*** or security. Utility software that does not come packaged with an operating system is often referred to as a third-party utility. In past years, antivirus software was a popular category of third-party utilities. With the recent influx of nuisance ads, intrusion attempts, and spam, utilities such as ad blockers, personal firewalls, and spam filters have also become best sellers. Filtering software is used by parents to block their children from objectionable Websites. Another popular category of utility software is system utilities. These utilities track down and ***fix*** disk errors, repair corrupted files, and give your PC a performance – enhancing tune-up.

A final group of utilities worth mentioning is designed for ***backing up*** and cleaning up hard disks, and ***shredding***files so they can’t be recovered. They can help you ***recover*** files deleted by mistake.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text.*

1. Operating system’s main purpose is to control what happens behind the scene.

2. Your PC can sometimes recover from memory leak problems if you use the Ctl+Alt+Del key sequence to close the corrupted program.

3. The operating system must ensure that the microprocessor does not “spin its wheels” waiting for input while it could be working on some other processing projects.

4. Windows is installed on more than 80 % of the world’s personal computers.

5. The term “buffer” is a technical jargon for a region of memory that holds data waiting to be transferred from one device to another.

6. Many operating systems provide helpful tools, called operating system utilities, that you can use to control and customize your computer equipment and work environment.

***Vocabulary practice***

***1. In the text find the opposites to the given words.***

roughly shred disorganize monopolize stop succeed break

***2. Fill in the blanks choosing from the variants given.***

1. An operating system … a computer’s resources, such as Ram, storage space, and peripherals.

a) allocates b) defines c) manages d) accommodates

2. To … more than one program at a time, the operating system must allocate specific areas of Ram for each program.

a) store b) install c) fix d) run

3. A graphical user-interface provides a way to point and click a mouse to … menu options and manipulate objects that appear on the screen.

a) feature b) deal with c) select d) manage

4. Handheld devices, such as PDAs and smartphones typically … single-user operating systems.

a) feature b) retrieve c) include d) establish

5. OS communicates with device driver software so that data can travel … between the computer and peripheral resources.

a) roughly b) smoothly c) simultaneously d) primary

6. Desktop operating systems are designed to accommodate a single user, but might also provide network … .

a) variety b) security c) capability d) compatibility

***3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: multiuser B: operating C: system

third user technologies

desktop enhancing interface

graphical operating system

performance party utilities

1. IBM’s OS/390 is one of the most popular mainframe … .

2. A computer can take advantages of … .

3. A … features menus and icons that you can manipulate with a click of a mouse.

4. A …, such as Windows, is designed for personal computers.

5. WinZip, WinAce are … that offer a variety of compression options.

***4. Fill in the gaps in the text.***

\_\_\_ (computer/application) software tells the operating system what to do. The operating system tells the \_\_\_ (device/tool) drivers, device drivers tell the \_\_\_ (software/hardware), and the hardware actually does the work. The operating system\_\_\_ (interacts/competes) with application software, device drivers, and hardware to \_\_\_ (manage/define) a computer’s \_\_\_ (resources/compatibility).

The core part of an operating system is called the \_\_\_ (kernel/cycle). In addition to this core, many operating systems \_\_\_ (provide/schedule) helpful tools, called \_\_\_ (utilities/capabilities).

***Speaking.*** *Discuss the following questions.*

1. What is an operating system?

2. What does an operating system do?

3. How does an operating system manage processor resources?

4. Why does an operating system manage memory?

5. Where is the operating system stored?

6. What are utilities? What are the most popular ones?

7. How does the operating system affect the user interface?

**Text C**

***Reading****. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***APPLICATION SOFTWARE***

Most computers include some basic word processing, e-mail, and Internet access software, but computer owners want additional software to ***increase*** their computer’s productivity, business, learning, or entertainment capabilities.

**Document production software**

This software ***assists***you with composing, ***editing***, designing, printing, and electronically publishing documents. The three most popular types of document software are word processing, desktop publishing, and Web authoring.

**Word processing software**, such as Microsoft Word gives you the ability to create, spell-check, edit, and format a document on the screen before you commit it to paper.

**Desktop publishing software** (abbreviated DTP) has sophisticated features to help you produce professional-quality output for newspapers, newsletters, brochures, magazines, and books.

**Web authoring software** helps you design and develop customized Web pages that you publish electronically on the Internet. It provides easy-to-use tools for composing the text for a web page, ***assembling*** graphical elements, and automatically generating HTML tags.

Document production software makes it easy to let your ideas flow because it automatically ***handles*** many tasks as “word wrap”, a **spelling checker***.* It ***offers*** several features that can ***improve*** the quality of your writing. They are: a **thesauru***s*, a **grammar checker**, a **readability formula**, a **Search and Replace**. The “look” of your final document depends on several formatting factors, such as **font style,** **paragraph style**, and **page layout**. Document production software allows you to work more productively.

**Spreadsheet Software**

A **spreadsheet** uses ***rows*** and ***columns***of numbers to create a model or representation of a real situation. Today, **spreadsheet software**, such as Microsoft Excel, provides tools to create electronic spreadsheets. As an added bonus, spreadsheet software helps you turn your data into a ***variety*** of colorful graphs. It also includes special data-handling features that allow you to sort data, ***search for*** data that meets specific criteria, and print reports. Spreadsheets are popular with accountants and financial managers who deal with paper-based calculations. Because it is easy to experiment with different numbers, spreadsheet software is particular useful for what-if analysis. The disadvantage of spreadsheet software is that – aside from a few predesigned ***templates***– you are responsible for entering formulas and ***selecting*** functions for calculations. If you don’t know the formulas or don’t understand the functions, you are out of luck.

In contrast to spreadsheet software, **“number crunching” software** provides a structured environment dedicated to a particular number crunching tasks, such as statistical analysis, mathematical modeling, or money management.

**Database Software**

A **database** is simply a collection of data that is stored on one or more computers. It can contain any sort of data. Database software helps you enter, find, organize, ***update***, and report information stored in a database. Microsoft Access, FileMaker Pro, and ask Sam are three of the most popular examples of database software for personal computers. Database software stores data as a series of records, which are composed of fields that hold data. A record holds data for a single entity – a person, place, or event. A field holds one item of data ***relevant***to a record. Your database software can help you print reports, export data to other programs, convert the data to other formats such as HTML.

Whether you print, import, copy, save, or transmit the data you find in databases, it is your responsibility to use it appropriately. Never introduce inaccurate information into a database.

**Graphics Software**

**Graphics software** is designed to help you create, manipulate, and print graphics. Some graphics software products specialize in a particular type of graphic, while others allow you to work with multiple graphics formats. If you are really interested in working with graphics, you will undoubtedly end up using more than one graphics software product. The most popular are **paint software**, **photo editing software,** and **drawing software**, **CAD** (computer-aided design) **software,** and **presentation software**.

**Video editing software** provides a set of tools for ***transferring*** video footage from a camcorder to a computer, clipping out unwanted footage, assembling video segments in any sequence, adding special visual effects, and adding a sound track. **DVD authoring software** offers tools for creating DVD with Hollywood-style menus.

A **software suite** is a collection of application software sold as a single package.

**Educational software** helps you learn and practice new skills. It is available for such diverse educational endeavors as learning languages, training yourself to use new software, how to play the piano or guitar, and improving keyboarding skills. Exam preparation software is available for standardized tests.

**Reference software** provides a collection of information and a way to access that information. This type of software includes massive amount of data. The reference software category spans a wide range of applications – from encyclopedias to medical references, from map software to trip planners, and from cookbooks to telephone books. The options are as broad as the full range of human interests.

Computer games are the most popular type of **entertainment software**. **Music software** is represented by **audio editing software**, **CD ripper software**, **audio encoding software, ear training software.**

***Comprehension check.*** *Choose the ending for each sentence from the two versions given.*

1. You can vary the font style selecting character formatting attributes, such as

a) italics, bold, underline, etc. b) layout, headers, frames, etc.

2. A thesaurus can help you find

a) opposites for a word. b) synonyms for a word.

3. In a worksheet,

a) each column is numbered and each row is lettered.

b) each column is lettered and each row is numbered.

4. Mathematical modeling software helps you

a) visualize the product of complex formulas.

b) analyze large sets of data to discover patterns.

5. Database software helps you

a) learn and practice new skills. b) enter and organize information.

6. A software suite is

a) a collection of application software sold as a single package.

b) a collection of data stored on one or more computers.

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) assist, help, edit, aid;

b) contain, select, choose, pick;

c) relevant, additional, supplementary, extra;

d) spreadsheet, database, Linux, graphics;

e) handle, deal with, assemble, manage;

f) generate, update, form, create.

g) improve, search for, upgrade, enhance

***2. Fill in the missing words choosing from the variants given.***

1. Various kinds of document product software provide tools for creating and … printed and web-based materials.

a) formatting b) sorting c) assembling d) transmitting

2. Spreadsheet software provides a sort of “blank canvas” on which you can create numeric … by simply “painting” values, labels, and formulas.

a) columns b) sequences c) models d) features

3. Database software stores data as a series of … and allows you to establish relationships between different types of records.

a) templates b) items c) entities d) records

4. CD ripper software … files from an audio CD to your computer’s hard disk.

a) edits b) transfers c) formats d) sorts

5. DVD authoring software … you to add Hollywood style menus to digital videos.

a) lets b) makes c) allows d) helps

6. The reference software category spans a wide … of applications.

a) entity b) sequence c) range d) circuit

***3. Transform the following sentences without any change in meaning. Use the prompts as they are given (words in brackets, parts of sentences).***

1. Most document production software includes a spelling checker.

A spelling checker is mostly …

2. Word processing offers several features that can improve the quality of writing (*to* *enhance*).

3. You may not be a composer or a musician to have a use for music software.

Neither … nor …

4. Many types of CAD software is available (*get access*).

5. Instead of typing data into a database you can also use data from a commercial database (*import*).

… than … you can …

6. If you are interested in working with graphics, you end up using more than one graphics software product (*combine*).

One who …

***4. Fill in the gaps in the text.***

The three most popular types of document production software include word processing, \_\_\_, and Web authoring. \_\_\_ software is similar to a “smart” piece of paper that automatically adds up the \_\_\_ of numbers you write on it. You can use it to make other calculations, too, based on simple equations that you write or more complex, built-in \_\_\_. Because it’s so easy to experiment with different numbers, this type of software is particular useful for \_\_\_ analyses. \_\_\_ software helps you store, find, organize, update, and report information stored in one or more tables. When two sets of records are \_\_\_, database software allows you to access data from both tables at the same time. A software \_\_\_ is a “bundled” collection of application software sold as a single package.

***Speaking.*** *Discuss the following questions.*

1. How does document production software help me turn my ideas into sentences and paragraphs?

2. What if I am a bad speller?

3. What features of document product software can improve my writing?

4. What is a spreadsheet?

5. What other “number-crunching” software is available?

6. What is a database?

7. What is the best –selling entertainment software?

8. What is a software suite?

**Text D**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***BUYING AND INSTALLING SOFTWARE***

It’s surprising how quickly your collection of software can grow as you ***discover***new ways to use your computer. Before you can use software, you have to ***install*** it on your computer.

The key “ingredients” necessary to install new software are the files that contain the programs and data. These files might be supplied on **distribution media.** System ***requirements****,* which specify the operating system and minimum hardware capacities necessary for a software product to work correctly can be found on the software box or posted on the download site.

**Installation basics**

When you install software, the new software files are placed in the appropriate folders on your computer’s hard disk, and then your computer performs any software or hardware configurations necessary to make sure the program is ready to run. During the installation process, your computer usually performs the following tasks:

- Copies files from distribution media or downloads files to specified folders on the hard disk

- ***Uncompresses*** files that have been distributed in compressed format.

- Analyzes the computer’s resources, such as processor speed. RAM capacity, and hard disk capacity, to verify that they meet or ***exceed*** the minimum system requirements.

- Analyzes hardware components and peripheral devices to select appropriate device drivers.

- Looks for any system files and players, such as Internet Explorer or Windows media Player, that are required to run the program but are not supplied on the distribution media or download.

- Updates necessary system files, such as the Windows Registry and the Windows Start menu, with information about the new software.

**Software updates**

Software publishers regularly ***update***their software to add new features, fix bugs, and update its security. Types of software updates (also called “upgrades”), include new versions, patches, and service packs. A **software patch** is a small selection of program code that ***replaces***part of the software you currently have installed. The term **service pack**, which usually applies to operating system updates, is a set of patches that correct problems and address security vulnerabilities. Software patches and service packs are usually free. It’s always a good idea to install patches and services when they become available. The revised code they contain often addresses security vulnerabilities and the sooner you patch up those holes, the better. A new version update usually installs in a similar way as you installed the original version, by activating a setup program, displaying a license agreement, and adding updated entries to your computer’s Start menu. Patches and service packs are usually distributed over the Internet and automatically install themselves when you download them. To combat piracy, many software publishers require users to type in a **validation code** to complete an installation. The result of an update depends on several factors. Most patches and service pack installations can not be reversed. A new version installation typically overwrites the old version, but you might have the option to keep the old version just in case you have trouble with the new one and need to revert back to the previous version.

**Uninstalling software**

With some operating systems, such as DOS, you can remove software simply by deleting its files. Other operating systems, such as Windows and Mac OS, include an **uninstall routine**, which deletes the software’s files from various folders on your computer’s hard disk. The uninstall routine also removes ***references*** to the program from the desktop and from operating system files, such as the file system restrictions.

**Software Copyrights and licenses**

***Copyright*** laws have fairly severe restrictions on copying, distributing, and reselling software; however, a license agreement might offer additional rights to consumers. The licenses for commercial software, shareware, freeware, open source, and public domain software specify different levels of permission for software use, copying, and distribution.

**Commercial software** is typically sold in computer stores or at Web sites. Although you “buy” this software, you actually purchase only the right to use it under the terms of the software license*.*

**Shareware** is copyrighted software marketed under a “try before buy” policy. It typically includes a license that permits you to use software for a trial period. To use it beyond the trial period you must pay a registration fee. A shareware license usually allows you to make copies of the software and distribute them to others. If they choose to use the software, they must pay a registration fee as well.

**Freeware** is copyrighted software that is available for free. Because the software is protected by copyright, you cannot do anything with it that is not allowed by copyright law or by the author. Typically, the license for freeware permits you to use the software, copy it, and give it away, but does not permit you to alter it or sell it. Many utility programs, device drivers, and some games are available as freeware.

**Open source** software makes the uncompiled program instructions – the source code – available to programmers who want to modify and improve the software.

**Public domain** software is not protected by copyright because the copyright has ***expired*,** or the author has placed the program in the public domain, making it available without ***restriction***. It may be freely copied, distributed, even resold. The primary restriction on public domain software is that you are not allowed to apply for a copyright on it.

***Comprehension check****.* *Match the beginnings of the sentences in the first column with the endings in the second.*

|  |  |
| --- | --- |
| 1. When you install software its files | for different operating systems. |
| 2. Installation procedures differ | might end up in different folders. |
| 3. Downloadable software can be provided | that guides you through the installation process. |
| 4. Public domain software | involves a fee. |
| 5. Windows software typically contains a setup program | in several different formats . |
| 6. Updating to a new version usually | is not protected by copyright. |

***Vocabulary practice***

***1. Put the letters in the following words into correct order.***

tchopgiry roeisttcri deexec susnecropm trneeqmueir rdeivsoc erceneefr

***2. Fill in the blanks choosing from the variants given.***

1. System … specify the operating system and minimum hardware capacities required for software to work correctly.

a) requirements b) references c) replacements

2. During the … process, your computer performs many tasks, including updating the Windows Registry and Start menu.

a) uninstallation b) installation c) updating d) copyrighting

3. Linux is an example of … software.

a) open source b)freeware c) public domain d) shareware

4. A software patch is a small selection of program code that … part of the software you currently have installed.

a) activates b) replaces c) installs d) specifies

5. Public domain software is not copyrighted because the copyright has … .

a) completed b) expired c) replaced d) purchased

6. Software patches and service packs are usually … .

a) expensive b) inexpensive c) free

***3. Restore the instructions for installing software from distribution media by matching the beginnings with the endings and put them into the correct order.***

|  |  |
| --- | --- |
| Start | the license agreement if one is presented on the screen. By agreeing to the terms of the license, you can proceed with the installation. |
| Insert | the first distribution CD or DVD. The setup program should start automatically. |
| Select | the prompts provided by the setup program to specify a folder to hold the new software program. |
| Follow | the installation option that best meets your needs. |
| Read | the program you just installed to make sure it works. |
| Insert | multiple distribution CDs in the specified drive when the setup program prompts you. |

***4. Fill in the gaps in the text.***

When you \_\_\_ software, the new software files are placed in the appropriate \_\_\_ on your computer’s hard disk, and then your computer performs any software configurations that are necessary to make sure the program is ready to run. The \_\_\_ files and data files for the software are placed in the folder you specify. Windows software typically contains a \_\_\_ program that guides you through the installation process.

A \_\_\_ is a form of legal protection that grants the author of an original “work” the right to copy, distribute, sell, and modify that work, except under special circumstances described by laws. A software \_\_\_ is a legal contract that defines the ways in which you may use a computer program.

***Speaking.*** *Discuss the following questions.*

1. Where can I get software?

2. What is included in a typical software package?

3. How do I know if a software program will work on my computer?

4. Why is it necessary to install most software?

5. What is a software update?

6. How do I get rid of software?

7. Are all software licenses similar?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Software Piracy**

Software is easy to steal. You don’t have to walk out of a store with a $495 DVD Workshop software box under your shirt. You can simply borrow your friend’s DVD Workshop distribution CDs and install a copy of the program on your computer’s hard disk. It seems so simple that it couldn’t be illegal. But it is.

Piracy takes many forms. End-user piracy includes friends loaning distribution disks to each other and installing software on more computers than the license allows. Although it is perfectly legal to lend a physical object, such as a sweater, to a friend, it is not legal to lend digital copies of software and music because, unlike a sweater that can be worn by only one person at a time, copies of digital things can be simultaneously used by many people.

Counterfeiting is the large-scale illegal duplication of software distribution media, and sometimes even its packaging. According to Microsoft, many software counterfeiting groups are linked to organized crime and money-laundering schemes that fund a diverse collection of illegal activities, such as smuggling, gambling, extortion. Counterfeiting software is sold in retail stores and through online auctions– often the packaging looks so authentic that buyers have no idea they have purchased illegal goods.

Internet piracy uses the Web as a way to illegally distribute unauthorized software. The Business Software Alliance (BSA) estimates that more than 800.000 Web sites illegally sell or distribute software.

In many countries software pirates are subject to civil lawsuits for monetary damages and criminal prosecution, which can result in jail time and stiff fines. Is software piracy really damaging? Who cares if you use a program without paying for it? Software piracy is damaging because it has a negative effect on the economy. Software production fuels economic development of many countries. A BSA economic impact study concluded that lowering global piracy from an average of 36 % to only 26 % would add more than 1 million jobs and $400 billion in worldwide economic growth.

Decreases in software revenues can have a direct effect on consumers, too. When software publishers are forced to cut corners, they tend to reduce customer service and technical support. As a result, you, the consumer, get put on hold when you call for technical support, find fewer free support sites, and encounter customer support personnel who are only moderately knowledgeable about their products. The bottom line – software piracy negatively affects customer service. As an alternative to cutting support costs, some software publishers might build the cost of software piracy into the price of the software.

Some analysts suggest that people need more education about software copyrights and the economic implications of piracy. Other analysts believe that copyright enforcement must be increased by implementing more vigorous efforts to identify and prosecute pirates.

**What do you think?**

1. Do you believe that software piracy is a serious issue?

2. Do you know of any instances of software piracy?

3. Do you think that most software pirates understand that they are doing something illegal?

4. Should software publishers try to adjust software pricing for local markets?

***Final test.*** *Do the tasks in the following test.*

1. All publicly available software programs adhere to the same licensing agreements. (*True/False*)

2. A(n) \_\_\_ operating system provides process and memory management services that allow two or more programs to run simultaneously.

3. Which of the following type of software is copyrighted software marked under a “try before buy” policy.

a) freeware b) shareware c) commercial software d) public domain software

4. \_\_\_ software helps you store, organize, update, and report information.

5. The microprocessor controls the operating system in your computer. (*True/False*)

6. A computer’s microprocessor understands both high-level and machine language. (*True/False*)

7. The operating system in many handheld computers is small enough to be stored in ROM. (*True/False*)

8. The software installation process includes which of the following activities:

a) analyzing the computer’s resources b) analyzing the computer’s hardware

c) updating necessary system files d) all of the above

9. MP3 encoding software is used to pull tracks off a CD and store it in a raw digital format on a computer’s hard disk. (*True/False*)

10. A(n) \_\_\_ translates all of the instructions in a program as a single batch, producing machine language instructions that are placed in a new file.

11. To start a software program, you run the program’s main \_\_\_ file.

12. Which of the following converts one computer instruction at a time into a machine language while the program is running?

a) a compiler b) an interpreter c) a translator d) none of the above

13. \_\_\_ language is the instruction set that is ‘hard wired’ within a microprocessor’s circuits.

14. A (n) \_\_\_ is a set of letters that shares a unified design.

15. Programmers first write instructions in a machine language and then translate them into a high-level language. (*True/False*)

16. System requirements specify both the operating system and the minimum hardware capacity necessary for a software product to work correctly. (*True/False*)

17. The \_\_\_ routine deletes a software program’s files and removes references to the program from the desktop and operating system files.

18. Which of the following is responsible for allocating specific areas of memory for each program running on your computer.

a) the microprocessor b) the operating system

c) RAM d) none of the above

19. Software counterfeiting and piracy does not include software that is distributed on the Internet. (*True/False*)

20. An auxiliary set of instructions that is used in conjunction with the main software program is called a(n) \_\_\_.

a) data file b) main executable file c) support program d) auxiliary file

***Projects.*** *Choose and perform one of the projects given.*

1. Computer games are big business. They are exported worldwide and accessed by communities of online players around the globe. For this project gather information about the most internationally popular computer games. Try some of them yourself to see what they are all about. What effect, if any, would you expect these games to have on individual players living in the cultures of 1) industrialized countries, 2) Middle-eastern countries, and 3) developing countries? Summarize your ideas.

2. Use the Web and other resources to compile a list of the software used in your current or future career field. Are there standard packages that job applicants need to know how to use? If so, what can you find out about those packages on the Web. Also, make a list of the software packages you are familiar with. Use the software classification system. As you consider your career goals for the next year, list at least five additional software packages you would like to learn. Explain why they would be helpful.

***Unit 4.* FILE MANAGEMENT, VIRUS PROTECTION**

**AND BACKUP**

**TEXT A**

***Pre-reading.*** *Match the meaning of the following English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. case sensitive | a) тека |
| 2. root directory | b) пристрій (середовище) зберігання інформації |
| 3. period | c) перевищувати |
| 4. coding scheme | d) символ підкреслення, риска знизу |
| 5. storage medium | e) зірочка (символ) |
| 6. exceed | f) ім'я дисковода |
| 7. folder | g) схема кодування |
| 8. underscore | h) кореневий каталог |
| 9. drive letter | i) точка |
| 10. asterisk | j) чутливий до регістра |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***FILE BASICS***

A **computer file** – or simply a “file” – is defined as a named collection of data that exists on a storage medium, such as a disk, CD, DVD, or tape. A file can contain a group of records, a document, a photo, music, a video, an e-mail message, or a computer program. Computer files have several characteristics, such as a name, format, location, size, and date.

Every file has a name and might also have a ***file* *extension***. When you save a file, you must provide a ***valid*** file name that ***adheres*** ***to*** specific rules, referred to as **file-naming convention**s. Each operating system has a unique set of file-naming ***conventions*.** Figure 4 lists the file-naming conventions for the current versions of Windows.

|  |  |
| --- | --- |
| Case sensitive | No |
| Maximum length of file name | File name and extension cannot exceed 255 characters |
| Spaces allowed | Yes |
| Numbers allowed | Yes |
| Characters not allowed | \* \ : < > | " / ? |
| File names not allowed | Aux, Com1, Com2, Com3, Com4, Con, Lpt1, Lpt2, Lpt3, Prn, Nul |

Fig. 4: Windows File-naming Conventions

DOS and Windows 3.1 limited file names to eight characters. With that limitation, it was often difficult to create ***descriptive*** file names As a result, files were sometimes difficult to ***locate*** and identify. Today, most operating systems allow you to use long file names.

Current versions of Windows support file names up to 255 characters long. That limitation includes the entire file path sometimes called a file specification—drive letter, folders, file name and extension.

**C:\My Music\Reggae\Marley One Love.mp3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Drive letter | Primary folder | Secondary folder | File name | File extension |

An operating system maintains a list of files called a directory for each storage disk, tape, CD, or DVD. The main directory of a disk is referred to as the **root** **directory**. A root directory can be subdivided into smaller lists. Each list is called a **subdirectory**. When you use Windows, Mac OS, or a Linux graphical file manager, these subdirectories are depicted as folders. Folders can be created within other folders. (See the example, mentioned above) A folder name is separated from a drive letter and other folder names by a special symbol. In Microsoft Windows, this symbol is the backslash (\). By storing a file in a folder, you ***assign*** it a place in an organized hierarchy of folders and files.

If an operating system attaches special ***significance*** to a symbol, you might not be able to use it in a file name. For example, Windows uses the colon (:) character to separate the device letter from a file name or folder, as in *C:Music.* When you use Windows applications, avoid using the symbols: \* \ < > | " / and ? in file names.

Some operating systems also contain a list of reserved words that are used as commands or special identifiers. You cannot use these words alone as a file name. Windows users should avoid using the following reserved words as file names: *Nul, Aux, Com1, Com2, Com3, Com4, Con, Lpt1, Lpt2, Lpt3,* and *Prn.*

Some operating systems are case sensitive, but not those you typically work with on personal computers. Feel free to use uppercase and lowercase letters in file names that you create on PCs and Macs.

You can also use spaces in file names. That’s a different rule than for e-mail addresses where spaces are not allowed. You’ve probably noticed that people often use underscores or periods instead of spaces in e-mail addresses such as Madi\_Jones@msu.edu. That convention is not necessary in file names, so a file name such as Letter to Madi Jones is valid.

A file extension is an optional file identifier that is separated from the main file name by a period, as in *Paint.exe.* With some operating systems, such as Windows, file extensions work like tickets that admit people to different plays, movies, or concerts. If a file has the right extension for a ***particular*** application program, you'll see it in the list of files you can open with that software. A file extension is related to the file format, which is defined as the ***arrangement*** of data in a file and the coding scheme used to represent the data. Files containing graphics are usually stored using a different **file** **format** than files containing text. Most software have a **native file format** (.doc for MSWord, .pdf for AdobeAcrobat etc.)

To designate a file’s location, you must first specify where the file is stored. Each of PC’s storage devices is identified by a device letter (A:, C:, D:) – a convention that is specific to DOS and Windows. A device letter is usually followed by a colon, so drive A could be designated as A: or as 3.5" Floppy (A:).

The main hard disk drive is usually referred to as “drive C.” Additional storage devices can be assigned letters D through Z. Although most PCs stick to the standard of drive A for the floppy disk drive and drive C for the hard disk drive, the device letters for CD, Zip, and DVD drives are not standardized.

A file contains data, stored as a group of bits. The more bits, the larger the file. **File size** is usually measured in bytes, kilobytes, or megabytes. ***Compared*** ***to*** small files, large files fill up storage space more quickly, require longer transmission times, and are more likely to ***be stripped* *off*** e-mail ***attachments*** by a mail server.

Your computer keeps track of the date that a file was created or last ***modified***. The **file date** is useful if you have created several versions of a file and want to make sure you know which version is the most ***recent***.

***Comprehension сheck*.** *Mark the following statements as True or False.*

1. When you create a file, you should give it a proper name according to file-naming conventions.

2. Windows limits the length of file names up to 265 characters.

3. Users must store a file in a folder to appoint it a place in a hierarchical structure of folders and files.

4. Operating systems add special significance to certain symbols that you should avoid in file names.

5. A file extension is a compulsory file identifier separated from the file name by a period.

6. The device letters for the floppy and hard disks are standardized.

***Vocabulary practice***

***1. Match up the words that are similar in meaning.***

|  |  |
| --- | --- |
| 1. stick; 2. particular; 3. contain;  4. conventions; 5. add importance;  6. be referred to as; 7. retrieve;  8. whole; 9. character; 10. assign;  11. proper; 12. arrangement; 13. alter. | a) attach significance; b) symbol;  c) layout; d)appoint; e) be defined as;  f) modify; g) valid; h) adhere; i) rules;  j) certain; k) include; l) strip off;  m) entire. |

***2. Fill in the blanks choosing out of the variants given.***

1. A valid file requires adhering to specific rules called file-naming … .

a) conditions b) conventions c) conversions d) contents

2. Drive letter, folders, file name and extension restrict the whole file path which is referred to as a file … .

a) location b) identification c) specification d) format

3. A list of files for each storage medium is defined as a … .

a) scheme b) directory c) modification d) application

4. … e-mail addresses, a valid file name may contain spaces.

a) instead of b) compared to c) like d) unlike

5. A native file format is supported by most …, e. g. .doc for MSWord.

a) processors b) hardware c) software d) servers

6. A character generally following a device letter is a … .

a) backslash b) period c) asterisk d) colon

7. If a user wants to find the most recent version of a created file, the file … will be useful.

a) name b) size c) date d) extension

8. The file format means the … of data and a coding scheme representing the data.

a) management b) attachment c) appointment d) arrangement

9. To pad storage space, files of a bigger size require … time than small file

a) more b) less c) higher d) lower

***3. Make two -word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: root B: words

maximum sensitive

application attachments

file directory

e-mail formats

reserved program

case length

1. Some operating systems which allow you to use uppercase and lowercase letters in file names are not … .

2. Large files can be easily stripped off … by mail server.

3. Graphical files and files containing text are saved in different … .

4. A … of file names is restricted in file-naming conventions.

5. The … is the main directory of a disk.

6. A file with the relevant extension for a particular … will be seen in the list of files of that software.

7. There are … that represent commands or special identifiers and can’t be used alone as a file name.

***4. Fill in the gaps in the text*.**

A computer \_\_\_ is a named collection of data that exists on a storage medium, such as a hard disk, floppy disk, CD, DVD, or tape. Every file has a name and might also have a file extension. The rules that specify valid file names are called \_\_\_. These rules do not allow you to use certain characters or \_\_\_ words in a file name. A file \_\_\_ is usually related to a file format - the arrangement of data in a file and the coding scheme used to represent the data. A software program’s \_\_\_ file format is the default format for storing files created with that program.

A file’s location is defined by a file \_\_\_ sometimes called a “path”, which includes the storage device, folder(s), file name and extension. In Windows, storage devices are identified by a \_\_\_ letter, followed by a colon. An operating system maintains a list of files called a \_\_\_ for each storage disk, tape, CD, or DVD. The main directory of a disk is sometimes referred to as the \_\_\_ directory, which can be subdivided into several smaller lists called subdirectories that are depicted as \_\_\_.

***Speaking.*** *Discuss the following questions.*

1. What is a computer file?
2. What are the rules for naming files?
3. Is there a maximum length for file names?
4. What is the purpose of folders?
5. Why are certain characters not allowed in a file name?
6. What are reserved words?
7. What is the difference between e-mail addresses and file names?
8. Are file extensions important?
9. How can you designate a file’s location?
10. What is the significance of a file’s size?
11. Why is the file date useful?

**Text B**

***Pre-reading.*** *Match the English words with their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. storage bin | a) рядок меню |
| 2. dialog box | b) індексний файл |
| 3. tip | c) діалогове вікно |
| 4. menu bar | d) сонет |
| 5. index file | e) запам'ятовуючий буфер |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***FILE MANAGEMENT***

File management encompasses any procedure that helps you organize your computer-based files so that you can find and use them more efficiently. Depending on your computer’s operating system, you can organize and manipulate your files from within an application program or by using a special file management ***utility*** the operating system provides.

**Application-based file management**

Applications, such as word processing software or graphics software, typically provide a way to open files and save them in a specific ***folder*** on a designated storage device. Take a look at an example of the file management capabilities in a typical Windows application — Microsoft Word.

As you type the document, it is held in RAM. If you want to save the document, you click File on the menu bar, and then select the Save As ***option***. The Save As dialog box opens and allows you to specify a name for the file and its location on one of your computer’s storage devices.

The difference between the two options is subtle, but useful. The Save As option allows you to select a name and storage device for a file, whereas the Save option simply saves the latest version of a file under its current name and at its current location. If you want to save a new file without a name, your application displays the Save As dialog box, even though you selected the Save option.

**Windows explorer**

As an example of a file management utility, take a closer look at **Windows** **Explorer**, a utility program bundled with the Windows operating system and designed to help you organize and manipulate the files stored on your computer.

The Windows Explorer window is divided into two “window panes” (see figure 5 on the following page).

In addition to locating files and folders, Windows Explorer provides a set of procedures that help you manipulate files and folders in the following ways:

- Rename

- Copy.

- Move. When you move a file, it is ***erased*** from its original location, so make sure you remember the new location of the file.

- Delete.

**File management tips**

The following tips pertain to managing files on your computer.

**-Use descriptive names.** Give your files and folders descriptive names, and avoid using cryptic abbreviations.

**-Maintain file extensions.** When renaming a file, keep the original file extension so that you can easily open it with the correct application software.

**- Group similar files.** Separate files into folders based on subject matter.

**- Organize your folders from the top down.** When devising a hierarchy of folders, consider how you want to access files and back them up.

**- Do not mix data files and program files**. Do not store data files in the folders that hold your software.

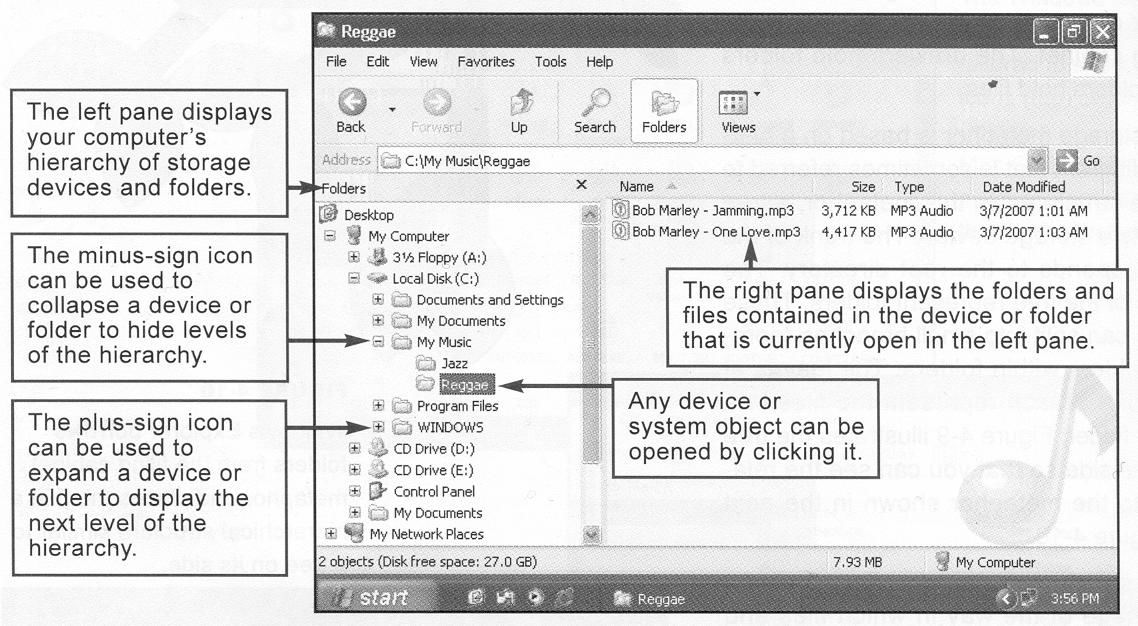


Fig. 5: The Windows Explorer window

**- Don’t store files in the root directory.** Although it is acceptable to create folders in the root ***directory***, it is not a good practice to store programs or data files in the root directory of your computer’s hard disk.

**- Access files from the hard disk.** For best performance, copy files from floppy disks or CDs to your computer's hard disk before ***accessing*** them.

**- Delete or archive files you no longer need.** Deleting unneeded files and folders helps keep your list of files from growing to an ***unmanageable*** size.

**- Be aware of storage locations.** When you save files, make sure the drive letter and folder name specify the correct storage location.

**- Back up! Back up your folders regularly.**

**Physical file storage**

Before a computer can store a file on a disk, CD, or DVD, the storage medium must be formatted. The formatting process creates the equivalent of electronic storage bins by dividing a disk into tracks and then further dividing each ***track*** into sectors. Tracks and sectors are ***numbered*** to provide addresses for each data storage bin. The numbering scheme depends on the storage device and the operating system. On floppy, Zip, and hard disks, tracks are ***arranged*** as concentric circles; on CDs and DVDs, one or more tracks spiral out from the center of the disk.

To speed up the process of storing and retrieving data, a disk drive usually works with a group of sectors called a **cluster** or a “block”. The number of sectors that form a cluster varies, depending on the capacity of the disk and the way the operating system works with files. A file system's primary task is to maintain a list of clusters and keep track of which are empty and which hold data. This information is stored in a special index file. If your computer uses the FAT32 file system, for example, this index file is called the **File Allocation Table** (FAT). If your computer uses NTFS, it is called the **Master File Table** (MFT).

When you save a file, your PC’s operating system looks at the index file to see which clusters are empty. It selects one of these empty clusters, records the file data there, and then revises the index file to include the new file name and its location.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text .*

1. It is preferable to maintain file extensions and not to store files in the root directory.

2. There is a slight difference between the Save option and the Save As option.

3. A special index file is required to keep track of a file’s location.

4. This program is related to the Windows operating system and exemplifies a file management utility.

5. The way to open and save a file on a specified storage medium depends on software applications.

6. Apart from locating files, it enables users to rename, copy, move and delete them.

***Vocabulary practice***

***1. Match up the words that are opposite in meaning.***

save distinct

empty display

additional include

subtle erase

hide basic

retrieve full

***2. Fill in the blanks choosing out of the variants given.***

1. To make storing and finding data fast, a disk drive deals with a … which is a group of sectors.

a) track b) bin c) cluster d) junction

2. You had better … cryptic abbreviations in files and folders.

a) give b) avoid c) access d) accept

3. You can avoid growing your list of files to an unmanageable size by … unnecessary files and folders.

a) saving b) deleting c) renaming d) moving

4. File … facilitates the process of organizing and manipulating your computer-based files.

a) location b) extension c) performance d) management

5. The operating system revises the index file to … the new file name and its location.

a) erase b) include c) number d) exclude

6. … a file is stored on a disk, CD, etc., the storage medium should be formatted.

a) before b) after c) while d) since

7. The pattern of … tracks and sectors is dependent on the storage medium and your PC’s operating system.

a) dividing b) selecting c) numbering d) arranging

***3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: file B: sign C: option

save storage utility

master management table

data file bin

plus as icon

1. If you want to select a name and a storage device for a file, the … should be used.

2. … are designated addresses by numbering tracks and sectors.

3. A special … provided by the operating system helps you manage your files efficiently.

4. The … is used to display the next level of your computer’s hierarchy of storage devices and folders.

5. The … is the index file supported by the NFTS file system.

***4. Fill in the gaps in the text.***

File \_\_\_ provides any procedure that can help you organize your computer-based files so that you can find and use them more \_\_\_. File management uses tools provided with a software program to open and save files. Additional tools might enable you to \_\_\_ new files and folders, rename files, and delete them. The Save and Save As \_\_\_ boxes are examples of these file management tools.

Before a computer stores data on a disk, CD, or DVD, it creates the equivalent of electronic storage \_\_\_ by dividing the disk into \_\_\_, and then further dividing the disk into \_\_\_. This dividing process is referred to as \_\_\_. Each sector of a disk is numbered, providing a storage address that the operating system can track. Many computers work with a group of sectors, called a \_\_\_, to increase the efficiency of file storage operations.

***Speaking.*** *Discuss the following questions.*

1. What does file management mean?

2. How does a software application help users manage files?

3. What is the difference between the Save option and the Save As option?

4. What is the example of a file management utility?

5. What is Windows Explorer designed for?

6 What can be done with the files and folders that are listed in Windows Explorer?

7. What file management tips should be followed while manipulating files?

8. What does the formatting process involve?

9. What is a cluster?

10. Is a file system’s primary or secondary task to keep track of which clusters keep data and which clusters don’t?

11. How does the operating system use an index file to help you save a file?

**Text C**

***Pre-reading.*** *Match the meaning of the following English words with their Russian equivalents.*

|  |  |
| --- | --- |
| computer virus | вірусний підпис |
| malicious code | Бот |
| boot sector virus | комп'ютерний вірус |
| macro virus | «Троянський кінь» |
| trigger event | перемикальна (тригерна) подія |
| Trojan horse | контрольна сума |
| Keylogger | клавіатурний шпигун |
| Bot | Макровірус |
| antivirus software | вірус сектора завантаження |
| Checksum | шкідливий код |
| virus signature | антивірусне програмне забезпечення |

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***Computer Viruses***

Viruses are one of the biggest ***threats*** to the security of your computer files. In 1981, there was one known computer virus. Today, the count exceeds 100,000. Between 900 and 1,300 new viruses appear every month.

A **computer virus** is a set of program instructions that attaches itself to a file, ***reproduces*** itself, and ***spreads*** to other files. The term “computer virus” is often used to refer to any ***malicious*** code or software that ***invades*** a computer system. The term malicious code (sometimes called “malware”) refers to a program or set of program instructions designed to surreptitiously enter a computer and disrupt its normal work. Many types of malicious code, including viruses, worms, and Trojan horses, are created and ***unleashed***by individuals referred to as “hackers” or “crackers”.

Viruses spread when people distribute ***infected*** files by exchanging disks and CDs, sending e-mail attachments, exchanging music on file-sharing networks, and downloading software from the Web. Many computer viruses infectfiles ***executed*** by your computer – files with extensions such as .exe, .com. or .vbs. When your computer executes an infected program, it also executes the attached virus instructions.

A virus can be classified as a file virus, ***boot*** sector virus, or macro virus. A file virus infects application programs, such as games. A boot sector virus infects the system files your computer uses every time you turn it on. These viruses can cause widespread ***damage*** to your computer files and recurring problems. A **macro** **virus** infects a set of instructions called a “macro” – a miniature program that usually contains ***legitimate*** instructions to automate document and worksheet production. When you view a document containing an infectedmacro, the macro virus duplicates itself into the general macro pool, where it is picked up by other documents. In addition to replicating itself, a virus might deliver a **payload**, which could be as harmless as displaying an annoying message or as devastating as ***corrupting*** the data on your computer’s hard disk. A trigger event, such as a specific date, can unleash some viruses. For example, the Michelangelo virus triggers on March 6, the birthday of artist Michelangelo.

A Trojan horse (sometimes simply called a “Trojan”) is a computer program that seems to perform one function while actually doing something else. Trojan horses are notorious for stealing passwords using a **keylogger** – a type of program that records your key-stroke.

Any software that can automate a task or autonomously execute a task when commanded to do so is called an intelligent agent. Because an intelligent agent behaves somewhat like a robot, it is often called a bot. Like a spider in its web, the person who controls many bot-infested computers can link them together into a network called a **botnet**. Botnets as large as 400,000 computers have been discovered by security experts.

**Malicious Code Trends**

|  |  |  |
| --- | --- | --- |
| **Date** | **Threats** | **Trends** |
| 1981 | Cloner | The first known virus begins to spread. Cloner infects files on disks formatted for Apple II computers. The prevalence of disk-borne viruses continues well into the1990s with Jerusalem (1987), Michelangelo (1992), and others. |
| 1988 | Internet Worm | The first major worm attack over the Internet sets the stage for today's prolific crop of mass-mailing worms. |
| 1998 | Back Orifice | First Trojan horse designed to allow a remote hacker to gain unauthorized access to a computer. |
| 1999 | Melissa | Macro viruses, such as Melissa and l.aroux, are ***prevalent*** for several years and cause trouble by infecting Microsoft Word and Excel files. |
| 2000 | Love Letter | One of the fastest spreading mass-mailing worms. Followed by Sobig, Blaster, and MyDoom (2004). |
| 2001 | Code Red | Worms designed for Denial of Service attacks gather steam. Code Red, which ***targeted*** the White House, is followed by Blaster (2001) and Slammer (2003). |
| 2002 | Klez | Klez is a mass-mailing worm that is particularly difficult to eradicate. Because the “From” address is spoofed, it is almost impossible to locate infectedcomputers. |
| 20Most notebook computers are equipped with several USB ports. 03 | Mimail | Social engineering takes center stage and users are confused by fake e-mails from seemingly legitimate companies, such as PayPal, Microsoft, and Wells Fargo. |
| 2004 | Sasser  Netsky  Xombe  MyDoom, Zafi  Bagle | Worms, such as Sasser, begin to emerge that infect computers without user interaction, such as opening an infectede-mail attachment. Mass-mailing worms are still most prevalent. Worms that spread over instant messaging and handheld devices begin to emerge. |
| 2005 | Mytob  Zotob  Rbot | Bots become one of the biggest security problems. Arriving as e-mail attachments, links embedded in e-mail messages, or from infected banner ads, bots install themselves on unprotected computers, which can then be controlled by unauthorized hackers and commandeered into botnets that launch spam and Denial of Service attacks |

These are the top three steps you can take to prevent your computer from becoming infected:

- Use antivirus software on every computing device you own.

- Keep software patches and operating system service packs up to date.

- Do not open ***suspicious*** e-mail attachments.

Antivirus software is a type of utility software that can look for and eradicate viruses, Trojan horses, bots, and worms. This essential software is available for handheld computers, personal computers, and servers. Popular antivirus software for personal computers includes McAfee VirusScan, Norton AntiVirus, and F-Secure Anti-Virus.

Antivirus software uses several techniques to find viruses. As you know, some viruses attach themselves to an existing program. The presence of such a virus often ***increases*** the length of the original program. The earliest antivirus software simply ***examined*** the programs on a computer and recorded their length. A change in the length of a program from one computing session to the next indicated the possible presence of a virus.

To counter early antivirus software, hackers became more cunning. They created viruses that insert themselves into unused portions of a program file without changing its length. Antivirus software developers fought back. They designed software that examines the bytes in an uninfected application program and calculates a checksum. A **checksum** is a number calculated by combining the binary values of all bytes in a file. Each time you run an application program, antivirus software calculates the checksum and compares it with the previous checksum. If any byte in the application program has changed, the checksum will be different, and the antivirus software ***assumes*** that a virus is present.

Today’s viruses, Trojan horses, bots, and worms are not limited to infecting program files, so modern antivirus software attempts to locate them by searching your computer’s files and memory for virus signatures. A **virus signature** is a section of program code, such as a unique series of instructions, that can be used to identify a known malicious program, much as a fingerprint is used to identify an individual.

***Comprehension check.*** *Choose the ending for each sentence from the two versions given.*

|  |  |
| --- | --- |
| 1. Worm named Code Red was targeted | a) White House;  b) Bank of Scotland. |
| 2. Any program designed to enter a computer and disrupt its normal operations is called | a) malicious code;  b) utility. |
| 3. Many types of malicious codes are created by | a) the computer itself;  b) individuals referred to as “hackers”. |
| 4. A boot sector virus infects the system files your computer uses | a) every time you turn it on;  b) when you are connected to the Internet. |
| 5. A change in the length of a program from one computing session to the next | a) indicated the possible presence of a virus;  b) is a result of operation system work. |
| 6. A checksum is | a) a number calculated by combining the binary values of all bytes in a file;  b) the cost of an antivirus program. |

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) virus, worm, Trojan horse, bot, file, botnet;

b) distribute, download, automate, infect, view, execute;

c) duplicates, instructions, infects, invades, behaves, spreads;

d) spider, programmer, hacker, user, server, developer;

e) individual, general, normal, personal, analytical, digital.

***2. Fill in the blanks choosing from the variants given.***

1. Does the term computer virus refer to any malicious code that … (*makes* *up/invades*) a computer system?

2. When your computer executes an infected program it … (*executes*/*deletes*) the attached virus instructions.

3. A trigger event, such as a specific date, can … (*kill/destroy/unleash*) some viruses.

4. Love letter is one of the … (*slowest/fastest*) spreading mass-mailing worms of all time.

5. Hackers created viruses that insert themselves into … (*used/unused*) portions of a program file without changing its length.

***3. Transform the given sentences using the word(s) in brackets without any change in meaning.***

1. A computer virus is a set of programs that attaches itself to a file (*connecting*).

2. If a document contains an infected macro, the macro virus duplicates itself into the general macro pool, where it is picked up by other documents (*doubles, selected*).

3. A virus might deliver a payload which could be both harmless and devastating (*do no harm, corrupt*).

4. Software that can automate a task when commanded to do so is called an intelligent agent (*is able, is instructed*).

5. A trigger event, such as a specific date, can unleash some viruses (*particular, release*).

6. Trojan horses are notorious for stealing passwords using a keylogger – a type of program that records your key-strokes (*known,* *a sort*)

***4. Fill in the gaps in the text.***

A computer virus is a set of program instructions that attaches itself to a file, reproduces itself, and spreads to the other files. You might encounter several types of viruses. A virus that attaches itself to an application program, such as a game utility, is known as a \_\_\_ virus. A boot \_\_\_ virus infects the system files your computer uses every time you turn it on. A \_\_\_ virus infects a set of instructions that automates document and worksheet production.

A Trojan horse is a computer program that seems to perform one function while actually doing something else. Such programs are notorious for stealing \_\_\_, although some delete files and cause other problems.

\_\_\_ software can help prevent viruses from invading your computer system and can root out viruses that that take up residence. This software typically scans for a virus \_\_\_ and is sometimes referred to as virus scanning software.

***Speaking.*** *Discuss the following questions.*

1. What is a computer virus?

2. How do viruses spread?

3. Are there different kinds of viruses?

4. What is a Trojan horse? What is a bot?

5. What is a botnet?

6. How can you avoid viruses and worms?

7. What is antivirus software? How does it work?

**Text D**

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***Data Backup***

**Backup and restore procedures**

Have you ever mistakenly copied an old version of a document over a new version? Has your computer's hard disk drive gone on the fritz? Did a virus wipe out your files? Has lightning “fried” your computer system? These kinds of data disasters are not rare; they happen to everyone. You can’t always prevent them, so you need a backup plan that helps you recover data that's been wiped out by operator error, viruses, or hardware failures.

A backup is a copy of one or more files that has been made in case the original files become ***damaged***. A backup is usually stored on a different storage medium from the original files. For example, you can back up files from your hard disk to a different hard disk, a writable CD or DVD: tape, floppy disk, or Web site.

A good backup plan allows you to ***restore*** your computing ***environment*** to its pre-disaster state with a minimum of fuss. Unfortunately, no single backup plan ***fits***everyone’s computing style or budget. You must ***devise*** your own backup plan that’s tailored to your particular computing needs.

A **full-system backup** contains a copy of every program, data, and system file on a computer. The advantage of a full-system backup is that you can easily restore your computer to its pre-disaster state simply by copying the backup files to a new hard disk. A full-system backup takes a lot of time, however, and automating the process requires a large-capacity tape backup device or a second hard disk drive.

A workable alternative to a full system backup is a “selective” backup that contains only your most important data files. The ***disadvantage*** of this backup strategy is that because you backed up only data files, you must manually reinstall all your software before restoring your data files.

If your strategy is to back up your important data files, the procedure can be simplified if you’ve stored all these files in one folder or its subfolders.

In addition to data files you create, a few other types of data files might be important to you. Consider making backups of these-files:

- Internet connection information

- E-mail folders

- E-mail address book

- Favorite URLs

- Downloads

Windows users often hear a ***variety*** of rumors about backing up the Windows Registry. The Registry, as it is usually called, is an important group of files the Windows operating system uses to store configuration information about all the devices and software installed on a computer system.

As simple as it sounds, backing up the Registry can present a bit of a problem because the Registry is always open while your computer is on. Windows users whose backup plans encompass all files on the hard disk must ***make sure*** their backup software provides an option for including the Windows Registry.

Your backup ***schedule*** depends on how much data you can ***afford*** to lose. If you’re working on an important project, you might want to back up the project files several times a day. ***Under normal use***, however, most people schedule a once-a-week backup. If you work with a To Do list, use it to remind yourself when it is time to make a backup.

Store your backups in a safe place. Don’t keep them at your computer desk because a fire or flood that damages your computer could also wipe out your backups. Storing your backups at a different location is the best idea, but at least store them in a room apart from your computer.

**Backup devices**

The backup device you select depends on the value of your data, your current equipment, and your budget. Most computer owners use what they have — a writable CD drive, Zip drive, or floppy disk drive.

The major disadvantage of backing up your data on CDs and DVDs is that the writing process is slow — slower than writing data to tape or a removable hard disk. Further, although it is ***feasible*** to back up your entire system on a series of CDs or DVDs, you would have to use special backup software, monitor the backup process, and switch disks occasionally. CDs and DVDs are more practical for backing up a select group of important data files.

Zip disks with 100 MB or 250 MB capacity are sufficient for backups of documents and most digital graphics files. Several 750 MB Zip disks might be enough for backing up all your data files and could be feasible for a full-system backup if you have not installed lots of application software.

A second hard disk drive is a good backup option — especially if it has equivalent capacity to your main hard disk. This capacity allows the backup process to proceed unattended because you won’t have to swap disks or CDs. Speed-wise, a hard disk is faster than tape, CD, or DVD drives. Unfortunately, like your computer’s main hard disk, a backup hard disk is susceptible to head ***crashes***, making it one of the least reliable storage options.

**Network and internet backup**

If your computer is connected to a local area network, you might be able to use the network server as a backup device. Before ***entrusting*** your data to a server, check with the network administrator to makesure you are allowed to store a large amount of data on the server. Because you might not want strangers to access your data, you should store it in a password-protected, non-shared folder. You also should makesure the server will be backed up on a regular basis so that your backup data won’t be wiped out by a server crash.

Several Web sites offer fee-based backup storage space. When needed, you can simply download backup files from the Web site to your hard disk. These sites are practical for backups of your data files, but space limitations and download times make them impractical for a full-system backup. Experts suggest that you should not rely on a Web site as your only method of backup. If a site goes out of business or is the ***target*** of a Denial of Service attack, your backup data might not be accessible.

**Backup software**

To make a backup, you can use **backup software** — a set of utility programs designed to back up and restore files. Backup software usually includes options that make it easy to schedule periodic backups, define a set of files that you want to regularly back up, and automate the restoration process.

Backup software differs from most copy routines because it typically compresses all the files for a backup and places them in one large file. Under the direction of backup software, this file can spread across multiple tapes if necessary. The file is indexed so that individual files can be located, uncompressed, and restored.

**Boot disks**

A ***boot*** disk is a floppy disk or CD containing the operating system files needed to boot your computer without accessing the hard disk. A barebones boot disk simply loads the operating system kernel. It is needed, if your hard disk fails or a virus wipes out the boot sector files on your hard disk, you will not be able to use your normal bootprocedure.

To create an MS-DOS boot disk, insert a blank floppy disk in drive A. Open My Computer or Windows Explorer, and then right-click the Drive A icon. Select Format and check the box labeled Create an MS-DOS startup disk.

***Сomprehension check.*** *Match the beginnings of the sentences in the first column with the endings in the second one.*

|  |  |
| --- | --- |
| 1. A backup is a copy of one or more files | a) to restore your computing environment to its pre-disaster state with a minimum of fuss. |
| 2. A good backup plan allows you | b) and automating the process requires a large capacity tape backup device or a second hard disk drive. |
| 3. You must devise your own backup plan | c) that is tailored to your particular computing needs. |
| 4. A full-system backup takes a lot of time | d) that has been made in case the original files become damaged. |
| 5. Your backup schedule depends on how much data | e) value of your data, your current equipment, and your budget. |
| 6 The backup device you select depends on the | f) you can afford to lose. |
| 7. If your computer is connected to a local area network | g) you might be able to use the network server as a backup device. |

***Vocabulary practice***

***1. Put the appropriate unscrambled words into the sentences on the right.***

|  |  |
| --- | --- |
| covreer  evitartalen  lailtsner  emagad  mumide | 1. Because you backed up only data files you must manually \_\_\_ all your software before restoring your data files.  2. You need a backup plan that helps you \_\_\_ data that’s been wiped out by operator error, viruses or hardware \_\_\_.  3. Store your backups in a safe place or a fire or flood that \_\_\_ your computer could also wipe out your backup.  4. A workable \_\_\_ to a full system backup is a selective backup that contains only your most important data files.  5. A backup is usually stored on a different storage \_\_\_ from the original files. |

***2. Fill in the blanks choosing from the variants given.***

1. A backup is usually … (*detected/stored*) on a different storage medium from the original files.

2. A workable alternative to a full system backup is a … (*selective/overall*) backup that contains only your most important data files.

3. Storing your backups at a different locations is … (*not a good/the best*) idea.

4. The backup device you select depends on … (*how much data you can afford to lose/the value of your data/your current equipment and your budget*).

5. A full-system backup … (*can be done in no time/takes a lot of time*).

6. Under normal use most people schedule … (*an everyday backup/once-a-week backup*).

***3. Match the beginnings and the endings of the instructions/steps given and put them into correct order.***

|  |  |
| --- | --- |
| 1. Your backup schedule depends on | a) that is tailored to your particular computing needs. |
| 2. No single backup plan fits | b) most people schedule a once-a-week backup. |
| 3. You can’t always prevent data disasters | c) how much data you can afford to use. |
| 4. You must devise your own backup plan | d) everyone’s computing style or budget. |
| 5. Under normal use | e) but at least store them in a room apart from your computer. |
| 6. The best idea is storing your backups at a different location | f) so you need a backup plan that helps you recover data that’s been wiped out. |

***4. Fill in the gaps in the text.***

A backup is a copy of one or more files that has been made in case the original files become damaged. For safety, a backup is usually stored on a different storage medium from the original files. A good backup plan allows you to \_\_\_ your computing environment to its pre-disaster state with a minimum of fuss.

No single backup plan fits everyone’s computing style or budget. Your personal backup plan depends on the files you need to back up, the hardware you have available to make backups, and your backup software. In any case, it is a good idea to back up the Windows \_\_\_ and make sure your files are free of \_\_\_. Backups should be stored in a safe place, away from the computer.

Backups can be recorded on floppy disks, writable CDs and DVDs, networks, Web sites, a second hard disk, or tapes. Many computer owners depend on writable CDs for backups, and use My Computer or Windows \_\_\_ to simply select files and copy files to the backup. \_\_\_ drives and backup software are typically used in business situations when a full-system backup is desirable. Backup software differs from most copy routines because it \_\_\_ all the files for a backup into one large file.

In addition to file backups, you should have a \_\_\_ disk containing the operating system files and settings needed to start your computer without accessing the hard disk.

***Speaking.*** *Discuss the following questions.*

1. Why do you need to make backups?

2. What are the major strategies and plans of backup? What does their choice depend on?

3. What are the advantages and disadvantages of different backup devices?

4. What can you say about network and internet backup?

5. What can you say about backup software?

6. What is a boot disk? How can it be created?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Computer Crime**

It doesn’t take any special digital expertise to mastermind some computer crimes. Setting fire to a computer doesn’t require the same finesse as writing a stealthy virus, but both can have the same disastrous effect on data. “Old-fashioned” crimes, such as arson, that take a high-tech twist because they involve a computer can be prosecuted under traditional laws.

Traditional laws do not, however, cover the range of possibilities for computer crimes. Suppose a person unlawfully enters a computer facility and steals backup tapes. That person might be prosecuted for breaking and entering. But would common breaking and entering laws apply to a person who uses an off-site terminal to “enter” a computer system without authorization? And what if a person copies a data file without authorization? Has that file really been “stolen” if the original remains on the computer?

Many countries have computer crime laws that specifically define computer data and software as personal property. These laws also define as crimes the unauthorized access, use, modification, or disabling of a computer system or data. But laws don’t necessarily stop criminals. If they did, we wouldn’t have to deal with malicious code and intrusions.

A 1995 high-profile case involved a computer hacker named Kevin Mitnick, who was accused of breaking into dozens of corporate, university, government, and personal computers. Although vilified in the media, Mitnick had the support of many hackers and other people who believed that the prosecution grossly exaggerated the extent of his crimes. Nonetheless, Mitnick was sentenced to 46 months in prison and ordered to pay restitution in the amount of $4,125 during his three-year period of supervised release. The prosecution was horrified by such a paltry sum – an amount that was much less than its request for $1,5 million in restitution.

Forbes reporter Adam L. Penenberg took issue with the 46-month sentence imposed by Judge Marianne Pfaelzer and wrote, “This in a country where the average prison term for manslaughter is three years. Mitnick’s crimes were curiously innocuous. He broke into corporate computers, but no evidence indicates that he destroyeddata. Or sold anything he copied. Yes, he pilfered software — but in doing so left it behind. This world of bits is a strange one, in which you can take something and still leave it for its rightful owner. The theft laws designed for payroll sacks and motor vehicles just don’t apply to a hacker.”

The U.S. Patriot Act and the Cyber-Security Enhancement Act carry even stiffer penalties – anywhere from 10 years to life in prison.

A CNET reporter questions the harshness of such penalties: “What bothers me most is that here in the United States, rapists serve, on average, 10 years in prison. Yet if, instead of assaulting another human being, that same person had released a virus on the Net, the criminal would get the same or an even harsher sentence.”

Law makers hope that stiff penalties will deter cyber criminals. U. S. Attorney John McKay is quoted as saying, “Let there be no mistake about it, cyber-hacking is a crime. It harms persons, it harms individuals, it harms businesses.

These cases illustrate our culture's ambivalent attitude toward computer hackers. On the one hand, they are viewed as evil cyberterrorists who are set on destroying the glue that binds together the Information Age. From this perspective, hackers are criminals who must be hunted down, forced to make restitution for damages, and prevented from creating further havoc.

From another perspective, hackers are viewed more as Casper the Friendly Ghost in cur complex cybermachines – as moderately bothersome entities whose pranks are tolerated by the computer community, along with software bugs. Seen from this perspective, a hacker's pranks are part of the normal course of study that leads to the highest echelons of computer expertise.

**What do you think?**

1. Should a computer virus distribution sentence carry the same penalty as

manslaughter?

1. Should it be a crime to steal a copy of computer data while leaving the original data in place and unaltered?
2. Should hackers be sent to jail if they cannot pay restitution to companies and

individuals who lost money as the result of a prank?

1. Do you think that a hacker would make a good consultant on computer security?

***Final test.*** *Do the tasks in the following test.*

1. A (n) \_\_\_ is a copy of one or more files that has been made in case the original files become damaged.

2. The Windows \_\_\_ is an important group of files that the Windows operating system uses to store configuration information about all the devices and software installed on a computer system.

3. The main directory of a disk is referred to as the \_\_\_ directory.

4. The main hard disk drive on a PC is often referred to as “drive C”. (*True/False*)

5. A filename extension is usually related to a file \_\_\_, which is the arrangement of data in a file and the coding scheme used to represent the data.

6. Antivirus software is 100% reliable when it comes to protecting your computer from viruses. (*True/False*)

7. A file specification or path typically includes all of the following information EXCEPT \_\_\_.

a) the file author b) the file name c) the file extension d) the drive letter

8. \_\_\_ software is a set of utility programs that looks for and eradicates viruses, worms, and Trojan horses.

9. File-naming \_\_\_ are a set of rules for naming files.

10. The easiest way to convert a file from one format to another is to find an application program that works with both file formats. (*True/False*)

11. Deleting a file’s icon from a directory does not necessarily remove the data from the disk. (*True/False*)

12. A computer \_\_\_ is a set of program instructions that attaches itself to a file, reproduces itself, and spreads to other files.

13. A root directory typically contains smaller \_\_\_, often depicted as folders in graphical user interfaces.

14. A (n) \_\_\_ is a computer program that seems to perform one function while actually doing something else.

15. A virus can be spread if people distribute infected files by \_\_\_.

a) exchanging disks or CDs b) sending e-mail attachments

c) downloading software from the Web d) all of the above

16. You should update your antivirus software regularly. (*True/False*)

17. Bot-infected computers linked together into a network is called a(n) \_\_\_.

18. A virus \_\_\_ is a section of the virus program that can be used to identify a known virus.

19. Computer virus trigger events are often tied to a specific date. (*True/False*)

20. The file \_\_\_ helps you keep track of the most current version of your file when you have saved several versions.

***Projects.*** *Choose and perform one of the projects given.*

1. Select one of the following statements and argue for or against it:

- People have the “right” to hone their computing skills by breaking into computers.

- A person who creates a virus is perfectly justified in releasing it if the purpose is to make everyone aware of these security breaches.

- Computer crimes are no different from other crimes, and computer criminals should be held responsible for the damage they cause.

2. Suppose you are a reporter for a local television station. Your assignment is to create a 90-second story about new emerged virus for your local TV news show. The basic objectives of the story are (1) to inform about the ways of spreading this virus and attributes that enable a person to find out presence of this particular virus and (2) to provide a set of concrete steps that a person could take to minimize the consequences for his computer and get rid of the virus. Of course, the network wants the story to be interesting, so you have to include a human-interest angle. Write the script for the story and include notes about the visuals that will appear.

***Unit 5.* internet and lan TECHNOLOGY**

**Text A**

***Pre-reading.*** *Match the terms with the appropriate definitions.*

Protocols Functions

HTTP(Hypertext Transfer Protocol) - responsible for address packets

FTR (File Transfer Protocol) - breaks a message or file into packets

POP (Post Office Protocol) - allows users who are logged on to one host to access another host

TCP (Transmission Control Protocol) - provides secure data transfer over the

Internet

IP (Internet Protocol) - transfer mail from an e-mail server to a

client Inbox

SMTP (Simple Mail Transfer Protocol) - exchanges information over the Web

IMAP (Internet Mail Access Protocol) - transfers e-mail messages from client

computers to an e-mail server

TELNET (Telecommunication Network) - transfers files between local and remote

host computers

SSL ( Secure Sockets Layer) - an alternative to POP

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***INTERNET TECHNOLOGY***

In 1969 was developed a project called APRANET designed to help scientists communicate and share valuable computer resources.Educators and scientists used primitive command-line user interfaces to send e-mail, transfer files and run scientific ***calculations*** on Internet supercomputers. At that time finding the information was not easy. Only in the early 1990s software developers сreated new user-friendly Internet access tools and Internet became available to anyone. Although exact figure cannot be determined, it is estimated that with approximately 200 ***nodes*** and 500 million users, Internet traffic exceeds 100 terabytes each week.

The Internet is not “owned” or ***operated by*** any single corporation or government. It’s a data communication network that grew over time in a somewhat haphazard configuration as networks connected to other networks.

The Internet ***backbone*** consists of ***high-speed*** fiber-optic links connecting high-capacity routers that direct network traffic. Backbones links and routers are maintained by **network service providers (NSPs)**. NSP equipment and links ***are tired*** together by **network access points** (**NAPs**).

Large ISPs connect directly to backbone ***routers***. Smaller ISPs typically connect to a larger ISP to gain Internet access and supply it to their customers.

You can track the route of data you send using Internet utilities, such as **Ping** and **Traceroute.** An Internet utility called Ping (Packet Internet Groper) sends a signal to a specific Internet address and waits for a reply. If a reply arrives, Ping reports that the computer is online and displays the ***elapsed time*** for the round-trip message. Ping is useful for ***finding out*** if the site ***is up*** and running. Ping is also useful for determining whether a connection offers adequate speed for videoconferencing or online computer games.

Ping also shows whether packets were lost in transmission. Packets can become lost when signal ***interference*** or network ***congestion overwhelms*** Internet servers and routers. Too many lost packets during an online gaming session can cause the game to stutter or stall. And if packets don’t arrive in the correct order, your game character might seem to act randomly for a few seconds.

A utility called Tracerouter records a packet’s path-including intermediate routers-from your computer to its destination.

An ISP operates network devices that handle the physical aspects of transmitting and receiving data from your computer. Many ISPs operate e-mail servers to handle incoming and outgoing mail for their subscribers and some also have Web servers for subscriber Web sites. ISPs can also maintain servers for chat groups, instant messaging, music file sharing, FTR (File Transfer Protocol) and other file transfer services.

Computer connects to the Internet in one of two ways: it can link directly to ISP using a device such as a ***voiceband modem***, cable modem, ***satellite*** dish, or DSL modem. Or, if your computer is part of a LAN, an Internet connection can be provided by a LAN link.

A local area network is called an **intranet**. Intranets are popular with businesses that want to store information as Web pages but not provide them for ***public*** access. An intranet that provides external access is called **extranet**.

A computer can have a permanently assigned **static IP address** or a temporally assigned **dynamic IP address**. As a general rule, computers on the Internet that act as servers use static IP address. Typically, ISPs, web sites, web hosting services, and e-mail servers are constantly connected to the Internet and require static addresses.

Although IP addresses work for communication between computers, people find it difficult to remember long string of numbers. Therefore, many Internet servers also have an easy-to-remember name, i. e. *nike.com* . The official term for this name is “fully qualified domain name” (FQDN), but most people just refer to it as a **domain name**. Every domain name ***corresponds to*** a unique IP address that has been entered into a huge database called the Domain Name System( DNS).Computers that host this database are referred to as domain name servers. A domain name, such as *travelocity.com*, must be converted into an IP address before any packets can be routed to it.

The Domain Name System is based on a ***distributed database***. This database is not stored as a whole in any single location; instead, it exists in parts all over the Internet. Your Internet connection is set up to access one of the many domain servers that ***reside on*** the Internet. Some domain names are not currently in use, but they are reserved. Internet entrepreneurs have made a business of registering high-profile domain names with the intention of reselling them.

***Comprehension check.*** *Mark the following statements as True or False.*

1. The Internet backbone consists of high-speed fiber-optic links.

2. A local area network is called extranet.

3. A computer must have a permanently assigned static IP address.

4. The Internet is not “owned” by any single corporation or government.

5. Computer connects to the Internet only by linking directly to ISP.

6. You can track the route of data you send using Internet utilities, such as Ping and Traceroute.

***Vocabulary practice***

***1. Match the words with their synonyms.***

computations congestion

knot node

connect find out

run calculations

overloading tire

learn base

backbone to be up

***2. Fill in the blanks choosing from the variants given.***

1. The Internet is not … a single company or country.

a) controlled b) operated by c) correspond to

2. The Internet backbones links and … are supported by network service providers.

a) wires b)connectors c) routers

3. Intranet allows businesses to store information but not provide them for … .

a) anyone b) public c) other companies

4. Pockets can be lost if network congestion … Internet services.

a) overwhelms b) corrupts c) stops

5. Each Internet server’s name … a the only IP address.

a) is converted into b) corresponds to c) acts as

6. Internet connection is set up access domain servers that … on the Internet.

a) reside b) exist c) register

***3. Make two-word combination using the words in columns and then fill in the gaps in the following sentences.***

A: distributed B: modem

elapsed name

voiceband dish

dynamic interference

domain database

signal time

satellite address

1. Packets can become lost when … or network congestion overwhelms Internet routers.

2. Ping reports that the computer is online and displays the … for the message.

3. Most people refer to the name of many Internet servers as a … .

4. A computer can have either or permanent static address or a temporal … .

5. A … exists in parts all over the Internet.

6. … and … are used for direct connection of a computer to ISP.

***4. Fill in the gaps in the text.***

Network service providers supply \_\_\_ links for the Internet backbone. The acronym \_\_\_ refers to points were equipment and \_\_\_ from this companies intersect.

An Internet utility called \_\_\_ helps you discover whether a host, such as web server is “alive”. This utility reports the \_\_\_ for a packet to travel from your computer to the host and back. Another utility, called \_\_\_, records the path of a packet as it travels from your computer to its destination. Most people access the Internet through an ISP, which provides modems, e-mail servers, domain name servers, and \_\_\_.

***Speaking.*** *Discuss the following questions*.

1. How did the Internet get started?
2. How is the Internet structured?
3. Is it possible to track data as it travels over the Internet?
4. What kinds of network devices are part of an ISP?
5. What’s a domain name?

**Text B**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***INTERNET ACCESS***

One of the most ***challenging*** aspects of the Internet is selecting a connection. Although most subscribers begin with dial-up connection, many soon explore high-speed Internet options. ***Home based*** LANs and ***wireless*** Internet access have become very popular.

A dial-up connection uses **POTS (plain old telephone services)** to transport data between your computer and your ISP. With a dial-up connection, your computer’s modem essentially places a regular telephone call to your ISP, when the ISP’s computer “answers” your call, a ***dedicated circuit*** is established between you and your computer. This circuit remains connected for the ***duration*** of your call and provides a communication link that caries data between your computer and the ISP.

The modem, you use with this type of connection, ***converts*** the signals from you computer into signals that can travel over the telephone lines. The word “modem” is derived from the words “modulate” and “demodulate”. In communication terminology, **modulation** means changing the characteristics of a signal, as when a modem changes a digital pulse into an analog audio signal. **Demodulation** means changing a signal back to its original state, as when a modem changes an audio signal back to a digital.

Another option for Internet connection is cable Internet service; with it your cable TV company becomes your Internet provider. In order to provide this type of connection, satellite dishes are installed; usually they are installed for a community and are referred to as the **head-end.** From the head-end, a cabling system branches out, offering both television and Internet access. Bandwidth of each cable is divided among three activities: TV channels, downstream data (the data you receive) and upstream data (the data you send).Cable Internet service plans offer speeds up to 6 Mbps.

With this connection your computer becomes part of a neighborhood data network and in this case two issues become significant: ***bandwidth*** and security. Unlike a dial-up connection, cable Internet service provides an **always-on connection**, which is particularly ***vulnerable*** to hackers and virus attacks. As for the second issue, the cable you share with your neighbors has a certain amount of bandwidth, and as more people use the service, it might seem to get slower and slower.

Other options, such as DSL and ISDN, could be chosen to get a high-speed Internet access. DSL (digital subscriber line) is a high-speed, digital, always-on, Internet access technology that runs over standard phone lines. It is one of the fastest Internet connections that’s affordable to individual consumers. Several variations of this technology exist, including ADSL (asymmetric DSL, with ***downstream*** speed faster than ***upstream*** speed). DSL is digital, so data doesn’t need to be changed into analog form and then back to digital as it does when you use a dial-up connection. A DSL can simultaneously carry voice and data, if permitted by DSL provider.

ISDN (Integrated Service Digital Network) is an all digital service with the potential to simultaneously carry voice and data. ISDN is not fast as DSL or cable Internet service but faster than a dial-up connection. A device called an **ISDN terminal adapter** connects a computer to a telephone wall jack and translated the computer’s digital signals into signals that can travel over the ISDN connection. ISDN service is typically regarded as a high-speed Internet connection option for businesses that maintain small LANs.

There are two primary options for getting a wireless access of your home PC or LAN to the Internet: satellite Internet service or fixed wireless Internet service. Satellite Internet service uses a satellite to transmit computer data directly to and from a satellite dish, owned by and individual. A satellite modem connects the satellite dish to a computer. In many areas, satellite Internet service is the only alternative to a dial-up connection. But on the downside, satellite data transport is subject to ***latency*** delays of one second or more, which occur as your data is routed between your computer and the satellite that orbits the Earth 22.200 miles above the Earth. Satellite transmission and reception can be blocked by ***adverse*** weather conditions, which make this type of data transport less ***reliable*** than most wired options.

Fixed wireless Internet service is designed to offer Internet access to homes and businesses by broadcasting data signals over areas large enough to cover most cities and ***outlying*** areas. Wireless technologies have less latency than satellite Internet service and can offer connection speeds suitable for online gaming and teleconferencing.

Also it is possible to connect to the Internet through LAN. LAN provides a ***cost-effective*** way to share one Internet connection among several computers. School computer labs and businesses usually provide access over LANs. LAN Internet access is also ***feasible*** for home networks. A single cable Internet, DSL, ISDN, or satellite connection can be cabled into your home LAN and accessed by all its workstations.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text.*

1. If a TV company has necessary equipment it can act as an Internet provider.

2. A lot of people soon switch from dial-up they use at the beginning to other types of connection.

3. If it’s allowed by provider, DSL can transmit both voice and data.

4. Satellite Internet service depends on the weather conditions.

5. With cable Internet service your computer is always connected to the Internet.

6. One of the cheapest ways to share Internet connection is LAN.

***Vocabulary practice***

***1. Match up the words that are opposite in meaning.***

always-on relaxing

outlying insecure

challenging favourable

feasible unstable

reliable close

adverse unsuitable

***2. Fill in the blanks choosing from the variants given.***

1. With a dial-up connection, a modem … the signals from your computer into signals that can be carried over the phone lines.

a) converts b) passes c) spreads

2. Using a satellite Internet service you can meet with … delays of a second or more.

a) established b) latency c) elapsed

3. When a modem changes the characteristics of a signal it means that … is carried out.

a) transformation b) modulation c) conversion

4. If you choose cable Internet service you should remember that it provides an always-on connection that makes your PC … to viruses and hackers.

a) protected b) unseen c) vulnerable

5. In a dial-up connection, modem places a call to your ISP and you are remained connected with it for the … of you call.

a) duration b) whole c) most part

6. One of the most popular options to have high-speed Internet access is ADSL. In it … speed is slower then … speed.

a) downstream a) upstream

b) initial b) downstream

c) upstream c) terminal

***3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: wireless B: communication C: speed

home terminal circuit

suitable Internet LANs

established connection adapter

SDN based access

provide dedicated link

1. Satellite Internet service is one of the options of getting … .

2. If you like to play online computer game it’s advisable for you to get fixed wireless Internet service since it can offer … for online gaming.

3. Recently … have become one of the most popular way of getting Internet access.

4. With a dial-up connection, when the computer of ISP ”answers” the call of your computer’s modem, you get so called … between you and ISP.

5. To translate the computer’s digital signal into signals that can travel over the ISDN connection you need a device called … .

6. An established dedicated circuit is used to … that caries data between the subscriber’s computer and ISP.

***4. Fill in the gaps in the text*.**

A cable modem provides Internet access over the TV cables that carry television signals from the cable company’s \_\_\_ to your home. With this connection two issues become significant: security and \_\_\_.

With \_\_\_ connections, such as DSL and cable, the \_\_\_ can enter the Internet any time his computer is turned on. \_\_\_ Internet service provides another high-speed Internet access method, but it has higher latency \_\_\_.

Nowadays you can get Internet access through LANs. Besides, LAN is considered to be really \_\_\_ way to share one Internet connection among several computers.

***Speaking.*** *Discuss the following questions*.

1. How does a modem work?
2. What is the significance of becoming part of a “neighborhood network”?
3. What is DSL?
4. What are options for wireless Internet access?
5. What are the pros and cons of satellite Internet service?

**Text C**

***Pre-reading*.** *Match the meaning of the following English words and their Ukrainian equivalents.*

|  |  |
| --- | --- |
| 1. Hypertext Markup Language (HTML) 2. Uniform Resource Locator (URL) 3. Web-Hypertext Transfer Protocol (HTTP) 4. hypertext link 5. “Surfing” (the Internet) 6. Browser 7. File Transport Protocol (FTP) 8. E-mail server 9. Web site 10. HTML-tags | * 1. Протокол передачі файлів;   2. браузер, програма перегляду сайтів (Web);   3. «подорожування» по сайтах (сьорфінг);   4. Web-вузол (сайт–розмов.) сторінка, яка відображається в браузері;   5. Уніфікований вказівник інформаційного ресурсу;   6. мова гіпертекстової розмітки;   7. сервер електронної пошти;   8. «тег» – елемент коду розмітки документа;   9. протокол передачі гіпертексту;   10. гіпертекстова зноска; |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***THE WORLD WIDE WEB***

The **World Wide Web** began in 1989 as a project by high-energy physics researchers in Switzerland to distribute research Internet to fellow physicists. Since then, the **Web** has rapidly moved into the forefront of Internet technologies. More people use the Web on the Internet than all other technologies on the Net combined. To most of the general public, the Web is synonymous with the Internet itself and is, in fact, thought by many to have played the dominant role in moving the Internet from an academic research tool to a household word.

The Web is an abstract (imaginary) space of information. On the Web, you find documents, sounds, videos, and information. On the Web connections are **hypertext** **links**. The Web uses a writing technology called hypertext. A hypertext is a group of unlinked files. Hypertext is a ***key concept*** for understanding today’s Web, but the idea of hypertext originated much earlier than the Web or even the Internet. Two of the most important elements of the Web-**Hypertext Transfer Protocol** (**HTTP**) and **Hypertext Markup Language** (**HTML**) – contain “hypertext” in their names.

HTTP is a protocol that works with **TCP/IP** (Transmission Control Protocol/Internet Protocol) to get Web resources to your desktop. A web resource can be defined as any chunk of data that has a URL, such as an HTML document, a graphic, or a sound file. HTTP includes commands called “methods” that help your **browser** communicate with web servers. GET is the most frequently used HTTP method. The GET method is typically used to ***retrieve*** the text and graphics files necessary for displaying a Web page. This method can also be used to pass a **search** **query** to a file server. HTTP transports your browser’s ***requests*** for a Web resource to a Web server. Next, it transports the Web server’s response back to your browser.

HTML is a set of specifications for creating HTML documents that a browser can display as a Web page. HTML is called a ***markup language*** because authors mark up their documents by inserting special instructions, called HTML tags, that specify how the document should appear when displayed on a computer screen or printed.

On today’s Web, many aspects of hypertext have become a reality. A typical Web page is based on a document stored in a file and identified by a unique address called a **URL** (**Uniform** **Resource** **Locator**). To **access** any one of these documents, you can type its URL. You can also click an underline word or phrase called a hypertext link (or simply a “link”) to access related Web pages.

HTTP and HTML are two of the major ingredients that define the Web. If you add URLs, browsers, and Web servers to this recipe, you’ll have a pretty complete menu of the basic technologies that make the Web work.

A **web** **server** ***stores*** data from Web pages that form a Web site. One way to store data for a Web page is as a file called an HTML document – a plain text, document with embedded **HTML tags**. Some of these tags ***specify*** how the document is to be displayed when viewed in a browser. Other tags contain links to related document, graphics, sound, and video files that are stored on Web servers.

As an alternative to HTML documents, Web servers can store Web page data in other types of files, such as **databases**. Data from product databases, college course schedules, and music catalogues can be assembled into HTML format “on the fly” in response to ***Web requests***.

To ***surf*** the Web, you use Web client software called a browser. When you type a URL into the browser’s ***Address box***, you are requesting HTML data for a specific Web page. Your browser ***creates*** a request for the data by using the HTTP “GET” command.

A Web server is configured to include ***HTTP*** ***software***. This software is always running when the server is “up” and ready to fulfill requests. One of the server’s ports is dedicated to listening for HTTP requests. When a request arrives, the server software analyzes it and takes whatever action is necessary to fulfill it.

The computer that runs Web software might have other software running on it as well. For example, a computer might operate as a Web server, as an e-mail server, and as an **FTP** (**File Transport Protocol**) server all at the same time! To efficiently ***handle*** these diverse duties, a computer devotes one port to HTTP requests, one port to handling e-mail, and another port to FTP requests.

A browser is a software program that on your computer and helps you access Web pages. Technically, a browser is the client half of the client/server software that ***facilitates*** communication between a personal computer and a Web server. The browser is installed on your computer, and Web server software is ***installed*** on servers connected to the Internet.

Your browser plays two key roles. First, it uses HTTP to send messages to a Web server – usually a request for a specific HTML document from Web server, your browser ***interprets*** the HTML tags to display requested Web page. Today’s popular browsers are Internet Explorer, Mozilla Firefox, Opera, Google Chrome.

A Web site is a group of ***related*** Web pages. The Web site is the **master address**, and the individual Web pages are like ***subdirectories*** to that root ***directory***. Many business are creating Web sites for their customers to use. These sites may include price list, information about products, and comparisons of product features with those of competing products. Many sites even allow customers to order products over the Web. Because your site is representing you on the Web, you will want the site to look impressive. For a professional-looking site, you may want to hire a firm that creates Web sites. Such firms employ HTML experts as well as graphic designers and marketing specialists.

***Comprehension check.*** *Choose the ending for each sentence from the two versions given.*

1. One way to store data for a web page is

a) a file called an HTML document.

b) a unique address called a URL.

2. Some of these tags specify how the document is

a) to be displayed when viewed in a browser.

b) to be identified by a unique address.

3. Business sites may include

a) price list, information about products and comparisons of product features with those of competing products.

b) related document, graphics, sound and video files.

4. HTTP is

a) a protocol that works with TCP/IP to get Web resources to your desktop.

b) a set of specifications for creating HTML documents that a browser can display as a Web page.

5. Your browser creates a request for the data by

a) using the HTTP “GET” command.

b) using Web pages.

6. The Get method can be used to

a) pass a search query to a file server.

b) listen for HTTP requests.

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) documents, specifications, protocols, commands;

b) file, database, data, directory;

c) screen, display, desktop, browser;

d) connections, links, addresses, sites;

e) query, request, response, port.

***2. Complete the sentences using one of the given endings.***

|  |  |
| --- | --- |
| 1. The WWW began as 2. HTTP is a protocol that works with 3. HTML is called a markup language because 4. A typical Web page is based on 5. A browser is a software program that runs 6. As an alternative to HTML documents, Web server can store | * 1. Web page data in other types of files, such as databases.   2. on your computer and helps you access Web pages.   3. a document stored in a file and identified by a unique address called URL.   4. authors mark up their documents by inserting special instructions, called HTML tags.   5. TCP/IP to get Web resources to your desktop.   6. a project by high-energy physics researches in Switzerland. |

***3. Transform the given sentences using the word in brackets without any change in the meaning.***

1) When you type a … into the browser’s address box, you are requesting HTML data from a specific Web page.

a) HTML b) URL c) HTTP d) TCP

2) A … is a software program that runs on your computer and helps you access Web pages.

a) Web server b) e-mail server c) FTP server d) browser

3) Your browser creates a … for the data by using the HTTP “GET” command.

a) response b) request c) message d) instruction

4) Technically, a browser is the client half of the client/server software that facilitates communication between a personal computer and a… .

a) Web server b) e-mail server c) FTP server d) web site

5) HTML is a set of specifications for creating … that a browser can display as a Web page.

a) HTML documents b) graphics c) sound d) video files

***4. Fill in the gaps with appropriate words.***

Many software tools are available today that make it easy to create Web pages. A Web page author can use a \_\_\_ editor, such as Notepad, to create Web pages “from scratch” by manually embedding HTML tags within the text of a document. It is also possible to use the HTML conversion routines included with many standard software applications. Another route is to use specialized Web \_\_\_ software, such as Microsoft FrontPage.

An HTML document is divided into two sections. The \_\_\_ section contains information used to define global properties for the document. The \_\_\_ section contains the text you want the browser to display, the HTML tags that format the text, and a variety of links. In addition to embedding HTML tags within the text, a Web page can be formatted with a \_\_\_ style sheet, which allows Web page designers to change formats throughout an HTML document without modifying individual HTML tags. To control the position of text and graphics on a Web page, many authors place these elements in the cells of a Web page \_\_\_.

**Text D**

***Pre-reading.*** *Match the meaning of the following English words and their Ukrainian equivalens.*

|  |  |
| --- | --- |
| 1. search engine; 2. content; 3. SEO (search engine optimization); 4. marketing; 5. database; 6. relevance; 7. indexing; 8. root directory; 9. web masters; 10. domain; 11. (to) parse; 12. spam. | * 1. маркетинг, торгівля;   2. ступінь відповідності;   3. база даних;   4. індексація;   5. кореневий каталог;   6. практично непотрібна інформація;   7. зміст, інформаційне наповнення;   8. розбір;   9. домен;   10. оптимізація пошукових систем;   11. пошукова програма;   12. розробник Web-сторінок; |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***SEARCH ENGINE OPTIMIZATION***

To find information on the **Web**, you may need to use a **search engine**. A search engine is a piece of software that gives you the ability to search for ***Internet*** ***resources***. Search engines are usually accessed through Web ***browser software***. Each search engine provides different ***searching options*** and has its own look. Search engines also differ greatly in the number of resources they allow you to search. Some search engines have both searching and ***browsing capabilities***. The major search engines are Google, Yahoo and Yandex.

If you want to promote your website in the search results of the major search engines, you should use **SEO** (**search engine optimization**). Search engine **optimization** is the process of improving the volume and quality of ***traffic*** to a [web site](http://en.wikipedia.org/wiki/Web_site) from [search engines](http://en.wikipedia.org/wiki/Search_engine) via “natural” (“organic” or “algorithmic”) [search results](http://en.wikipedia.org/wiki/Search_engine_results_page). Usually, the earlier a site is presented in the search results, or the higher it “ranks,” the more searchers will visit that site. SEO can also ***target*** different kinds of search, including [image search](http://en.wikipedia.org/wiki/Image_search), [local search](http://en.wikipedia.org/wiki/Local_search_%28Internet%29), and industry-specific [vertical search](http://en.wikipedia.org/wiki/Vertical_search) engines.

As an [Internet marketing](http://en.wikipedia.org/wiki/Internet_marketing) strategy, SEO considers how search engines work and what people search for. Optimizing a website primarily involves editing its **content** and **HTML** **coding** to both increase its relevance to specific ***keywords*** and to remove barriers to the [***indexing*** activities](http://en.wikipedia.org/wiki/Web_crawler) of search engines.

The acronym “SEO” can also refer to “search engine optimizers”, a term adopted by an industry of [consultants](http://en.wikipedia.org/wiki/Consultants) who carry out optimization projects on behalf of clients, and by employees who perform SEO services in-house. Search engine optimizers may offer SEO as a stand-alone service or as a part of a broader marketing campaign. Because effective SEO may require changes to the [HTML](http://en.wikipedia.org/wiki/HTML) source code of a site, SEO tactics may be incorporated into web site development and [design](http://en.wikipedia.org/wiki/Web_site_design). The term “search engine friendly” may be used to describe web site designs, [menus](http://en.wikipedia.org/wiki/Menu_%28computing%29), [content management systems](http://en.wikipedia.org/wiki/Content_management_systems) and [shopping carts](http://en.wikipedia.org/wiki/Shopping_cart_software) that are easy to optimize.

The leading search engines use [**crawlers**](http://en.wikipedia.org/wiki/Web_crawler) to find pages for their algorithmic search results. Pages that are linked from other search engine indexed pages do not need to be submitted because they are found automatically. Some search engines operate a paid submission service that guarantee crawling for either a set fee or [cost per click](http://en.wikipedia.org/wiki/Pay_per_click). [Search engine](http://en.wikipedia.org/wiki/Web_search_engine) crawlers may look at a number of different factors when [crawling](http://en.wikipedia.org/wiki/Web_crawler) a site. Not every page is indexed by the search engines. Distance of pages from the **root directory** of a site may also be a factor in whether or not pages get crawled.

To avoid undesirable content in the search indexes, webmasters can instruct ***spiders*** not to crawl certain files or directories through the standard [robots.txt](http://en.wikipedia.org/wiki/Robots.txt) file in the root directory of the ***domain***. Additionally, a page can be explicitly excluded from a search engine’s database by using a [meta **tag**](http://en.wikipedia.org/wiki/Meta_tag) specific to robots. When a search engine visits a site, the robots.txt located in the [root directory](http://en.wikipedia.org/wiki/Root_directory) is the first file crawled. The robots.txt file is then parsed, and will instruct the robot as to which pages are not to be crawled. As a search engine crawler may keep a cached copy of this file, it may on occasion crawl pages a webmaster does not wish crawled. Pages typically prevented from being crawled include login specific pages such as shopping carts and user-specific content such as search results from internal searches. In March 2007, Google warned webmasters that they should prevent indexing of internal search results because those pages are considered ***search spam***.

SEO techniques can be classified into two broad categories: techniques that search engines recommend as part of good design, and those techniques of which search engines do not approve. The search engines attempt to minimize the effect of the latter, among them [**spamdexing**](http://en.wikipedia.org/wiki/Spamdexing). Industry commentators have classified these methods, and the practitioners who employ them, as either [white hat](http://en.wikipedia.org/wiki/White_hat) SEO, or [black hat](http://en.wikipedia.org/wiki/Black_hat) SEO. White hats tend to produce results that last a long time, whereas black hats anticipate that their sites may eventually be banned either temporarily or permanently once the search engines discover what they are doing.

An SEO technique is considered white hat if it conforms to the search engines’ guidelines and involves no deception. As the search engine guidelines are not written as a series of rules or commandments, this is an important distinction to note. White hat SEO is not just about following guidelines, but is about ensuring that the content a search engine indexes and subsequently ranks is the same content a user will see. White hat advice is generally summed up as creating content for users, not for search engines, and then making that content easily accessible to the spiders, rather than attempting to trick the algorithm from its intended purpose. White hat SEO is in many ways similar to web development that promotes **accessibility**, although the two are not identical.

[Black hat SEO](http://en.wikipedia.org/wiki/Spamdexing) attempts to improve rankings in ways that are disapproved of by the search engines, or involve deception. One black hat technique uses a text that is hidden, either as a text colored similar to the background or positioned off screen. Another method gives a different page depending on whether the page is being requested by a human visitor or a search engine, a technique known as [cloaking](http://en.wikipedia.org/wiki/Cloaking).

Search engines may penalize sites they discover using black hat methods, either by reducing their rankings or eliminating their listings from their databases altogether. Such penalties can be applied either automatically by the search engines’ algorithms, or by a manual site review.

***Comprehension check.*** *Match the beginnings of the sentences in the first column with the endings in the second.*

|  |  |
| --- | --- |
| 1. To find information on the Web 2. Search engine optimizers may offer 3. The term “search engine friendly” may be used 4. One black hat technique uses text that is hidden, 5. Search engines may penalize sites they discover using black hat methods, 6. Distance of pages from the root directory of a site | * 1. may also be a factor in whether or not pages get crawled.   2. either by reducing their rankings or eliminating their listings from their databases altogether.   3. either as text colored similar to the backgrounds.   4. to describe Web site designs, menus, content management systems and shopping carts that are easy to optimize.   5. as a stand-alone service or as a part of a broader marketing campaign.   6. you may need to use a search engine. |

***Vocabulary practice***

***1. Fill in the blanks in the sentences with the necessary word(s); all the letters of the word(s) are given on the right.***

|  |  |
| --- | --- |
| 1. A search engine is a piece of … that gives you the ability to search for Internet resources. | E T A O F W T R S |
| 2. The term “search engine friendly” may be used to describe Web site designs, menus, content … systems and shopping carts that are easy to optimize. | A G T E E M A M N N |
| 3. To avoid … content in the search indexes, web-masters can instruct spiders not to crawl certain files | E L D U E I R N S A B |
| 4. SEO … can be classified into two broad categories. | Q E S T U I N H C E |
| 5. Black hat SEO … to improve rankings in ways that are disapproved of by the search engines, or involve deception. | T A T S M T P E |
| 6. Search engines may … sites they discover using black hat methods. | E P Z E A N L I |

***2. Fill in the blanks choosing from the variants given.***

1. If you want to promote your … in the search results of the major search engines, you should use SEO.

a) computer b) host c) website d) disk

2. Such programs usually guarantee inclusion in the …, but do not guarantee specific ranking within the search results.

a) index b) database c) code d) charter

3. To avoid undesirable content in the search indexes, … can instruct spiders net to crawl certain files or directories.

a) workers b) admins c) customers d) webmasters

4. Black hat SEO attempts to improve … in ways that are disapproved of by the search engines.

a) rankings b) costs c) velocity d) quality

***3. Match the beginnings and the endings of the description given and put them into correct order.***

|  |  |
| --- | --- |
| 1. As an Internet marketing strategy, SEO considers. 2. The leading search engines use crawlers 3. In March 2007, Google warned webmasters that they 4. An SEO technique is considered white hat if 5. Black hat SEO attempts to improve rankings in ways 6. Search engines may penalize sites they discover | * 1. using black hat methods, either by reducing their rankings or eliminating their listings from their database.   2. that are disapproved of by the search engines, or involve deception.   3. it conforms to the search engines guidelines and involves no deception.   4. should prevent indexing of internal search results because those pages are spam.   5. to find pages for their algorithmic search results.   6. how search engines work and what people search for. |

***4. Fill in the gaps in the text.***

[Webmasters](http://en.wikipedia.org/wiki/Webmaster) and content providers began \_\_\_ sites for search engines in the mid-1990s, as the first search engines were cataloging the early [Web](http://en.wikipedia.org/wiki/World_Wide_Web). Initially, all a [webmaster](http://en.wikipedia.org/wiki/Webmaster) needed to do was submit a page, or [URL](http://en.wikipedia.org/wiki/Uniform_Resource_Locator), to the various engines which would send a [spider](http://en.wikipedia.org/wiki/Web_crawler) to “crawl” that page, extract links to other pages from it, and return information found on the page to be \_\_\_. The process involves a search engine spider downloading a \_\_\_ and storing it on the search engine’s own server, where a second program, known as an [indexer](http://en.wikipedia.org/wiki/Search_engine_indexing), extracts various information about the page, such as the words it contains and where they are located, as well as any weight for specific \_\_\_, as well as any and all links the page contains, which are then placed into a scheduler for crawling at a later date.

Site owners started to recognize the value of having their sites highly ranked and visible in search engine \_\_\_, creating an opportunity for both [white hat](http://en.wikipedia.org/wiki/White_hat) and [black](http://en.wikipedia.org/wiki/Black_hat) \_\_\_ SEO practitioners. According to industry analyst [Danny Sullivan](http://en.wikipedia.org/wiki/Danny_Sullivan_%28technologist%29), the earliest known use of the phrase search \_\_\_ optimization was a spam message posted on Usenet on July 26, 1997.

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Censorship on the Web**

The Internet offers instant access to information across national and cultural borders, but along with helpful information the Internet hosts a disturbing amount of unsavory material. Militias and hate groups use Web sites to recruit new members and spread their views. International terrorists use Web sites as recruiting tools and for boasting about suicide bombings. Criminals, anarchists and dissenters post guidebooks and tips on how to do all kinds of illegal activities, from making suitcase bombs to spreading viruses.

Some advocate cyber censorship to irresponsible Web sites, blogs and discussion groups. Cyber censorship typically means blocking access to Web sites, but it can also mean closing sites and removing them from host servers. Censorship advocates are opposed by free speech supporters. The controversy over censorship is not new. In most cases words are acceptable, whereas actions can be punishable. But in some cases, words are punishable, too.

A second censorship guideline hinges on local standards of morality. Local communities can apply their own standards to determine whether material is obscene.

However, local standard are difficult to sort out on the Internet where a Web surfer in Tennessee can easily access Web sites, bulletin boards and chart groups that originate from anywhere in the world.

The U. S. Supreme Court supports the concepts of cyberzones that limit net access to certain materials. It is possible to construct barriers in cyberspace and use them to screen for identity, making cyberspace more like the physical world and more amenable to zoning laws. As an example, AOL is trying to develop a family - friendly Internet portal by enforcing policies against offensive speech.

But in some countries cyber citizens have no choice but to use a government-controlled ISP. In many countries, free speech is not a basic right conferred to all citizens. Many dictatorial regimes want their citizens to receive news from the outside world only after government censor has screened it. Officials in more than 20 countries use sophisticated tools to block Web sites, filter e-mail, and censor discussion groups.

China has some of the most rigorous Internet censorship in the world. The “Great Firewall of China” as it is sometimes called, blocks Internet content by preventing IP addresses of objectionable sites from being routed through its gateways into China. In Iran, government censors monitor political and news Web sites. In Saudi Arabia if you tried to open “Rolling Stone” magazine’s Web site, you would find that access has been denied. The Saudi government claims it censors the Internet to preserve culture and heritage. That argument in many ways reflects the concept of cyberzones that conform to local standards of morality. Even free-speech activists seem to agree. They say: “We do think that information should be free, but we do need to find a balance for respect for sovereign states to preserve their own culture.”

Despite such cultural sensitivity, technology giants, such as Microsoft, Yahoo! and Cisco Systems have been criticized for providing foreign government with tools for blocking culturally objectionable sites.

**What do you think?**

1. Should government be allowed to block access to Web sites based on local religions, politics and customs?

2. Do you believe that a privately held ISP like AOL has the right to censor the data posted on Web sites it hosts?

3. Should companies like Microsoft, Yahoo! and Cisco Systems provide blocking technology to foreign government?

***Projects.*** *Perform the project given.*

1. Worldwide, communication capabilities are growing quickly. Nevertheless, there is a great disparity in communication capabilities among countries. For this project, use any resources to gather information about the communication options that are available throughout the world. Consider available technologies and the number of people who use them. Your research can include the following: land-based phones, cellular phones, dial-up connection for Internet, cable Internet, such services as DSL and ISDN, wireless Internet, LAN. Consider how they might affect lifestyles and economies of different regions. Suppose that you are organizing a debate about global communication technology and you must devise a controversial question on which the debate will be based and write it down. You should also write three ”pro” and “con” paragraphs just to make sure that both sides will have substantial material to debate.

2. Many companies have a Web site that provides information on their products and services. Use a search engine to locate a company in your career field. Suppose you are a recruiter for that company and you’ll be attending a series of college career fairs. Create a one-page information flyer that you can hand out to prospective recruits. It should include: company’s name, location(s) URL; a brief description of the company’s mission, products, and services; a description of typical working conditions; instructions on how to submit a resume electronically.

***Final test.*** *Do the tasks in the following test.*

1. … is a utility that records a packet’s path from your computer to its destination.

2. HTTP is a classified a(n) … protocol, which maintains no record of previous interactions and handles each request based entirely on information that comes with it.

3. … is a high-speed, always-on Internet access technology that runs over standard phone lines.

4. HTML tags are enclosed in angle brackets. (*True/False*)

5. You may experience … delays of 1 second or more when using satellite data transport services.

6. HTML is abbreviation for … .

a) Hypertext machine link c) Hypertext markup language

b) Hypertext makeup language d) Hypertext mail link

7. Which of the following protocols is responsible for addressing packets so that they can be routed to their destination?

a) IP b) TCP c) POP d) FTR

8. Which of the following are examples of browsers?

a) Mozzila b) Opera c) Netscape Navigator d) all of the above

9. The Internet grew out of the …, which was created in 1969.

10. … is a set of specifications for creating documents that browser can display as a Web page.

11. In communication technology, … means the change of characteristics of a signal.

12. In everyday conversation the term “Web page” is often used for the HTML document as well as the Web page you see on your screen, even though technically they are not the same. (*True/False*)

13. Networked computers are vulnerable to … access to data.

14. HTML documents do not actually contain graphics. (*True/False*)

15. Domain name … are computers that host a database called the Domain Name System.

16. HTTP is a protocol that works with … to get Web resources to your desktop.

17. If permitted by your DSL provider, you can use your DSL connection for voice

calls as well as for transmitting data. (*True/False*)

18. A browser uses … to request a specific HTML document from a web server, and then interprets the HTML tags in order to display the requested Web page.

19. A … area network is a data communications network that connects personal computers within a very limited geographical area – usually a single building.

20. A permanently assigned IP address is referred to as a … IP address.

***Unit 6.* information systems analysis and**

**design**

**Text A**

**Reading.** Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

***Information Systems***

**An information system** collects, stores, and processes data to provide useful, accurate, and timely information, typically within the context of an organization. Although an information system does not necessarily have to be computerized, today most information systems rely on computers and communications networks to store, process, and transmit information with far more efficientcy than would be possible with a manual system. In this unit, the term “**information system**” refers to a system that uses computers and usually includes communications networks.

An information system is used by the people in an organization and its customers. You've undoubtedly used many information systems – for example, when registering for classes, getting cash from an ATM, and purchasing merchandise on the Web. You might even work for a business or nonprofit organization where you have access to an information system. Not everyone in an organization uses an information system in the same way. An information system must support the needs of people who engage in many different organizational activities.

An information system can help the people in an organization perform their jobs more quickly and effectively by automating routine tasks, such as reordering ***inventory,*** taking customer orders, or sending out renewal notices. Information systems can also help people solve problems. One of the major functions of an information system is to help people make decisions in response to problems.

Because organizations have different missions and face different problems, they require different kinds of information systems. An information system might have one or more of the following components: a transaction processing system, a management information system, a decision support system, or an expert system. Let’s take a closer look at a transaction processing system.

In an information system context, **a transaction** is an exchange between two parties that is recorded and stored in a computer system. When you order a product at a Web site, buy merchandise in a store, or withdraw cash from an ATM, you are involved in a transaction.

Many organizational activities involve transactions**. A transaction processing** **system (TPS)** provides a way to collect, process, store, display, modify, or cancel transactions. Most transaction processing systems allow many transactions to be entered simultaneously. The data collected by a TPS is typically stored in databases, and can be used to produce a regularly scheduled set of reports, such as monthly bills, weekly ***paychecks,*** annual inventory summaries, daily manufacturing schedules, or periodic check registers.

Early transaction processing systems, such as **banking** and **payroll** applications of the 1970s, used **batch processing** to collect and hold a group of transactions for processing until the end of a day period. An entire batch was then processed without human intervention, until all transactions were completed or until an error occurred.

In contrast to batch processing, most modern transaction processing systems use **online processing**—a real-time method in which each transaction is processed as it is entered. Such a system is often referred to as an **OLTP system** (online transaction processing system**). OLTP** uses a “***commit*** or ***rollback***” strategy to ensure that each transaction is processed correctly. This strategy is crucial because most transactions require a sequence of steps, and every step must succeed for the transaction to be completed.

If you ***withdraw*** cash from an ATM the bank’s computer must make sure your account contains sufficient funds before it ***deducts*** the withdrawal from your account and allows the ATM to deliver cash. If the ATM is out of cash, however, the transaction fails, and the withdrawal should not be deducted from your account. A TPS can **commit** toa transaction and permanently update database records only if every step of the transaction can be successfully processed. If even one step fails, the entire transaction fails anda***rollback*** returns the records to their original state.

Although a TPS excels at maintaining transaction data entered by clerical personnel and online customers, its reporting capabilities are limited. A typical TPS generates **detail reports**, which provide a basic record of completed transactions. However, managers need more sophisticated reports to help them analyze data.

***Comprehension check.*** *Mark the following statements as True or False.*

1. An information system usually helps people to find solutions to their problems.

2. You aren’t involved in a transaction when you order a product online.

3. All POS systems automatically calculate, change and identify customers who previously wrote bad checks.

4. Everyone in an organization uses an information system in the same way.

5. An information system has to be computerized.

6. A TPS is one of the components of an information system.

***Vocabulary practice***

***1. Match the words with their synonyms.***

accurate subtract

generate evolve

deduct essential

commit perform

crucial complicated

sophisticated exact

***2. Fill in the blanks choosing from the variants given.***

1. A group of people working together to accomplish a goal is a(n) … .

a) organization b) colleagues c) developers d) corporation

2. An information system must ... the needs of people who participate in different organizational activities.

a) protect b) share c) support d) maintain

3. Some POS systems automatically … credit cards.

a) check b) verify c) examine d) process

4. Many TPS … plenty of transactions to be entered at a time.

a) allow b) permit c) prohibit d) let

5. An information system ability to assist with problem solving and decision making depends on data it collects and makes … .

a) shared b) closed c) accessible d) available

6. A TPS simply … data.

a) stores b) records c) processes d) keeps

***3. Make two-word combination using the words in columns and then fill in the gaps in the following sentences.***

A: batch B: report

online method

routine processing

payroll tasks

detail customer

real-time system

1. First transaction processing systems used … .

2. If you buy goods on the Internet you are … .

3 Online processing is … in which each transaction is processed as it is entered.

4. A … provides a basic record of completed transactions.

5. Without a … we can’t calculate deductions and taxes, track employee hours generate paychecks.

6. Often repeated activities are called …

***4. Fill in the gaps in the text.***

\_\_\_ systems play a key role in helping organizations achieve goals, which are set forth in a \_\_\_ statement. Workers use information systems to produce and manipulate \_\_\_. Transaction \_\_\_ systems provide an organization with a way to collect, modify, display or \_\_\_ transactions. These systems encompass activities such as general accounting, inventory \_\_\_, and e-commerce. \_\_\_ information systems typically build on the data collected by a TPS to produce \_\_\_ that managers use to make the business decisions needed to solve routine, structured problems.

***Speaking.*** *Discuss the following questions*.

1. What is an information system?

2. Who uses information systems?

3. How do information systems help people in an organization?

4. Do organizations require different kinds of information systems?

5. What is a transaction?

6. What is a transaction processing system?

7. What are the limitations of transaction processing systems?

**Text B**

***Pre-reading.*** *Match the meaning of the following English words and their Russian equivalents.*

|  |  |
| --- | --- |
| 1discrete step | a) впровадження |
| 2 checklist | b) покроковий режим |
| 3 implementation | c) перелік |
| 4 milestone | d) проміжний етап розробки |

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***Systems Analysis***

Whether you are a part of a team that is developing a complex corporate information system, or you are developing a small information system for your own use, you will be more likely to succeed if you analyze the purpose of the information system, carefully design the system, test it thoroughly, and document its features. In this text you’ll learn about the planning and analysis that’s required for an information system.

**SYSTEM DEVELOPMENT LIFE CYCLE**

An information system progresses through several phases as it is developed, used, and finally retired. These phases are referred to as **a system** **development life cycle** – usually referred to as **SDLC.**

**Planning**

**Phase Analysis**

**Phase Design**

**Phase Implementation**

**Phase Maintenance**

**Phase**

The original **waterfall SDLC,** shown above, approaches each phase as **a discrete step** in the development process. One phase is supposed to be completed before the next phase can begin.

The **SDLC** is an outline of a process that helps develop successful information systems. The process of planning and building and information system according to the **SDLC** is referred to as **systems analysis and design.**

**Planning Phase**

For creating an information system it’s important to have a plan. Initial plans for an information system are developed during the planning phase. The planning phase for an information system project includes the following activities:

- Assemble the project team

- Justify project

- Choose development methodology

- Develop a project schedule

- Produce a Project Development Plan.

The main goal of these activities is to create a **Project Development Plan.** Before the project proceeds beyond the planning phase, the Project Development Plan must typically be reviewed and approved by the management. This planning document includes:

A short description of a project, including its ***scope***

A justification for the project, which includes an estimate of the project costs and potential financial benefits

A list of project team participants

A schedule for the project, including **an outline** of its phases

Project planning begins in the planning phase but stretches throughout the entire project. As the project takes shape, project managers break down the work into tasks and **milestones,** which can be scheduled and assisted. As tasks are completed, the schedule can be updated and adjusted. Project management software is an effective tool for planning and scheduling. It helps manages track and visualize the complex interactions between tasks. Popular examples include **open source software**, such as Open WorkBench, and commercial software, such as Microsoft Project.

**ANALYSIS PHASE**

The **analysis phase** begins after the project team selects a development methodology, draws up the **Project Development Plan**, and receives permission to proceed from management. The goal of the **analysis phase** is to produce a list of requirements for a new or revised information system.

Typically, a new information system is designed to replace a system or process that is already in place. It is important to study the current system to understand its strengths and weaknesses before planning a new system.

**System requirements** are the criteria for successfully solving problems identified in an information system. There requirements guide the design and implementation for a new or updated information system. They also serve as an evaluation checklist at the end of the development project, so they are sometimes called **success factors.** A new or updated information system should meet the requirements the project team defines.

The project team determines requirements by interviewing users and studying successful information system that solve problems similar to those in the current system. Another way to determine requirements is to construct a prototype as an experimental or trial version of an information system. Often the prototype is not a fully functioning system because it is designed to demonstrate only selected features that might be incorporated into a new information system. A systems analyst shows the prototype to users, who evaluate which features of the prototype are important for the new information system.

After the project team studies the current system and then determines what the new system should do, system requirements are incorporated into a document called a **System Requirements Report** that describes the objectives for an information system. If management or the project sponsor approves the report, the project can move on to the design phase.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text.*

1. These plans are developed during the planning phase.

2. You can determine the system requirements by this way.

3. A list of requirements for a new system should be produced at this phase.

4. Several phases are required for information process.

5. A plan is inseparable part of an information system.

6. There are plenty of tools for diagramming and specifying the current system.

***Vocabulary practice***

***1. Match up the words that are opposite in the meaning.***

succeed essential

permission computerized

updated fail

manual destroy

create out out of date

obsolete ban

***2. Fill in the blanks choosing from the variants given.***

1. Project management software is an effective tool for … and scheduling.

a) planning b) maintenance c) analysis d) development

2. “A project team” is a group of people who are assigned to analyze and … an information system.

a) maintain b) develop c) implement d) test

3. Users and analysts work together to identify problems and look for solution in a development process called … application design.

a) co-operative b) united c) joint d) mutual

4. A modified waterfall SDLC allows to … between SDLC phases

a) overlap b) break c) skip d) stretch

5. A System Requirements Report describes the … for a new information system.

a) innovations b) ideas c) objectives d) goals

6. It is difficult to complete the design phase until system … have a chance to work with software tools that are purchased in the implementation phase.

a) analysts b) developers c) builders d) administrators

***3. Make three-word combinations using the words in columns and them fill in the gaps in the following sentences.***

A: information B: source C: source

joint requirements software

project application plan

open system report

system management project

project development software

1. … describes the objectives for an information system.

2. … is developed during the planning phase.

3. … must be reviewed and approved by the management.

4. You can use … for planning and scheduling.

5. OpenWork Bench and Microsoft Project are …, aren’t they?

6. … is based on the idea that the best information systems are designed when end-users and system analysts work together as equal partners.

***4. Fill in the gaps in the text.***

The process of planning and building an information system is referred to as systems \_\_\_.The development process is supervised by an organization’s Information Systems (IS) department, but the \_\_\_ team includes members from other departments as well. System development follows some type of system development \_\_\_ cycle(SDLC), which consists of several phases. In the \_\_\_ SDLC one phase of the SDLC must be completed before the next phase begins. A project begins with a \_\_\_ phase in which a member of the IS department creates a Project Development Plan. The project team then proceeds to the \_\_\_ phase, with the goal of producing a list of requirements for a new or revised information system.

***Speaking.*** *Discuss the following questions*.

1. What is a system development life cycle?

2. How does an information project begin?

3. What does the planning phase entail?

4. Do computers offer tools for planning activities?

5. How does the project team determine what the new system should do?

6. How does the project team document system requirements?

7. What does the project team do with system requirements?

**Text C**

***Pre-reading*.** *Match the terms with their definitions.*

centralized processing - describes the information system problem and the requirements for the solution.

distributed processing - describes the way the information system’s software should interact with users, store data, process data, and format reports.

request for proposal (RFP) - in which processing tasks are distributed to servers and workstations.

request for quotation (RFQ) - is a request for a formal price quotation on a list of hardware and software.

application specifications - in which data is processed on a centrally located computer.

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***SYSTEM DESIGN***

In the design phase of the SDLC, the project team must figure out how the new system will fulfill the requirements specified in the System Requirements Report. The project team should identify several potential hardware and software solutions by brainstorming and researching case studies at Web sites and in computer magazines. When evaluating hardware solutions for a new information system, the project team considers the overall architecture of the information system based on level of automation, processing methodology, and network technology. Some information systems provide a higher level of automation than others. For instance, a point-of-sale system with a low level of automation might require the checkout clerk to enter credit card numbers from a keypad. At a higher level of automation, a magnetic strip reader automates the process of entering a credit card number. A further level of automation is achieved by using a pressure-sensitive digitizing pad and stylus to collect customer signatures.

An information system can be designed for centralized and distributed processing. Distributed processing in a client/server or peer-to-peer environment is very popular because it provides high levels of processing power at a low cost. Virtually every information system requires a network, so the project team must examine network alternatives, such as LANs, extranets, intranets, and the Internet. Many information systems require a complex mixture of networks, such as a LAN in each branch office connected to a company intranet, with customers accessing selected data using the Internet.

The project team might consider software alternatives, such as whether to construct the system “from scratch” in a programming language or select a turnkey system. An information system “from scratch” is usually costly, but offers the most flexibility for meeting the system requirements. An application development tool is essentially a type of software construction kit containing building blocks that can be assembled into a software product. It includes expert system shells and database management systems.

Commercial software for an information system is usually a series of preprogrammed software modules. It eliminates much of the design work required with programming languages or application development tools. It is available for standard business functions and market businesses and organizations. Although most commercial software has some customization options, in many cases, it cannot be modified to exactly meet every system requirement.

A turnkey system consists of hardware and commercial software designed to offer a complete information system solution. Like commercial software, a turnkey system must be extensively evaluated to determine whether it can satisfy system requirements.

To determine the best solution, the project team devises a list of criteria for comparing each potential solution. It isn’t complicated if the project team uses a decision support worksheet. After the project team selects a solution, the next task is to select the hardware and software. Sometimes the team knows exactly what brand, model, or version of hardware and software are required. At other times, the team has a general understanding, but needs vendor help selecting specific products. RFPs and RFQs help the team collect information for these important decisions. Technical criteria for hardware might include processing speed, reliability, upgradability, maintenance costs, and warranty. Technical criteria for software might include reliability, compatibility, and the availability of patches to fix program errors.

Next step depends on the type of solution selected. If a turnkey solution is selected, the next step might be to get approval to move into the implementation phase of the SDLC. In contrast, if the project team selected a solution that requires custom programming, the team’s systems analysts will create a set of application specifications. Many project failures are often referred to as feature creep. Proposed changes should be managed within a formal process that includes written change requests.

***Comprehension check****. Choose the ending for each sentence from the two versions given.*

1. Distributed processing in a client\server or peer-to-peer environment

a) is very popular because it provides high levels of processing power at a low price.

b) is very popular because it provides the highest levels of processing power at a high price.

2. A series of programmed software modules

a) eliminates much of the design work required with programming languages or application development tools.

b) requires much of the design work with programming languages or application development tools.

3. An application development tool is

a) essentially a type of software construction kit containing building blocks that can be assembled into a software product.

b) a software kit that can’t be assembled into a software product.

4. RFPs and RFQs help the team

a) collect information for the important decisions.

b) determine information for the important decisions.

5. Technical criteria for hardware might include

a) processing speed, reliability, upgradability, maintenance cost, and warranty.

b) reliability, compatibility, and the availability of patches to fix program errors.

6. Many project failures are often referred to as features creep

a) because of changes in needs.

b) because old features tend to creep into the development process.

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) research, require, study, examine;

b) collect, gather, determine, take;

c) reliability, compatibility, digitizing, availability;

d) creep ,steal, get into, include;

e) card, set, kit, collection;

f) sheave, block, database, pulley.

***2. Fill in the missing words choosing from the variants given.***

1. The project team should identify … potential hardware and software solutions.

a) all b) one from all c) some

2. Distributed processing provides … of processing power at a low cost.

a) high levels b) low levels c) intermediate levels

3. Many information systems require a complex mixture of networks, such as a LAN in each branch office … a company intranet.

a) separated from b) linked to c) built into

4. An application development tool is essentially a type of software construction kit containing building blocks that can be … a software product.

a) included into b) managed by c) put together into

5. A turnkey system consists of hardware and commercial software designed to … a complete information system solution.

a) suggest b) control c) design

6. A turnkey system must be extensively evaluated to determine weather it can … system requirements.

a) find out b) create c) satisfy

7. The team’s systems analysts will create … of application specifications.

a) data b) a series c) a criteria

***3. Transform the given sentences using the words in brackets without any change in meanings.***

1. Distributed processing in a client/server or peer-to-peer environment is very popular because it provides high levels of processing power at a low cost (*means*).

2. It eliminates much of the design work required with programming languages or application development tools (*eliminated*).

3. Most commercial software cannot be modified to exactly meet every system requirement (*modification*).

4. Like commercial software, a turnkey system must be extensively evaluated to determine whether it can satisfy system requirement (*as…as*).

5. At a higher level of automation, a magnetic strip reader automates the process of entering a credit card number (*automatically*).

6. A further level of automation is achieved by using a pressure-sensitive digitizing pad and stylus to collect customer signatures (*collecting*).

7. The project team should identify several potential hardware and software solutions by brainstorming and researching case studies at Web sites and in computer magazines (*when*).

***4. Fill in the gaps in the text.***

In the \_\_\_ phase of the SDLC, the project team identifies solutions, evaluates those solutions, and then selects the best one. It is possible that a \_\_\_ system might offer a complete hardware and software solution. The project team can use a\_\_\_ support worksheet to evaluate solutions based on general, technical, and functional criteria.

After the project team selects a solution, it can then select the specific hardware and software products to build the new information system. The project team might send out a request for \_\_\_, asking vendors to recommend a solution and specify hardware and software requirements. As an alternative, when team members know exactly what hardware and software they need for the solution, they can send out a request for \_\_\_, which simply asks for vendor prices. After selecting hardware and software, the team can develop \_\_\_ specifications that descried the way the new information system should interact with the user, store data, process data, and format reports.

***Speaking.*** *Discuss the following question.*

1. What happens in the design phase?

2. How does the project team come up with solution?

3. What hardware alternatives are available?

4. What software alternatives are available?

5. How does the team choose the best solution?

6. How does the project team find the right hardware and software for the new information system?

7. What’s an RFP and RFQ?

8. How does the project team evaluate an RFP or RFQ?

9. What happens after the project team selects a solution?

10. What is the importance of application specifications?

**Text D**

***Pre-reading*.** *Match the terms with their definitions.*

a) system testing - is the process of modifying a commercial

` application to reflect an organization’s needs;

integration testing - ensures that module operates reliably and correctly;

software customization - is performed to ensure that the modules operate together correctly;

acceptance testing - is a place where software testing can occur without disrupting the organization’s regular information system, or it might be located on an entirely separate computer system;

unit testing - ensures that all hardware and software components work together correctly;

test area - is designed to verify that the new Information system works as required;

b) user documentation - is staffed by technical support specialists familiar with the information system’s software;

procedure handbook - describes a system’s features, hardware architecture, and programming;

help desk - describes how to interact with the system to accomplish specific tasks;

system documentation - is a type of user documentation that contains step-by-step instructions for performing specific tasks;

c) phased conversion - means that the old system is completely deactivated and the new system is immediately activated;

direct conversion - avoids some of the risk of direct conversion because the old system remains in service while some or all of the new system is activated;

pilot conversion - works well with larger information systems that are modularized because the new system is activated one module at a time;

parallel conversion - works well in organizations with several branches that have independent information processing systems because the new information system is activated at one branch at a time.

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***IMPLEMENTATION AND MAINTENANCE***

After the plan for an information system is approved, it’s time to start building it. The implementation phase can include: purchase and install hardware and/or software, create applications, test applications, finalize documentation, train users, convert data, convert to new system.

Application testing is performed in three ways: unit testing, integration testing, and system testing. Unit testing and integration testing are usually performed in a test area. A test area might to be located in an isolated section of storage on the computer system that runs the organization’s regular information system, or might be located on an entirely separate computer system. When a problem is discovered during unit testing or integration testing, the team must track down the source of the problem and correct it. Unit testing and integration testing are then repeated to make sure the problem is corrected, and no new problems were introduced when the original problem was fixed.

The data for a new information system might exist in card files, file folders, or an old information system. This data must be loaded into the new system − a process called “data conversion”. When converting data from a manual system to a computer system, the data can be typed or scanned electronically into the appropriate storage media. When converting data from an existing computer system to a new system, a programmer typically writes conversion software to read the old data and convert it into a format that is usable by the new system.

System conversion refers to the process of deactivating an old information system and activating a new one. It is also referred to as “cutover” or “go live”. There are several strategies for converting to a new system. They are a direct conversion, a parallel conversion, a phased conversion, a pilot conversion.

A new or upgraded information system undergoes a final test called acceptance testing. It includes the use of real data to demonstrate that the system operates correctly under normal and peak data loads. The term “maintenance phase” is a bit misleading because it seems to imply that the information system is maintained in a static state. On the contrary, during the maintenance phase, an information system is likely to undergo many changes to meet an organization’s needs. They can include the following: upgrades to operating system and commercial software, user interface revisions to make the system easier to use, application software revisions to fix bugs and add features, hardware replacements to enhance performance, security upgrades.

To combat an escalating number of viruses, worms, Denial of Service attacks, and intrusions, security has become a top priority for the maintenance phase of an information system’s life cycle. Maintaining security is an ongoing activity. A system operator and a systems programmer are responsible for system maintenance. Even after in-depth training, employees sometimes forget procedures or have difficulty when they encounter a new set of circumstances. Many organizations establish a help desk to handle end-user problems. For example, suppose you encounter a problem with an update procedure and call the help desk. The help desk technician begins to troubleshoot the problem and soon realizes that it is caused by a programming error not caught during system testing. This bug is recorded in a “bug report” that is routed to the programming group, which can determine its severity and take steps to fix it.

***Comprehension check.*** *Match the beginnings of the sentences in the first column with the endings in the second.*

|  |  |
| --- | --- |
| 1. Unit testing and integration testing are  2. When a problem is discovered during unit testing or integration testing  3. System conversion refers  4. When converting data from an existing computer system to a new system  5. A system operator and a systems programmer are  6. The help desk technician begins | a) responsible for system maintenance.  … a programmer typically writes.  b) conversion software to read the old data and convert it into a format that is usable by the new system.  c) … usually performed in a test area.  d) … the team must track down the source of the problem and correct it.  e) … to troubleshoot the problem and soon realizes that it is caused by a programming error not caught during system testing.  f) … to the process of deactivating an old information system and activating a new one. |

***Vocabulary practice***

***1. Put the letters in the following words into the correct order.***

sienncovor ruvis sinrution shoyubtleroot cascumcriten agerost

***2. Fill in the blanks choosing from the variants given.***

1. Application testing is performed in three ways: integration testing, unit testing and … .

a) data testing b) program testing c) system testing

2. When a problem is discovered during unit testing or integration testing, the team must … the source of the problem and correct it.

a) investigate b) produce c) include

3. Unit testing and integration testing are repeated to make sure the problem is … .

a) activated b) converted c) solved

4. System conversion refers to the process of deactivating an old … system and activating a new one.

a) information b) operating c) support

5. An information system is likely to undergo many … to meet a company’s needs.

a) changes b) formats c) systems

6. Many organizations establish a help desk … end-user problems.

a) to divide b) to manage c) to enlarge

7. The help desk technician begins to troubleshoot the problem and soon … that it is caused by a programming error not caught during system testing.

a) forgets b) repeats c) understands

***3. Match the beginnings and the endings of the instructions/steps given and put them into correct order.***

|  |  |
| --- | --- |
| 1. Create debugger as a system software that helps programmers  2. After that write the specifications and design the computer system and the methods for the information system  3. Write the program in a specific programming language, that specifically refers  4. Depending on the organization and its size, the systems analyst’s tasks are  5. Next step is to interview the people who will be using the system  6. With the help of testing and acceptance, make sure the system works properly and  7. Then determine which people and what kind of software, hardware, and monetary resources are  8. Keep system working properly and, if business procedures or conditions are changed, | a) to determine their needs, problems, and expectations.  b) to solve the problem.  c) turn it over to the users with accompanying training, as necessary.  d) to writing source code.  e) necessary or available to solve the problem.  f) to analyze the problem to be solved, the data to be input, the expected output, and other system considerations.  g) identify errors.  h) improve them. |

***4. Fill in the gaps in the text.***

During the \_\_\_ phase of the SDLC, the project team supervises the technicians who set up new hardware, install programming languages and other application \_\_\_ tools, create and test applications, and customize software. The team also finalizes the system documentation and trains users. In this phase, three types of testing ensure that new software works correctly. \_\_\_ testing is performed on each module, and then \_\_\_ testing is performed to make sure that all of the modules work together correctly. \_\_\_ testing ensures that the software components work correctly on the hardware and with other, perhaps older, elements of the information system.

When application testing is complete, data is converted from the old system to the new one, users are trained, and the new system goes live. Four types of information system “go live” conversions are possible. At the end of the conversion process, the information system undergoes a final test called \_\_\_ testing, designed to assure the system’s owner that the new system works as specified.

After installation, an information system enters the \_\_\_ phase of its life cycle.

***Speaking.*** *Discuss the following questions.*

1. Does a new information system typically require new hardware?

2. What the next step in the implementation phase?

3. What is application testing?

4. What documentation does the project team create during the implementation phase?

5. How do employees learn how to use the new information system?

6. How does a business switch from the old information system to the new system?

7. What happens during the maintenance phase?

8. How important is system security during this phase?

9. Who is responsible for system maintenance?

10. Why do maintenance activities include user support?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Online Voting**

The idea of online voting surfaced years ago as the Internet gained popularity. The term online voting usually refers to a remote voting system that allows voters to cast their ballots from any computer connected to the Internet.

Because of its advantages, online voting has the potential to attract net-savvy young voters who historically have voted in lower numbers than other segments of the population. It also simplifies the voting process for elderly and homebound voters. The convenience of online voting might also increase participation in local elections.

Online voting has the potential to decrease the number of ballots that are invalidated because of procedural problems, such as failing to completely punch out the “chad” on a ballot card, or checking more than one candidate on a paper ballot. Voting software can prevent voters from erroneously selecting more than one candidate and make sure that voters can revise their selections without invalidating their ballots.

Although there are plenty of supporters of this form of elections there are lots of opponents because of the risk of some technological issues with Internet security.

In addition to them online voting opponents have concerns about voter fraud and privacy.

For democracy to function properly, its citizens should be confident that the electoral system is honest and works. Online voting presents some sticky technological and social challenges. Although these challenges exist, secure technologies for online banking and e-commerce are working, so shouldn’t it be possible to design an online voting system that's secure enough to conduct our elections?

**What do you think?**

1. Would you prefer online voting to voting at a polling place?

2. Should online voting be available only to specific groups of people who currently have trouble reaching polling places?

3. What technical issues can online voting face and how to solve them?

***Projects.*** *Perform the project given.*

1. Form a group of two to five students as the project team for a systems development project. Elect one person as the team leader, who will assign tasks to each group member. Your team’s mission is to complete the planning phase for a systems development project and produce a Project Development Plan. The first task is to identify and briefly describe an information system at school, work, or local business that needs improvement. The second task is to make a list of problems and opportunities that exist in that system. The third task is to make a list of tasks your team would perform, design, construct, and implement a new information system. Finally, incorporate all your findings into a document that would serve as the Project Development Plan. Submit this plan to your instructor, who might provide additional directions for your group work and report format.

2. Create 10 rules for an expert system that pertains to your career field. To complete the assignment, think of a set of simple decisions that someone on the job might be required to perform. For example, a loan officer might be required to make a quick evaluation of a borrower, an auto mechanic might be required to figure out what various tapping noises mean, or a fitness instructor might be required to recommend the best type of fitness class for clients. Make a list of 10 rules that would help make the decision. The rules should be in the format IF…THEN…Submit your rules to your instructor.

***Final test.*** *Do the tasks in the following test.*

1. In the analysis phase, the project team determines how the new information system will meet the requirements. (*True/False*)

2. A … tool is a software application that is designed for documenting system requirements, diagramming current information systems, scheduling development tasks and developing computer programs.

3. The process of planning and building a new information system is referred to as systems … and design.

4. The goal of the…phase is to produce a list of requirements for a new or revised information system.

5. A Project Development Plan typically must be approved by the management before a project proceeds beyond the planning phase. (*True/False*)

6. In an information system context, a … is an exchange between two parties that is recorded and stored in a computer system.

7. Generally most transaction processing systems provide managers with detail reports that contain all the information needed to understand and analyze data. (*True/False*)

8. A transaction …- system provides a way to process, store, display, modify, or cancel transactions.

9. During the … phase, the project team supervises the tasks necessary to construct the new information system.

10. If you have a question about the information system you are using, the first step to finding the answer is to call the help desk. (*True/False*)

11. In the … phase, the project team identifies potential solutions, evaluates these solutions, and then selects the best solution.

12. If a project- team selects turnkey solution the next step would be to have the team’s system analysts create a set of application specifications. (*True/False*)

13. … processing using client/server or peer-to-peer architecture provides high level processing power at a low cost.

14. Which of the following documents ask a vendor both to recommend hard ware and software for an information system solution and to provide the vendors qualifications to implement the solution.

a) request for quotation c) request for solution

b) request for qualifications d) none of the above

15. Which type of transaction processing systems collects and holds a group of transactions for processing until the end of a day or a pay period.

a) online processing c) group processing

b) batch processing d) rollback processing

16. Unit testing is normally performed in a test area. (*True/False*)

17. Which phase of an SDLC is usually the most expensive?

18. The analysis phase concludes when the System Requirement Report is written. (*True/False*)

19. An expert system uses fuzzy logic to deal with imprecise data by asking for a level of confidence with an DLTP system, if one step fails during the transaction, the record will … to their original state.

20. All of the following activities take place during the implementation phase EXCEPT.

a) purchasing and installing software c) purchasing and installing software

b) creating applications d) testing applications

***Unit 7.* DATABASES**

**Text A**

***Reading***. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***FILE AND DATABASE CONCEPTS***

In the broadest definition, a database is a collection of information. Today, databases are typically stored as computer files. The tasks ***associated*** with creating, maintaining, and ***accessing*** the information in these files are referred to as data management, file management, or database management. The basic element of a structured file is a field. It contains the smallest unit of meaningful information. Each field has a unique field name that describes its contents. For example, in the Vintage Music Shop database, the field name Album Title describes a field containing the name of an album, such as *Hard Day’s Night*. A field can be variable length or fixed length. A variable-length field is like an accordion – it expands to fit the data you enter, up to some maximum number of characters. A fixed-length field contains a predetermined number of characters (bytes). The data you enter in a fixed-length field cannot exceed the allocated field length. Moreover, if the data you enter is shorter than the allocated length, blank spaces are automatically added to fill the field.

In the world of computing, a record refers to a collection of data fields. Computer databases typically display records as rows in a table or as forms. Each kind of record is referred to as a record type. It is usually shown without any data in the fields. A record that contains data is referred to as a record occurrence, or simply a record.

A structure file that contains only one record type is often referred to as a flat file. Flat files can be used to store simple data, such as names and addresses. In contrast, a database can contain a variety of different record types. A key characteristic of a database is its ability to maintain relationships do that data from several record types can be consolidated or aggregated into essentially one unit for data retrieval and reporting purposes. In database jargon, a relationship is an association between data that’s stored in different record types. For example, Vintage Music Shop’s Customers record type is related to the Orders record type because customers place orders.

An important aspect of the relationship between record types is cardinality. Cardinality refers to the number of associations that can exist between two record types. When one record is related to many records, the relationship is referred to as a one-to-many relationship. A many-to-many relationship means that one record in a particular record type can be related to many records in another record type, or vice versa. The relationship between record types can be ***depicted*** graphically with an entity-relationship diagram (sometimes called an “ER diagram” or “ERD”).

Several database models exist. Some models work with all the relationships described earlier in this section, whereas other models work with only a subset of the relationships. The four main types of database models in use today are ***hierarchical***, network, relational, and object oriented. The simplest database model arranges record types as a hierarchy. In a hierarchical database, a record type is referred to as a ***node*** or “segment”. The top node of the hierarchy is referred to as the root node. Nodes are arranged in a hierarchical structure as a sort of upside-down tree. A parent node can have more than one child node. But a child node can have only one parent node.

The network database model allows many-to-many relationships in addition to one-to-many relationships. Related record types are referred to as a network set, or simply a “set”. A set contains an owner and members. An owner is similar to a parent record in a hierarchical database. A member is roughly equivalent to a child record. The most popular database model today is a relational database. It stores data in a collection of ***related*** tables. Each ***table*** (also called a “relation”) is a sequence, or list, of records. All the records in a table are of the same record type. Each row of a table is equivalent to a record as is sometimes called a tuple. Each column of the table is equivalent to a field, sometimes called an attribute. Relationships can be added, changed, or deleted on demand. An object-oriented database stores data as objects, which can be grouped into classes and defined by attributes and methods. A class defines a group of objects by specifying the attributes and methods this objects share. The attributes for an object are equivalent to fields in a relational database. A method is any behavior that an object is ***capable*** of performing. There is no equivalent to a method in a non-object-oriented database.

***Comprehension check.*** *Mark the following statements as True or False.*

1. The field is a basic element of a structured file.

2. The field contains the biggest unit of meaningful information.

3. The length of a field is always fixed.

4. Simple data, such as names and addresses, can be stored in flat files.

5. Every relation is a sequence, or list, of records.

6. Relationships can be changed or deleted on demand.

***Vocabulary practice***

***1. In the text, find the synonyms to the given words.***

a node important several typically to perform to comprise

***2. Fill in the blanks choosing from the variants given.***

1. The most popular database model today is a … database.

a) relational b) object-oriented c) non-object

2. The data you enter in a … field cannot exceed the allocated field length.

a) fixed-length b) variable-length

3. All the records in a table are of the same record … .

a) group b) type c) set

4. The simplest database model arranges record types as a … .

a) hierarchy b) column c) relation

5. Each field has a … field name that describes its contents.

a) unique b) unusual c) unknown

6. All the records in a table are of the … record type.

a) same b) different c) simple

***3. Make two-word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: non-object-oriented B: type

a many-to- many relationship

record database

flat length

simple data

allocated file

1. Any kind of record is referred to as a … .

2. Flat files can be used to store …, such as names and addresses.

3. Moreover, if the data you enter is shorter than the …, blank spaces are automatically added to fill the field.

4. There is no equivalent to a method in a … .

5. A structure file that contains only one record type is often referred to as a …

6. … means that one record in a particular record type can be related to many records in another record type, or vice versa.

***4. Fill in the gaps in the text.***

Computer databases evolved from manual file processing technology in which data is stored in a single \_\_\_ file that uses a uniform format for every item the file contains. A \_\_\_ holds the smallest unit of meaningful information. A series of data fields forms a \_\_\_, which stores data about one entity – a person, place, thing, or event.

Each kind of record is referred to as a record type. A record that contains data is sometimes referred to as a record \_\_\_. A \_\_\_ file contains only one record type. In contrast, a \_\_\_ can contain a variety of different record type.

***Speaking.*** *Discuss the following questions.*

1. What is a database?

2. What is the basic element of a structured file?

3. What is a record?

4. What is involved in defining the structure for records in a file?

5. What are relationships?

**Text B**

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***DATA MANAGEMENT TOOLS***

**Data Management Software**

The simplest tools for managing data are software packages dedicated to a specific data management task, such as keeping track of appointments or managing your ***checking account***. You can purchase these tools or download them from Internet. Although these tools are easy to use, they don’t generally allow you to create new record types because the new record types are ***predefined***. Most ***spreadsheet*** and word processing software packages feature simple tools that allow you to specify fields, enter data and ***manipulate*** it. For example, Microsoft Excel allows you to sort records, validate data, search for records, perform simple statistical functions, and generate graphs based on the data. Such simple file management tools are popular for individuals who want to maintain flat files that contain hundreds, not thousands, of records. To create your own data management software it is possible to simply enter data as an ASCII text file, and then use a programming language to write routines to access that data.

**Database Management Systems**

The term DBMS (Database Management System) refers to software that is designed to manage data stored in a ***database***. Each DBMS typically specializes in one of the four database models, but some DBMS software offers versatility by dealing with a variety of models and data. An XML DBMS, for example, is optimized for handling data that exists in XML format. An OODBMS (object-oriented database management system) is optimized for an object-oriented database model, allowing you ***to store*** and manipulate data classes, attributes, and methods. Database client software allows any remote computer or network workstation to access data in a database.

**Databases and the Web**

The Web provides an opportunity for many people to gain access to data from ***multiple*** locations. The simplest way to provide Web access to database is converting a data base report into a HTML document, which can be ***displayed*** as a Web page by a browser. In several situations, such as e-commerce, it is important for people to use a browser to add or update records in a database. For example, the process of ordering merchandise at Vintage Music Shop creates a new order record, changes the In Stock field in the Albums table, and creates a customer record for first-time customers. These dynamic database updates require an architecture similar to that used for dynamic Web publishing, plus the use of forms. A form usually exists on a Web server, which sends the form to your browser. Several tools, including ASP, CGI, and PHP, help you create server-side programs.

**XML Documents**

XML is a markup language that allows field ***tags***, data, and tables to be incorporated into a Web document. It was developed in response to several deficiencies that became apparent as HTML gained widespread use. For example, suppose you are interested in speeches given by Martin Luther King, Jr. Entering his name in a search engine produces thousands of entries, including MLK biographies, streets and schools named after a famous civil rights leader, historic locations relating to the civil rights movement and so on. XML provides tags that can bу embedded in a XML document to put data in context.

As you can see, many techniques exist for storing, accessing, and displaying the data from the databases. Sometimes more than one tool has the potential to work for a specific application. Now that you’ve had an introduction to the options, you should be able ***to evaluate*** when and how to use them.

***Comprehension check.*** *Mark the following statements as True or False.*

1. Many techniques exist for storing, accessing, and displaying the data from the databases.

2. The Web provides an opportunity for a limited number of people to gain access to data from multiple locations.

3. Simple file management tools are popular for individuals who want to maintain files that contain thousands of records.

4. The term DBMS (Database Management System) refers to software that is designed to manage data stored in a database.

5. Microsoft Excel doesn’t allow you to sort records, validate data, search for records, perform simple statistical functions, and generate graphs based on the data.

6. XML is a markup language that allows field tags, data, and tables to be incorporated into a Web document.

***Vocabulary practice***

***1. In the text find the opposites to the given words.***

civil sometimes simple purchase allow unknown

***2. Fill in the blanks choosing from the variants given.***

1. Most spreadsheet and word processing software (*sets, packages, collections*) feature simple tool that allow you to specify fields, enter data and manipulate it.

2. As you can see, many techniques (*are existing, exist, have been existed*) for storing, accessing, and displaying the data from the databases.

3. For example, Microsoft Excel (*to allow, is allowing, allows*) you to sort records, validate data, search for records.

4. XML (*were, is, have been*) a markup language that allows field tags, data, and tables to be incorporated into a Web document.

5. Now that you (*have had, had, has had*) an introduction to the options, you should be able to evaluate when and how to use them.

6. Many (*methods, ways, techniques*) exist for storing, accessing and displaying the data from the databases.

***3. Make three-word combinations using the words in the columns and then fill in the gaps in the following sentences.***

A: address B: client C: software

System management task

database book Database

data management software

database Management information

data server software

1. The simplest tools for managing data are soft packages dedicated to a specific … .

2. The term DBMS … refers to software that is designed to manage data stored in a database.

3. Simple tools that easily store … might not be suited for managing a worldwide airline reservation system.

4. To create your own … it is possible to simply enter data as an ASCII text file.

5. … is designed to manage billions of records and lots of transactions every second.

6. … allows any remote computer or network workstation to access data in a database.

***4. Fill in the gaps in the text.***

The data in a database can be \_\_\_ over the Web. A simple process called \_\_\_ Web publishing converts a database report into an HTML document, which can be displayed by a browser. More sophisticated \_\_\_ Web publishing produces data from a database on demand. HTML forms and XForms not only provide search capabilities, but can also be used to add or modify data in a \_\_\_ with a Web browser. \_\_\_ documents provide a Web-based data management tool that uses special \_\_ as field names within a document.

***Speaking.*** *Discuss the following questions.*

1. Are simple data management tools available?

2. Can you create your own data management software?

3. What kinds of tools are specially designed for creating and manipulating databases?

4. Is it possible to access a database over the Web?

**Text C**

***Pre-reading task.*** *Match the meaning of the following English words with their Ukrainian equivalents.*

1. conversion routine а) избыточность данных

2. data redundancy b) порядок сортування

3. BLOB c) індекс бази даних

4. variable-length field d) конверсійна підпрограма

5. primary key e) первинний ключ

6. sort order f) целочисленный тип данных

7. validation rule g) большой двоичный объект

8. fixed-length field h) поле неподвижной длины

9. integer data type i) правило ратифікації

10. database index j) поле переменной длины

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***DATABASE DESIGN***

The ***key*** to an effective database is its ***initial*** design. In a well-designed database, data can be ***flexibly*** manipulated to produce timely, ***meaningful***, and ***accurat***e information for decision making. Bad database design can ***lead*** to ***messy*** database, lost records, and inaccurate data. The ***goal*** of database design is to store information so that it easy to access and maintain, but ***concise*** enough to take up as little disk space as possible.

The term **database structure** refers to the arrangement of ***fields***, tables, and ***relationships*** in a database. The first step in structuring a ***relational*** database is to determine what data must be collected and stored. To do so, a database designer might begin by consulting users and studying the ***current*** filing system to compile a list of available data as well as any ***additional*** data necessary to produce ***on-screen*** output or printed reports.

After the designer determines what data to store, the next step is to organize that data into fields. It is usually easy to break data into fields just by using ***common sense*** and considering how people might want to access the data. Any data that people would to search for, sort on, or use in a calculation should be in its own field. The ***treatment*** of first and last name ***illustrates*** the concept of breaking data into fields. A database designer could ***define***a field called Name to hold an entire customer’s name. With the entire name in one field, however, the database would not be able to access individual parts of the name, making it difficult to ***alphabetize*** customers by last name or to produce a report in which names appear in one field. That’s why the last names are stored in a different field than first names.

Although two people might have, for example, the same name or two paychecks might contain the same amount, a computer must have some way to ***differentiate*** between records. A **primary key** is a field that contains data ***unique*** to a record.

The data that can be entered into a field depends on the field’s data type. From a technical perspective, **data type *specifies*** the way data is represented on the disk and in RAM. From a user perspective, the data type determines the way data can be manipulated. When designing a database, each field is ***assigned*** a data type. Data can be broadly classified as numeric or ***character.*** Character data contains letters, numerals and symbols not used for calculations. Numeric data contains numbers that can be manipulated mathematically by ***adding***, ***averaging***, ***multiplying*** and so forth. The are several numeric data types, including real, integer, and date. The **real data** type is used for fields that contain numbers with decimal places- prices, percentages, and so on. The **integer data** type is used for fields that contain whole numbers-quantities, repetitions, rankings, and so on. The **date data type** is used to store dates in a format that allows them to be manipulated, such as you want to calculate the numbers of days between two dates.

The **text data type** is ***typically*** assigned to ***fixed-length fields*** that hold character data- people’s names, albums titles, and so on. Text fields sometimes hold data that looks like numbers, but doesn’t need to be mathematically manipulated. Telephone numbers and ZIP codes are examples of data that looks numeric, but should be stored in text fields. A **memo data type** usually provides a ***variable-length field*** into which users can enter comments. The **logical data type** (sometimes called a Boolean or yes/no data type) is used for true/false or yes/no data using minimal storage space. Some file and database management systems also include additional data types, such as BLOBs and hyperlinks. A **BLOB** (binary large object) is a collection of binary data stored in a single field of a database. BLOBs can be just about any kind of data you would store as a file, such as an MP3 music track. The **hyperlink data type** stores URLs used to link directly from a database to a Web page.

The information produced by reports and processing routines is only as ***accurate*** as the information in the database. Unfortunately, data ***entry errors*** can ***compromis***e the ***accuracy*** and ***validity*** of a database. When designing a database, it is important ***to think ahead*** and ***envision*** potential data entry errors. Preventing every ***typographical*** error is not possible. However, it is possible to catch some of these errors by using field validation rules, list boxes, or lookups. A process called **normalization** helps to create a database structure that can save storage space and ***increase*** processing efficiency. The goal of normalization is to ***minimize*** **data redundancy –** the amount of data that is repeated or ***duplicated*** in a database.

Records in a database can be organized in different way depending how people want to use them. No single way of organizing the data ***accommodates*** everyone need’s, but tables can be sorted or ***indexed*** in multiple ways. A table’s **sort order** is the order in which records are stored on disk. Sorted tables typically produce faster queries and updates. In a sorted table, new records are inserted to maintain the order. Most DBMSs use a sort key to determine the order in which records are stored. A table’s **sort key** is one or more fields used to specify where new records are inserted in a table. A database index can be used to organize data in alphabetic or numeric order. A **database index** contains a list of keys, and each key provides a ***pointer*** to the record that contains the rest of the fields related to that key.

Designing the database user interface can be a ***challenging*** task. If a company’s database includes multiple tables used by many different people, a professional user interface designer usually creates and maintains the user interface. Large databases might even require a group of user interface designers, ***meanwhile*** the interfaces for smaller databases, such as those used by small business or individuals, is most likely created by a single one.

A ***well-defined*** user interface for a database should be clear, ***intuitive***, and efficient. A designer might consider the following principles:

- Arrange fields in a logical order beginning at the top-left of the screen. The first field should be those used most often or those that come first in the data entry ***sequence.***

- Provide ***visual*** ***clues*** to the entry areas. An edit box, line, or shaded area can ***delineate*** data entry areas.

- Entry areas should appear in a consistent position relative to their ***labels***. By convention, labels are placed left of the entry areas or above them.

- Provide a quick way to move through the fields in order. By convention, the tab key performs this function.

- If all fields do not fit on a single screen, use ***scrolling*** or create a second screen.

- Provide buttons or other ***easy-to-use*** controls for moving from one record to another.

- Supply on-screen instructions to help ensure that data is entered correctly. Web database can ***benefit*** from links to ***help pages.***

After the design for the database structure is completed, it is time to load the database with an ***initial*** set of data. Data can be loaded into a database manually by using ***generic*** data entry toolssupplied with the DBMS or by using a customized data entry module created by the database designer. Entering data manually can take a long time, however, and mistakes such as ***misspelling*** are common. If the data exists electronically in another type of database or in flat files, it is usually possible to transfer the data using a custom-written conversion routine or import and export routines. A **conversion routine** converts the data from its ***current*** format into a format that can be automatically ***incorporate*** into the new database. It takes some time and requires knowledge about database formats to write conversion routines, but for large databases, it’s much quicker to convert data than to re-enter it manually. Converting data also results in fewer errors.

Some DBMSs provide ***built-in*** import and export routines that automatically convert data from one file format to another. An import routine brings data into a database. For example, if data was ***previously*** stored as a spread-sheet file, an import routine in Microsoft Access can be used to transfer data from the spreadsheet to an Access database. In contrast, an export routine copies data out of a software package, such as spreadsheet software, and into the database. Typically, you would use either an import routine or an export routine to move data from one ***location*** to another, but not both.

***Comprehension check.*** *Choose the ending for each sentence from the two versions given.*

1. The key to an effective database is

a) its initial design.

b) to determine what data must be collected and stored.

2. The term database structurerefers to

a) the arrangement of fields, tables, and relationships in a database.

b) the concept of breaking data into fields.

3. From a technical perspective, data typespecifies

a) the way data can be manipulated.

b) the way data is represented on the disk and in RAM.

4. Character data contains

a) letters, numerals and symbols not used for calculations.

b) numbers that can be manipulated mathematically.

5. The goal of normalization

a) to produce timely, meaningful, and accurate information for decision making.

b) is to minimize data redundancy-the amount of data that is repeated or duplicated in a database.

6. After the design for the database structure is completed, it is time

a) to determine the order in which records are stored.

b) to load the database with an initialset of data.

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) initial, original, primary, subsequent;

b) allow, permit, let, advice (verb + object + to);

c) current, visual, intuitive, efficiently;

d) carry out, execute, fulfill, specify;

e) reduce, decrease, minimize, grow up;

f) tool, device, equipment, gadget.

***2. Fill in the blanks choosing from the variants given.***

1. In a well-designed database, data can be … manipulated to produce timely, meaningful, and accurate information for decision making.

a) flexibly b) smoothly c) slowly d) hardly

2. The term database structurerefers to the … of fields, tables, and relationships in a database.

a) agreement b) allocation c) arrangement d) appointment

3. A primary keyis a … that contains data unique to record.

a) space b) field c) table d) file

4. When designing a database, you should … and envision potential data entry errors.

a) think ahead b) think about c) think over d) think out

5. Entering data … can take a long time, however, and mistakes such as misspelling are common.

a) electronically b) automatically c) in written form d) manually

6. A conversion routine … the data from its current format into a format that can be automatically incorporate into the new database.

a) provides b) transfers c) converts d) supplies

***3. Transform the given sentences using the word in brackets without any change in meaning. You may omit, change or add words as required.***

1. The goal of database design is to store information so that it easy to access and maintain (*aim*).

2. The treatment of first and last name illustrates the concept of breaking data into fields (*shows*).

3. BLOBs can be just about any kind of data you would typically store as a file, such as an MP3 music track (*usually*).

4. The information produced by reports and processing routines is only as accurate as the information in the database (*exact*).

5. No single way of organizing the data accommodates everyone need’s, but tables can be sorted or indexed in multiple ways (*satisfies*).

6. Typically, you would use either an import routine or an export routine to move data from one location to another, but not both. (*place*).

***4. Fill in the gaps in the text.***

The first step in designing relational data base is to define its fields by specifying a \_\_\_and data type. Integer, date and \_\_\_ data types are used for fields that might be mathematically manipulated. The \_\_\_ data type is used for fixed-length fields containing text that is not intended to be mathematically manipulated. The \_\_\_ data type is a variable-length field for entering text. The \_\_\_ data type is used to store true/false or yes/no data. The \_\_\_ data type is used to store binary data, such as MP3 files or graphics. When designing fields, a database designer can also include field formats, field \_\_\_ rules, and lookup routines to reduce data entry errors.

***Speaking.*** *Discuss the following questions.*

1. What is the goal of a well-designed database?

2. What does the term database structure refer to?

3. Speak on the first step in structuring a relational database? What is the next step?

4. Why are last names stored in a different field than first names?

5. What does make each record unique?

6. How does a database designer know what data types to use?

7. Can a database designer prevent people from entering inaccurate data?

8. What is normalization?

9. What are the principles that a designer might consider to improve this database?

10. How is data loaded into database tables?

**Text D**

***Pre-reading task.*** *Match the meaning of the following English words with their Ukrainian definitions.*

1. SQL query a) запис

2. Database client software b) повне оновлення

3. Relation database c) мова запитів

4. Record d) реляційна база даних

5. Global update e) ключове слово

6. Parameter f) програмне забезпечення клієнта бази даних

7. Keyword g) SQL-запит

8. Query language h) слово-команда

9. Command word i) об’єднання таблиць

10. Joining tables j) параметр

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***SQL***

Addingrecords, finding information and making updates are all important aspects of database use. Most people who access a database on a “casual” basis interact with very simple user interfaces. These user interfaces ***shield*** users from the ***intricacies*** of sophisticated query languages. Nevertheless, a little ***background*** in query languages can help you understand the power and capabilities of databases.

Query languages like **SQL (**Structured Query Language**)** typically work behind the scenes as an ***intermediary*** between the database client software provided to users and the database itself. Database client software provides an easy-to-use interface for entering search ***specifications***, new records, data updates, and so on. The client software ***collects*** your input, and then converts it into an **SQL query**, which can ***operate*** directly on the database to carry out your instructions.

An SQL query is a sequence of words, much like a sentence. Most ***implementations*** of SQL accept either uppercase or lowercase keywords.

The SQL query language provides a collection of special ***command words*** called **SQL keywords**, such as SELECT, FROM, INSERT, and WHERE, which ***issue*** instructions to the database. Most SQL queries can be divided into three simple elements that specify an action, the name of database table, and a set of parameters. Let’s look at each of these elements.

An SQL query typically begins with an action keyword, or command, which specifies the operation you want to carry out. For examples, the command word **DELETE *removes*** a record from a table, the command word **CREATE** creates a database or table, the command word **INSERT** is used to add a record, the command word **JOIN** uses the data from two tables, **SELECT** searches for records and **UPDATE** changes data in the field.

SQL keywords such as USE, FROM, or INTO can be used to construct a ***clause*** specifying the table you want to access. The clause consists of a keywords followed by the name of the table. For example, the clause **FROM Tracks** ***indicates*** that you want to use the Tracks table from the Vintage Music Shop’s database.

The term **parameter** refers to detailed specifications for a command. Keyword such as WHERE usually begin an SQL clause containing the parameters for a command.

One of the most common database operations is to query for a particular record or group of records by using the **SELECT** command. The phrase, for example, **SELECTAlbumTitle, Album Cover** specifies that the database should show you only the album title and cover, and until you ***confirm*** that is the album you are interested in, it will not show you additional information such as the price or list of tracks.

You can change records in a database only if you have ***authorization*** to do so. At Vintage Music Shop’s site, for example, customers do not have authorization to change album prices or ***alter*** the name of the songs on an album. The process of purchasing an album, however, does cause an update in the whole database. Your purchase just ***reduces*** the number of albums in the shop’s ***inventory***. To accomplish this update, one of the software modules in the shop’s inventory system issues an SQL **UPDATE** command to reduce the number in the InStock field record. In addition to changing the data in a single record, SQL can perform a **global update** that changes the date in more than one record at a time. It means that is possible to update a group of records. Suppose you’re Vintage Music Shop’s marketing manager, and you want ***to put*** all The Rolling Stones albums ***on sale*** by reducing the DiscountPrice to $9.95. You could do it the hard way by searching for an ArtistName field that contains “Rolling Stones”, adjusting the DiscountPrice field for that record, and then looking for the next Rolling Stones album. However, it would be easier to change all records with a single command. The following SQL statement accomplish this global update:

UPDATE Albums

SET DiscountPrice=9.95

WHERE ArtistName=”Rolling Stones”

Let’s see how this command performs a global update. The UPDATE command means you want to change the data in some or all of records. Albums is the name of the record type containing the data you want to change. SET DiscountPrice=9.95 tells the DBMS to change the data in the DiscountePrice field to $9.95. WHERE ArtistName=”Rolling Stones” tells the DBMS to change only those records where the artist name is Rolling Stones. Although the global update function is powerful, it works only for records that have ***similar*** characteristics.

Recall that the process of normalization creates tables that can be related by fields that exist in both tables. In SQL terminology, the creating a relationshipbetween tables is referred to as **joining tables.** To take ***advantage*** of the relationship between two tables, you first have to join the tables. Why? Remember that in relational database, the tables are essentiall***y*** independent unless you join them together. The **SQL JOIN** command ***allows*** you to ***temporarily*** joinand ***simultaneously*** access the data in more than one table.

SQL is a very ***extensive*** and powerful language that can be used not only to manipulate data, but also to create databases, tables and reports. Because SQL is one of the most popular database ***tools,*** many computer professionals consider SQL fluency as essential ***career skill.***

***Comprehension check.*** *Match the beginning of the sentences in the first column with the endings in the second.*

|  |  |
| --- | --- |
| 1. Adding records, finding information, and making updates  2. Query languages like SQL typically work behind the scenes  3. Database client software provides  4. An SQL query is  5. The process of purchasing an album  6. The SQL JOIN command allows you | a) as an intermediary between database client software provided to users and the database itself.  b) are all important aspects of database use.  c) a sequence of words, much like a sentence.  d) only if you have authorization to do so.  e) an easy-to-use interface for entering search specifications, new records, data updates and so on.  f) does cause an update in the whole database. Your purchase just reduce the numbers of albums in the shop’s inventory. |

***Vocabulary practice***

***1. Put the letters in the words in brackets into the correct order.***

1. A little … in query languages can help you understand the power and capabilities of databases (*roducknabg*).

2. An SQL query typically begins with an action …, or command, which specifies the operation you want to carry out (*weykdor*).

3. The clause consists of a keywords followed by the name of the … (*ablet*).

4. Your … just reduces the numbers of albums in the shop’s inventory (*sacherup*).

5. The term … refers to detailed specifications for a command (earpmaret).

6. Although the global update function is powerful, it works only for … that have similar characteristics (coerdrs).

***2. Fill in the blanks choosing from the variants given.***

1. Most people who access a database on a “casual” basis … with very simple user interface.

a) manipulate b) work c) operate d) interact

2. A little … in query languages can help you understand the capabilities of databases.

a) certainty b) background c) career skills d) experience

3. The SQL query language provides a collection of special command … called SQL keywords, such as SELECT, FROM, INSERT, and WHERE, which issue instructions of the database.

a) words b) passwords c) names d) numbers

4. Most SQL queries can be divided into three simple elements that … an action, the name of database table, and a set of parameters.

a) execute b) indicate c) construct d) specify

5. Customers do not have … to change album prices or alter the name of the songs on an album.

a) authorization b) rights c) permission d) possibilities

6. SQL is a very extensive and powerful language that can be used not only to … data, but also to create databases, tables and reports.

a) enter b) manipulate c) to make updates d) input

***3. Match the beginnings and the endings of the steps given and put them into correct order.***

|  |  |
| --- | --- |
| 1 SET DiscountPrice=9.95 tells  2. WHERE ArtistName=”Rolling Stones” tells  3. Albums is  4. The UPDATE command means  5. It means that  6. SQL can perform a global update | a) the name of the record type containing the data you want to change.  b) to change the data in the DiscountePrice field to $9.95.  c) to change only those records where the artist name is Rolling Stones.  d) you want to change the data in some or all of records.  e) that changes the date in more than one record at time.  f) is possible to update a group of records. |

***4. Fill in the gaps in the text.***

SQL is a database query language that typically works behind the scenes as an intermediary between the database \_\_\_ software provided to users and the database itself. Although the specifications for searchers and other database tasks are collected by easy-to use graphical user interfaces, those specifications are converted into SQL \_\_\_ which can communicate directly with the database. An SQL query contains SQL \_\_\_ such as SELECT, FROM, INSERT, JOIN and WHERE, plus \_\_\_ that specify the details of the command. Records can be removed from a database using the SQL \_\_\_ command. Record can be added to a table using the SQL \_\_\_ command. To search for data, you can use the SQL \_\_\_ command. To change or replace the data in a field requires the SQL \_\_\_ command.

***Speaking.*** *Discuss the following questions.*

1. What are the most important aspects of database use?

2. Why is so important to have a little background in query languages?

3. What does the abbreviation SQL stand for?

4. How does a query language like SQL work?

5. What does a simple SQL query look like?

6. How does SQL specify the action that someone wants carried out in the data base? Speak on the most commonly used SQL command words.

7. How does SQL specify which table to use?

8. How do SQL queries carry out searches?

9. Is it possible to change the contents of records or to update a group of records? What does the process of purchasing cause?

10. How is the date retrieved from more than one table at a time? What command does allow you to access the data in more than one table?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Privacy**

You might be astonished by the amount of information stored about you in computer database. You bank has information on your financial status, credit history, and the people, organizations, and businesses to which you write checks. School records indicate something about your ability to learn and the subjects that interest you. Medical records indicate the state of your health. Credit card companies track the places you shop and what you purchase in person, by main, or on the Web. Your phone company stored your phone number, your address, and a list of the phone numbers you dial. The driver’s license bureau has your physical description. Your internet cookies track many of the Web sites you frequent. By compiling this data-a process sometimes referred to as “profiling’-an interested person or company could guess some very privet things about you, such as your political views or even your sexual orientation.

When records were stored on index cards and in file folders, locating and distributing data constituted a laborious process that required hand transcriptions or photocopies of piles of papers. Today, this data exists in electronic format and easy to access, copy, sell, shop, consolidate, and alter.

Privacy advocates point out the potential for misusing data that has been collected and stored in computer database. In response to terrorist threats, the Pentagon is working on several controversial projects designed to mine data from database that store information about passports, visas, work permits, car rentals, air-line reservations, arrests, bank accounts, school grades, medical history, and fingerprints. Government data miners believe that data mining could uncover terrorists. Privacy advocates note, however, that every data set contains patterns. The big question is whether any set of seemingly innocent activities, such as credit card purchases, can be correlated with impending terrorist acts. The potential for error and privacy violation in generalized data mining projects is sobering. Privacy advocates are encouraging lawmakers to closely monitor government snooping and restrict privet-sector sale and distribution of information about individuals. Some legislation is in place for certain private-sector institutions. For example, the 1999 Financial Services Modernization Act requires financial institutions to supply clients with an annual notice expanding how personal information is collected and share. This legislation also required financial institution to provide a way for clients to opt out of such information exchanges.

The issue of privacy is not simple. Information about you is not necessarily “yours”. Although you might “reveal” information about yourself on an application form, other information about you is collected without your direct input. For example, suppose you default on you credit card payment. The credit card company has accumulated information about your delinquent status. Shouldn’t it have freedom to distribute this information, foe example, to another credit company?

People aren’t always unwilling victims of privacy violations. Many individuals knowingly let companies gather profiling information to get free products. For example, thousands of people signed up for Google’s Gmail service even though they knew their e-mail massages could be scanned to develop marketing profile.

Unfortunately, private information can be garnered from your computer without your permission. Spyware is a type of software containing code that tracks personal information from your computer and passes it on to third parties, without your authorization or knowledge. Spyware might be embedded in an application that you download, or it can download itself from unscrupulous Web-sites-a process called a “driveby download”Database containing personal information do offer positive benefits. For example, many web surfers appreciate the shortcuts offered by software agents that assemble a customer profile in order to recommend books, CDs, videos, new articles, and other targeted goods and services. These users might willingly give up some measure of privacy for the convenience afforded by these agents.

The electronic privacy issue appears to be heading toward some type of compromise between strict privacy and wholesale collection/distribution of personal data.

**What do you think?**

1. Do you think data about you should be distributed only after your permission is obtained?

2. Can you identify an actual incident when you discovered that data about you was distributed without your approval?

3. Do you think the information you provide on paper forms is more private than the information you enter into Web-based format?

4. Have you thought about ways to protect your privacy?

***Final test.*** *Do the tasks in the following test.*

1. A(n) … file is a structured file containing only one record type … .

2. All of the following are considered advantages of using static Web publishing to display data on a Web page, EXEPT … .

a) you data remains secure

b) most entry-level DBMSs provide the capability to produce an HTML page

c) users can change your data d) it provides a “snapshot” of your data

3. Modern database software supports data …, which means keeping data separated from the program modules that manipulate the data.

4. The first step to organize relational database is to organize data into field. (*True*/ *False*)

5. In a relational database, an attribute is equivalent to a record. (*True/False*)

6. A(n) … is a collection of data fields that pertain to an entity, such as a person, place, or thing.

7. One of the goal of normalization process is to minimize data … .

8. SQL … include SELECT, FROM and INSERT.

9. ASP, CGI, and PHP are used to create XML documents that are processed on a server before being sent to your browser. (True/False)

10. In SQL, the JOIN command allows you to add fields to a database. (*True/False*)

11. Spreadsheet software typically includes some data management features suitable for working with relational database. (*True/False*)

12. A database index has no bearing on the physical sequence of records stored on disk. (*True/False*)

13. Data … refers to the use of statistical tools for automated extraction of predictive information from database.

14. An SQL query is a sequence of words, much like a sentence. (*True/False*)

15. One a table’s sort key has been added, it cannot be changed. (*True/False*)

16. In an ERD, relationships and … are shown by connecting lines.

17. A primary … contains data unique to a record.

18. The term “parameter” refers to detailed specifications for a command. (*True/False*)

19. Real, integer, text, logical, BLOB and date are examples of data … .

20. A database consists of one or more records … that contain data.

***Projects.*** *Choose and perform one of the projects given.*

1. A friend wants to create a table to store information about a collection of old books. List the fields you might include in the table to store information about the book. For each field, specify the field name, data type (text, numeric, date, etc) and field length. Indicate primary key(s) and describe in writing how you would sort and/or index the data.

2. Computer databases often store personal information about the citizens of more than one country, yet privacy expectations and laws differ. For this project, explore the differences in privacy laws around the globe. Which countries have the strongest privacy laws and which have the weakest? Which laws would govern the data stored by multinational companies? As a global consumer, which databases would concern you most for potential privacy violations? Consolidate your thoughts into a one- to two-page paper and submit to your instructor.

***Unit 8.* computer programming**

**Text A**

***Pre-reading task.*** *Match the meaning of the following English words with their Ukrainian definitions.*

1. assumption a) програма - відладчик

2. event driven b) сітка, таблиця

3. gridc) припущення, допущення

4. paradigm d) керована подія

5. debugger e) система понять, модель

6. flowchart f) постановка задачі

7. problem statement g) графічна схема програми

***Reading*.** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***PROGRAM PLANNING***

The programming process begins with a problem statement that helps you clearly define the purpose of a computer program. In the context of programming, a **problem statement** defines certain elements that must be manipulated to achieve a result or goal. A good problem statement for a computer program has three characteristics:

1. It specifies any assumptions that define the scope of the problem.

2. It clearly specifies the known information.

3. It specifies when the problem has been solved.

In a problem statement an **assumption** is something you accept as true in order to proceed with program planning. The “**known information**” is the information that you supply to the computer to help it solve a problem. There are also **variables** (values that can change) and **constants** (factors that remain the same) in computer programs.

Formulating a problem statement provides a minimal amount of planning, which is sufficient for only the simplest programs. A typical commercial application requires far more extensive planning, which includes detailed program ***outlines***, job assignments, and schedules. To some extent, ***program planning*** depends on the language and paradigm used to code a computer program. The phrase **programming paradigm** refers to a way of conceptualizing and structuring the tasks a computer performs. For example, whereas one programmer might focus on the steps required to complete a specific computation, another one might focus on the data that forms the basis for the ***computation.*** Quite a number of programming paradigms exist, and a programmer might use techniques from multiple paradigms while planning and coding a program.

There are different program planning ***tools***, such as ***flowcharts, structured English***, pseudocode, UML diagrams, and decision tables, which are used to provide sufficient planning.

Regardless of the tools used, when planning is complete, programmers can begin coding, testing, and documenting. The process of coding a computer program depends on programming language you use, the programming tools you select, and the programming paradigm that best fits the problem you are trying to solve. Programmers typically use a text editor, a program editor, or a VDE to code computer programs.

A text editor is any word processor that can be used for basic editing tasks, such as writing e-mail, creating documents, or coding computer programs. When using a text editor to code a computer program, you simply type in each instruction.

A program editor is a type of text editor specially designed for entering code for computer programs.

A **VDE** (visual development environment) provides programmers with tools to build substantial sections of a program by pointing and clicking rather than typing lines of code. A typical VDE is based on a **form design grid** that a programmer manipulates to design the user interface for a program. By using various tools provided by the VDE, a programmer can add objects, such as controls and graphics, to the form design grid. In the context of a VDE, a control is a screen-based object whose behavior can be defined by a programmer.

In visual development environment, each control comes with predefined set of events. Within the context of programming, an **event** is defined as an action, such as click, drag, or key press, associated with the form or control. A programmer can select the events that apply to each control. An event usually requires the computer to make some response. Programmers write **event-handling code** for the procedures that specify how the computer responds to each event.

A programmer’s choice of development tools depends on what is available for a particular programming language and the nature of the programming project. Text editors and program editors provide a fine tool set for programs with minimal user interfaces. A visual development environment is a powerful tool for programming software applications for GUI environments, such as Windows. Most GUI applications are “***event-driven***”, which means that when ***launched***, the program’s interface appears on the screen and waits for the user to initiate an event.

A computer program must be tested to ensure that it works correctly. Testing often consists of running the program and entering test data to see whether the program produces correct results.

When a program doesn’t work correctly, it is usually the result of an error made by the programmer. A **syntax error** occurs when an instruction doesn’t follow the syntax rules, or grammar of the programming language. Syntax errors are easy to make, but they are usually also easy to detect and correct.

Another type of program ***bug*** is a **runtime error**,which, as its name indicates, shows up when you run a program. Some runtime errors result from instructions that the computer can’t ***execute***.

Some runtime errors are classified as logic errors. A **logic error** is an error in the logic or design of a program. It can be caused by an inadequate definition of the problem or an incorrect formula for a calculation, and they are usually more difficult to identify than syntax errors.

Programmers can locate errors in a program by reading through lines of code, much like a proofreader. They can also use a tool called **debugger** to step through a program and monitor the status of variables, input, and output. A debugger is sometimes packaged with a programming language or can be obtained as an add-on.

Anyone who uses computers is familiar with program documentation in the form of ***user manuals*** and help files. Programmers also insert documentation called **remarks** or “comments” into the programming code. Remarks are identified by language-specific symbols.

A well-documented program contains initial remarks that explain its purpose and additional remarks in any sections of a program where the purpose of the code is not immediately clear.

***Comprehension сheck.*** *Mark the following statements as True or False.*

1. The programming process begins with coding.

2. A typical commercial application requires a minimal amount of planning.

3. A programmer might use techniques from multiple paradigms while planning and coding.

4. Programmers typically use a program editor to code computer programs.

5. A visual development environment provides programmers with tools to build substantial sections of a program by pointing and clicking.

6. Text editors and program editors provide a fine tool for programming software interfaces.

7. Syntax errors result from instructions that the computer can’t execute.

***Vocabulary practice***

***1. Match up the words that are similar in meaning.***

computation medium

bug scheme

to execute error, mistake

environment calculation

outline carry out

to launch instrument

tool to start (up)

***2. Fill in the blanks choosing from the variants given.***

1. Microsoft Visual Basic was one of the first programming languages to feature a visual development … .

a) medium b) environment c) tool

2. If program testing doesn’t produce the expected results, the program contains a (an) …, sometimes called a “...”.

a) mistake b) error c) problem d) bug

3. Program planning ... depends on the language and paradigm used to code a computer program.

a) instruments b) options c) tools

4. When the user … GUI application, the program interface appears on the screen and waits for the user to initiate an event by clicking a menu, dragging an object, or typing text.

a) starts up b) begins c) launches

5. A typical commercial program requires extensive planning, which includes detailed program … .

a) plans b) outlines c) schemes

6. Some runtime errors result from instructions that computer can’t ... .

a) execute b) make c) carry out

7. Programmers approach problems in different ways: while one programmer might focus on the steps to complete specific …, another programmer might focus on the data that forms the basis for the … .

a) tasks b) calculations c) computations

***3. Make two-word combinations using the words in columns and then fill in the following sentences.***

A: programming B: planning

problem error

runtime statement

structured manual

event driven

program paradigm

user English

1. Anyone who uses computers is familiar with program documentation in the form of ... and help files.

2 The process of coding a computer program depends on programming language you use, the programming tools you select, and the … that best fits the problem you are trying to solve.

3. The programming process begins with a … that helps you clearly define the purpose of a computer program.

4. Most GUI applications are …, which means that when launched, the program’s interface appears on the screen and waits for the user to initiate an event.

5. An assumption is something you accept as true in order to proceed with … .

6. There are different program planning tools, such as flowcharts, … pseudocode, UML diagrams, and decision tables.

7. … shows up when you run a program.

***4. Fill in the gaps in the text.***

Computer programmers focus on \_\_\_ computer programs, but also plan, test, and document computer programs. Before program code can be written, a programmer needs a clear problem \_\_\_, which includes a list of assumptions, a description of known information, and a specification for what constitutes a solution. With a clear plan, a programmer can begin coding using a generic text editor, a program editor, or a \_\_\_ development environment. A program is not complete until it has been tested to ensure that it contains no \_\_\_ errors or runtime errors. Programmers can use software called a \_\_\_ to step through a program. All computer programs should include internal documentation in the form of \_\_\_, which are explanatory comments inserted into a computer program along with lines of code.

***Speaking.*** *Discuss the following questions.*

1. What is a problem statement?

2. What is an assumption?

3. Does the problem statement provide sufficient planning to begin coding?

4. How does a programmer code a computer program?

5. What is a text editor and a program editor?

6. What is a VDE?

7. How does a programmer know if a program works?

8. What can cause program errors?

9. How do programmers find errors?

10. Do computer programs contain any special documentation?

**Text B**

***Pre-reading.*** *Match the English words with their Ukrainian equivalents.*

1. sequence a) зразок, шаблон

2. walkthrough b) послідовність

3. pattern, sample c) цикл, повтор

4. loop, iteration d) наскрізний контроль

5. notational e) застосовувати

6. implement f) цифровий запис

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***PROCEDURAL PROGRAMMING***

The traditional approach to programming uses a **procedural paradigm** (sometimes called “imperative paradigm”) to conceptualize the ***solution*** to a problem as a ***sequence*** of steps. A program written in a procedural language typically consists of ***self-contained instructions*** in a sequence that indicates how a task is to be performed or a problem is to be solved.

A programming language that supports the procedural paradigm is called a **procedural language**. Procedural languages are well suited for problems that can be easily solved with a ***linear, or step–by-step, algorithm***. Programs created with procedural languages have a starting point and an ending point. The flow of execution from the beginning to the end of the program is essentially linear – that is, the computer begins at the first instruction and carries out the prescribed series of instructions until it reaches the end of the program.

An **algorithm** is a set of steps for carrying out a task that can be written down and ***implemented***. An algorithm for a computer program is a set of steps that explains how to begin with known information specified in a problem statement and how to manipulate that information to arrive a solution. In a later phase of the ***software*** ***development process***, the algorithm is coded into instructions written in a programming language so that a computer can implement it.

To design an algorithm, you might begin by recording the steps you take to solve the problem manually. The computer also needs the initial information, so the part of your algorithm must specify how the computer gets it. Next, your algorithm should also specify how to manipulate this information and, finally, how the computer decides what to display as the solution.

You can express an algorithm in several different ways, including structured English, pseudocode, and flowcharts. These tools are not programming languages, and they cannot be processed by a computer. Their purpose is to give you a way to document your ideas for program design.

**Structured English** is a subset of the English language with a limited selection of sentence structures that reflects processing activities. Another way to express an algorithm is with pseudocode. **Pseudocode** is a ***notational*** system for algorithms that has been described as a mixture of English and your favorite programming language.

A third way to express an algorithm is to use a flowchart. A **flowchart** is a graphical representation of the way a computer should progress from one instruction to the next when it performs a task.

Before finalizing the algorithm for a computer program, you should perform a **walkthrough** toverify that your algorithm works.To perform a walkthrough for a simple program, you can use a calculator, paper, and pencil to step through a ***sample*** problem using realistic “test” data.

For more complex programs, a walkthrough might consist of a ***verbal*** presentation to a group of programmers who can help identify logical errors in the algorithm and suggest ways to make the algorithm more efficient.

The algorithm specifies the order in which program instructions are performed by the computer. Unless you do otherwise, sequential execution is the normal pattern of program execution. During **sequential execution**,the computer performs each instruction in the order it appears – the first instruction in the program is executed first, then the second instruction, and so on, to the last instruction in the program.

Some algorithms specify that a program must execute instructions in an order different from the sequence in which they are listed, skip some instructions under certain circumstances, or repeat instructions. **Control structures** are instructions that specify the sequence in which program is executed. Most programming languages have three types of control structures: sequence controls, selection controls, and repetition controls.

A **sequence control structure** changes the order in which instructions are carried out by directing the computer to execute an instruction elsewhere in the program. A sequence control structuredirects the computer to the statements they contain, but when these statements have been executed, the computer neatly returns to the main program.

A **selection control structure**, also referred to as a “decision structure” or “branch”, tells a computer what to do, based on whether a condition is true or false. A simple example of a selection control structure is the IF…THEN…ELSE command.

A **repetition control structure** directs the computer to repeat one or more instructions until certain condition is met. The section of code that repeats is usually referred to as a **loop** or “***iteration***”. Some of the most frequently used repetition commands are FOR…NEXT, DO…WHILE, DO…UNTIL, and WHILE…WEND (which means “while ends”).

All the first programming languages were procedural. The first widely used ***standardized computer language***, FORTRAN, with its procedural paradigm set the ***pattern*** for other popular procedural languages, such as COBOL, APL, ALGOL, PL/1, PASCAL, C, ADA, and BASIC.

The procedural approach is best suited for problems that can be solved by following a step-by-step algorithm. It has been widely used for transaction processing, which is characterized by the use of a single algorithm applied to many different sets of data. For example, in banking industry, the algorithm for calculating ***checking account balances*** is the same, regardless of the amounts ***deposited*** and ***withdrawn***. Many problems in math and science also lend themselves to the procedural approach.

The procedural approach and procedural languages tend to produce programs that run quickly and use ***system resources*** efficiently. It is a classic approach understood by many programmers, software engineers, and system analysts. The procedural paradigm is quite flexible and powerful, which allows programmers to apply it to many types of problems.

The ***downside*** of the procedural paradigm is that it does not fit gracefully with certain types of problems – those that are unstructured or those with very complex algorithms. The procedural paradigm has also been criticized because it forces programmers to view problems as a series of steps, whereas some problems might better be visualized as interacting objects or as interrelated words, concepts, and ideas.

***Comprehension check.*** *Indicate the paragraph where the following ideas are found in the text.*

1. A program written in a procedural language contains the prescribed series of instructions.

2. An algorithm shows the steps how to manipulate the information to arrive at a solution.

3. There are different tools to express an algorithm.

4. To make sure that your algorithm works, you should verify it.

5. Program instructions can be executed in order they are listed or some instructions can be skipped or repeated.

6. Many problems in banking industry lend themselves to the procedural approach.

***Vocabulary practice***

***1. Match up the words that are opposite in meaning.***

sequential parallel algorithm

downside problem

to focus written

solution advantage

to deposit to distract

linear algorithm random

verbal to withdraw

***2. Fill in the blanks choosing from the variants given.***

1. During … execution,the computer performs each instruction in the order it appears – the first instruction in the program is executed first, then the second instruction, and so on, to the last instruction in the program.

a) random b) sequential c) direct d) reverse

2. The main ... of procedural paradigm is that it forces programmers to view problems as a series of steps, whereas some problems might better be visualized as interacting objects or as interrelated words, concepts, and ideas.

a) benefit b) advantage c) drawback d) downside

3. The fact that algorithms are usually written in a format that is not specific to a particular programming language allows you … on formulating a correct algorithm.

a) to concentrate b) to focus c) to distract

4. The traditional approach to programming uses a procedural paradigm to conceptualize the … a problem as a sequence of steps.

a) problem b) decision c) solution

5. The algorithm for calculating checking account balances is the same, regardless of the amounts … and.... .

a) invested, placed, deposited b) drawn out, withdrawn, taken away

6. Procedural languages are well suited for problems that can be easily solved with … algorithm.

a) chain b) linear c) parallel

7. For complex programs, a walkthrough might consist of a... presentation to a group of programmers who can help identify logical errors in the algorithm and suggest ways to make the algorithm more efficient.

a) written b) graphical c) verbal

***3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.***

A: selection B: account C: instruction

self step-by-step algorithm

software computer balances

standardized development language

checking control process

linear contained structure

1. The procedural approach is best suited for problems that can be solved by following a … .

2. A …, also referred to as a “decision structure” or “branch”, tells a computer what to do, based on whether a condition is true or false.

3. The first widely used …, FORTRAN, with its procedural paradigm set the pattern for other popular procedural languages.

4. In banking industry, the algorithm for calculating … is the same.

5. A program written in a procedural language typically consists of ... in a sequence that indicates how a task is to be performed or a problem is to be solved.

6. The algorithm is coded into instructions written in a programming language which a computer can implement in a later phase of the … .

***4. Fill in the gaps in the text.***

Languages such as COBOL and FORTRAN support a traditional approach to programming called the \_\_\_ paradigm, which is based on a step-by-step \_\_\_. Procedural languages provide a variety of \_\_\_ structures that allow programmers to specify the order of program execution. A \_\_\_ control structure directs the computer to execute instructions, not coded as a simple succession of steps. A \_\_\_ control provides a choice of paths, based on whether a condition is true or false. A \_\_\_ control, or “loop”, repeats one or more instructions until a certain condition is met. Procedural languages produce programs that run quickly and use \_\_\_ resources efficiently.

***Speaking.*** *Discuss the following questions.*

1. What is proceduralprogramming?

2. What is an algorithm?

3. How do you write an algorithm?

4. What is the best way to express an algorithm?

5. How do you know if your algorithm is correct?

6. In what order does a computer perform program instructions?

7. Can the computer make decisions while it executes a program?

8. What are the most popular procedural languages?

9. What kinds of problems are best suited to the procedural approach?

10. What are the advantages and disadvantages of the procedural paradigm?

**Text C**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***OBJECT-ORIENTED PROGRAMMING***

The abbreviation “OO”, which stands for object oriented, is used to describe a programming paradigm as well as a variety of computer programming languages.

**Objects and classes**

The **object-oriented paradigm** is based on the idea that the ***solution*** for a problem can be visualized in terms of objects that interact with each other. In the context of this paradigm, an **object** is a unit of data that ***represents*** an abstract or a real world ***entity***, such as a person, place, or thing. For example, an object can represent a $10.99 small pepperoni pizza. Another one can represent a pizza delivery guy named Jack Flash. Yet another object can be a customer living at 22 Pointe Rd.

The real world contains lots of pizzas, customers, and delivery guys. These objects can be defined in a general way by using classes. Whereas an object is a single ***instance*** of an entity, a **class** is a ***template*** for a group of objects with similar characteristics. For example, a Pizza class defines a group of gooey Italian snacks that are made in a variety of sizes, crafted into rectangular or round shapes, and sold for various prices. A class can produce any number of unique objects.

When taking the object-oriented ***approach*** to a problem, one of the first steps is to identify the objects that pertain to a solution. As you might expect, the solution to the pizza problem requires some pizza objects. Certain characteristics of pizzas provide information necessary to solve the problem. This information – the price, size, and shape of a pizza – provides the structure for the Pizza class. A class is defined by attributes and methods. A **class** **attribute** defines the characteristics of a set of objects.

Each class attribute typically has a name, ***scope*** and data type. One class attribute of the Pizza class might be named “pizzaPrice”. Its scope can be defined as public or private. A **public attribute** is available for use by any routine in the program. A **private attribute** can be accessed only from the routine in which it is defined. The pizzaPrice attribute’s data type can be defined as “double”, which means that it can be any decimal number. OO programmers often use **UML** (Unified Modeling Language) diagrams to plan the classes for a program. Although a programmer completes the overall program plan before coding, jump ahead to take a quick look at the Java code for the attributes in the Pizza class. The first line of code defines the name of the class. Each subsequent line defines the scope, data type, and name of an attribute. The curly brackets simply define the start and end of the class.

Class Pizza

{public string pizzaShape;

public double pizzaPrice;

public double pizzaSize;}

**Inheritance**

The object-oriented paradigm endows classes with quite a bit of flexibility. For the pizza program, objects and classes make it easy to compare round pizzas to rectangular pizzas rather than just to square pizzas.

Suppose you want to compare a 10-inch round pizza to a rectangular pizza that has a length of 11 inches and a width of 8 inches. The Pizza class holds only one measurement for each pizza—pizzaSize. This single attribute won't work for rectangular pizzas, which might have a different length and width. Should you modify the class definition to add attributes for pizzaLength and pizzaWidth? No, because these attributes are necessary only for rectangular pizzas, not for round pizzas. An OO feature called “inheritance” provides flexibility to deal with objects’ unique characteristics.

In object-oriented jargon, **inheritance** ***refers to*** passing certain characteristics from one class to other classes. For example, to solve the pizza problem, a programmer might decide to add a RoundPizza class and a RectanglePizza class. These two new classes can ***inherit*** attributes from the Pizza class, such as pizzaShape and pizzaPrice. You can then add specialized characteristics to the new classes. The RectanglePizza class can have attributes for length and width, and the RoundPizza class can have an attribute for diameter.

The process of producing new classes with inherited attributes creates a superclass and subclasses. A **superclass**, such as Pizza, is any class from which attributes can be inherited. A **subclass** (or “derived class”), such as RoundPizza or RectanglePizza, is any class that inherits attributes from a superclass. The set of superclasses and subclasses that are ***related*** to each other is referred to as a **class** **hierarchy**. Java uses the “extends” command to link a subclass to a superclass. The statement *class RectanglePizza extends Pizza* means “create a class called RectanglePizza that’s derived from the superclass called Pizza”.

class RectanglePizza extends Pizza

{double pizzaLength;

double pizzaWidth;}

**Methods and messages**

An OO program can use objects in a variety of ways. A basic way to use objects is to manipulate them with methods. A **method** is a segment of code that defines an action. The names of methods usually end in a set of parentheses, such as compare() or getArea().

A method can perform a variety of tasks, such as collecting input, performing calculations, making comparisons, executing decisions, and producing output. For example, the pizza program can use a method named compare () to compare the square-inch prices of two pizzas and display a message indicating the best pizza.

A method begins with a line that names the method and can include a ***description*** of its scope and data type. The scope—public or private—specifies which parts of the program can access the method. The data type specifies the kind of data, if any, that the method produces. The initial line of code is followed by one or more lines that specify the calculation, comparison, or routine that the method performs.

A method is activated by a message, which is included as a line of program code, sometimes referred to as a “call”. In the object-oriented world, objects often interact to ***solve*** a problem by sending and receiving messages. For example, a pizza object might receive a message asking for the pizza’s area or price per square inch.

**Polymorphism**, sometimes called “overloading”, is the ability to redefine a method in a subclass. It allows programmers to create a single, generic name for a procedure that behaves in ***unique*** ways for different classes. Polymorphism provides OO programs with easy extensibility and can help simplify program code.

***Comprehension check.*** *Choose the ending for each sentence out of the two or three given.*

1. The statement “class RectanglePizza extends Pizza” means

a) create a class called Pizza that is derived from the superclass called RectanglePizza.

b) create a class called RectanglePizza that is derived from the superclass called Pizza.

2) Inheritance refers to passing certain characteristics from one

a) method to another method.

b) class to other classes.

c) class to a superclass.

3) A public attribute

a) can be accessed only from the routine in which it is defined.

b) is available for use by any routine in the program.

c) can't be created in a class which contains private attributes.

4) A class attribute

a) defines the characteristics of a set of objects.

b) is available for use by any routine in the program only if it is private.

5) The process of producing new classes with inherited attributes creates

a) only a superclass. b) a superclass and subclasses.

6) In the object-oriented world, objects

a) don't interact.

b) often interact to solve a problem by sending and receiving messages.

***Vocabulary practice***

***1. Which word does not belong to the group?***

a) class, object, function, method;

b) overloading, inheritance, polymorphism, lambda expression;

c) static, private, protected, public;

d) Smalltalk, Prolog, C++, Java;

e) Boolean, String, Multivalued, Double;

f) overclass, class, subclass, superclass.

***2. Fill in the missing words choosing from the variants given.***

1. … allows programmers to create a single, generic name for a procedure that behaves in unique ways for different classes.

a) inheritance b) paradigm c) polymorphism

2. The OO paradigm defines a(an) … as a unit of data that represents an abstract or real-world entity.

a) method b) object c) class d) attribute

3. Which type of diagrams are often used to plan the OO classes for a program?

a) HTML b) UML c) XML d) Flowchart

4. Which of the following items is not a typical feature of an object-oriented language?

a) polymorphism b) inheritance c) classes d) relationships

5. In the context of OO, a class attribute … .

a) defines the characteristics of a set of objects

b) defines the behavior of an object

c) is used to determine if an object exists

d) is another name for an object

6. The set of superclasses and subclasses related to each other is referred to as … .

a) a class hierarchy b) a set of independent classes

c) a set of classes with a common parent

***3. Transform the following sentences without any change in meaning. Use the prompts as they are given (words in brackets, parts of sentences).***

1. For the pizza program, objects and classes make it easy to compare round pizzas to rectangular pizzas rather than just to square pizzas (*comparison*).

2. A method begins with a line that names the method and can indicate a description of its scope and data type (*describe*).

3. The abbreviation “OO” is used to describe a programming paradigm as well as a variety of computer programming languages (*description*).

4. In the object-oriented world, objects interact to solve a problem by sending and receiving messages (*interaction*).

5. When taking the object-oriented approach to a problem, one of the first steps is to identify the objects that pertain to a solution (*identification*).

6. A basic way to use objects is to manipulate them with methods (*manipulation*).

***4. Fill in the gaps in the text.***

The object-oriented paradigm is based on the idea that the solution to a problem can be visualized in terms of objects that \_\_\_ with each other. An object is a single instance of an entity. Programmers can use a \_\_\_ as a template for a group of objects with similar characteristics. Classes can be derived from other classes through a process called \_\_\_. The set of superclasses and subclasses that are related to each other is referred to as a class \_\_\_. OO programmers often use \_\_\_ Modeling Language diagrams to plan the classes for a program. Objects interact to solve problems by exchanging \_\_\_ which initiate an action, process, or procedure. OO programmers can create \_\_\_ to define what happens once an action is initiated.

***Speaking.*** *Discuss the following questions.*

1. What is the basic focus of the objected-oriented paradigm?

2. What’s the difference between an object and a class?

3. How do I define the classes I need to solve a problem?

4. How do I code a class when writing a program?

5. How flexible are classes for defining different types of objects?

6. What is inheritance?

7. How do I code a subclass?

8. How does an OO program use objects?

9. What can a method do?

10. What does a method look like when it has been coded in Java?

**Text D**

***Reading.*** *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

***OBJECT-ORIENTED LANGUAGES AND APPLICATIONS***

Computer historians believe that SIMULA (SIMUlation LAnguage) was the first computer language to work with objects, classes, inheritance, and methods. SIMULA was developed in 1962 by two Norwegian computer scientists for the purpose of programming simulations and models. SIMULA laid the ***foundation*** for the object-oriented paradigm, which was later incorporated into other programming languages, such as Eiffel, Smalltalk, C++, and Java.

The second major development in object-oriented languages came in 1972 when Alan Kaye began work on the Dynabook project at the Xerox Palo Alto Research Center (PARC). Dynabook was a prototype for a notebook-sized personal computer, intended to handle all the information needs of adults and children. Kaye developed a programming language called Smalltalk for the Dynabook that could be easily used to create programs based on real-world objects. Dynabook never became a commercial product, but Smalltalk survived and is still in use today. Smalltalk is regarded as a classic object-oriented language, which encourages programmers to take a “pure” OO approach to the programming process.

As the object-oriented paradigm gained popularity, several existing programming languages were modified to allow programmers to work with objects, classes, inheritance, and polymorphism. The concept for the Ada programming language ***originated*** in 1978 at the U. S. Department of Defense. The first versions of Ada were procedural, but in 1995, the language was modified to ***incorporate*** object-oriented features. A similar transformation took place with the C language in 1983, except that the object-oriented version earned a new name — C++. Hybrid languages, such as Ada95, C++, Visual Basic, and C#, give programmers the option of using procedural and object-oriented techniques.

Java is one of the newest additions to the collection of object-oriented languages. Originally planned as a programming language for consumer electronics, such as interactive cable television boxes, Java evolved into an object-oriented programming platform for developing Web applications. Java was officially launched by Sun Microsystems in 1995 and has many of the characteristics of C++, from which it derives much of its syntax. Like C++, Java can also be used for procedural programming, so it is sometimes classified as a hybrid language.

The object-oriented paradigm can be applied to a wide range of programming problems. Basically, if you can ***envision*** a problem as a set of objects that pass messages back and forth, the problem is suitable for the OO approach.

The object-oriented paradigm is cognitively similar to the way human beings perceive the real world. Using the object-oriented approach, programmers might be able to visualize the solutions to problems more easily. Facets of the object-oriented paradigm can also increase a programmer’s efficiency because encapsulation allows objects to be adapted and reused in a variety of different programs. **Encapsulation** refers to the process of ***hiding*** the internal details of objects and their methods. After an object is coded, it becomes a “black box,” which essentially hides its details from other objects and allows the data to be accessed using methods.

A potential disadvantage of object-oriented programs is runtime ***efficiency***. Object-oriented programs ***tend*** to require more memory and processing resources than procedural programs. Programmers, software engineers, and system analysts can work together to weigh the tradeoffs between the OO approach and runtime efficiency.

***Comprehension check.*** *Match the beginnings of the sentences in the first column with the endings in the second column.*

|  |  |
| --- | --- |
| Beginnings | Endings |
| 1. SIMULA laid foundations for  2. Smalltalk is regarded as  3. Java evolved into an object-oriented programming platform for  4. The object-oriented paradigm is cognitively similar to  5. Encapsulation allows objects  6. Programmers, software engineers and system analysts can work together | a) to be adapted and reused in a variety of different programs.  b) a classic object-oriented language.  c) to weigh the tradeoffs between the OO approach and runtime efficiency.  d) the way human beings perceive the real world.  e) the object-oriented paradigm.  f) developing Web applications. |

***Vocabulary practice***

***1. Put the letters in the following words into the correct order.***

migradap papharoc quchetine fifecynice angatdavidse tulenpasacion

***2. Fill in the blanks choosing from the variants given.***

1. The process of hiding internal details of objects and their methods is called … .

a) encapsulation c) inheritance

b) polymorphism d) object-oriented

2. Smalltalk, Eiffel, Java, and … are all programming languages that support the object-oriented paradigm.

a) C b) C++ c) Fortran d) Ada

3. … is NOT a typical feature of an object-oriented language.

a) polymorphism c) classes

b) inheritance d) relationships

4. Object-oriented programs tend to require … memory and processing resources than procedural programs.

a) less b) more

5. Hybrid languages, such as Ada95, Visual Basic, and …, give programmers the option of using procedural and object-oriented techniques.

a) C b) C++ c) C#

6. If you can envision a problem as a set of … that pass messages back and forth, the problem is suitable for the OO approach.

a) classes b) objects

***3. Match the beginnings and the endings of the sentences, and then put the sentences into the correct order.***

|  |  |
| --- | --- |
| 1. SIMULA laid the foundation  2. The second major development of object-oriented languages  3. Computer historians believe that SIMULA was  4. Dynabook never became a commercial product, but  5. Smalltalk is regarded as a classic object-oriented language  6. Dynabook was a prototype | a) the first computer language to work with objects, classes, inheritance, and methods.  b) which encourages programmers to take a “pure” OO approach to the programming process.  c) Smalltalk survived and is still in use today.  d) for a notebook-sized personal computer.  e) came in 1972.  f) for the object-oriented paradigm, which was later incorporated into other programming languages. |

***4. Fill in the gaps in the text.***

The OO paradigm allows programmers to hide the internal details of objects and their methods. This process, called \_\_\_, allows objects to be easily reused, modified, and repurposed.

Computer historians believe \_\_\_ was the first programming language to work with objects, classes, inheritance, and methods. It is a language called \_\_\_. Recently many procedural languages have been given OO capabilities. \_\_\_, which originated at the Department of Defense, was originally a procedural language, but now includes OO features. The C language was modified into a language called\_\_\_, and again modified into C#. Recent versions of \_\_\_ Basic also offer programmers the option of working within the object-oriented paradigm.

***Speaking.*** *Discuss the following questions.*

1. How did object-oriented languages originate?

2. Which object-oriented languages are popular today?

3. What kinds of applications are suitable for object-oriented languages?

4. What are the advantages and disadvantages of the OO paradigm?

***Critical thinking.*** *Read the article and express your opinion on the problem.*

**Human Factors**

Today’s programming languages provide programmers with sophisticated tools for coding and testing software. Why then, are computers and computer software so often characterized as being difficult to use?

Programmer and user interface designer Alan Cooper offers an explanation and solution in his book “The Inmates Are Running the Asylum”. According to Cooper, programmers don’t intentionally create bad technology products. “Programmers aren’t evil. They work hard to make their software easy to use. Unfortunately, their frame of reference is themselves, so they only make it easy to use for other software engineers, not for normal human beings”. Cooper suggests that it is possible to create intuitive, easy-to-use technology products by devoting more time to developing detailed product specifications with the assistance of an “interactive designer” who is familiar with the psychology and habits of a typical computer user.

Clare-Marie Karat, a psychologist and IBM researcher developed

**The Computer User’s Bill of Rights**

1. The user is always right. If there is a problem with the use of the system, the

system is the problem, not the user.

1. The user has the right to easily install software and hardware systems.
2. The user has the right to a system that performs exactly as promised.
3. The user has the right to easy-to-use instructions for understanding and utilizing

a system to achieve desired goals.

1. The user has the right to be in control of the system and to be able to get the

system to respond to a request for attention.

1. The user has the right to a system that provides clear, understandable, and

accurate information regarding the task it is performing and the progress toward completion.

1. The user has the right to be clearly informed about all system requirements for

successfully using software or hardware.

1. The user has the right to know the limits of the system’s capabilities.
2. The user has the right to communicate with the technology provider and receive

a thoughtful and helpful response when raising concerns.

1. The user should be the master of software and hardware technology, not vice-

versa. Products should be natural and intuitive to use.

Karat agrees with Cooper’s comments about programmers being unable to understand the people who use their software. She says, “The profile of the people who use systems has changed, while the system, and the culture in which they have developed, have not adjusted … The engineers and computer scientists who design hardware and software know little about the needs and frustrations of consumers.”

Some efforts to simplify operating system software have created another band of disgruntled users who complain that important features are now “hidden” because of feedback from novice testers who considered such features too advanced or confusing. Some controls, such as those for setting up networks, are not easy to understand, but could be crucial for a successful installation. Hiding those controls because they might confuse beginners has only caused advanced users to become frustrated.

Who is right? Can technology be simplified, yet remain powerful enough to accomplish complex tasks? A branch of ergonomics called Human Factors, or Human-Computer Interaction (HCI), focuses on factors that make computers easy or difficult to use.

**What do you think?**

1. Can you think of a specific instance when you have become frustrated with a software user interface?

2. Is it possible to make computer software significantly easier to use?

3. Would you agree that programmers do not understand the viewpoint of a typical computer user and consequently produce bad software?

***Final test.*** *Do the tasks in the following test.*

1. Which of the following types of editors provide tools to create programs by pointing and clicking …?

a) programming editor b) VDE c) GUI d) control editor

2. Most programming languages include control structures known as … .

a) sequence b) selection c) repetition d) all of the above

3. During … execution, the computer performs each instruction in the order that appears.

4. A class is a template for a group of objects with similar characteristics. (*True*/*False*)

5. The … paradigm is based on the idea that the solution for the problem can be visualized in terms of objects that interact with each other.

6. OO programmers often use … diagrams to plan the classes for a program.

7. A(n) … is a graphical representation of the way a computer should progress from one instruction to the next when it performs a task.

8. A(n) … is a set of steps for carrying out a task that can be written down and implemented.

9. The set of superclasses and subclasses that are related to each other is referred to as a class … .

10. In an OO program, objects send and receive … to initiate actions, which the programmer defines by creating a(n) … .

11. A(n) … control structure tells a computer what to do based on whether a condition is true or false.

12. A(n) … is a segment of code that defines an action.

13. The process of passing certain characteristics from a superclass to a subclass is referred to as … .

14. A(n) … attribute is an attribute that is available for use by any routine in a program.

15. Which of the following is NOT an example of a repetition command?

a) FOR…NEXT b) WHILE…..WHEND c) DO…..WHILE d) IF….THEN

16. In a problem statement, a(n) … is something that you accept as true in order to proceed with program planning.

17. A program written in a(n) … language typically consists of self-contained instructions in a sequence that indicates how a task is to be performed or a problem is to be solved.

a) object-oriented b) procedural c) event-driven d) functional

18. Smalltalk, Eiffel, Java, C++ are all programming languages that support the object-oriented paradigm. (*True/False*)

19. FORTRAN is considered a good choice for object-oriented programming. (*True/False*)

20. Which of the following terms refer to the way a computer programmer conceptualizes and structures the tasks that a computer performs …?

a) programming paradigm c) object-oriented design

b) algorithm development d) logical architecture

***Projects.*** *Choose and perform one of the projects given.*

1. Programming computer games is a complex task. A central program ties together numerous aspects of the game, such as characters, scenery, buildings, monsters, weapons, treasure, food, and sounds. To appreciate the complexity of game programming, play a computer game. Make a list of the objects you encounter during the first five minutes of the game. You might have to stop and restart the game several times to complete your list. Don’t forget to include the title screen, introductory music, video, and so on. (Don’t include the time it takes you to watch the video in your five-minute viewing period.) Expand your list of objects by adding descriptions of what happens to the objects. Take a screenshot of the game during your observation period. Submit your list and screenshot. Indicate the name of the game you observed on the screenshot. Follow your instructor’s guidelines for printed or electronic documents.

2. The computer game industry is hot and employs professionals from a wide variety of career fields, including programmers, artists, musicians, narrators, writers, producers, accountants, photographers, videographers, historians, military science, and physicists. Think about your career field. How would a professional in your career field fit into a computer game development team? What aspect of the game would they work on? Jot down your thoughts, and then go online and search for information about computer game development. What can you learn about jobs in the computer game industry for people with skills in your chosen career field? Submit your findings in a format of your choice. You can write a one-page summary or get creative and work up a brochure or 30-second radio spot.