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ПРАКТИЧЕСКИЙ КУРС АНГЛИЙСКОГО ЯЗЫКА В ОБЛАСТИ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ

ENGLISH PRACTICAL COURSE ON INFORMATION TECHNOLOGIES

*Рекомендовано УМО по образованию в области информатики
и радиоэлектроники в качестве пособия для специальностей
1-40 01 01 «Программное обеспечение информационных технологий»,
1-40 02 01 «Вычислительные машины, системы и сети»,
1-40 03 01 «Искусственный интеллект»,
1-40 05 01 «Информационные системы и технологии (по направлениям)»,
1-53 01 07 «Информационные технологии и управление в технических
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Основными целями пособия являются развитие навыков чтения аутентичных текстов, изучение и закрепление лексики, приобретение студентами навыков правильного понимания и перевода оригинального текста по специальности, развитие навыков монологической и диалогической речи в сфере профессиональной коммуникации.
Предназначено для студентов, изучающих учебную дисциплину «Иностранный язык».

Содержание

MODULE IV

Предисловие

Пособие разработано с учетом требований государственного стандарта высшего профессионального образования и предназначено для студентов, изучающих учебную дисциплину «Иностранный язык».

В основу данного пособия положена модульная технология, которая и определила структурную организацию учебного материала. Каждый из четырех модулей включает два раздела: Computers and Digital Basics, Computer Hardware, Computer Software, Operating Systems and File Management, Internet and LAN Technologies, Information Systems Analysis and Design, Computer Programming, Databases.

Пособие включает большое количество аутентичных текстов оригинальной тематической лексики, позволяющей использовать иностранный язык как средство профессионального общения. Авторами предлагается специально разработанный комплекс упражнений по изучению и закреплению профессиональной лексики, формированию навыков общения, который направлен на развитие иноязычной профессиональной коммуникативной компетентности студентов, изучающих информационные технологии, для осуществления профессионально ориентированного общения. По структуре все разделы идентичны, даны ясные формулировки заданий.

Содержание работы подобрано в соответствии с типовой и рабочей программами по английскому языку исходя из современных требований методики преподавания иностранных языков в неязыковом вузе.

MODULE I

UNIT 1. COMPUTERS AND DIGITAL BASICS

READING

Read the questions and find the answers in the text.

1. How does digital technology affect society?
2. What are the four phases of the digital revolution?
3. What's the difference between an operating system and application software?

TEXT A: COMPUTER CONCEPTS

At present we live in the information age. It is a period of history when information is easy to access and affects many aspects of everyday life. The importance of information is not new. It has always been a powerful tool. The information age is unique because of its underlying technology based on digital electronics. The digital revolution offers advantages, but requires adaptations. Digital innovations require societies to **make adjustments** to traditions, lifestyles and legislation. Digitization is the process of converting text, numbers, sounds, photos and video into data that can be processed by digital devices. Data processing is based on an input-processing-output cycle which is often referred to as the IPOS cycle. The digital era has evolved through four phases, beginning with big, expensive computers and progressing to modern digital world in which small inexpensive digital devices are everywhere.

In the first phase computers were huge, complex and expensive devices. They existed in limited numbers, primarily housed in big corporations and government agencies. Computers and data processing became **crucial tools** for effective business operations. The second stage was presented by personal computing which is characterized by small, standalone computers powered by local software. Local software refers to any software that is installed on a computer's **hard disk**. The third phase of the digital revolution materialized as computers became networked and when the Internet was opened to public use. A **computer network** is a group of computers linked together to share data and resources. The Internet is a global computer network. The Web is a collection of linked documents, graphics, and sounds that can be accessed over the Internet. A key aspect of the Web is that it adds content and substance to the Internet. From 1996–2010 computing was characterized by the Web, e-mail, multiplayer games, music downloads and enormous software applications. Then Facebook, Twitter and Google Apps have sent computing in new directions.

Cloud computing characterized the fourth phase of the digital revolution. Cloud computing provides **access** to information, applications, communications and storage over the Internet. Before cloud computing most computers ran software based locally. With cloud computing all that changes. You can store your data in the cloud,

making it **available** no matter what computer you use. Using a cell phone service provider your mobile device accesses the Internet. The touchscreen on your mobile gives you access to apps that play music, show movies, report news. You use Google or Wikipedia to access information and when you need to produce a document, you head over to Google to access its cloud-based word processor. You spend lots of time maintaining your profiles on social networking services and interacting with friends through cloud-based social media.

Computers do so many things and come in such a variety of shapes and sizes that it might seem difficult do distill their common characteristics into an all-purpose definition. A computer is a **multipurpose device** that accepts **input**, processes data, stores data, and produces **output**, all according a series of stored instructions. Computer input is whatever is typed, submitted or transmitted to a computer system. An input device gathers data and transforms it into electronic signals for the computer to store and manipulate. Output is the result produced be a computer. Some examples of computer output include reports, documents, music, graphs and pictures. Output devices display, print, or transmit the results of processing. Computers manipulate data in many ways, and this manipulation is called **processing**. In a computer most processing takes place in a component called the **central processing unit** or **CPU**. The CPU of most modern computers is a microprocessor, which is an electronic component that can be programmed to perform tasks based on data it receives. A computer sores data so that it will be available for processing. **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. Data is typically stored in files. A computer file is a named collection of data that exists on a storage medium. The series of instructions that tells 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.

Computers run two main types of software: **application software** and **system software**. A computer can be applied to many tasks, such as writing, number crunching, video editing, and online shopping. Application software is a set of computer programs that helps carry out a task. **Word processing software**, for example, helps people edit and print documents. Software application is sometimes referred to as apps, especially in the context of handheld devices. Whereas application software is designed to help a person carryout a task, the primary purpose of system software is to help the computer system monitor itself in order to function efficiently. An example of system software is a computer **operating system** (**OS**), which is essentially the master controller for all the activities that take within a computer.

At one time there were three distinct categories of computers: **mainframes**, minicomputers and microcomputers. Now commonly used computer categories include **personal computers, servers, mainframes and supercomputers**. A personal computer is a microprocessor-based computing device designed to meet the computing needs of an individual. It provides access to a wide variety of local and

cloud-based applications. In the computer industry, the term server has several meanings. It can refer to computer hardware, to a specific type of software, or to a combination of hardware and software. In any case, the purpose of a server is to serve computers on a network by supplying them with data. A mainframe computer is a large and expensive computer capable of simultaneously processing data for hundreds or thousands of users. Mainframes are generally used by businesses or governments to provide centralized storage, processing and management for large amounts of data. Mainframes remain the computer of choice in situations where reliability, data security and centralized control are necessary. A computer falls into the supercomputer category if it is one of the fastest computers in the world. Because of the speed, supercomputers can tackle complex tasks and compute-intensive problems that just would not be practical for other computers.

A computer-intensive problem is one that requires massive amounts of data to be processed using complex mathematical calculations. Handheld digital devices include familiar gadgets such as iPhones, iPads, iPods, Garmin GPSs, Droids and Kindles. These devices incorporate many computer characteristics. They accept input, produce output, process data and include storage capabilities. Handheld devices vary in their programmability and their versatility. The term **workstation** has two meanings. It can simply refer to an ordinary personal computer that is connected to a network or to powerful desktop computers used for high-performance tasks, such as medical imaging and computer-aided design, that require a lot of processing speed. In the computer industry, the term **server** has several meanings. It can refer to computer hardware, to a specific type of software, or to a combination of hardware and software. In any case the purpose of a server is to serve computers on a network (such as the Internet or a home network) by supplying them with data.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. A computer network is a group of computers linked together to share data and resources.
2. Cloud computing characterized the third phase of digital revolution.
3. You can't interact with your friends through cloud-based social media.
4. Computer input is submitted or transmitted to a computer system.
5. Processing is data manipulation in many ways.
6. Application software is a set of computer programs that helps carry out a task.
7. Computers run two main types of software: application software and system software.
8. The term server refers only to computer hardware.

VOCABULARY
1. Match the terms with their definitions.

1) system software	a) the main processing circuitry within a computer or chip that contains the ALU, control unit and registers
2) central processing	b) computing in which local devices access apps that run on an Internet-based server
3) workstation	c) a powerful desktop complete designed for specific tasks
4) cloud computing	d) the manipulation of data by a computers microprocessor or central processing unit
5) processing	e) computer programs such as operating system or utility software, that help the computer carry out essential operating test
6) operation system	f) the software that controls the computer's use of it's hardware resources, such as memory and disk storage space
7) word processing software	g) computer programs that assist the user in producing documents, reports, letter

2. Complete the following sentences choosing one out of the variants given.

1. Cloud computing ... access to information, applications and communications.
   a) gives;   b) provides;   c) supplies;   d) guarantees.
2. Reports, documents, graphs and pictures can be ... to as computer output.
   a) performed;   b) supplied;   c) transformed;   d) referred.
3. Memory is the part of a computer where data and instruction are stored ... .
   a) permanently; b) available;   c) temporarily;   d) versatile.
4. A computer ... input, processes and stores data, produced output according to a series of instructions.
   a) accepts;   b) submit;   c) emerges;   d) transmits.
5. 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.
6. A computer ... to the supercomputer category if it is one of the fastest computers in the world.
   a) refers;   b) belongs;   c) falls in to;   d) characterizes.
7. Supercomputers can ... complex tasks and compute-intensive problems.
   a) solve;   b) tackle;   c) present;   d) analyse.

QUICK CHECK
Fill in the gaps in the text to best complete each sentence.

The … revolution is an ongoing process of social, political, and economic change brought about by technologies such as computers and networks. The … is a global computer network originally developed as a military project, adapted for research and academic use, and then for commercial use …, a form of electronic

communication, was an application for the masses and finally a reason to buy a computer and join the digital revolution. Another aspect of the digital revolution is …, a process by which several technologies with distinct functionalities evolve to form a single product. Technology has the potential to spread ideas, such as freedom and democracy, but it might have a chilling effect on … or the right to be left alone. It might also affect intellectual … because digital technology has made it easy to produce copies with no loss in quality from the original. Technology-driven … has an effect on the economy, as consumers gain access to products and services from countries other than their own. Activists worry about the digital … that separates people who have access to technology and those who do not.

DISCUSSION
Work in groups. Discuss the following questions.

1. What are the four phases of the digital revolution?
2. How does digital technology affect society?
3. Why are the Web and the Internet not the same?
4. How do computers work with input, output, processing, storage, and stored programs?
5. What's the difference between an operating system and application software?
6. Do you know the difference between the apps you use and your computer's operating system?
7. How do personal computers differ from servers, mainframes and supercomputers?
8. Are portable media players and mobile phones classified as computers?

WRITING
Write a short summary of the text using the following concept map in relation to computer basics.
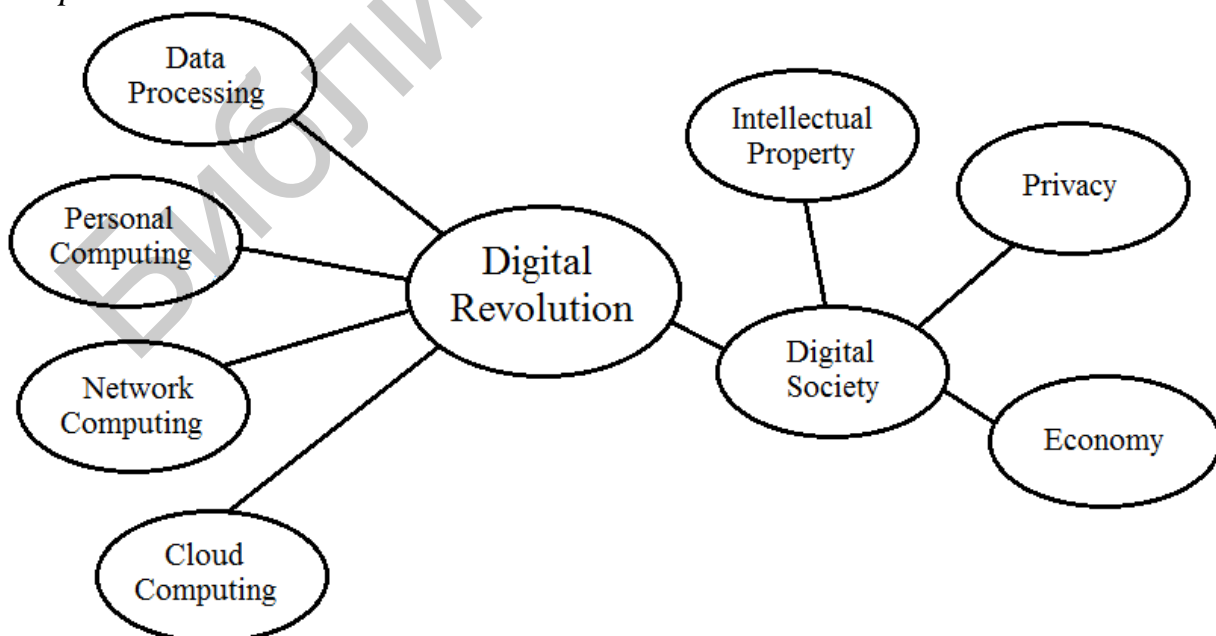
SPEAKING
On the basis of a concept map speak about digital revolution in modern society.

TEXT B: DIGITAL DATA REPRESENTATION AND PROCESSING

READING
Read the text and answer the following questions.

1. Is there a difference between data and information?
2. What is data representation?
3. How does digital data work?

Computers and other digital devices work with such things as texts, numbers, music, images, speech, and video. The amazing aspect of digital technology is that it distills all these different elements down to simple pulses of electricity and stores them as 0s and 1s. Data refers to the symbols that represent people, events, things, and ideas. In everyday conversation people use the terms data and information interchangeably. Nevertheless, some technology professionals make a distinction between the two terms. They define data as is any raw facts or observations that describe a particular phenomenon that represents people, events, things and ideas. Data becomes information when it is presented in a format that people can understand and use. Data is used by machines, such as computers, information is used by humans. Information is simply data that has a particular meaning within a specific context. Information may be data that has been processed in some way. When we speak of data processing, the input is data, the output is useful information. So, data processing is a series of actions or operations that convert data into useful information.

Data representation refers to the form in which data is stored, processed, and transmitted. For example, devices such as smartphones, tablets, and computers store numbers, text, music, photos, and videos in formats that can be handled by electronic circuitry. Those formats are data representations. Data can be represented using digital or analog methods. 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.

Digital data is text, numbers, graphics, sound, and video that have been converted into discrete digits such as 0s and 1s. In contrast, **analog data** is represented using an infinite scale of values. 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»). 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 work with digital data under the control of a computer program. Computer programmers create programs that control digital devices. These programs are usually in a written in a high-level programming language, such as C, C++, Python or Java. An important characteristic of most programming languages is that they can be written with simple tools, such as a word processor and they can be understood by programmers. The human-readable version of a program created in a high-level language by a programmer is called source code. 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 allows Extended ASCII to *provide* codes for 256 characters. **Unicode** (pronounced «YOU ni code») uses sixteen bits and provides codes for 65,000 characters.

The procedure for translating source code into 0s and 1s can be accomplished by a compiler or an interpreter. A compiler converts all the statements in a program in a single batch and the resulting collections of instructions, called **object code**, is placed in a new file. Most of the program files distributed as software contain object code that is ready for the processor to execute. As an alternative to a compiler, an interpreter converts and executes one statement at a time while the program is running. After a statement is executed the interpreter converts and executes the next statement. A microprocessor is hard-wired to perform a limited set of activities, such as addition, subtraction, counting and comparisons. This collection of preprogrammed activities is called an **instruction set**. Instruction sets are not designed to carry out any specific task, such as word processing or playing music. Instead, an instruction set is designed to be general purpose so that programmers can use it in creative ways for the wide variety of tasks performed by all kinds of digital devices. The list of codes for a microprocessor's instruction set, called **machine language**, can be directly executed by the processor's circuitry. A set of machine language instructions for a program is called **machine code.** 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.

A single high-level instruction very often converts info multiple machine language instructions. A programmer creates human-readable source code using a programming language. A compiler or an interpreter converts source code into machine code. Machine code instructions are a series of 0s and 1s that correspond to a processor's instruction set. A microprocessor contains miles of microscopic circuitry and millions of miniature components divided into different kinds of operational units, such as the ALU and the **control unit**. The **ALU** (arithmetic logic unit) is the part of the microprocessor that performs arithmetic operations, such as addition and subtraction. It also performs logical operations, such as comparing two numbers to see if they are the game. The ALU uses registers to hold data that is being processed. The microprocessor's control unit fetches each instruction. Data is loaded into the ALU's registers. Finally, the control unit gives the ALU the green light to begin processing. The instructions that a computer is supposed to process for a particular program are held in memory. When the program begins the memory address of the first instruction is placed in a part of the microprocessor's control unit called an instruction pointer. The control unit can then fetch the instruction by copying data from that address into its instruction register. From there, the control unit can in processing. The ALU is responsible for performing arithmetic and logical operations. It uses registers to hold data ready to be processed. When it gets the go-ahead signal from the control unit, the ALU processes the data and places the result in an accumulator. When the computer completes an instruction, the control increments the instruction pointer to the memory address of the next instruction, and the instruction cycle begins again.

COMPREHENSION
Find the paragraph where the following ideas are expressed in the text.

1. In everyday conversation people use the terms data and information interchangeably.
2. Data can be represented using digital or analog methods.
3. Computers work with digital data under the control of a computer program.
4. A collection of preprogrammed activities is called an instruction set.
5. A set of machine language instructions for a program is called machine code.
6. The ALU is the part of the microprocessor that performs arithmetic operations.

VOCABULARY
1. Link the beginning and the end of the sentence.

1) Data becomes information … .
2) The input is data; the output is useful information … .
3) A source code is … .
4) An instruction set is designed … .

5) Machine code is … .
6) The term to digitize means … .

a) to convert raw, analog data into digital format.
b) a set of machine language instructions for a program.
c) to be general purpose for the wide variety of tasks.
d) the human – readable version of a program created by a programmer.
e) when we speak of data processing.
f) when it is presented in a format that people can understand and use.

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

1. A computer converts source code into … .
   a) machine code;   b) object code;   c) binary codes.
2. A programmer creates a human – readable source code using … .
   a) machine code;   b) a programming language;   c) an instruction set.
3. Technology professionals define data as … .
   a) number;   b) raw material;   c) information.
4. Information is simply … that has been processed in some way.
   a) out;   b) input;   c) data.
5. Processing is a serious of actions or operations that … input into out.
   a) convert;   b) store;   c) interpret.
6. System model shows that … goes into a process.
   a) data;   b) information;   c) raw material.
7. Information is … material.
   a) meaningful;   b) raw;   c) useless.

QUICK CHECK
Fill in the gaps in the text to best complete each sentence.

Software is usually written in high-level languages, such as C, C++, Python and Java. The human-readable version of a program, created in a high-level language by a programmer, is called … code. A(n) … or an interpreter converts this high level code into code. A microprocessor is hard-wired to perform a limited set of activities, such as addition, subtraction, counting, and comparisons. This collection of preprogrammed activities is called a(n) … set. Each instruction begins with a(n) … code, which is a command word for an operation such as add, subtract, compare, or jump. Most instructions also include a(n) … that specifies the data, or the address of the data, for the operation. The processor's ALU uses … to hold data that is being processed. The processor's … unit fetches each instruction, sends data to the registers, and then signals the ALU to begin processing.

DISCUSSION
Work in groups. Speak on the following topics.

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1. Is there a difference between data and information?
2. What is data representation?
3. What is data processing?
4. Why do computers need programs?
5. How do digital devices process data?
6. What role does the control unit play?
7. What does the term to digitize mean?

WRITING
Create a concept map using the following words in relation to digital data representation.

> data, numbers, Unicode, images, sound, EBCDIC, characters, ASCII, binary

SPEAKING
On the basis of a concept map speak about the difference between data and information.

TEXT C: PASSWORD SECURITY

READING
Read the text and find the answers to the questions.

1. What are the most common authentication protocols?
2. What is the difference between a password and a PIN?
3. How serious is password theft?
4. What is password manager software?

User **IDs**, passwords, and personal identification numbers (**PINs**) are a fact of everyday life in the information age. They are required for activities such as using **ATMs** and debit cards, logging in to Windows, accessing wireless networks, making an iTunes purchase, instant messaging, and reading e-mail. Many Web sites encourage you to sign up for membership by choosing a user ID and **password**. Security experts use the term **authentication protocol** to refer to any method that confirms a person's identity using something the person knows, something the person possesses, or something the person is. For example, a person might know a password or PIN, possess an ATM card or a credit card. A person can also be identified by **biometrics**, such as a fingerprint, facial features, or a **retinal pattern**. Authentication protocols that use more than one means of identification are more secure than others. Computer-related security is primarily based on passwords associated with user IDs. The level of protection depends on good password selection and management on the part of users. A **user ID** is a series of characters – letters, numbers or special symbols – that becomes a person's unique identifier. It is also referred to as a user name,

login, screen name, online nickname, or handle. User IDs are public. Because they are not secret, they do not offer any level of security. The rules for creating a user ID are not consistent throughout all applications, so it is important to read instructions carefully before finalizing your user ID.

A **password** is a series of characters that verifies a user ID and guarantees that you are the person you claim to be. Login screens for many applications provide a «forgot my password» link. A personal question provides an alternative authentication protocol to ensure that you are not a hacker pretending to be a legitimate user who has lost a password. Both passwords and PINs are classified as something-the-user-knows authentication methods. In practice, PINs tend to be a short sequence of numbers that can be entered using a numeric keypad, whereas passwords tend to be longer sequences of letters, numbers and special characters that require a full qwerty keyboard for entry. PINs are commonly used with two-factor authentication protocols, whereas passwords are used in conjunction with single-factor authentication protocols.

Password hacking is a big serious problem in many countries. To a hacker obtaining the password for a specific user ID is rewarding because he can get into personal information. When someone gains unauthorized access to your personal data and uses it illegally, it is called **identity theft**. Armed with your password and other personal data, a cybercriminal can use your credit card, apply for a mortgage using your financial data, and create fake accounts in your name. It is important to understand how hackers get passwords and how you can protect yours. Hackers employ a whole range of ways to steal passwords: shoulder surfing, dumpster diving, sticky notes. The **brute force attack** uses password-cracking software. Because it exhausts all possible combinations of letters to decrypt a password, a brute force attack can run for days to crack some passwords. If a hacker doesn't have physical access to your work area but your computer is connected to a network, your password can be discovered by a hacker using a remote computer and software tools that systematically guess your password. Another technique is called **sniffing**, which intercepts information sent out over computer networks. Sniffing software is used legitimately by network administrators to record network traffic for monitoring and maintenance purposes. The same software can also be used for illicit activities. If your user ID and password travel over a network as unencrypted text, they can easily fall into the hands of a password thief. An even more sophisticated approach to password theft is **phishing**, in which a hacker poses as a legitimate representative of an official organization such as your **ISP** or an online payment service in order to persuade you to disclose highly confidential information. As users became better at identifying phishing messages, password thieves resorted to the use of key loggers. A **key logger** is software that secretly records a user's keystrokes and sends the information to a hacker. A key logger is a form of malicious code called a Trojan. Trojans are computer programs that seem to perform one function while actually doing something else. They can be embedded in e-mail attachments, software downloads, and even files. With password theft becoming more and more widespread, security experts recommend using a strong, secure password for

financial transactions. A strong, secure password is one that is easy to remember but difficult to crack.

To protect your password, you must take steps to keep it safe. Do not share your password with anyone. Avoid writing down a password. Memorize it. If you think one of your passwords has been compromised, change it immediately. You can accumulate many passwords and user IDs – for logging in to Windows, accessing online banking, using e-mail, shopping online, downloading music, and getting into your Facebook account. The more passwords and user IDs you have, the more difficult they become to remember. First select a unique user ID that you can use for more than one site. Next, you can maintain two or three tiers of passwords.

Your computer's operating system, Web browser, or other software might include a password manager to help you keep track of user IDs and passwords. A **password manager** stores user IDs with their corresponding passwords and automatically fills in login forms. Standalone password manager software offers a more inclusive approach to creating and retrieving passwords. A standalone password manager stores user IDs and passwords in an encrypted file. You can access this file using a master password. A standalone password manager can also generate secure «nonsense passwords».

In addition to generating and tracking your passwords, most password manager software provides other features, such as password strength meters and form fillers. A password strength meter indicates whether your passwords are secure enough – a feature that is useful if you've created your own passwords, rather than using your password manager to generate them. Form fillers automatically enter data into online Web forms such as those that request billing data when you order at an online shopping site. Many form fillers also match a Web form's **URL** against a set of valid URLs that you have provided in order to avoid sending data to a fake Web site that you have been lured to visit by a phishing message. When entering passwords, form fillers are not collecting your password from the keyboard; therefore, a hacker's key logger cannot secretly record keystrokes.

There are several free, shareware, or open source password managers, such as KeePass and Kaspersky Password Manager. Some password manager software is portable, which means that it does not have to be installed on a computer before it is used. Instead, you can carry it around on a USB flash drive so that your passwords are available wherever you use a computer. New password management techniques are being developed, but some offer their own set of potential security problems. For example, Web-based password managers can be attractive targets for password thieves. By breaking into a single site, a password thief could harvest thousands of passwords. As new password management technologies appear, make sure you evaluate them carefully before trusting them with your valuable data.

COMPREHENSION
Write the questions that could produce the following answers.

1. Security experts use the term authentication protocol to refer to any method that confirms a person's identity.
2. A password is a series of characters that verifies a used ID.
3. When you use a debit card you have to enter your PIN.
4. Hacker is a skilled programmer who manipulates computers with malicious intent.
5. When someone gains unauthorized access to your personal data illegally it is called identity theft.
6. Hackers employ a whole range of ways to steal passwords.

VOCABULARY

1. Complete these sentences with the words in the box.

> password, authentication protocol, biometrics, phishing, identity theft, sniffing, brute force attack, password manager

1. … is a method of breaking encryption code by trying all possible encryption keys.
2. A special set of symbols used to restrict access to a user's computer or network is … .
3. … is software that keeps track of sites at which a user has registered and the password that corresponds to each site.
4. … is the use of physical attributes, such as a fingerprint, to verify a person's identity.
5. … is an illegal practice in which a criminal obtains enough information to masquerade as someone.
6. … is a technique that uses packet sniffer software to capture packets as they are sent over a network.
7. … is passwords, user's IDs and biometric measures used to verify a person's identity.
8. … is an e-mail based scam that's designed to fool users into revealing confidential information.

2. Match up these verbs and nouns to make common collocations and make up your own sentences with them.

A	refer to, to be based on, depend on, provide, be connected to, keep track of, request, identify
B	biometrics, billing data, passwords, network, authentication protocol, password selection, method, passwords

QUICK CHECK
Fill in the gaps in the text to best complete each sentence.

Passwords and user IDs are the most common authentication … . Password theft has become a serious security problem that has led to many cases of … theft, when unauthorized individuals gain access to personal data. Hackers guess, discover, and steal passwords using a variety of techniques. A(n) … attack tries passwords from a list of commonly used passwords. A(n) … force attack tries every possible combination of letters and numbers. … intercepts information sent out over computer networks … uses fraudulent Web sites or e-mail messages to fool unsuspecting readers into entering passwords and other personal information. A(n) … is software that secretly records a user's keystrokes and sends them to a hacker. To keep passwords safe, you should consider using tiered passwords or standalone password … software that generates secure passwords and keeps track of which password corresponds to each site you access.

DISCUSSION
Work in groups. Discuss the following questions.

1. What is an authentication protocol?
2. What factors does a level of protection depend on?
3. In what case are authentication protocols more secure than others?
4. How do hackers steal passwords?
5. How can you create secure passwords?
6. What is password manager software?
7. Does password manager help you keep track of all your passwords?
8. Should you store passwords in the cloud?

WRITING
Write a short summary of the text using the key terms below.

> identification (ID), password, personal identification number (PIN), authentication protocol, security, identity theft, intellectual property, password manager, password hacking

SPEAKING
On the basis of the questions below speak about password security.

1. What can confirm a person's identity?
2. What is a user ID and a password?
3. What is the difference between a password and PIN?
4. How serious is password theft?
5. How can hackers get your password?
6. How can you create and protect your password?
7. What is password manager software?

FINAL UNIT TEST

Fill in the blanks to best complete each sentences.

1. Data … was the computing technology behind the first phase of the digital revolution.
2. A computer … is a group of computers linked together to share data and resources.
3. … computing provides access to information, applications, communications and storage over the Internet.
4. A computer is a digital device that processes data according to a series of … instructions called a program or software.
5. Computer data is temporarily stored in, but is usually transferred to … where it can be left on a more permanent basis.
6. A digital device, such as a computer, is called a(n) … when it requests data from a server.
7. A(n) … is a special-purpose microprocessor that is built into the machine it controls.
8. Data … refers to the format in which data is stored, processed and transferred.
9. Digital devices often use the … number system to represent numeric data.
10. A(n) … converts all of the source code instructions into a new file containing code.
11. A machine language instruction has two parts: a(n) … code and an operand.
12. The ALU in your computer's microprocessor holds data in … .
13. An authentication … is any method that confirms a person's identity using something the person knows.
14. A(n) … attack can guess your password if you use common passwords or everyday words.
15. Most browsers include a built-in password … that remembers the user IDs and passwords you use when logging in to Web sites or online e-mail.

UNIT 2. COMPUTER HARDWARE

PRE-READING

1. Match the definition and the term.

1	a type of non-volatile storage typically used in personal computers to store boot and BIOS data	a	CPU cache
2	a computer that can use software designed for another make or type	b	capacity
3	involving or achieved by permanently connected circuits	c	BIOS
4	a small set of basic input/output system instructions stored in ROM	d	bootstrap loader
5	the number of bits that a CPU can manipulate at one time, which is dependent on the size of the registers in the CPU	e	EEPROM

6	a part or element of a larger whole	f	word size
7	a program that automatically runs when a computer is first turned on in order to load the operating system	g	microprocessor
8	an integrated circuit that contains the circuitry for processing data, a single-chip version of the CPU	h	compatible
9	special high-speed memory providing the CPU rapid access to data that would otherwise be accessed from disk or RAM	i	hard-wired
10	the maximum amount that something can contain	j	component

2. Read the text and answer the questions about the information in the text.

1. What are the components of a typical desktop computer system?
2. How do portable computers differ from desktops?
3. How important is compatibility? Are there compatibility issues with handheld computers?
4. When a computer is turned on, what happens first?
5. How does the cache size affect performance?
6. How does an instruction set affect performance?
7. What impact does word size have on performance?
8. How to compare microprocessor performance?
9. Is it possible to replace the computer's microprocessor with a faster one?
10. Can a computer run out of memory?

TEXT A: PERSONAL COMPUTER SYSTEMS

A stationary desktop computer is placed on a desk and runs on power from an electrical wall outlet. It contains **the internal nodes** of the personal computer and **peripheral devices**: system unit; keyboard; mouse; display system; hard disk drive; optical drive; removable storage; sound system; network and Internet access; printer.

PORTABLE COMPUTERS

A portable computer is a small, lightweight personal computer with input, output, storage, and processing components integrated into a single unit that runs on power supplied by an electrical outlet or a battery.

Types of portable personal computers: an enhanced media player; a smartphone; a tablet computer; laptops or notebooks; netbooks.

Computers that operate in essentially the same way and use the same software are said to be compatible or having the same platform.

MICROPROCESSOR BASICS

A **microprocessor** (or a «processor») is an integrated circuit designed to process instructions. It is the largest chip on the system board. A microprocessor can be referred to as a CPU on a chip because it **performs** essentially the same tasks as the central processing unit (CPU) of a classic computer. The list of instructions that a microprocessor can perform is called its **instruction set**. These instructions are **hard-**

wired into the processor's circuitry. A microprocessor's performance is affected by several factors, including **clock speed**, **bus speed**, **word size**, **cache size**, **instruction set**, **number of cores** and **processing techniques**.

The speed of the **microprocessor clock** – a timing device that sets the pace for executing instructions – indicates the speed the processor can execute instructions. It is usually specified in Gigahertz (GHz).

A **cycle** is the smallest unit of time in a microprocessor universe. Every action a processor performs is 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 require multiple cycles. Some processors can execute several instructions in a single clock cycle.

Word size means the number of bits that a microprocessor can **manipulate** at one time. Word size is based on the size of the ALU and the **capacity** of circuits that lead to those registers. The larger word size – he higher is 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 megabytes (MB). A large cache can increase computer performance.

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. Using a technology called **pipelining**, a processor can begin executing an instruction before it completes the previous instruction. With **parallel processing**, multiple instructions are executed at the same time. The idea of **Hyper-Threading technology** is to break each physical core into two virtual ones. Theoretically, in this case, twice as much information can pass through each core. However, Hyper-Threading technology will not give the same performance as a larger number of real physical cores. A microprocessor that contains circuitry for more than one processing unit is called a **multi-core processor**. More cores usually produce faster performance.

A microprocessor with an increasingly complex instruction set, each requiring several clock cycles for execution, uses **CISC** (complex instruction set computer) technology. A microprocessor with a limited set of simple instructions uses **RISC** (reduced instruction set computer) technology. Most processors in today's desktop and laptop computers use CISC technology. Many processors used in handheld devices are ARM (advanced RISC Machine) processors.

COMPUTER MEMORY: RAM, ROM, EEPROM, BIOS, UEFI

RAM (random access memory) or dynamic RAM (DRAM), is a temporary **holding** area for data, application program instructions, and the operating system. RAM holds raw data waiting to be processed, the program instructions for processing that data, the results of processing until they can be stored more permanently. The instructions are loaded into RAM every time you start your computer. The RAM module is a volatile device and when you turn off or restart the computer all the stored information will irretrievably disappear, and it will not be possible to restore it

just like on a hard disk. 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. The more data and programs can fit into RAM, the less time your computer will spend moving data to and from virtual memory.

Whereas RAM is temporary and volatile, **ROM (read-only memory)** is permanent and non-volatile. The contents of ROM are «hard-wired» in the circuitry and remain in place even when the computer power is turned off. Newer **EEPROM** (electrically erasable programmable read-only memory) is a type of ROM that is non-volatile but user-modifiable. A ROM or EEPROM chip along with its instructions is commonly referred to as **firmware**. Today, the term ROM is used when referring to either ROMs or EEPROMs.

ROM contains a small set of instructions and data called the **bootstrap loader**. In a PC, the contents of **ROM** are sometimes referred to as the **BIOS** (basic input/output system).The bootstrap loader's 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 data files. The bootstrap loader requires some basic information about storage, memory, and display configuration. That data is stored in ROM along with the bootstrap loader instructions. In rare cases, the bootstrap loader instructions must be changed in ROM. If you change basic hardware, the bootstrap loader data must be updated. Some operating systems recognize hardware changes and automatically update the configuration data stored in ROM. **UEFI** (Unified Extensible Firmware Interface) being more effective is used instead of BIOS.

CMOS MEMORY. To operate correctly, a computer must have some basic information about storage, memory, and display configurations. The information is held in CMOS, a type of chip that requires very little power to hold data. 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.

COMPREHENSION
Choose a word from the variants provided.

1. The bootstrap loader *provides/requires* some basic information about storage, memory, and display configuration.
2. A ROM or EEPROM chip along with its instructions is commonly referred to as *hardware/firmware*.
3. The instructions are loaded into *RAM/ROM* every time you start your computer.
4. The clock speed is *equal/not equal* to the number of instructions a processor can execute in one second.

5. Word size *determines/depends* on the computer performance.
6. Many processors used in handheld devices are *CISC/ARM* processors.
7. EEPROM is *volatile/non-volatile* and user-modifiable.
8. Many graphics operations take less time with a computer that has a *scarce/considerable* RAM capacity.
9. A microprocessor operates at full efficiency only if all components in the computer can handle **the** *faster/slower* speeds.
10. Data transfer rate is the amount of data a storage device can move per *minute/ second* from the storage medium to the computer.

VOCABULARY
Complete the sentences with the words from the text.

1. A computer … unit houses the main circuit board, microprocessor, storage devices, and network card.
2. The … for loading the operating system into RAM when a computer is first turned on are stored in ROM.
3. The data about storage, memory, and display configurations of the computer is stored in ROM along with the … instructions.
4. Access … is typically faster for random-access devices than for sequential access devices.
5. In RAM, a charged … is «turned on» and represents a «1» bit.
6. Each RAM location has an address and uses eight capacitors to … the eight bits that represent a byte.
7. Most computers are … with a preinstalled operating system and a Web browser.
8. Some computer-based activities require more … or storage capacity than others.
9. The term … device designates the equipment that might be added to a computer system to enhance its functionality.
10. Various testing laboratories run a series of tests to gauge the overall speed of a….
11. The results of … tests are usually available on the Web and published in computer magazine articles.

DISCUSSION
Work in groups. Discuss the following questions.

1. When a computer is turned on, what happens first?
2. Is bigger always better?
3. Which one of the following will NOT increase computer performance? *Higher GHz clock speed. More cycles per instruction. More cores*.
4. Why does a computer need memory? What are the four types of memory? Briefly describe how each one works.

WRITING

Write a short summary of the text to present it in the group.

SPEAKING

1. When do you use an electrical outlet to work with your portable computer?
2. How often do you have to charge the battery of your computer?
3. Does your computer support compatibility function?
4. Is it a good idea to upgrade an old computer?

TEXT B: STORAGE DEVICES

PRE-READING

1. Match the Russian and English equivalents.

1	a net work-enabled printer	a	карта памяти
2	firmware	b	твердотельный накопитель с энергонезависимой памятью
3	width of viewing angle	c	устройство хранения
4	graphics card	d	сетевой принтер
5	solid state storage(SSD)	e	флэш-память
6	support encryption	f	видеокарта
7	device drive	g	носитель информации
8	storage device	h	ширина угла обзора
9	memory card	i	прошивка
10	flash memory	j	привод устройства
11	storage medium	k	поддерживать шифрование

2. Read the text and answer the questions on the topic of the text.

1. What are the basic components of a data storage system?
2. How is data stored on a storage device?
3. How can one storage technology be more versatile than another?
4. What makes a storage technology durable?
5. What's important about storage capacity?
6. How does a hard disk drive work?
7. What are the types of optical storage technology?
8. What is solid state storage?
9. What is the best use for USB flash drives?

A data storage system has two main components: **a storage medium** and **a storage device**. The term «**storage technology**» refers to a storage device and the media it uses.

A **storage medium (media)** is the disk, tape, CD, DVD, paper, or other substance that contains data. **A storage device** is the mechanical apparatus that records and retrieves data from a storage medium.

A computer works with data that has been coded into bits that can be represented by 1s and 0s. These 1s and 0s are **transformed** into changes in the **surface** of a storage medium. How this **transformation** happens depends on the storage technology. Three types of storage technologies are used for personal computer: **magnetic**, **optical**, and **solid state**.

Storage devices are compared using such criteria as **versatility**, **durability**, **speed**, and **capacity**.

The hard disk drive is not very **versatile**: it can access data only from its fixed disk platters. Hard disk drives are susceptible to damage that could cause data loss. Other technologies (CDs, DVDs or flash drives) can be more **durable**. **Data transfer rate** is the amount of data a storage device can move per second the storage medium to the computer. **Access time** is the average time it takes a computer to locate data on the storage medium and read it. **Random access** (also called **direct access**) is the ability of a device to jump directly to the requested data. Fast storage devices are preferred over slower devices. **Storage capacity** is the maximum amount of data that can be stored on a storage medium.

MAGNETIC STORAGE TECHNOLOGY. **Magnetic storage** stores data by magnetizing microscopic particles on a disk or tape surface. Data stored magnetically can be easily changed or deleted simply by changing the magnetic orientation of the appropriate particles on the disk.

Hard disk drive is a device for storing information on the principle of magnetic recording. A hard disk is one or more platters and their associated read-write heads. Hard disk platters rotate as a unit on the spindle to position **read-write heads** over specific data. A read-write head mechanism in the disk drive magnetizes particles to write data, and senses the particles' polarities to read data. The **density** of particles on the disk surface provides hard disks with great capacities. A hard disk drive mechanism includes a circuit board called a **controller** that positions the disk and read-write heads to locate data.

OPTICAL STORAGE TECHOLOGY. CD and DVD technologies are classified as **optical storage**, which stores data as microscopic light and dark spots on the disc surface. The disk is quite durable and data less **susceptible** to environmental damage than data recorded on magnetic media. Optical technologies can be grouped into **read-only**, **recordable**, and **rewritable**.

Read-only technology stores data permanently on a disc. This technology uses a laser to store and read data which is represented   as microscopic **light and dark spots** on the disk surface. The spots reflect the light differently. As the laser lens reads the disk, these differences are translated into the 0s and 1s that represent data.

Recordable technology (R) uses a laser to change the color in a dye layer 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.

Rewritable technology (RW) uses phase change technology to alter a crystal structure on the disk surface. The crystal structure can be changed from light to dark and back again many times.

SOLID STATE STORAGE or **flash memory** is a technology that stores data in erasable, rewritable circuitry, rather than on spinning disks. **Solid state storage** is durable, removable and provides fairy fast access to data because it includes no moving parts.

Compact storage cards can be classified as **solid state storage**, which stores data in a non-volatile, reusable, low-power chip.

A **memory card** is a flat, solid state, non-volatile medium. A **card reader** is a device that reads and writes data on solid state storage. Many desktop and laptop computers have a built-in card reader.

A **solid state drive** (**SSD**) is a package of flash memory that can be used as a substitute for a hard disk drive.

The term **USB** (**Universal Serial Bus**) is a standard type of connection for various devices. A **USB flash drive** is removable and rewritable. It plugs directly into a computer's system unit using a built-in connector. It is durable and requires no card reader. Often flash drives are used to update the BIOS or **UEFI** (Unified Extensible Firmware Interface) motherboards. UEFI-enabled machines have faster startup and shutdown times as compared to BIOS-based machines. A USB-storage device **supports encryption**, which is not unimportant for the safe storage of information. Flash drives can be used as a key for activation (USB Keys) applications.

BASIC INPUT DEVICES include: a keyboard; a mechanical or optical mouse; a scanner; a digital camera; a microphone; a trackpad (touchpad/touchscreen).

Some devices require software, called a **device drive** to set up communication between your computer and the device. The USB port can automatically detect a newly connected device and attempt to establish the setting necessary for sending data between it and the computer.

OUTPUT DEVICES are computer hardware; they are connected via special connectors, directly to the motherboard or expansion cards. An output **device** can be absolutely any device that will help you get information in the form in which it will be possible to perceive it.

The devices that perform information output from the computer are: **display devices** and all sorts of **audio devices**.

A computer **display system** includes a display device such as a **monitor** and **graphics circuitry** that generates the signals for displaying an image on the screen.

A computer monitor is usually an **LCD (liquid crystal display)** producing an image by manipulating light within a layer of liquid crystal cells. Image quality is a factor of **screen size**, **dot pitch**, **width of viewing angle** and **color depth**. LCD technology is now being replaced by **LED (light-emitting diode)** technology which is more environmentally friendly.

Audio devices facilitate the output of sound information. **A sound card** is an expansion board or a built-in integrated chipset to create sound on a computer. As a rule, **a sound card** or **sound chip** is supplied with the **firmware** on the disc.

A **computer printer** is an output device that produces computer-generated text or graphical images on paper. A computer sends data for a printout to the printer along with a **set of instructions** on how to print that data. The data that arrives at a printer along with a **set of instructions** and its **printer language** requires memory. Printers differ in **resolution**, **print speed**, **duty cycle**, **duplex capability**, **memory** and **networkability**.

The advantage of a **net work-enabled** printer is that it can connect directly to a computer network; it can be placed in a location convenient for all the network users. It might be useful for printing from handheld devices that cannot be connected to a printer by cable. **A plotter** is a device that allows reproducing high-precision drawings, maps, schemes and other information on paper.

COMPREHENSION
Look through the passage and write your question about its content.

In addition to a display device, such as a monitor, a computer display system also requires graphics circuitry that generates the signals for displaying an image on the screen. One type of graphics circuitry, referred to as **integrated graphics**, is built into a computer's system board. A second option, called **dedicated graphics**, is graphics circuitry mounted on a small circuit board called **a graphics card**. A graphics card contains **a graphics processing unit** (GPU) and special video memory, which stores screen images as they are processed but before they are displayed.

VOCABULARY
Fill in the gaps; use the words from the box.

integrated, USB, memory, write, expansion, time, SSD, magnetic, solid state, rewritable

1. Access … is typically faster for random-access devices than for sequential access devices. 2. A magnetic storage device uses a read-… head to magnetize particles that represent data. 3. The particles on the surface of a hard disk retain their … orientation until that orientation is changed. 4. The process of accessing, saving, and modifying data on a … disc is relatively slow compared to the speed of hard disk access 5. A (n) … uses the same storage technology as a USB flash drive, but is not designed to be removable. 6. Some … drives are about the same size as a microprocessor chip. 7. One type of graphics circuitry, referred to as … graphics, is built into a computer's system board. 8. Many kinds of peripheral devices are available with … connections. 9. … cards are non-volatile. 10. A(n) … port is any connector that passes data into and out of a computer or peripheral device.

DISCUSSION

Discuss in groups and present the results of the discussion in the form of a dialogue.

1. How does a computer move data to and from peripheral devices?
2. Why do some peripheral devices include a CD?

WRITING

Write a short summary of the text and get prepared for speaking on the topic.

SPEAKING

Select storage devices for your computer. What's the best way to add devices to a computer system? How do you store your data?

TEXT C: HARDWARE SECURITY

PRE-READING

1. Find the translation for the words below.

1	BSoD	a	марка компьютера
2	jump to conclusions	b	удар молнии
3	thunderbolt	c	нестираемый
4	power surge	d	регулятор напряжения
5	computer's make	e	точное местоположение
6	exact location	f	спешить с выводами
7	to track	g	стабильный ток
8	stable current	h	скачок напряжения
9	surge suppressor	i	синий экран смерти
10	indelible	j	прослеживать

2. Look through the following text and choose/write down 5-6 key words to express its main idea.

For trouble-free computer use, it is important to secure and regularly maintain your computer equipment. Computers are prime targets for thieves. You may use some important tips for protection your portable computer from theft.

• Never leave your portable computer unattended, especially when you at a coffee shop, the library or the airport.

• If you have to leave your portable computer in your car, never leave it in plain view. Lock it up in the trunk or cover it up.

• Carry your portable computer in an inconspicuous carrying case.

• Record your portable computer's make, model, and serial number and store them away from the computer.

• Consider securing your portable computer with an anti-theft device.

Your chances of recovering a stolen computer improve if you have taken some steps in advance, such as recording the computer's serial, number, affixing a tracking label, or installing tracking software.

STOP (Security Tracking of Office Property) plates leave an indelible tattoo on your computer equipment, which contains a unique ID number registered in the international STOP database. Tracking and recovery software, such as CyberAngel and LoJach for Laptops, secretly sends a message as soon as a thief uses a stolen computer to log on to the Internet. This message contains the computer's exact location and is directed to a tracking or monitoring center. Apple's Find My iPhone system can be used to track missing iPhones, iPods, and iPads.

SURGE PROTECTION

Computers and peripheral devices require stable current and are particularly sensitive to sudden bursts of electrical energy. To ensure that your computer stays in good running condition, it is essential to protect it from power surges. A power surge is a sudden increase in electrical energy affecting the current that flows to electrical outlets. You can protect your computer equipment from power surges by plugging it into a surge suppressor, instead of directly into a wall outlet. For added protection during thunderstorms, shut down your computer, turn off all your peripheral devices, and unplug the surge suppressor and all computer-related cables from wall outlets, including the cable for your modem.

BASIC MAINTENANCE

To prevent hardware problems you can undertake some preventive maintenance to extend the life of your computer equipment. Regularly clean your computer components and peripheral devices to keep them in good condition.

A good computer maintenance routine:

• Back up your files regularly, particularly those that are most important to you. Test your back up procedures periodically.

• Run utilities that ensure peak performance for your hard disk drive.

• Delete your browser's history and cache files on a monthly basis in order to free up space for your temporary files. The free space results in faster downloads from the Internet.

• Apply the latest operating system, driver, and security updates.

• Scan your computer for viruses and spyware once a week.

• Keep antivirus and spyware definitions updated.

To solve many hardware problems follow the **basic guidelines for troubleshooting**:

• Stay calm and don't jump to any conclusions until you've thought everything through.

• Write down all error messages and any other information that goes with them.

• Make sure all components are plugged in and that there are no loose cables.

• If you can, try to duplicate the problem by going through the same steps that led you to it.

• Look for troubleshooting and repair tips in your user's manual, on your vendor's Web site, or even through a search engine.

• Run your antispyware and antivirus software.

• Restarting your computer can clear up many minor operational problems.

Your computer probably has a special safe mode designed for professional troubleshooting. When operating in this mode, your computer uses a limited version of the operating system that allows you to use your mouse, screen, and keyboard, but no other peripheral devices.

COMPREHENSION
Answer the questions about hardware protection.

1. What measures might be undertaken to prevent a computer from being stolen?
2. What is a power surge?
3. How to protect a computer from power surges?
4. What is a surge suppressor and how does it work?
5. What is safe mode?
6. What is the blue screen of death?
7. What can be called preventive maintenance?
8. What is the impact of overheating for a computer? Is it possible to avoid it?
9. How to clean the computer screen?

VOCABULARY
1. Complete the sentences with the given words.

maintain, surge, fans, death, safe, secure, locks, troubleshooting, answers

For trouble-free computer use, it is important to … and regularly … your computer equipment. Anti-theft devices include computer … and tie-down brackets. Computers can be protected from power … by connecting to a surge suppressor. Keeping your computer's … vents free of dust can help to keep its temperature within operational levels. Problems such as the blue screen of … require troubleshooting. Windows offers interactive … tools formatted as a series of simple questions, … and recommendations. Booting into … mode can also be a helpful step in the troubleshooting process.

2. Choose the necessary word from the given variants.

How Can I Tell if Something is Wrong With my Computer?

There are several **indistinct/clear** signs that your computer is in trouble. The most **obscure/obvious** sign is failure to power up. A loud beep at startup time can also **indicate/disguise** a problem. If your computer's screen remains blank or error messages **appear/disappear**, you might have a hardware problem. Hardware problems can also show up as unexpected restarts at **regular/random** intervals, or as a peripheral device that stops working. Windows users might **face/overlook** the blue

screen of death (also called BSoD). The blue screen of death indicates that the operating system has **missed out/encountered** an error from which it cannot recover. And in this case the computer no longer **ignores/accepts** any commands.

DISCUSSION
What are the first steps to take if your computer seems to have an operational problem?

WRITING
Write a short summary of the text (use your words from exercise 2 and get prepared to speak on the topic.

SPEAKING
Describe what you do: to prevent hardware problems; to protect the computer from damage; to prevent the computer from being stolen; if something is wrong with your computer.

FINAL UNIT TEST

1. A(n) … screen offers a more environmentally friendly choice than a(n) LCD screen.
2. … storage technologies, such as hard disks, store data as magnetized particles.
3. Random access memory is a special holding area for data, program instructions, and the … system.
4. Data stored on a hard disk:
   a) has a direct pipeline to the microprocessor; b) goes to RAM before it is transferred to the processor; c) can be remotely processed without leaving the storage device; d) is volatile.
5. Is it efficient to upgrade the microprocessor in a desktop computer?
6. … technology produces an image by filtering light through a layer of liquid crystal cells.
7. Storage … is the maximum amount of data that can be stored on a storage medium, and it is measured in bytes; usually in gigabytes (GB) or terabytes (TB).
8. Which optical technology performs most similarly to a hard disk drive?
   a) RAM; b) ROM; c) R; d) RW.
9. In a computer with a 6 ms (milliseconds) hard drive, 6 ms refers to:
   a) the drive's access time; b) the drive's capacity; c) the drive's rotational speed; d) the drive's data transfer rate.
10. Microprocessor performance can be measured by the speed of the microprocessor … .
11. … state storage technologies, such as USB flash drives, store data by activating electrons in a microscopic grid of circuitry.
12. The bootstrap loader requires some basic information about:
    a) storage; b) memory; c) display configurations; d) all of the above.

13. Cache capacity is usually measured in … .
14. Storage devices … time is the average time it takes a computer to locate data on the storage medium and read it.
15. Many processors used in handheld devices, such as iPods, Droids and BlackBerrys, are … (advanced RISC Machine) processors.
16. Computers typically have much less memory than storage capacity (True/False).
17. Optical storage technologies store data as a series of … and lands on the surface of CDs and DVDs.
18. A widescreen computer display has a 16:9 … ratio.
19. The segment of the data bus to which peripheral devices connect is called the expansion … or external … .
    a) card; b) port; c) slot; d) bus.
20. Data transfer rate is the amount of data a storage device can move per second from the storage medium to the computer (True/False).

MODULE II

UNIT 3. COMPUTER SOFTWARE

READING
Before reading the text match the descriptions with the famous applications.

A	word processor, spreadsheet, virus protection, browser, photo editing, database software, email software, presentation software, music software, video software, mapping application, drawing software
B	Adobe Photoshop, Internet Explorer, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Kaspersky, Outlook Express, Oracle, iTunes, Apple iMovie, Google Maps, CorelDraw

TEXT A: SOFTWARE BASICS

The term **software** was once used for all non-hardware components of a computer. Using today's terminology, however, the documents and photos you create are usually referred to as data files rather than as software. Software determines the tasks a digital device can help you accomplish. 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, virus protection, file management, or Web browsing.

The two main categories are **system software** and **application software**. Operating systems are classified as system software. Device drivers, utilities, and programming languages are also system software. Application software categories include music, graphics, mapping, finance, and entertainment. Application software is designed to help people accomplish real-world tasks, whereas system software is

designed for computer-centric tasks. Let's take a look at some of the applications you might have on your digital devices.

Music software offers many ways to work with music, sound effects, and narration from your desktop, laptop, or handheld computer. The most popular music software capabilities include downloading, playing and recording music files, creating playlists, transferring music to handheld devices, editing, cropping and mixing digital recordings, streaming, and identifying songs.

A **mapping application** displays satellite, aerial, or street maps used to locate places and get directions between two addresses. Google Maps is one of the most extensive mapping applications, and its core technology is the basis for many other mapping products. **Location-based software** is able to access your current location and use it to show you the closest shops, restaurants, ATMs, and theaters.

Business software is a broad term that includes vertical and horizontal market software. **Vertical market software** is designed to automate specialized tasks in a specific market or business. Examples include hospital patient management and billing software. Today, almost every business has access to some type of specialized vertical market software designed to automate, streamline, or computerize key business activities. **Horizontal market software** is generic software that just about any kind of business can use. For example, many small businesses use QuickBooks to keep track of income and expenses, pay bills, and track inventory. Payroll software and project management software are examples of horizontal market software.

A type of system software called **utility software** is designed to help you monitor and configure settings for your digital gear, its operating system, or application software. Like all system software, utilities focus on computer-centric tasks such as blocking viruses or diagnosing hard disk errors. A set of basic utilities is included with your device's operating system. Third-party software companies offer additional products that extend and improve upon those supplied by the operating system. A **PDF** reader, such as Adobe Reader, is an essential utility that displays documents stored in standard PDF files.

Another popular category of utility software is **system utilities** that can track down and fix disk errors, repair corrupted files, and give your device a performance-enhancing tune-up. System utilities for handheld computers include apps which display memory usage, available storage space, CPU usage, Wi-Fi and cellular addresses, and battery level.

A **device driver** is software that helps a peripheral device establish communication with a computer. This type of system software is used by printers, monitors, sound cards, network cards, storage devices, modems, mice, and scanners. Once installed, a device driver automatically starts when it is needed. Device drivers usually run in the background, without opening a window on the screen.

Office suites, such as Microsoft Office and Google Docs, are popular with individual computer owners and in business environments. They are sometimes referred to as **productivity software** because they offer features that really help get work done. **An office suite** is a collection of programs that typically include word processing, spreadsheet, presentation, and database modules.

Word processing packages, such as Microsoft Word or iWork Pages give you the ability to create, spell-check, edit, and format a document on the screen before you commit it to paper. Your word processing software is likely to include a **thesaurus**, which can help you find a synonym for a word. A **grammar checker** reads through your document and points out potential grammatical trouble spots. Most word processing software includes a **spelling checker** that marks misspelled words in a document. The look of your final document depends on several **formatting** factors. **Page layout** refers to the physical position of each element on a page. **Paragraph style** includes the alignment of text within the margins and the space between each line of text. A **font** is a set of letters that share a unified design.

Spreadsheet software provides tools to create electronic spreadsheets. It is similar to a smart piece of paper that automatically adds up columns of numbers written on it. You can make other calculations, too, based on simple equations that you create or more complex, built-in formulas. It also includes special data-handling features that allow you to sort data, search for data that meets specific criteria, and print reports. Because it is so easy to experiment with different numbers, spreadsheet software is particularly useful for **what-if analysis**.

Database software helps you enter, find, organize, update, and report information stored in a database. 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, thing, or event. A **field** holds one item of data relevant to a record. Many databases contain hundreds or thousands of records. If you want to find a particular record or a group of records, scrolling through every record would take a very long time. Instead, you can enter a **query** that describes the information you want to find. Queries can take several forms:

A **query language**, such as SQL (Structured Query Language), provides a set of commands for locating and manipulating data. A **natural language query** is a question stated in a language such as English, rather than an esoteric query language. A **keyword search**, popular with search engines such as Google, is simply a collection of words relevant to your search. A **query by example** (QBE) simply requires you to fill out a form with the type of data you want to locate.

COMPREHENSION

1. What is software? How is it categorized?
2. What are mapping applications? What is location-based software?
3. What is the difference between vertical and horizontal market software?
4. What is an office suite? Give an example.
5. What is utility software? What are must-have utilities?
6. What is a device driver? What devices use this type of system software?
7. What is spreadsheet software? What is it useful for?
8. How does a database store data? How do you locate specific data?

VOCABULARY

1. Fill in the blanks choosing from the variants given.

1. Software which is easy to use is … .	a) user-easy; b)user-friendly; c) usable
2. Software for use by children and schools is … .	a) learning; b) teaching; c) educational
3. Software for use by businesses is … .	a) commercial; b) businesslike; c) busy
4. Software made specially for one company is … .	a) one-off; b) unique; c) tailor-made
5. Software for use at home is … .	a) for home use; b) for house use; c) for household use
6. Software which has been illegally copied is … .	a) unreal; b) pirate;d c) fake
7. Software which has been bought from the company that produced it is … .	a) real; b) justified; c) licensed

2. Choose the correct preposition. Then match the problem with the solution.

A. The operating system **in/on** my computer doesn't support the latest version **of/from** this application. These files are too big. My computer says it hasn't got enough memory **for/to** run this program. I think there's a bug **in/inside** this software. There doesn't seem to be an icon for the program **in/on** the desktop. I can't use this program. It's all **in/with** French! I can't get the driver for my new printer **to/at** work. I haven't got a media player **in/on** my computer.

B. *You can download one for free **to/from** the Internet. Perhaps you could get an older version – or buy a new computer! What about uninstalling the driver for your old printer? Have you checked to see if there are any updates available **in/on** the Internet? Why don't you close **off/down** all those other applications you've got open? How about compressing them **with/by** WinZip? Go **to/on** the «start» menu, and click **at/on** «All Programs». Change the language setting.*

QUICK CHECK
Fill in the blanks to best complete each sentence.

1. … software is designed for computer-centric tasks, whereas … software is designed to help people accomplish real-world tasks. 2. Mapping and … -based software helps consumers find the nearest ATM or turn-by-turn directions to the airport. 3. For businesses, … market software is designed to automate specialized tasks. 4. … market software is generic software that can be used by just about any kind of business. 5. … software is designed to help you monitor and configure

settings for your computer system equipment, the operating system, or application software. 6. A(n) … reader is an essential utility that displays documents in a standard format for exchanging files. 7. Device … are a type of system software that helps a computer establish communication with peripheral devices.

DISCUSSION
Work in groups. Discuss the following questions.

1. List seven categories of application software.
2. List at least five functions performed by utilities.
3. Describe three ways that word processing software can help improve your writing.
4. Describe four ways to query a database.
5. List at least six key features of music software.

WRITING
Create a concept map of the text above using the key words below.

system software, application software, utilities, operating systems, device drivers, programming languages, entertainment, educational, reference, video, graphics

SPEAKING
On the basis of the questions below speak about your computer software.

1. Which applications do you use most for school, work, or play? Why?
2. How do they help you in your work, school, or play?
3. Which features do you find the most useful?
4. Do your applications have any limitations that annoy you? What are they?
5. Is there an application you'd like to learn to use? What would you use it for?

TEXT B: INSTALLING AND BUYING SOFTWARE

READING
Study the key words of the text below and try to define them in your own words.

a copyright, a handheld device, costly, a fee, free of charge, handy, a backup, original work, trial period, legal protection, a patent, a software upgrade

Software installation is the process of placing a program into a computer so that it can be run or executed. You can use some software without installing it, but other software has to be installed before you can use it. A **Web application** (or Web app) is software that is accessed with a Web browser. Instead of running locally, much of the program code for the software runs on a remote computer connected to the Internet or other computer network. Most Web apps require no installation at all

on your local computer or handheld device. Your device must, however, have a Web browser and an Internet connection. Web apps are truly handy but consider their advantages and disadvantages:

+ You can access Web apps from any device that has a browser and an Internet connection. Your data is usually stored on the app's Web site, so you can access data even when you are away from your main computer. Web apps are always up to date. Web apps do not require local storage space.

− Web apps tend to have fewer features than applications that require installation. If the site hosting the app shuts down, you will not be able to access the application or your data. Your data might be more vulnerable to exposure or loss because it is out of your control. Make local backups, if possible.

A **mobile app** is designed for a handheld device, such as a smartphone, or tablet computer. Most handheld devices can use both Web apps and mobile apps. The difference between the two is that Web apps run on a remote computer, whereas mobile apps run from the handheld device, so they have to be downloaded and installed. Games and entertainment seem to dominate mobile apps, whereas shopping and social apps dominate the Web apps category.

Local applications are installed on a computer's hard disk. When you install a local application, all of its 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.

The main component of a software package is an **executable file** designed to be started by users or automatically launched by the operating system. Additional files contain support modules called «application extensions», data files, and text files.

Portable software is designed to run from removable storage, such as a CD or USB flash drive. Program files are not installed on the hard disk, no configuration data is stored on the hard disk, and no entries need to be made in the Windows Registry. When the device containing the portable software is removed from the computer, no trace of it is left there.

Periodically, software publishers replace older versions of a software product with a new version that's sometimes referred to as a **software upgrade**. Upgrading to a new version usually involves a fee, but it is usually less costly than purchasing the new version off the shelf. A **software update** (sometimes called a software patch) is a small section 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 updates. Updates and service packs are designed to correct problems and address security vulnerabilities. Software updates and service packs are usually free.

In most countries computer software is protected by a copyright. A **copyright** is a form of legal protection that grants the author of an original work an exclusive right to copy, distribute, sell, and modify that work. In addition to copyright protection, computer software is often protected by the terms of a software license. A **software license**, or license agreement, is a legal contract that defines the ways in which you may use a computer program.

From a legal perspective, there are two categories of software: public domain and proprietary. **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. Public domain software may be freely copied, distributed, and even resold. The primary restriction on public domain software is that you are not allowed to apply for a copyright on it. **Proprietary software** has restrictions on its use that are delineated by copyright, patents, or license agreements. Based on licensing rights, proprietary software is distributed as commercial software, demoware, shareware, freeware, and open source software.

Commercial software is usually sold in retail 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. Some commercial software is free.

Demoware is distributed for free and often comes preinstalled on new computers, but it is limited in some way until you pay for it.

Shareware is copyrighted software marketed under a try-before-you-buy policy. To use it beyond the trial period, you are supposed to pay a registration fee. Unlike feature- or time-limited demoware, shareware is supposed to be fully-functioning software.

Open source software makes uncompiled program instructions – the source code – available to programmers who want to modify and improve the software. Open source software may be sold or distributed free of charge in compiled form, but it must, in every case, also include the source code. Linux is an example of open source software.

Freeware is copyrighted software that is available for free. It is fully functional and requires no payment for its use. A freeware license 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, most device drivers, and some games are available as freeware.

Before purchasing software, make sure the license allows you to use the software the way you want to. Just remember that many software programs exist and you can find usually alternatives with similar features offered under various licensing terms.

COMPREHENSION
Decide whether you agree or disagree with the question below.

1. Do you have to install Web apps?	Yes/No
2. Are all software licenses similar?	Yes/No
3. Is shareware the same as freeware?	Yes/No
4. Can handheld devices use both Web apps and mobile apps?	Yes/No
5. Can commercial software be free?	Yes/No
6. May open source software be sold?	Yes/No

VOCABULARY

1. Complete these sentences with the words in the box.

> domain, open, requirements, piracy, shareware, proprietary, freeware, copyright, license

1. When shopping for additional utilities and apps, check the system … to make sure your device has the correct operating system and necessary hardware capacity. 2. Software is protected by …, and illegal copying is referred to as software … . 3. … software, such as commercial software, is protected by copyright that grants to its author an exclusive right to copy, distribute, sell, and modify that work. 4. Public … software is not protected by copyright. 5. A software … can extend or limit the rights granted by copyright. 6. Demoware and … are distributed free of charge, but require payment for continued use. 7. … source software is distributed with its source code, and can be modified. 8. … is copyrighted software that can be used for free, but cannot be altered or resold.

2. Match the terms with the definitions. Explain the words in bold.

1. trial version	a. A **simplified** version which is cheaper to buy
2. shareware	b. Software which is in the **public domain**. Anybody can use it without paying
3. freeware	c. The **full version** with all the features
4. home-use version	d. You can try it for a while for free. Then if you want to keep using it, you are expected to pay a **fee** to the writer
5. professional version	e. You can use it for free for a while. When the **trial period** is over, you have to pay, or the program will be blocked

QUICK CHECK

Fill in the blanks to best complete each sentence.

1. The process of … software places a program into a computer so that it can be executed or run. 2. … apps are examples of cloud computing and are accessed from a browser. 3. … apps are installed on a local handheld device by downloading from an app store. 4. In contrast to local applications, … software is designed to run from removable storage, such as a CD or USB flash drive. 5. A software … is a small section of program code that replaces part of the software you currently have installed. 6. The term service …, which usually applies to operating system updates, is a set of patches that correct problems and address security vulnerabilities.

DISCUSSION

Work in groups. Discuss the following questions.

1. What are Web apps? Do you have to install them?
2. What are the advantages and disadvantages of Web apps?
3. What are mobile apps? How do mobile apps differ from Web apps?
4. How do local applications work?
5. What's included in a typical software package?
6. What are updates, patches, and service packs?
7. What is a software copyright? What is a software license?
8. Name at least 5 software licenses and explain the difference between them.

WRITING

Student A, write a set of step-by-step instructions for installing software from a distribution CD. Student B, write a set of instructions for installing downloaded software.

SPEAKING

On the basis of the text above speak about the differences between:

- proprietary software
- open source software
- shareware
- freeware
- commercial software
- public domain software

TEXT C: SOFTWARE SECURITY

READING

Before reading the text match various types of malware with their definitions.

1. a computer worm   **4. an intelligent agent**   **7. a botnet**
2. a mass-mailing worm **5. a bot**   **8. spyware**
3. a Trojan horse   **6. a zombie**   **9. a virus hoax**

a. … is a computer program that seems to perform one function while actually doing something else.
b. Because an intelligent agent behaves somewhat like a robot, it is often called … .
c. A computer under the control of a bad bot is sometimes referred to as … because it carries out instructions from a malicious leader.
d. … is a self-replicating program designed to carry out some unauthorized activity on a victim's computer.
e. Like a spider in its web, the person who controls many bot-infested computers can link them together into a network called … .

f. Any software that can automate a task when commanded to do so is called … .
g. … spreads by sending itself to every address in the address book of an infected computer.
h. … usually arrives as an e-mail message containing dire warnings about a supposedly new virus on the loose.
i. … is a type of program that secretly gathers personal information without the victim's knowledge, usually for advertising and other commercial purposes.

Security software is designed to protect computers from various forms of destructive software and unauthorized intrusions. Security software can be classified into various types: antivirus, antispyware, anti-spam, and firewalls. Each type focuses on a specific security threat. The terms **malicious software** and **malware** refer to any computer program designed to surreptitiously enter secretly a computer, gain unauthorized access to data, or disrupt normal processing operations. Malware includes viruses, worms, Trojans, bots, and spyware. Malware is created and unleashed by individuals referred to as hackers, crackers, black hats, or cybercriminals. Some malware is released as a prank. In an increasing number of cases, malware is unleashed for monetary gain.

A **computer virus** is a set of program instructions that attaches itself to a file, reproduces itself, and spreads to other files. A common misconception is that viruses spread themselves from one computer to another. They don't. Viruses can replicate themselves only on the host computer. A key characteristic of viruses is their ability to lurk in a computer for days or months, quietly replicating themselves. While this replication takes place, you might not even know that your computer has contracted a virus; therefore, it is easy to inadvertently spread infected files to other people's computers. In addition to replicating itself, a virus usually delivers a payload which can corrupt files, destroy data, or otherwise disrupt computer operations. A trigger event, such as a specific date, can unleash some viruses. Viruses that deliver their payloads on a specific date are sometimes referred to as time bombs.

Some malware does a good job of cloaking itself, so victims are unaware of its presence. Cloaking techniques are great defense mechanisms because when victims aren't aware of malware, they won't take steps to eradicate it. Some hackers cloak their work using rootkits. The term **rootkit** refers to software tools used to conceal malware and backdoors that have been installed on a victim's computer. Rootkits are usually distributed by Trojans.

Some techniques for safe computing include installing and activating security software on any digital device that is at risk, keeping software patches and operating system service packs up to date, not opening suspicious e-mail attachments, obtaining software only from reliable resources and always scanning it for malware, avoiding unsavory Web sites and not clicking pop-up ads.

A **security suite** integrates several security modules to protect against the most common types of malware, unauthorized access, and spam. Security suites might include additional features such as Wi-Fi detection that warns of possible intrusions

into your wireless network, and parental controls for monitoring and controlling children's Internet usage. A security suite has both advantages and disadvantages. First, it costs less than purchasing standalone security modules. Second, a single interface for accessing all of the security suite's features is much less complex than having to learn how to configure and run several different products. On the other hand, most security suites cannot run concurrently with standalone security products, and overlapping security coverage from two similar products can cause glitches.

Antivirus software is a type of utility software that looks for and eradicates viruses, Trojan horses, worms, and bots. Some antivirus software also scans for spyware, although several security software publishers offer spyware detection as a separate module. Antivirus software is available for all types of computers and data storage devices, including handhelds, USB flash drives, servers, PCs, and Macs.

Modern antivirus software attempts to identify malware 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. Antivirus software scans for virus signatures in programs, data files, incoming and outgoing e-mail and attachments.

Two aspects of your antivirus software periodically need to be updated. First, the antivirus program itself might need a patch or an update to fix bugs or improve features. Second, the list of virus signatures must be updated to keep up with the latest malware developments. Virus signatures and other information that antivirus software uses to identify and eradicate malware are stored in one or more files usually referred to as **virus definitions** (or a virus database). If, during the scanning process, your virus protection software identifies a virus, worm, or Trojan horse in a file, it can try to remove the infection, put the file into quarantine, or simply delete the file. A **quarantined file** contains code that is suspected of being part of a virus. For your protection, most antivirus software encrypts the file's contents and isolates it in a quarantine folder, so it can't be inadvertently opened or accessed by a hacker.

Despite occasional misses, however, antivirus software and other security software modules are constantly weeding out malware that would otherwise infect your computer. It is essential to use security software, but also important to take additional precautions, such as making regular backups of your data.

COMPREHENSION
Decide whether the following statements are TRUE or FALSE? Say why?

1. Security software can be classified into various types.
2. Antivirus software is not available for all types of computer devices.
3. Antivirus software attaches to a file, reproduces itself, and spreads to other files.
4. Virus signatures are stored in one or more files referred to as virus definitions.
5. The term rootkit refers to software tools used to conceal malware.
6. Viruses spread when people exchange infected files, as e-mail attachments, and on file sharing networks, social networking sites, and download sites.

VOCABULARY

1. Choose the correct words in italics.

Why do we have to ***follow/notify*** these new security procedures? Last month a ***hijack/hacker*** got into our system. He installed ***adware/spyware*** to see what we did on the computers. And another time we had a ***worm/firewall*** in the system. It destroyed everything on the hard drive. I ***transferred/reported*** it to my supervisor when I discovered it but it was too late to recover most of the files. Did you ***save/unplug*** your computer last night? You shouldn't ***disconnect/install*** it. It causes all kinds of problems. I ***checked/loaded*** new software onto it yesterday evening. Did you ***back up/put up*** your files before you did that?

2. Complete these sentences with the words in the box.

Trojan, adware, biometric scanning, browser hijacker, encryption, hacker, spyware, malware attack

1. A(n) … is someone who tries to break into a computer system.
2. A program which is usually free but contains a virus is called a(n) … .
3. An effort to get unauthorized access to a computer is called a(n) … .
4. A(n) … is software that replaces the user's search engine with its own.
5. … blocks authorized access.
6. Software that sends information about the use of a computer system is called … .
7. … is one way to make sure that only authorized people access the network.
8. … is software that automatically plays commercials on a computer.

QUICK CHECK
Fill in the blanks to best complete each sentence. The first letter is given.

1. Security software can be classified into various types: antispyware, anti-spam, and **f**… . 2. A computer **v**… is a set of program instructions that attaches itself to a file, reproduces itself and spreads to other files. 3. A computer **w**… is a self-replicating program designed to carry out some unauthorized activity on a victim's computer. 4. In the context of computing, a Trojan **h**… is a computer program that seems to perform one function while actually doing something else. 5. **S**… is a type of program that secretly gathers personal information without the victim's knowledge, usually for advertising and other commercial purposes. 6. To combat malware, it is important to use **a**… software that looks for virus signatures. 7. Most computer owners obtain this software as one module in a security **s**… .

DISCUSSION
1. What is security software?
2. How can you avoid security threats?

3. What malware threats do you know?
4. What is a security suite? What additional features might it include?
5. What are the advantages and disadvantages of a security suite?
6. How do you understand the term rootkit?
7. What is antivirus software and how does it work?
8. How can you keep your antivirus software up to date?
9. What does quarantine mean?

WRITING
Write a short summary of the text above to illustrate how antivirus software works.

SPEAKING
On the basis of the questions below speak about your antivirus software.

1. Do you believe that software piracy is a serious issue?
2. Have you ever had any instances of software piracy on your computer?
3. What kind of antivirus software do you use?
4. Has your antivirus software quarantined any files?
5. Do you have antivirus software on your phone? Why, or why not?
6. Is there any way to stop software piracy?

FINAL UNIT TEST
Fill in the blanks to best complete each sentence.

1. The category of software that is designed for computer-centric tasks is … software.
2. … software helps you carry out tasks such as creating documents, editing graphics, and locating nearby restaurants.
3. … market software is designed to automate specialized business tasks.
4. System … software can help you track down and fix disk errors, repair corrupted files, and improve device performance.
5. A(n) … driver is designed to help a peripheral device establish communication with a computer.
6. Each database record is composed of many … .
7. When using database software, you can search for data by entering a keyword or natural language … .
8. … software is useful for performing «what-if» analyses.
9. A computer … can lurk in a computer for days or months, quietly replicating itself.
10. A group of zombie computers controlled by a hacker is called a(n) … .
11. A virus … is a unique section of malicious code that can be identified by antivirus software.
12. A(n) … file is suspected of containing a virus, so your antivirus software usually encrypts the file and stores it in a special folder.
13. Before purchasing software, you should check the … requirements.

14. LibreOffice, Firefox, and Linux are examples of … source software that can be legally modified and redistributed.
15. Most … applications require no installation and are accessed through a browser.
16. On a PC, a(n) … program guides you through the installation process.
17. A(n) … pack is a set of patches that correct problems and address security vulnerabilities.
18. Usually the files for downloaded software are … into one compressed file.
19. … software can be copied to a flash drive and run without additional installation.
20. … law allows you to make an extra, or backup, copy of software as long as you do not defeat any copy protection mechanisms.

UNIT 4. OPERATING SYSTEMS AND FILE MANAGEMENT

ACTIVE VOCABULARY
Study the key terms below and try to define them in your own words.

> a desktop, a taskbar, a Start screen, an icon, a tile, a menu, a ribbon, a submenu, a dialogue box, a memory leak, a buffer, a GUI

READING
Read the text and find the answers to the questions.

1. What are the four main resources that an operating system manages?
2. Explain the significance of multitasking, multithreading, and multiprocessing.
3. Are different operating systems needed for different computing tasks?

TEXT A: OPERATING SYSTEM BASICS

An operating system (abbreviated OS) is a type of system software that acts as the master controller for all activities that take place within a computer system. Your computer's OS provides an environment for running software and controlling peripheral devices. While you interact with application software, your computer's OS is busy behind the scenes with resource (any component that is required to perform work) management tasks such as:

- **Manage processor resources to handle simultaneous input**, **output**, **and processing tasks**. Many activities – called processes – compete for the attention of your computer's microprocessor. To manage all these competing processes, your computer's OS must ensure that each process receives its share of microprocessor cycles. Depending on the capabilities of the OS and computer hardware, processes can be managed by **multitasking** (provides process and memory management services that allow two or more tasks, jobs, or programs to run simultaneously), **multithreading** (allows multiple parts, or threads to run simultaneously), and **multiprocessing** (supports a division of labor among all the processing units).

- **Manage memory by allocating space for all the programs and data that are in use during a computing session**. Sometimes an application requests memory but never releases it- a condition called a **memory leak**. Memory «leaks» away into this application's reserved area, eventually preventing other programs from accessing enough memory to function properly.

- **Keep track of storage resources so that files and programs can be found and manipulated**. OS stores and retrieves files from your computer's hard drive and other storage devices. 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 by communicating with peripheral devices**. Your computer's OS communicates with device driver software so that data can travel smoothly between the computer and peripheral resources. It uses **buffers** to collect and hold data while the computer is busy with other tasks.

For most computers, the operating system program is quite large, so most of it is stored on a hard disk. During the boot process, the operating system kernel is loaded into RAM. The kernel provides essential OS services, such as memory management and file access. The **kernel** stays in RAM all the time your computer is on. Other parts of the OS, such as customization utilities, are loaded into RAM as they are needed.

The sequence of events that occurs between the time that you turn on a computer and the time that it is ready for you to issue commands is referred to as the **boot process**, or booting your computer. Your computer's small **bootstrap program** is built into special ROM circuitry housed in the computer's system unit. When you turn on a computer, the ROM circuitry receives power and begins the boot process by executing the bootstrap program.

- **Establish basic elements of the user interface such as appearance of the desktop, menus, and toolbars**. A user interface can be defined as the combination of hardware and software that helps people and computers communicate with each other. Most computers today feature a **graphical user interface**, abbreviated as GUI and pronounced as «gooey» or «gee you eye». There are some basic control elements of a GUI. A **desktop** is a visual work area that covers the entire screen and remains in the background throughout a computing session. A desktop includes a **taskbar** or **dock** for launching applications, which are displayed in rectangular **application windows** on the desktop. A **Start screen**, popular on handheld devices, appears at the end of the boot process and whenever it is invoked by the user, commonly by pressing the Home button. Start screens display icons or titles for apps. An **icon** is a small picture that represents a program, file, or hardware device. Some icons are designed as **tiles**, which can display information feeds of live data. A **button** is a graphic that can be clicked to make a selection. They can be arranged in a **toolbar** or displayed on a taskbar. A **menu** displays a list of commands or options on a **menu bar**. A **ribbon** is an alternative type of menu that is arranged as rows of tools on a succession of tabs. Two methods are generally used to present a reasonably sized list of options: submenus and dialog boxes. A **submenus** is an additional set of commands that the computer displays after you make a selection from the main

menu. A **dialog box** displays the options associated with a command. You fill in the dialog box to indicate specifically how you want the command carried out.

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

A **single-user operating system** deals with one set of input devices – those that can be controlled by one user at a time. Operating systems for tablet computers and smartphones fit into this category. DOS is an example of a single-user OS designed for desktop computers.

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

A **server operating system** provides tools for managing distributed networks, e-mail servers, and Web hosting sites. Server OSs typically route data and programs to each user's local computer where the actual processing takes place. They might also provide multiuser capabilities.

A **desktop operating system** is designed for a desktop or laptop personal computer. These operating systems are designed to accommodate one user at a time, but also provide networking capability.

A **mobile operating system** is designed for devices such as smartphones and tablet computers. Mobile OSs support touchscreens, but tend to limit multitasking and user access to local storage devices.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. The OS tells application software what to do.
2. When an operating system allocates tasks to various cores of a microprocessor, it is called multiprocessing.
3. RAM, storage space, and peripheral devices are computer's resources.
4. Windows 10 is a multiuser operating system.
5. The operating system is itself a program, so it requires RAM space, too.
6. The Start screen is displayed when the iPad starts, and any time the user presses the Home button.

VOCABULARY
1. Find words or expressions in the text which mean the following:

1. A GUI element usually displayed near the bottom of the screen to help users launch and monitor applications.
2. A component of GUIs that displays icons representing tools, commands, and other options.
3. Windows 10 screen that contains all of the tiles for application.

4. An element of the user interface that represents users with multiple tabs instead of menus at the top of the application window.

5. Icons which can display information feeds of live data.

6. A standard component of most GUIs that is displayed as a strip of clickable options that in turn display a list of commands.

7. An element of GUIs that appears in a window and requests information, such as command parameters, from a user.

2. Complete the following text with these words and word combinations.

peripheral devices, power switch, tests, hard disk, routines, bootstrap, configuration data

Six major events happen during the boot process. When you turn on the … , the power light is illuminated, and power is distributed to the computer circuitry. The microprocessor begins to execute the … program that is stored in ROM. The computer performs diagnostic … of several crucial system components. The computer identifies any … that are connected and checks their settings. If necessary, the operating system is copied from the … to RAM. The microprocessor reads … and executes any customized startup … specified by the user.

QUICK CHECK
Fill in the gaps in the text.

An operating software interacts with application software, device drivers, and hardware to manage a computer's …, such as the processor, memory, and input/output devices. To allow two or more programs to run simultaneously, an OS can offer … service. Within a single program, … allows multiple parts, or threads, to run simultaneously. An operating system's … capability supports a division of labor among all the processing units. An operating system might have to deal with a memory …, a situation caused by an application that requests memory, but never releases it. Operating systems are informally categorized and characterized using one or more of the following terms: A(n) … -user operating system expects to deal with one set of input devices – those that can be controlled by one person at a time. A(n) …-user operating system is designed to deal with input, output, and processing requests from many users. A(n) … operating system provides management tools for distributed networks, e-mail servers, and Web site hosting. A(n) … operating system is one that's designed for a personal computer. A(n) … operating system is designed for devices such as iPhones and Droids.

DISCUSSION

Work in groups. Discuss the following questions.

1. What is an operating system?
2. What does an operating system do?
3. How do operating systems manage processor resources?
4. How do operating systems handle so many processors?
5. How does an operating system manage memory?
6. How does the OS keep track of storage resources?
7. Are different operating systems needed for different computing tasks?
8. What are the basic control elements of a GUI?

WRITING

Create a concept map of the text above in relation to operating system tasks.

SPEAKING

On the basis a concept map speak about what an operating system is and what it does.

TEXT B: FILE BASICS AND FILE MANAGEMENT

ACTIVE VOCABULARY

Study the key terms of this unit and try to define them in your own words.

> defragmentation utility, fragmented files, formatting process, a track, a sector, a cluster, a file header, a file format, file specification, a folder, reserved words

READING

Read the text and find answers to the questions:

1. Is the file extension the same as a file format? What the significance of file format?
2. How can you manage files on a computer?
3. What do you know about physical file storage?

Computer files in digital format offer a compact and convenient way to store documents, photos, videos, and music. They 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 conventions**. Each OS has a unique set of file-naming conventions. A **file extension** is an optional file identifier that is separated from the main file name by a period. Some OSs also contain a list of **reserved words** that are used as commands or special identifiers. To designate a file's location, you must first specify the device where the file is stored. You can

store files on a hard drive, removable storage, a network computer, or cloud-based storage (Internet-based storage service). Every storage device has a **directory** containing a list of its files. The main directory is referred to as the **root directory**. A root directory can be subdivided into smaller lists. Each list is called a **subdirectory**. Each subdirectory is depicted as a **folder**. Folders help you envision your files as if they were stored in a filing cabinet.

A computer file's location is defined by a **file specification**, sometimes called a **path** (C:\Music\Reggae\Marley One Love.mp3), which on a PC includes the drive letter, folder(s), file name, and extension. The term **file format** refers to the organization and layout of data that is stored in a file. The format of a file usually includes a header, data, and possibly an end-of-file marker. A **file header** is a section of data at the beginning of a file that contains information about a file, such as the date it was created, the date it was last update, its size, and its file type.

A file extension is not the same as a file format. Although a file extension is a good indicator of a file's format, it doesn't really define the format. A software application can open files that exist in its native file format, plus several additional file formats. But when a file doesn't open, one of the three things probably went wrong:

1. The file might have been damaged by a transmission or disk error. Although you might be able to use file recovery software to repair the damage.

2. Someone might have inadvertently changed the file extension. If you have a little time, you change the file extension and try to open the file. Otherwise, you should contact the source of the file to get accurate information about its real format.

3. Some file formats exist in several variations. You might be able to open the file if you use different application software.

Perhaps you need to convert a file from one format to another. The easiest way to do it is to find application software that works with both file formats. Open the file using that software, and then use the Export option, or the Save As dialog box, to select a new file format, assign the file a new name, and save it

Before a computer can store a file on a disk, CD, DVD, or BD, 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. On hard disks, tracks are arranged as concentric circles; on CDs, DVDs, and BDs, one or more tracks spiral out from the centre of the disk.

The OS uses a **file system** to keep track of the names and locations of files that reside on a storage medium, such as a hard 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.

When you save a file, your PC's OS 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.

A file that does not fit into a single cluster spills over into the next contiguous (meaning adjacent) cluster, unless that cluster already contains data. When

contiguous cluster are not available, the OS stores parts of a file in noncontiguous (nonadjacent) clusters.

When you want to retrieve a file, the OS looks through the index for the file name and its location. It moves the disk drive's read-write head to the first cluster that contains the file data. Using additional data from the index file, the OS can move the read-write heads to each of the clusters containing the remaining parts of the file.

As a computer writes files on a disk, parts of files tend to become scattered all over the disk. These **fragmented files** are stored in noncontiguous clusters. Drive performance generally declines as the read-write heads move back and forth to locate the clusters containing the parts of a file. To regain peak performance, you can use a **defragmentation utility**, such as Windows Disk Defragmenter, to arrange the files on a disk so that they are stored in contiguous clusters.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. Understanding file formats helps you find the right player software for music.
2. If you change a file name extension, the contents are converted into a format that corresponds to the extension.
3. An easy way to convert a file from one format to another is to open it with an application that supports only one file format, and then use the Save As dialogue box to select an alternative file format.
4. When using Windows, you cannot use Aux word as a file name.
5. A software application automatically stores files in any file format unless you specify otherwise.
6. We use the same rules for e-mail addresses and file names.
7. Files can be stored on local devices, on a network, or in the cloud.

VOCABULARY
1. Complete the following text with these words:

> changes, overwrites, recover, remains, removes, purchase, select, appears

When you click a file's icon and then … the Delete option, the operating system simply … the status of the file's clusters to «empty» and … the file name from the index file. The file name no longer … in a directory listing, but the file's data … in the clusters until a new file is stored there. You might think that data is as good as erased, but it is possible to … utilities that … a lot of this supposedly deleted data. To delete data from a disk in such a way that no one can read it, you can use special file shredder software that … supposedly empty sectors with random 1s and 0s.

QUICK CHECK
Fill in the gaps in the text.

A computer … is a named collection of data that exists on a storage medium. Every file has a name and might also have a file extension. The rules that specify valid file names are called file-naming … . These rules typically 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. File … encompasses any procedure that helps you organize your computer-based files so that you can find them effectively. The way that data is actually stored is referred to as the … storage model. Before a computer stores data on a disk, it creates the equivalent of electronic storage bins by dividing the disk into …, and then further dividing the disk into … . This dividing process is referred to as … . Many computers work with a group of sectors, called a(n) …, to increase the efficiency of file storage operations.

DISCUSSION
Work in groups. Discuss the following questions.

1. What are the rules for naming files?
2. What are reserved words?
3. How do I designate a file's location?
4. Is a file extension the same as a file format?
5. Why can't I open some files?
6. What if all my software fails to open a particular file format?
7. How do I use a file management utility?
8. What can I do with the folders and files that are listed in File Explorer?
9. How does the operating system keep track of a file's location?
10. How does a disk become fragmented?

WRITING
Write a short summary of the text using Active Vocabulary.

SPEAKING
Speak about how to make effective use of computer files and about a physical storage model.

TEXT C: BACKUP SECURITY

ACTIVE VOCABULARY
Look through the key terms of the text and match them up with the definitions below.

1. A CD that contains all the operating system files and application software files necessary to restore a computer to its original state.

2. Data stored about the state of files and the operating system at a given point in time, then used to roll back the computer system to that state.
3. A bi-by-bit copy of the contents of a disk created for backup, archiving, or duplication of data.
4. A section of a hard disk that contains the files necessary, to restore a computer's hard disk contents to factory condition.
5. A backup that contain files that changed since the last backup.
6. A process by which a backup is restored to a hard disk without first reinstalling the operating system and device drivers.
7. A copy of all the files that changed since the last full backup of a disk.

READING
Read the text and find the answers to the questions.

1. Why do I need to make backups?
2. What are the major strategies and plans of backups?
3. What does their choice depend on?
4. What backup would you prefer? Why?

You can't always prevent data disasters, so you should have a **backup** that stores the files needed to recover data that's been wiped out by operator error, viruses, or hardware failures. Your backup schedule depends on how much data you can afford to lose. If you want to be able to restore your computer to its current state, you need to backup all of its files using synchronization software, backup software, imaging software, or virtual machine technology.

Synchronization compares the content of files on two devices and makes them the same. It can be used for backup because it dynamically maintains a parallel set of files on your computer's hard disk and your backup device.

A program called Time Machine supplied with Mac OS X is good example of synchronization software. It works by first making a backup of every file from the computer's primary storage device and synchronizes any files that have been changed. Windows includes a synchronization utility called **File History**. It is designed to back up files stored in your Libraries, Desktop, Favorites, and Contacts folders. Once you activate File History, it checks hourly for files that have changed and copies those files to the backup device.

A **full system backup** includes a copy of every file stored on your computer's hard drive. In addition to data files, a full system backup includes copies of all installed programs, settings, and the OS. To restore your hard drive, you'll need to use a boot disk, a recovery disk, and copies of your application software. A **boot disk** is a removable storage medium containing the OS files needed to boot your computer without accessing the hard disk. CDs, DVDs, and even USB flash drives can be used as boot disks. A **recovery disk** is a bootable CD, DVD, or other media that contains a complete copy of your computer's hard disk as it existed when the computer was new. It contains the OS, device drivers, utilities, and even software that was bundled

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with your computer. However, a recovery disk will not restore your data files, any software that you installed, or any configuration settings you've made since you unwrapped your computer from its shipping box.

Recovery partitions are convenient for restoring a corrupted device driver or software module because you can simply copy or reinstall the file from the recovery partition to the main partition. The files in the recovery partition are not accessible, however, if your computer's hard disk fails.

The **Windows Registry** is an important group of files to store configuration information about all the devices and software installed on a computer system. But backing up the Registry can be a problem because the Registry is always open while your computer is on. Some software that you might use for backups cannot copy open files. To get periodic copies of your computer's Registry settings, you can create restore points. A **restore point** is a snapshot of your computer settings. Restore points can be set by accessing the Control Panel and then searching for "Restore Point". If a hard disk problem causes system instability, you might be able to roll back to a restore point when your computer was operational.

Backup software is a set of utility programs designed to back up and restore some or all of the files on a computer's primary storage device. Backup software differs from most copy and synchronization routines because it compresses all the files for a backup and places them in one large file. The backup file is indexed so that individual files can be located, uncompressed, and restored. A **differential backup** makes a backup of only those files that were added or changed since your last full backup session.

An **incremental backup** backs up files that were added or changed since the last backup. To restore a set of incremental backups, you must first install a full backup, then install each of the incremental in succession. Remember, you should run an up-to-date virus check as the first step in your backup routine.

Some backup systems streamline the process by restoring a computer's OS, device drivers, settings, and data in a single step – a process called **bare-metal restore**. Bare-metal restore software usually works with a disk image. A **disk image** is a bit-by-bit copy of the data from all sectors of a disk. Disk imaging utilities create an exact clone of the original disk, unlike most backup software that makes file-by-file copies. A disk image includes all the data from a disk, even boot information and other data locked by the OS. But it copies data from the entire disk; it generally cannot be configured like traditional backup software to copy only selected files.

Today's trend toward the use of virtual machines offers another option for backups. For example, if you run Windows as a virtual machine on a Mac, you can simply back up the entire Windows machine as one folder or file.

Handheld devices are usually backed up by synching them to a desktop or laptop computer.

Many Android devices include backup software, usually accessible from the Settings icon. Generally, backups from Android devices are stored in the cloud on Google servers. If you want to go beyond data backup and back up your Android

system files, you can use third-party backup software, such as Titanium Backup or Backup Master.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. The Windows Registry directly influences on your backup schedule.
2. Synchronization works only with your computer's hard disk.
3. You can use a recovery disk to return your computer to its factory default state.
4. File History is a full system backup.
5. Restore points are essentially backups of the Windows Registry.
6. Disk imaging software can be used to restore all operating system, program, and data files.
7. A differential backup backs up files that were added or changed since the last backup.

VOCABULARY
1. Complete the following text with these words.

encrypt, allocated, depends on, be aware, lose, offer, make sure

Web sites that … storage space for backups are called online backup services. The cost of these services usually … the amount of storage space that's … to you. Before depending on remote backups, however, … that the speed for backing up and restoring your data is only as fast as your Internet connection. Also, remote data is more prone to snooping by employees, hackers, and overzealous government agents; you might want to … your remote backup data, but … you don't … your encryption key or your backup data will be useless.

2. Read the sentences below and choose the correct term given in the text in bold for each case.

1. Some software that you might use for backups cannot copy open files and if you use such software, it might never back up the … .
2. … software stores the operating system, boot programs, drivers, software applications, and data necessary to restore a backup system to an entirely new computer, without requiring intermediate steps to install the operating system and device drivers.
3. You should test your … by trying to restore one file.
4. A … will not restore your data files, any software that you installed, or any configuration settings you've made since you unwrapped your computer from its shipping box.

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5. Time Machine and similar … software can store backups on network file servers and on Internet-based storage services.
6. A(n) … includes copies of all installed applications, data files, and the operating system, that exist on a computer's hard disk.
7. With current versions of Windows, the Windows installation CD is configured as a … and can be used if your computer does not boot normally.

QUICK CHECK
Fill in the gaps in the text.

A good backup plan allows you to … your computing environment to its pre-disaster state. In any case, it is a good idea to back up the Windows … and make sure your files are free of … . Personal computer backups are typically recorded on … hard drives, USB flash drives, network servers, and online storage services. An easy way to get a backup of important data files is to use a … management utility to select important files copy them to a USB flash drive. … compares files on two devices and makes them the same. Backup software differs from most copy routines because it … all the files for a backup into one large file. A(n) … backup saves time by backing up only those files that have been changed since the last backup. The process can be simplified by using a backup system that offers bare- … restore.

DISCUSSION
Work in groups. Discuss the following questions.

1. What about backing up the Windows Registry?
2. What are differential and incremental backups?
3. Can I restore my computer in one simple operation?
4. Are file backups sufficient protection against data disaster?
5. How does synchronization software work?
6. What is a restore point?
7. What is the easiest way to back up your important data files?
8. What about other backup options?

WRITING
Write a short summary of the text using Active Vocabulary.

SPEAKING
On the basis of the text speak about different techniques for backing up.

FINAL UNIT TEST

1. To back up your Android system files, you can use … .
   a. iTunes software.   b. bare-metal restore software.
   c. Titanium Backup.   d. the Registry.

2. You're using third-party backup software, and you want a set of backups that are easy to restore and won't take long to make a backup. What option should you use?
   a. Full system backup. b. Incremental backup. c. Differential backup.
3. Restore points can be set automatically as well as manually (True/False).
4. What is the disadvantage of a disk image?
   a. You can't back up the Windows Registry. b. You can't restore individual files.
   c. You can't restore it. d. You have to put it on a cloud server.
5. A(n) … backup saves time by backing up only those files that have been changed since the last backup.
6. File History is not a full system backup. This utility backs up only important files (True/False).
7. A backup made by copying all the files to a backup device is called a … backup.
8. The operating system is itself a program, so it requires RAM space, too (True/False).
9. During the boot process on your desktop computer, what part of the operating system is loaded into RAM?
   a. Bootstrap loader. b. Kernel. c. ROM. d. Desktop.
10. ROM is … and cannot be loaded into RAM.
    a. hardware. b. software.
11. When one thread for a spreadsheet program is waiting for input from the user while other threads perform a long calculation in the background, it is called … .
    a. multitasking. b. multithreading. c. multiprocessing.
12. The term buffer is technical jargon for a region of memory that holds data waiting to be transferred to a hard disk (True/False).
13. Even unless you know what application software is installed on your friends' computers, you will know for certain they can open any file you've sent (True/False).
14. A disk … is a section of a hard disk drive that is treated as a separate storage unit.
15. A file specification provides name and location of a file (True/False).
16. … a disk helps your computer operate more efficiently.
17. If you change a file name extension the content of a file will be converted into a format that corresponds to the extension (True/False).
18. Suppose you open a file and edit it, and then want to save it with a different name. You can use the Save option from the File menu (True/False).
19. A file extension is the same as a file format (True/False).
20. .bmp, .docx, .exe, and .move are examples of file … .

UNIT 5. INTERNET AND LAN TECHNOLOGIES

READING
Look through the key terms of the unit and match them up with the definitions below.

> Hub, repeater, gateway, wireless access point, switch, bridge, PAN, MAN, LAN, WAN

1. This network covers a large geographical area and consists of smaller networks, which might use different computer platforms and network technologies.
2. It extends a wired network by adding additional ports.
3. It allows wireless devices to connect to a wired network.
4. It is a data communication network that connects personal computers within a very limited geographical area.
5. It extends the range of a network by restoring signals to maximum strength and retransmitting them.
6. It is a public high-speed network voice and data transmission within 50 miles.
7. It joins two different types of networks, such as your home network and the Internet.
8. It connects two similar networks.
9. This network refers to the interconnection of personal digital devices or consumer electronics within a range of about 10 meters and without the use of wires or cables.
10. It facilitates communication among multiples devices on a network.

TEXT A: COMPUTER NETWORKS

Today, networks are everywhere and everyone wants to be connected. Networks can be classified according to their size and geographic scope (PAN, LAN, MAN, WAN). You can think of a network as a spider web with many interconnecting points, are referred to as node. A network node usually contains a computer, networked peripheral, or network device. To connect to a LAN, a computer requires network circuitry, sometimes referred to as a network interface card (NIC). Network circuitry is built into the main system board of most personal computers. If not, a NIC can be added to a slot in the system board or a USB port.

A **networked peripheral** is any device that contains network circuitry to directly connect to a network. Printers, scanners, and storage devices are examples of devices that can be equipped to directly connect to a network instead of connecting to a workstation.

A storage device that directly connects to a network is called **network attached storage** (NAS). A **network device** is any electronic device that broadcasts network data, boosts signals, or routes data to its destination. The most important

network device is a **router,** which acts as a central distribution point for getting data to its destination. Network devices also include hubs, switches, gateways, bridges, wireless access points, and repeaters.

Data in a network with wired connections travels from one device to another over cables. Wired connections are fast, secure and simple to configure. This type of connection is more secure than wireless one because a computer can only join a network if it is physically connected by a cable. An example of wired network technology is **Ethernet**. Ethernet is a family of a computer networking technologies commonly used in LAN, MAN and WAN.

 A network without wires transports data through the air, eliminating the need for cables. Networks of all sizes, from PANs to LANs and WANs, can use wireless technologies, such as radio signals, microwaves, and infrared light. Most wireless connections transport data as **RF signals** (radio frequency signals). They are sent and received by a transceiver (a combination of a transmitter and a receiver) that is equipped with an antenna. Workstations, peripheral devices and network devices can be equipped with transceivers.

Microwaves (the waves themselves, not your oven) can be aimed in a single direction and have more carrying capacity than radio waves. Microwave installations usually provide data transport for large corporate networks.

Today, most people are familiar with television remote controls that use **infrared light** beams. Infrared can also carry data signals, but only for short distances and with a clear line of sight. Its most practical use seems to be for transmitting data between devices connected to a PAN.

The most popular wireless LAN technology is **WI-FI**. WI-FI refers to a set of wireless networking technologies defined by IEEE802.11 standards. A WI-FI device transmits data as radio waves and is compatible with Ethernet, so you can use the two technologies in a single network. Additional wireless technology is **Bluetooth**. Bluetooth is a short-range wireless network technology that is designed to make connections between two devices. A **communications channel** or link, is a physical path or a frequency for signal transmissions.

Network links must move data and move it quickly. **Bandwidth** is the transmission capacity of a communications channel. High-bandwidth communications systems, such as a cable TV and DSL, are referred to as **broadband**, whereas systems with less capacity, such as dial-up Internet access, are referred to as **narrowband**. Broadband capacity is essential for networks that support many users, and those that carry lots of audio and video data, such as music and movie downloads.

A **communication protocol** refers to a set of rules for efficiently transmitting data from one network node to another. Protocols set standards for encoding and decoding data, guiding data to its destination. Specifically, protocols are responsible for the following aspects of network communications: dividing messages into packets, affording addresses to packets, initiating transmission, regulating the flow of data, checking for transmission errors, acknowledging receipts of transmitted data.

A **packet** is a parcel of data that is sent across a computer network. Each packet contains the address of a sender, the destination address, a sequence number, and some data. Some communications networks, such as the telephone system, use a technology called **circuit switching**, which essentially establishes a dedicated, private link between one telephone and another for the duration of a call. Unfortunately, circuit switching is rather inefficient. For example, when someone is on hold, no communication is taking place - yet the circuit is reserved and cannot be used for other communications. A more efficient alternative to circuit switching is **packet switching** technology, which divides a message into several packets that can be routed independently to their destination. Every packet includes the address of its destination device. Packets from many different messages can share a single communications channel. When data reaches its destination, it is checked for errors one last time and then the packets are reassembled into their original configurations.

COMPREHENSION
1. Read the questions and find the answers.

1. How do computers connect to LANs?
3. What are network devices?
5. What can communication protocols do?

2. What is Ethernet?
4. What is Bluetooth?
6. What is WI-FI?

2. Define the following statements as advantages or disadvantages of LAN.

1. It enables people to work together.
2. Malfunctions limit access to data.
3. Sharing networked software can reduce costs.
4. LANs are vulnerable to unauthorized access.
5. Sharing data on a LAN can increase productivity.
6. LANs are vulnerable to malicious code.
7. Sharing an Internet connection can be cost-effective and convenient.
8. Sharing networked hardware can provide access to a wide range of services and specialized peripheral devices.

VOCABULARY
Complete the following sentences with these words or sentences.

1. A university that offers wireless Internet access to students and the local community is operating what type of network?
   a. PAN. b. LAN. c. MAN. d. WAN.
2. When a network becomes inoperable:
   a. It is easier for hackers to steal data.   c. Viruses start to spread.
   b. Users do not have access to network resources.   d. All of the above.
3. The key protocol for most of computer networks is:
   a. DOS. b. Windows. c. TCP/IP. d. Handshaking.

4. The wireless signals that travel over a home network are most similar to:
   a. the emissions from a microwave oven; b. the signals that travel within a fiber-optic cable; c. the interference from an electrical outlet; d. the signals from a car radio.
5. Suppose all the Ethernet ports of your router are full, but you need to add a few more wired devices to your LAN. What can you use?
   a. A hub. b. A switch. c. A bridge. d. A WAP.
6. The device that acts as the central distribution point for a network is called a(n) … .
   a. router. b. repeater. c. bridge. d. switch.

QUICK CHECK
Fill in the gaps in the text.

1. A doom-room network covers a limited area and is an example of a(n) … area network. 2. Each connection point on a network is referred to as a network … . 3. Communications …, such as TCP\IP, set standards for encoding and decoding data, guiding data to its destination. 4. A(n) … switching network establishes a dedicated connection between two devices, whereas a(n) … switching network divides messages into small parcels and handles them on a first-come, first-served basis. 5. The most popular wired network technology is … and is defined by IEEE 802.3 standards. 6. A short-range, wireless network technology primarily used fop PANs is called … . 7. In a network that uses WI-FI wireless … protocol, a centralized device broadcasts data to all of the workstations. 8. Today, capability is included with just about every desktop, laptop, and smartphone.

DISCUSSION
Work in groups. Describe the following topics.

1. List five characteristics of Ethernet that make it a popular network standard.
2. List the technologies that carry wireless signals and give an example of where each is commonly used.
3. Describe the differences between WI-FI and Bluetooth technologies, and give examples of where you would expect to find each in use.

WRITING
Create a concept map of computer networks devices using active vocabulary from the text.

LANs, PANs, WANs, MANs, circuit switching, packet switching, broadband, narrowband, Ethernet, Radio waves, Microwaves, Infrared, WI-FI, Bluetooth

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SPEAKING

On the basis of the questions below speak about Computer Networks and Network Technologies.

1. Describe the characteristics of PANs, LANs, WMANs, WANs, plus provide an example of each.
2. Create a list of network devices mentioned in this text.
3. Explain the difference between an analog signal and a digital signal. Explain why most modern communications systems use digital signals.
4. Explain the difference between packet switching and circuit switching.

TEXT B: INTERNET TECHNOLOGY

READING

Before reading the text look through the types of Internet protocols and match them up with the definitions below.

> TCP (Transmission Control Protocol), IP (Internet Protocol), UDP (User Datagram Protocol), HTP (Hypertext Transfer Protocol), FTP (File Transfer Protocol), POP (Post Office Protocol), SMTP (Simple Mail Transfer Protocol), VoIP (Voice over Internet Protocol), IRC (Internet Relay Chat), Bit Torrent

1. It transfers files between local and remote host computer.
2. It transmits text messages in real time between online users.
3. It creates connections and exchanges packets of data.
4. An alternative data transport to TCP used for DNS, Voice over IP, and file sharing.
5. It provides devices with unique addresses.
6. It exchanges information over the Web.
7. It transfers mail from an e-mail server to a client Inbox.
8. It transmits voice conversations over the Internet.
9. It distributes files using scattered clients rather than a server.
10. It transfers e-mail messages from client computer to an e-mail server.

The internet backbone is a network of high-capacity routers and fiber-optic links that provides the main routes for data traffic across the internet. Backbone links and routers are maintained by **network service providers** (NSPs). NSP equipment and links are tied together by network access points (NAPs). An internet service provider (ISP) is a company that offers Internet access to individuals, businesses, and smaller ISPs. To communicate with an ISP, your computer uses some type of communications device, such as modem. A modem contains circuitry that converts the data-carrying signals from your computer to signals that can travel over various communications channels. Data travels over the internet at an incredible speed. On average, data usually arrives at its destination in less than a second after it is sent.

The elapsed time for data to make a round trip from point A to point B and back to point A is referred to as **latency**. The utility called **Ping** (Packet Internet Grouper) sends a signal to a specific Internet address and waits for a reply. When a reply arrives, Ping reports that computer is online and displays the elapsed time for the round- trip message. Another utility called Traceroute records a path of packet to its round-trip speed. You can use Traceroute to analyze the latency of your data as it hops from one router to the next. The connection speeds advertised by ISPs refer to the amount of data that travels between a computer of subscriber and ISP within a given time period. Your connection speed depends on whether you connect to your ISP using a telephone, cable television, satellite, or wireless link. Actual speed can differ from maximum speed because links are susceptible to interference that can hinder signals. Upstream speed can also differ from downstream speed. **Upstream speed** is the rate of data that is uploaded from one computer to the Internet. **Downstream speed** is the rate of data downloaded to your computer. When upstream speeds differ from downstream speeds, you have **an asymmetric Internet connection.** When upstream and downstream are the same, you have a **symmetric Internet connection**. For most users, however, an asymmetric connection is sufficient.

Consumers have several options for connecting to the Internet. **Fixed Internet access** links your computer to an ISP from a stationary point, such as wall socket or roof-mounted antenna**. Portable Internet access** allows you to easily move your access device, as in the case of vehicle-mounted satellite dishes that can be deployed when the vehicle is parked. It is light and compact enough to easily carry. Like a fixed satellite dish, a portable dish transmits signals to and receives signals from a geostationary satellite. **Mobile Internet access** allows you to use Internet as you are on the go, such as using a cell phone to collect your e-mail while you are traveling by train. You are not necessarily limited to a single Internet access option. Many consumers find it convenient to maintain fixed Internet access for home use, but use portable or mobile method of Internet access while out.

A dial-up connection is a fixed Internet connection that uses a voiceband modem and telephone lines to transport data between your computer and your ISP. **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 is affordable to individual consumers. DSL data is transmitted to and from your local telephone switching station in pure digital form and can simultaneously carry voice and data. The speed of a DSL connection varies according the characteristics of your telephone line and your distance from the switching station. **Cable Internet service** is a means of distributing always-on broadband Internet access over the same infrastructure that offers cable television service. Cable signals are not particularly vulnerable to environmental interference but data transport speeds are affected by subscriber use. The cable you share with your neighbors has a certain amount of bandwidth. The more and more neighbors use the service, it might seem to get slower and slower. Most people are familiar with services that provide also offer Internet access. Satellite Internet service is a means of

distributing always-on, high-speed asymmetric Internet access by broadcasting signals to and from a personal satellite dish. Satellite signals access to television programming over a personal satellite dish. Many companies that provide satellite TV can be blocked or slowed by adverse weather conditions, such as rain and snow, which makes this type of data transport less reliable than cable and DSL.

In addition to being popular for home networks, WI-FI is also used for public networks operated by merchants, hotels, schools, and municipalities. If your computer is equipped for WI-FI, as are most of laptops, tablets, and smartphones, you have a portable means of accessing the Internet by carrying your digital device to any WI-FI hotspot. **WI-FI hotspot** is an area in which the public can access a WI-FI network that offers Internet service. Some WI-FI hotspots offer free service that might or might not require a password, others require a service plan or one-time use free. The speed of a hotspot is related to the speed of the wired line that connects it to the Internet.

There is a lot of buzz about cloud computing these days, and its scope continues to evolve. Cloud computing is a concept, it is the idea that consumers use their computers or handheld devices to access applications, storage, and other computing resources supplied by Internet-based servers, rather than from their local devices. Cloud computing encompasses most Internet-enabled activities including Webmail, Google searching, social networking, blogging and photo sharing. The concept of cloud computing is that apps and data are available any time, from anywhere, and on any device. Cloud computing depends on a grid of servers, storage devices, and protocols that offer Internet-accessible computing ranging from consumer-level media sharing to office productivity applications and complex corporate data processing. These resources are maintained by Internet service companies, such as Google, Amazon, Apple, and Microsoft. For example, Apple maintains a 500.000-square-foot facility for its iCloud data center where subscribers can store music, photos, data files, backups, reminders and contracts. Microsoft offers a similar cloud service called SkyDrive.

COMPREHENSION
1. Read the questions and find the answers.

1. How does the Internet work?
2. What does the actual speed of Internet connection depend on?
3. Is there a difference between portable Internet access and mobile Internet access?
4. What is DSL?
5. How does cable Internet service work?
6. What is satellite Internet service?
7. What is a WI-FI hotspot?

2. Choose the right answers to the following questions.

1. The Internet backbone: a. became the ARPANET in 1985. b. is maintained by ISPs. c. has NAPs where data can get sidetracked. d. has links provided by NSPs to ISPs.
2. If you want to operate an e-commerce site from your home, you will need all of the following except: a. a dynamic IP address. b. an always-on connection. c. a static IP address. d. a domain name.
3. What is the purpose of a domain name server? a. to hand out IP addresses. b. to translate domain names into IP addresses. c. to route packets to their destination d. to encrypt data that is sent over the Internet.
4. What is the similarity between dial-up and DSL? a. both use telephone lines. b. they have similar speeds. c. they both operate well over any distance. d. neither one is as fast as satellite Internet service.
5. Which one of the following fixed Internet connections use wireless technologies? a. dial-up. b. DSL. c. cable. d. satellite.
6. WI-FI is considered what type of Internet access? a. fixed. b. portable. c. mobile. d. DSL.

VOCABULARY
Give the Russian equivalents to these words and expressions: a modem, domain name system, upstream speed, downstream speed, a WI-FI hotspot, cellular data service, wireless application protocol, cloud computing

QUICK CHECK
Read the text about background of Internet and fill in the missed words.

The Internet infrastructure is based on high-capacity communications links referred to as the Internet …, tied together at network … points where data can cross over from one equipment of NSP to another. An Internet … provider offers Internet access to individuals, businesses, and smaller ISPs. The Internet uses several communications protocols, including …, which is responsible for addressing packets. Every device on the Internet has a(n) … address. Most high-speed internet connections use … technology and even dynamic IP addresses might seem permanent because they do not change unless you turn off your modem. A(n) … name server converts numeric IP addresses into familiar names. The speed of an Internet connection measured by utilities such as Ping and Traceroute refers to …, the elapsed time for data to make a round trip from point A to point B. The speed is a measure of the amount of data that travels between two points in a given amount of time. Many Internet connections are …, meaning the downstream speed is different than the upstream speed.

DISCUSSION
Speak on the following topics:

1. Internet Technology
2. Portable and mobile Internet access
3. Fixed Internet Access
4. Cloud computing

WRITING
Student A list advantages and Student B list disadvantages of dial-up, cable, DSL, satellite and fixed wireless Internet services.

SPEAKING
Speak about Internet Technology using the following words:

> connection speed, latency, Ping, Traceroute, TCP\IP, domain name system, DSL, dial-up, cable, satellite, portable Internet access, WI-FI hotspots, mobile internet access, cloud computing

Text C: INTERNET AND LAN SECURITY

READING
Read the text and find the keywords for each paragraph.

Networks with wired or wireless connections are vulnerable to a variety of threats, including viruses, theft, and equipment failure. Many threats can be handled using techniques for standalone computers. Network equipment should be connected to power strips to prevent damage from power spikes. Data should be backed up in a case of a hard drive failure and computers should be protected by antivirus software. Wireless signals are broadcasted through the air, and like the signals from a radio station, they can be picked up by any device equipped with a receiver tuned to the right frequency. Wired connections funnel data through a cable, not through the air. Wired signals can be intercepted only by physically tapping into the cable or router.

If your network is not secured, hackers can easily connect to it, monitor transmitted data, access connected devices, spread viruses, and your network as a launching pad for spam.

Encryption transforms a message in such a way that its contents are hidden from unauthorized readers. Encryption is designed to keep messages secret. In the context of computing, encryption can be used in many ways, including the following:

− Scrambling data sent over wired or wireless networks to prevent intrusions.

− Securing credit card numbers and other personal information transferred from shoppers' computers to e-commerce sites.

− Encrypting computer files and databases so that data they contain is unusable if the device containing the data is lost or compromised.

− Scrambling the contents of e-mail messages to maintain privacy.

Symmetric key encryption uses the key to encrypt a message as well as decrypt it. Symmetric keys are not practical for e-mail and other situations in which the person receiving encrypted data does not have the key beforehand.

Public key encryption eliminates the key-distribution problem by using one key to encrypt a message, but another key to decrypt the message. Public key encryption is a crucial technology for e-commerce and e-mail. When you use a secure connection to transmit a credit card number, the server sends a public key to your browser. Your browser uses this public key to encrypt the credit card number. After it is encrypted, no one- not even you – can use the public key to decrypt the message. The encrypted message is sent to a Web server, where the private key is used to decrypt it.

An **intrusion** is any access to data or programs by hackers, criminals, or other unauthorized persons. As the result of an intrusion, data can be stolen or altered, system configurations can be changed to allow even more intrusions, and software can be surreptitiously installed and operated under the remote control of a hacker. One of the most common ways of gaining unauthorized access to a network- based computer is by looking for open ports. A **communications port** is the doorway that allows a computer to exchange data with other devices. It is a portal through which data flows. A **port probe** (or port scan) is the use of automated software to locate computers that have open ports and are vulnerable to unauthorized access. One of the easiest steps to enhance your security is to turn it off when you are not using it. When your computer is turned off, its ports are inactive and they are not vulnerable to intrusions. Putting your computer into sleep mode or activating a screensaver is not sufficient protection. Your computer must be shut down and turned off. You should also keep your computer up to date with the latest operating system security patches and service packs.

A **firewall** is software or hardware designed to filter out suspicious packets attempting to enter or leave a computer. Firewall software helps keep your computer secure in several ways. It ensures that incoming information was actually requested and is not an unauthorized intrusion. It blocks activity from suspicious IP addresses and – best of all – it reports intrusion attempts so that you can discover whether hackers are trying to break into your computer.

One of the most effective steps you can take to secure your computer from intrusions is to install a router. It screens IP addresses to keep locally addressed packets within the LAN so that they are delivered without traveling a circuitous route over the Internet and back. Your router has its own IP address. The key point about your IP address is that it is routable. A **routable IP address** is one that can be accessed by packets on the Internet. When you connect your PC to a router and request an IP address, your router answers your request, not the ISP. Most routers are configured to assign private IP addresses. A **private IP address** is non-routable IP address that can be used within a LAN, but not for Internet data transport. **Network address translation** (NAT) is the process your router uses to keep track of packets and their corresponding private or public IP addresses. Sales representatives and telecommuters often access corporate networks from home by using a secured connection called a **virtual private network**.

COMPREHENSION
According to the text, are the following sentences True or False? Say why?

1. Encryption is designed to keep messages secret.
2. Symmetric key encryption is the best one for e-mail.
3. Public key encryption uses one key to encrypt a message, but another key to decrypt the message.
4. Symmetric key encryption uses the same key to encrypt a message as it does to decrypt the message.
5. The ports of your computer are more secure if they do not even appear to exist when probed using a port scanner.
6. Windows includes a built-in firewall that can be activated to monitor intrusion attempts.

VOCABULARY
Find words or expressions in the text which mean the following.

1. A physical circuit or mechanism through which data flows. 2. The process of encoding a message or information in such a way that only authorized parties can access it. 3. An act or instance of intruding. 4. A network security system that monitors and controls incoming and outgoing network traffic. 5. The number assigned to a network equipped piece of hardware by which other device can identify it. 6. Any skilled computer expert that uses their technical knowledge to break a password code or gains remote access to a protected computer system.

QUICK CHECK
Fill in the gaps in the text.

One of the most common ways of gaining unauthorized access to a network-based computer is by looking for open … . A port … is the use of automated software to locate computers that have open ports and vulnerable to unauthorized access. You should also up to date with the latest OS security … and … . You can also install … software designed to filter out suspicious packets. Corporations try to limit intrusions by setting up virtual … networks that offer encrypted connections for access to a remote server.

DISCUSSION
Work in groups. Discuss the following questions.

1. Describe the difference between symmetric encryption and public key encryption.
2. Make a checklist of steps you can take to secure your computer from Internet-based intrusion.

WRITING
Write a short summary choosing one of the two topics.

1. Make a list of security concerns that are related to local area networks.
2. Make a list of security concerns that are related to Internet access.

SPEAKING
On the basis of an active vocabulary speak about Internet security and network security.

> treats, encryption, symmetric and public key encryption, intrusion attempts, port probes, firewalls, NAT, VPNs

FINAL UNIT TEST
Fill in the blanks to best complete each sentences.

1. Each connection point on a network is referred to as a(n) … and can contain computers, networked …, or network devices.
2. High-bandwidth channels are referred to as …, whereas low-bandwidth channels are referred to as … .
3. … is a fast and secure wired network technology defined by IEEE 802.3 standards.
4. Most wireless routers transport data using … frequency signals.
5. … is a short-range wireless network technology that is designed to make connections between two devices.
6. … is a technology, that divides a message into several packets that can be routed independently to their destination.
7. … cannot penetrate metal objects and work best for line-of-sight transmission when a clear path exists between the transmitter and receiver.
8. The Internet infrastructure is based on high-capacity communications links referred to as the Internet …, tied together at network … points where data can cross over from one NSP's equipment to another's.
9. Many Internet connections are …, meaning the downstream speed is different than the upstream speed.
10. The speed of an Internet connection measured by utilities such as Ping and Traceroute refers to …, the elapsed time for data to make a round trip from point A to point B.
11. … Internet service is a means of distributing always-on broadband Internet access over the same infrastructure that offers cable television service.
12. Satellite Internet service is a means of distributing always-on, high-speed asymmetric Internet access by broadcasting signals to and from a personal satellite … .

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13. … Internet access offers a continuous Internet connection as you are walking or riding in a bus, car, train, or plane.
14. You can find … in locations such as coffee shops, parks, hotels, community centers, college campuses, and airports.
15. The concept of … computing is that data and apps are available any time, from anywhere, and on any device.
16. …/… is the primary protocol suite responsible for message transmission on the Internet.
17. … is designed to keep messages secret.
18. As the result of an …, data can be stolen or altered, system configurations can be changed, and software can be surreptitiously installed and operated under the remote control of a hacker.
19. A port … is the use of automated software to locate computers that have open ports and are vulnerable to unauthorized access.
20. You can also install … software designed to filter out suspicious packets attempting to enter or leave a computer.

UNIT 6. INFORMATION SYSTEMS ANALYSIS AND DESIGN

READING
Before reading the text match the descriptions with the modern information systems.

1) online transaction processing system (OLTP systems); 2) management information system(MIS); 3) decision support system (DSS); 4) executive information system (EIS); 5) expert system; 6) neural network; 7) transaction processing systems (TPS)

a) uses batch processing to collect and hold a group of transactions until the end of a day or pay period. Generates detail reports, which provide a basic record of completed transaction.
b) uses a real-time method in which each transaction is processed as it is entered.
c) consolidates data collected by a transaction processing system by grouping and summarizing it. Provides more sophisticated reports to help analyze data.
d) makes decisions without direct guidance from an experienced decision maker. Using a technique called fuzzy logic, it deals with imprecise data by working with confidence levels or with problems that have more than one solution.
e) helps people make decisions by directly manipulating data, analyzing data from external sources, generating statistical projections, and creating data models of various scenarios, but the final choice remains the responsibility of the human decision maker. It is not a substitute for human judgment.
f) uses computer circuitry to simulate the way a brain might process information, learn, and remember. Based on the evidence, it begins to establish its own criteria – its own rules – about the data.

g) is designed to provide senior managers with information relevant to strategic management activities based on information from internal and external databases.

TEXT A: INFORMATION SYSTEMS AND SYSTEMS ANALYSIS

Most organizations use information systems to operate more effectively, gather information, and accomplish tasks. In this section, the term **information system** refers to a system that uses computers and usually includes communications networks. An information system collects, stores, and processes data to provide useful, accurate, and timely information. Today most information systems rely on computers and communications networks to store, process, and transmit information with far more efficiency than would be possible using manual systems. Every organization has its mission and all activities that take place in an organization, including those that involve computers, should contribute to this mission. One of the major functions of any information system is to help people make decisions in response to problems.

An information system progresses through several phases as it is developed, used, and finally retired. These phases encompass a system development life cycle, usually referred to as the **SDLC** known as **System Development Life Cycle**, which provides a general outline of how an information system evolves and delineates the phases of system development. Systems analysis and design is a discipline that focuses on developing information systems according to the phases of an SDLC.

The Planning phase for an information system project includes the following activities: assemble the project team, justify the project, choose the development methodology, develop a project schedule, produce a project development plan

The goal of these activities is to create a **Project Development Plan**. The Project Development Plan is usually reviewed and approved by management. This planning document includes:

− A short description of the 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.

Depending on the scope of the problem and the expertise of the professional staff, an information systems project can be managed by an in-house information technology department or outsourced to a development firm. A system development project team is assigned to analyze and develop an information system. Other members of an organization might also be asked to participate in various phases of the project.

Justifying a project often involves identifying problems and opportunities within an organization's current information system. Project team members can identify problems and opportunities using a variety of techniques, such as interviews and data analysis. As part of the planning phase, the project team selects one or more

methodologies that provide structure for the development effort. A system development methodology guides developers through the phases of system development and specifies what takes place in each phase; it encompasses the activities, procedures, methods, best practices, deliverables, and automated tools that system developers follow to complete the SDLC. The next activity is project scheduling. It begins in the planning phase, but stretches throughout the entire project. Project managers organize the work into tasks and milestones, which can be scheduled and assigned. As tasks are completed, the schedule is updated and adjusted. **Project management software** is assigned to help in planning and scheduling. It helps managers track and visualize the complex interactions between tasks. Popular project management offerings include open source software such as Open Workbench, and commercial software such as Microsoft Project. Industry standard tools for scheduling and project management include: **PERT** (**Program Evaluation and Review Technique**) is a method for analyzing the time needed to complete each project task and identifying the minimum time needed to complete the total project. A **WBS (work breakdown structure)** breaks a complex task into a series of subtasks. A **Gantt chart** uses bars to show the timing of development tasks as they occur over time. Each bar on the chart represents a task; the length of a bar indicates the task's expected duration.

The Analysis phase begins after the project team selects a development methodology, draws up the Project 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. Activities for analysis phase are: study the current system, determine the system requirements, and write requirements report. The project team determines requirements by interviewing users and studying successful information systems that solve similar problems. Another way to determine requirements is to construct a prototype. A systems analyst shows the prototype to users, who evaluate which features of the prototype are important for the new information system. Most new information systems are 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 designing a new 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. System requirements are the criteria for successfully solving problems identified in an information system. A new or updated information system should meet requirements defined by the project team. A **CASE tool (computer-aided software engineering tool)** is a software application designed for documenting system requirements, diagramming current and proposed information systems, scheduling development tasks, and developing computer programs.

COMPREHENSION

Read the questions and find the answers in the text.

1. Why are information systems such an important aspect of everyday life? How do they help organizations carry out their missions?
2. What is an SDLC? What activities are included into the planning phase for an information system project?
3. What is the goal of these activities and what does this planning document include?
4. What is a system development methodology? How is the project schedule developed?
5. What is the main goal of the analysis phase? What are the typical activities?
6. How is the project teams determine what the new system should do?
7. What is a Case Tool?

VOCABULARY

1. Fill in the blanks choosing from the variants given.

fuzzy, mission, development, requirements, project, inference, bar

Effective systems are designed to support goals that help an organization carry out its … statement. An expert system uses an … engine to process rules and produce a diagnosis, recommendation, or decision. Using a technique called … logic, it can deal with imprecise data by working with confidence levels or with problems that have more than one solution. Each … on the chart in A Gantt chart represents a task. A(n) … team can use one of several approaches to the system development process. A project begins with a planning phase in which a member of the IT department creates a Project … Plan. The goal of analysis phase is to produce a list of … for a new or revised information system.

2. Read the sentences below and choose the correct word in bold type.

1. The SDLC provides a **general/specific** outline of how an information system evolves. 2. Depending on the **scope/scale** of the problem an information systems project can be managed by an in-house IT specialists or a development firm. 3. In the planning phase, one of the main goals is to produce a **Project Plan/System Requirements Report**. 4. System **requirements/specifications** are the criteria for successfully solving problems identified in an information system. 5. CASE tools help project team members manage all the details of **system/project**. 6. The project team selects one or more **methodologies/methods** that provide structure for the development effort.

QUICK CHECK
Fill in the gaps in the text.

… systems play a key role in helping organizations achieve goals. Transaction … systems provide an organization with a way to collect, display, modify, or cancel transactions. … information systems typically build on the data collected by a TPS to produce reports that managers use to make the business decisions needed to solve routine, structured problems. A decision … system helps workers and managers make non-routine decisions by constructing decision models that include data collected from internal and external sources. A(n) … system is designed to analyze data and produce a recommendation or decision based on a set of facts and rules called a(n) … base. If the rules for an expert system are not known, a neural … might be used to enable a computer to «learn» how to make a decision.

DISCUSSION

1. What kinds of information systems do organizations typically use?
2. How does an information system project begin? What does the planning phase entail?
3. What happens in the analysis phase? Why study the current system?
4. What kinds of scheduling and documentation tools do systems analysts use?
5. What do these acronyms stand for: MIS, OLTP systems, TPS, DSS, EIS, SDLC, A CASE tool, PERT, WBS?

WRITING
Create a concept map of the text above using the information about different types of information systems/ planning and analysis phases of a SDLC.

SPEAKING
Using your concept map, speak on different types of information systems/ planning and analysis phases of a SDLC.

TEXT B: SYSTEM DESIGN. IMPLEMENTATION AND MAINTENANCE

READING
Study the possible software alternatives and work out their «pros» and «cons».

1. Creating an information system from scratch with programming tools using a programming language can take many months or years. It is usually costly, but offers the most flexibility for meeting the system requirements.
2. An application development tool is essentially a type of software construction kit containing building blocks that can be assembled into a software product. Expert system shells and database management systems are included. It usually speeds up

the development process, but might not offer the same level of flexibility as a programming language.

3. Application software for an information system is usually a series of preprogrammed software modules supplied by a software developer. It eliminates much of the design work required with programming languages or application development tools. Although most application software has some customization options, in many cases, it cannot be modified to exactly meet every system requirement, which necessitates adjustments in an organization's procedures.

4. A turnkey system is essentially an «information system in a box», which consists of hardware and application software designed to offer a complete information system solution. It might seem like a quick and easy solution, and it looks attractive to many project teams. However, it must be extensively evaluated to determine whether it can satisfy system requirements.

So, if in the Analysis phase, the project team determines what the new information system must do, in the Design phase the project team must figure out how the new system will fulfill the requirements specified in the System Requirements Report. The project team chooses a solution, selects hardware and software, and designs detailed application specifications. There might be more than one way to solve the problems and meet the requirements identified in the analysis phase of the SDLC. Some potential solutions might be better than others, more effective, less costly, or less complex. The basis for choosing hardware and software includes general criteria, such as cost and delivery time. The project team should also consider the vendor's reliability, expertise, and financial stability. **A request for proposal (RFP)** is a document that describes the information system problem and the requirements for the solution. An RFP essentially asks a vendor to recommend hardware and software for the solution, and to describe the vendor's qualifications for implementing the solution. **A request for quotation (RFQ)** is a request for a formal price quotation on a list of hardware and software. A project team issues an RFQ to vendors when it knows the make and model of the equipment and the titles of the software packages needed but wants to compare prices from different vendors. 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. The project team has to consider the overall architecture based on level of automation, processing methodology, and network technology. Software alternatives might also be considered. Exactly what happens next in the system design phase 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 selects a solution that requires custom programming, the team's systems analysts will create a set of application specifications that describe the way the information system's software should interact with users, store data, process data, and format reports. But the last step in this stage is to write application

specifications. There is a key element in developing an effective information system and play a critical role in ensuring that the development process proceeds efficiently.

During the Implementation phase of the SDLC, the project team supervises the tasks necessary to construct the new information system. The tasks that take place during 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.

As the implementation phase begins, programming languages, development tools, and application software needed for the new information system are purchased, installed, and tested to ensure that they work correctly. Software testing can reveal problems that result from incompatibilities with existing hardware and software. These problems must be corrected before continuing with system development. Testing might also reveal bugs (errors) in the software, which must be corrected by the software developer. In addition to new software, the specifications for most new information systems require new hardware, which can either replace old equipment or supplement existing equipment. When the software for an information system is created by using a programming language or an application development tool, programmers must create and test all the new software modules. When an information system is constructed using application software, the software sometimes must be customized. Software customization is the process of modifying a commercial application to reflect an organization's needs. Customization might include modifying the user interface, enabling various security settings, selecting the menus that appear on the screen, and designing forms or reports. A rigorous testing process is the only way to make sure a new information system works. Different types of testing during the implementation phase help identify and fix problems before the information system is incorporated into day-to-day business activities. One of the most important tasks during the implementation phase is to make sure the information system is completely documented so that it can be used effectively and modified easily. The documentation for an information system can be broadly categorized as system documentation or user documentation. System documentation describes a system's features, hardware architecture, and programming. User documentation describes how to interact with the system to accomplish specific tasks. It might also include tutorials that demonstrate how to get started and how to accomplish specific tasks. In preparation for using a new information system, users generally need training on software use and data entry. During training sessions, users learn how to interact with the interface, use the new system to perform day-to-day tasks, and find additional information in user manuals, procedure handbooks, or video tutorials. Training sessions for a new information system can be conducted by members of the project team or outsourced to professional trainers. The old data must also be loaded into the new system – a process called data conversion. System conversion refers to the process of deactivating an old information system and activating a new one. It is also referred to as a «cutover» or «to go live». When converting data from an existing computer system to a new system, a programmer can write conversion software to read the old data and convert it into a format that is

usable by the new system. Without such software, users would be forced to manually reenter data from the old system into the new system.

The Maintenance phase is the last and the longest SDLC phase and it lasts until the system is retired. It involves day-to-day operation of the system, making modifications to improve performance, and correcting problems. Three key concepts ensure good quality of maintenance service: reliability, availability, and serviceability. The term **quality of service (QOS)** refers to the level of performance a computer system provides. Typical maintenance phase activities ensure that the system functions as well as possible. During the maintenance phase, an information system is likely to undergo many changes to meet an organization's needs. Changes can include: operating system, application software and security upgrades, user interface revisions to make the system easier to use, application software revisions to fix bugs and add features, hardware replacements necessary to retire defective equipment or enhance performance, hardware, software, or network adjustments to maintain and enhance quality of service. Although the analysis, design, and implementation phases of the SDLC are costly, for many organizations, the maintenance phase is the most expensive because it is the longest. When an information system first goes alive, maintenance costs are high while programmers work out bugs and users clamor for suggest. After most of the bugs are fixed and users become familiar with the information system, maintenance costs decrease. As an information system near the end of its useful life span, repair costs rise, and changing business practices begin to require modifications that time-consuming and expensive to implement.

COMPREHENSION

According to the text, are the following sentences TRUE or FALSE? Say why?

1. In the planning phase of the SDLC, a project team identifies several potential solutions and then selects the one that offers the most benefits at the lowest cost.
2. An application development tool is essentially a software construction kit containing building blocks that can be assembled into the software for an information system.
3. The project team can develop and send out a request for quotation (RFQ) to ask vendors for prices on specific equipment and software.
4. Application documentation describes the way an application should interact with users, store data, process data, and format reports.
5. Customization can reveal problems that result from incompatibilities with existing hardware and software.
6. During the maintenance phase, two key concepts ensure good of service: reliability and serviceability.
7. The old data must also be loaded into the new system – a process called transformation data.

VOCABULARY

1. The text contains a number of common partnerships. Match them up to make common collocations. Make up your own sentences with them.

a) turnkey, price, procedure, training, application, conversion, maintenance, system	b) requirements, session, system, specifications, handbook, software, costs, quotation

2. Complete these sentences with the words in the box.

project, goes live, converting, automation, bugs, modifications

1. When a new information system first …, maintenance costs are high while programmers work out bugs and users clamor for support. 2. After most of the … are fixed and users become familiar with the information system, maintenance costs decrease. 3. As an information system nears the end of its useful life span, repair costs rise, and changing business practices begin to require … that are time-consuming and expensive to implement. 4. When … data from a manual system to a computer system, the data can be typed or scanned electronically into the appropriate storage media. 5. Training sessions for a new information system can be conducted by members of the … team or outsourced to professional trainers. 6. The project team should consider the pros and cons of different levels of … because they affect all aspects of the planned information system.

QUICK CHECK

Fill in the blanks to best complete each sentence.

In the … phase of the SDLC, the project team identifies potential solutions, evaluates those solutions, and then selects the best one. The project team might send out a request for …, asking vendors to recommend a solution. As an alternative, the project team can send out a request for …, which simply asks for vendor prices. During the … phase, 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 and also finalizes the system …, trains users and tests new software. When the information system enters the … phase of its SDLC, backups, monitors system utilization, and troubleshoots operational problems are performed.

DISCUSSION

Make up your own list of questions to be used in the discussion using the following key terms:

application specifications, design phase, implementation phase, maintenance phase, procedure handbook, quality of service, request for proposal, request for quotation, software customization, system documentation, user documentation

WRITING

Write a short summary of the text using the key terms above.

SPEAKING

On the basis of a summary speak about different activities during the last three stages in a system development process.

TEXT C: INFORMATION SYSTEM DATA SECURITY

READING

Read the text and find the answers to the questions.

1. What are the most common threats to the data stored on corporate information systems?
2. What is corporate identity theft? How are corporate identities stolen?
3. How is the data on corporate information systems protected from threats?
4. Does a data center help minimize risks? What if disaster strikes?

Threats against information systems are increasing. As with personal computers, common **threats** to corporate information systems include natural disasters, power outages, equipment failures, human errors, software failures, security breaches, acts of war, and malware. Threats to a corporate information system can affect thousands of people. Natural disasters can completely shut down a computer system, cut off service to customers, and potentially destroy the system completely. Power outages can be caused by natural disasters, overloaded power grids, planned brownouts, and rolling blackouts. Equipment failures can occur in any hardware component of a computer system. The risk of failures increases as a hardware component ages, but they can occur in brand-new hardware. Human errors are mistakes made by computer operators, for example, entering inaccurate data and failing to follow required procedures. Software failures can be caused by bugs or flawed software design. Flaws in critical software that controls air traffic or nuclear power plants can be deadly. Other bugs may cause security leaks that allow unauthorized access to corporate servers. Security breaches include stolen data, physical intrusions, and deliberate sabotage. Cyberterrorism can cause damage to critical national infrastructures such as power grids and telecommunications systems. Malware can damage just about any computer system. You might have experienced the nuisance of rooting out a virus from your personal computer.

With the escalation of online crime, corporate **identity theft** has become a major security threat. When a company's brand is used without authorization, the company has become a victim of identity theft. Corporate identity attacks can undermine customer confidence, overwhelm customer service, generate bad publicity and result in lost revenues. The Internet makes it easy to steal corporate identities and use them for phishing scams and fake Web sites. It is not difficult for hackers to copy logos and other graphic elements from Web pages of legitimate sites and compile

them into an official-looking e-mail message. Creating a fake Web site is also easy. Hackers can obtain a URL that's similar to one used by a legitimate company by using a different country code or using .biz instead of .com. By copying and pasting a few graphics, the site looks legitimate, too. Preventing corporate identity theft is not really feasible. With current HTTP and HTML technologies, corporations have no way to lock down their branding elements, so hackers can easily misappropriate them. Consumers will remain at risk until there is universal implementation of technology that verifies a Web site's legitimacy. Companies can take steps to protect their customers and deal quickly with identity theft incidents, but no computer system can be completely risk-free. Several proactive measures can protect information systems from threats. These measures can be grouped into four deterrents, preventive countermeasures, corrective procedures and detection activities. **Deterrents** reduce the likelihood of deliberate attack. Both physical deterrents, such as limiting access to critical servers, and common deterrents, such as multi-level authentication, password protection, and biometric identification fall under this category. **Preventive countermeasures** shield **vulnerabilities** to render an attack unsuccessful or reduce its impact. Firewalls that prevent unauthorized access to a system and encryption that makes stolen data indecipherable are examples of preventive countermeasures. **Corrective procedures** reduce the effect of an attack. Data backups, disaster recovery plans, and the availability of redundant hardware devices all are examples of corrective procedures. **Detection activities** recognize attacks and trigger preventive countermeasures or corrective procedures. For example, antivirus software detects viruses entering a system and can be configured to perform corrective procedures such as removing the virus and quarantining infected files.

To help minimize risks the hardware and software for most corporate information systems are housed in **data centers**. A data center is a specialized facility designed to hold and protect computer systems and data. It includes special security features and is designed to proactively reduce the risk of data loss that might occur as a result of a disaster. Physical security is critical to data centers. Most data centers limit physical access using password protection and fingerprint identification systems. Motion detectors, automated alarm systems and many other **Metrics** prevent unauthorized movement through the building. For maximum protection, some data centers are housed in former military bunkers, abandoned mines, or limestone caves to provide protection against many natural disasters and a supply of uninterrupted power from high-capacity, battery-operated uninterruptible power supplies and backup power generators to keep computers functioning during power outages. But disaster **recovery plans** are also critical to data security. It is a step-by-step plan that describes the methods used to secure data against disaster and sets guidelines for how an organization will recover lost data if and when a disaster occurs. It must deal not only with calamities but also must take into account day-to-day events that could potentially cause data loss.

COMPREHENSION

According to the text, are the following sentences TRUE or FALSE? Say why?

1. Natural disasters can completely shut down a computer system, cut off service to customers, and potentially destroy the system completely.
2. Biometric identification methods, such as fingerprint and retinal scans, provide one line of defense against threats.
3. Data centers are not designed to proactively reduce the risk of data loss that might occur as a result of a disaster.
4. Preventing corporate identity theft is really feasible. Corporations have good way to lock down their branding elements, so hackers cannot easily misappropriate them.
5. To avoid downtime, one of the most basic requirements for a data center is a supply of uninterrupted power.

VOCABULARY

1. Complete the following sentences with these words:

power, data, corrective, countermeasures, identity

1. … procedures, such as data backups, can reduce the effect of a virus that spreads throughout corporate computers. 2. Preventive … shield vulnerabilities to render an attack unsuccessful or reduce its impact. 3. Some guidelines are offered to help corporations minimize the effects of … theft. 4. … outages can be caused by natural disasters, overloaded power grids, planned brownouts, and rolling blackouts. 5. Some of the most secure … centers are located underground in old military bunkers and abandoned mines.

2. Choose an appropriate goal of these security measures.

1) deterrents	a) shield the vulnerabilities to render an attack unsuccessful or reduce its impact
2) preventive countermeasures	b) reduce the effect of an attack
3) corrective procedures	c) recognize attacks and trigger some proactive measures
4) detection activities	d) reduce the likelihood of deliberate attack

QUICK CHECK

Fill in the gaps in the text.

Corporate identity theft has become a major security concern because of increasing numbers of … scams and … Web sites. Companies also have established policies that guard against corporate identity … and protect personal data of employees and clients. To protect hardware, software, and data, corporate systems are

often housed in a protective facility called a(n) … center. Most companies have a disaster … plan that describes how to secure data against disaster, reconstruct lost data, and restore normal operations after a disaster. Power … can be caused by natural disasters, overloaded power grids, planned brownouts, or rolling blackouts.

DISCUSSION
Work in groups. Discuss the following questions.

1. How vulnerable are information systems to threats that could cause them to fail?
2. Speak on several proactive measures that can protect information systems from threats.
3. Why is physical security critical to data centers? What are the requirements?
4. What does a disaster recovery plan ensure?

WRITING
Create a concept map of the text above in relation to the key terms below.

corporate data, vulnerabilities, security

SPEAKING
On the basis of a concept map speak about:

1. Corporate data vulnerabilities.
2. Proactive security measures.
3. Examples falling under each category.

FINAL UNIT TEST
Fill in the gaps to best complete each sentence.

1. Transaction … systems encompass activities such as general accounting, inventory tracking, and e-commerce.
2. The process of planning and building an information system is referred to as systems … and design.
3. A project begins with a(n) … phase in which Project Development Plan is created.
4. Application … describe the way an application should interact with the user, store data, process data, and format reports.
5. In the design phase of … (Use the acronym), all the solutions are identified and evaluated, and the best one is selected.
6. … software solutions for a project include the use of programming languages, application development tools, or application software.
7. A(n) … system might offer a complete hardware and software solution.

8. During the … phase, the project team supervises the technicians and customizes software.
9. At the end of the … process, the information system undergoes a final test.
10. The target audience for … documentation is programmers, designers, and analysts.
11. After testing and installation, an information system enters the … phase of its life cycle.
12. … procedures can reduce the effect of a virus that spreads throughout corporate computers.
13. Corporate identity … has become a major security concern.
14. Some of the most secure … centers are located underground.
15. The project … then proceeds to the … phase to producing a list of … for a new or revised information system.

MODULE IV

UNIT 7. COMPUTER PROGRAMMING

READING
Read the text and find the answers to the questions.

1. Who create computer programs?
2. How does a programmer plan a computer program?
3. What does the process of coding depend on?
4. What can cause program errors?

TEXT A: PROGRAMMING BASICS

Computer programs are developed by computer programmers or software engineers. Computer **programming** encompasses a broad set of activities that include **planning**, **coding**, **testing**, **and documenting**. Most programmers participate in all of these phases of program development, but focus on the coding process. Software engineers tend to focus on designing and testing activities.

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:

- It specifies any assumptions that define the scope of the problem.
- It clearly specifies the known information.
- 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** in a problem

statement is the information that you supply to the computer to help it solve a problem. After identifying the known information, a programmer must specify how to determine when the problem has been solved. Usually this step means specifying the output you expect.

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. Methodologies can be classified as predictive or agile.

A predictive methodology requires extensive planning and documentation up front. It allows little room for adaptation and change. Predictive methodologies are preferred for large software development projects. In contrast to predictive methodologies, **an agile methodology** focuses on flexible development and specifications that evolve as a project progresses. Programmers produce a subset of the entire project, show it to users, and then plan the next phase of development.

Programmers also approach problems in different ways. Whereas one programmer might focus on the steps required to complete a specific computation, another programmer might focus on the data that forms the basis for the computation. The phrase **programming paradigm** refers to a way of conceptualizing and structuring the tasks a computer performs. Today's most popular programming paradigms are:

Paradigm	Languages	Description
Event-driven	Visual Basic, C#	Focuses on selecting user interface elements and defining event-handling routines that are triggered by various mouse or keyboard activities
Procedural	BASIC, Ada, Pascal, Fortran, COBOL	Emphasizes linear steps that provide the computer with instructions on how to solve a problem or carry out a task
Object-oriented	Smalltalk, C++, Java, Scratch	Formulate programs as a series of objects and methods that interact to perform a specific task
Declarative	Prolog	Focuses on the use of facts and rules to describe a problem

When planning is complete, programmers can begin coding, testing, and documenting. The process of coding a computer program depends on the programming language you use and the **programming tools** you select. Programming languages can be divided into two major categories: **low-level languages** (machine languages and assembly languages) and **high-level languages** (based on human languages).

Programmers can use a text editor, program editor, or VDE to code computer programs. A **text editor** is any word processor that can be used for basic text editing tasks, such as writing e-mail, creating documents, or coding computer programs. 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.

When a program doesn't work correctly, it is usually the result of a syntax, logic, or runtime error. A **syntax error** occurs when an instruction does not 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. A **runtime error** occurs when a program runs. Some runtime errors result from instructions that the computer can't execute. A **logic error** is a type of runtime error in the logic or design of a program, such as using the wrong formula. Logic errors can be caused by an inadequate definition of the problem or an incorrect formula for a calculation, and 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 proof-reader. They can also use a tool called a **debugger** to step through a program and monitor the status of variables, input, and output.

Anyone who uses computers is familiar with **program documentation** in the form of user manuals and help files. Programmers also insert documentation called **remarks** into the program code. Remarks are identified by language-specific symbols, such as // in Java, or keywords, such as Rem in BASIC. Remarks are useful for programmers who want to understand how a program works before modifying it.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. The programming process begins with coding.
2. Software engineers focus on designing and testing activities.
3. A typical commercial application requires a minimal amount of planning.
4. Syntax errors result from instructions that the computer can't execute.
5. Programmers insert documentation called remarks into the program code.

VOCABULARY
1. Complete these sentences with the words in the box.

syntax, VDE, language, text, high-level, paradigm, agile, low-level, developments

1. Computer programming … include procedural, object-oriented, event-driven, and declarative. 2. … methodologies seem best for projects with a small core of developers working at a single location. 3. Omitting a keyword, such THEN, or required punctuation, such as a period or using incorrect punctuation are common … errors. 4. Notepad, the accessory program supplied with Microsoft Windows, is one of the most popular … editors used for programming PCs. 5. Using tools provided by the … a programmer can add objects, such as controls and graphics, to the form design

grid. 6. A … language includes commands specific to a particular CPU or microprocessor family, while a … language uses command words and grammar based on human languages. 7. C and C++ remain popular today for system and application software … . 8. Objective-C is the programming … used to develop iPhone and iPad apps; Java is used for Android apps.

2. Match up these verbs and nouns to make common collocations and make up your own sentences with them.

A	to achieve, to solve, to accept, to follow, to run, to produce, to execute
B	a problem, instructions, a program, a goal, a result, as true, rules

QUICK CHECK
Fill in the blanks to best complete each sentence.

1. … is the process of designing, coding, and testing computer programs.
2. Computer programmers focus on … computer programs, but also plan, test, and document computer programs.
3. Before program code can be written, a programmer needs a clear problem … .
4. With a clear plan, a programmer can begin coding using a text editor, a program editor, or a … development environment.
5. A program is not complete until it has been tested to ensure that it contains no … errors, runtime or … errors.
6. To find errors in a computer program, programmers can use a software tool called a … .
7. Computer programs include internal documentation in the form of … .

DISCUSSION
Work in groups. Discuss the following questions.

1. Describe the three elements of a problem statement.
2. What is the difference between predictive and agile methodologies?
3. How does a programmer code a computer program?
4. Describe today's most popular programming paradigms.
5. List and describe tools that programmers use to create computer programs.
6. How do programmers find errors? List and describe three types of errors that are typically found when computer programs are tested.
7. Do computer programs contain any special documentation?

WRITING
Create a concept map of the text using the key terms below.

1. *Planning* (problem statement, assumptions, known information; programming paradigms; predictive and agile methodologies).
2. *Coding* (programming languages; program editors, VDEs).
3. *Testing and documentation* (syntax, runtime and logic errors; remarks).

SPEAKING
On the basis of a concept map above speak about programming basics.

TEXT B: OBJECT-ORIENTED PROGRAMMING

READING
Skim read the text and find the key words/phrases for each paragraph. Try to define them in your own words.

The traditional approach to programming uses a **procedural paradigm** to conceptualize the solution to a problem as a sequence of steps and it is very efficient for number-crunching tasks. The **declarative paradigm** describes aspects of a problem that lead to a solution and help to solve problems for non-numeric data, including words and concepts. 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. It is efficient for problems that involve real-world objects.

Objects and clases. In the context of OO 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
Read the questions and find the answers in the text.
1. What are the main programming paradigms?
2. What is the basic focus of the object-oriented paradigm?
3. What's the difference between an object and a class?
4. How do you define the classes you need to solve a problem?
5. How do you code a class when writing a program?
6. What is inheritance?
7. What can a method do? What activates a method?
8. What are the advantages of polymorphism?

VOCABULARY
1. Choose the correct word in italics.

1. The abbreviation OO, which stands for object oriented, is used to describe a programming *concept/paradigm* as well as a variety of programming languages. 2. In OO programming, a class is a template for a group of objects with similar *characteristics/attributes*. 3. The process of producing new classes with *public/inherited* attributes creates a class hierarchy that includes a superclass and subclasses. 4. In a Java program, a line of code such as compare (Pizza1, Pizza2) produces a message used to activate or call the *compare()/get Area()* method. 5. A concept called *inheritance/polymorphism* allows programmers to create a single name for a procedure

that behaves in unique ways for different classes. 6. *Procedural/ declarative* programming focuses on a step-by-step algorithm that instructs the computer how to arrive at a solution. 7. If you can envision a problem as a set of *objects/classes* that pass messages back and forth, the problem is suitable for the OO approach.

2. Translate the Russian fragment into English, using some of these key words:

paradigm, to perceive the world, encapsulation, to hide, runtime efficiency

Концепция объектно-ориентированного подхода в программировании схожа с восприятием окружающего мира человеком. Используя ОО подход, программист легче находит решение задач. Эффективность данной парадигмы состоит в том, что метод инкапсуляции позволяет адаптировать объекты и повторно использовать их в других программах. Инкапсуляция – это процесс сокрытия внутренних деталей объектов и их методов. После того, как объект кодируется, он превращается в «черный ящик», который скрывает все детали от других объектов и обеспечивает доступ к данным, используя «методы». Инкапсулированные объекты можно использовать повторно, изменять их, менять назначение. Потенциальным недостатком объектно-ориентированных программ является оперативность выполнения. Они, как правило, требуют больше памяти и ресурсов для обработки.

QUICKCHECK
Fill in the blanks to best complete each sentence. The first letter is given.

1. The object-oriented approach emphasizes classes and methods that form **o**… . 2. Programmers can use a **c**… as a template for a group of objects with similar characteristics. 3. Classes can be derived from other classes through a process called **i**… . 4. The set of superclasses and subclasses that are related to each other is referred to as a class **h**…. 5. OO programmers often use **U**… diagrams to plan the classes for a program. 6. Objects interact to solve problems by exchanging **m**…, which initiate an action, a process, or a procedure. 7. The idea of creating objects that can be reused or modified is called **e**… .

DISCUSSION
Work in groups. Define the following terms associated with object-oriented programming. Make sure you can use your own words to correctly explain each other the focus terms.

object, class, superclass, subclass, attribute, message, method, inheritance, polymorphism, encapsulation

WRITING

Create a concept map of the text using the key words from the previous exercise.

SPEAKING

On the basis of the questions below speak about the object-oriented paradigm.

1. What is the main idea of OO paradigm?
2. What kinds of applications are suitable for OO languages?
3. Which OO languages are popular today?
4. What are advantages and disadvantages of the OO paradigm?

TEXT C: SECURE PROGRAMMING

READING

Study the key words of the text below and try to explain them in your own words.

> security holes, a buffer overflow, a verbose error message, randomization,
> to anticipate, vulnerabilities, a threat, to prevent, walkthroughs,
> mitigation strategies, to handle the failure, a patch

Hackers, crackers, cybercriminals, or black hats – no matter what you call them; their goal is to gain unauthorized access to information. The first line of defense in cyber security is computer programmers who create the applications, operating systems, and utilities that you use every day. Viruses, worms, bots, malicious Web scripts, and other exploits creep into computer systems through security holes, but why do these holes exist? Some of the most common software **security defects** include buffer overflows and verbose error messages.

A **buffer overflow** is a condition in which data in memory exceeds its expected boundaries and flows into memory areas intended for use by other data. Programmers can prevent buffer overflows by controlling pointers, checking input for suspicious characters, and placing strict boundaries on the values that can be stored in variables. A technique called **address space randomization** arranges key data areas in locations that are difficult for hackers to predict and target.

Good programmers try to anticipate how a program might fail and include code to handle the failure. Often, the result is an error message displayed to the user. When software is in developmental and testing phases, error messages can help programmers locate the source of errors. If those **verbose error messages** remain when the software ships, they can present attackers with information about the directory location of programs or files, the structure of a database, or the layout of the program in memory. Some of the most common examples of verbose error messages appear during unsuccessful attempts to log in or access files.

Software security begins when program specifications are formulated. Techniques such as formal methods, threat modeling, attack trees, and defensive programming help programmers remain aware of security throughout the software development life cycle.

Formal methods help programmers apply logical and mathematical models to software design, coding, testing, and verification. Formal methods, however, add to the cost and time of software development, so they tend to be used only for life-critical systems, such as air traffic control and nuclear reactor control systems.

Threat modeling is a technique that can be used to identify potential vulnerabilities by listing the key assets of an application, categorizing the threats to each asset, and developing threat mitigation strategies that can be implemented during coding. Threats can be categorized using a model like **STRIDE**:

Spoofing: Pretending to be someone else

Tampering: Changing, adding, or deleting data

Repudiation: Covering tracks to make attacks difficult to trace

Information disclosure: Gaining unauthorized access to information

Denial of service: Making a system unavailable to legitimate users

Elevation of privilege: Modifying user rights to gain access to data

Some threats are more likely to occur than others, and some threats have the potential to cause more damage than others. Software designers can rank threats using the **DREAD** categories:

Damage: How much damage can a particular attack cause?

Reproduce: Is this attack easy to reproduce?

Exploit: How much skill is needed to launch the attack?

Affected: How many users would be affected by an attack?

Discovered: How likely is it that this attack would be discovered?

Defensive programming is an approach to software development in which programmers anticipate what might go wrong as their programs run, and take steps to smoothly handle those situations. Techniques associated with defensive programming include **source code walkthroughs** that can identify security holes; **simplification** of complex sections of code; **filtering input**. **Signed code** is a software program that identifies its source and carries a digital certificate. It ensures that the software will not run if even a single byte of the source code is changed by a virus or any other factor.

When software bugs are discovered, the programmer's remaining line of defense is to produce a bug fix, or **patch**.

Computer users have no control over software at the code level, but there are a few steps they can take to avoid security problems:

− Select applications from software publishers with a good security track record.

− Read reviews of products before you download them and avoid software that doesn't receive good reviews.

− Watch for patches and apply them.

− Consider using open source software, which has been extensively reviewed by the programming community.

− And yes, keep your firewall and antivirus software deployed and up to date.

COMPREHENSION

Read the questions and find the answers in the text.

1. How can programmers prevent buffer overflows and verbose error messages?
2. What techniques are used to provide software security?
3. Why are formal methods used mainly for life-critical systems?
4. How can threats be categorized in threat modeling?
5. What techniques are associated with defensive programming?
6. How can signed code help users avoid downloading virus-infected software?
7. What steps should users take to avoid security problems?

VOCABULARY

1. Match software security techniques with the definitions.

1. A signed digital certificate	a. are mathematically-based techniques for developing reliable software
2. STRIDE categories	b. help developers gauge the severity of threats
3. Simplification	c. identifies the source of a software program
4. Filtering input	d. open source software goes through extensive public scrutiny that can identify security holes
5. DREAD categories	e. complex code is more difficult to debug than simpler
6. Source code walkthroughs	f. help software developers anticipate threats from attackers
7. Formal methods	g. programmers should use a tight set of filters on all input fields

2. Find words in the text that are in an obvious sense similar to the terms below.

1. A **buffer overrun** allows attackers to change the way a program works. 2. **Information-rich message** provides attackers with information about restricted access folder names and locations. 3. **Risk analysis** helps programmers identify ways in which their programs might be compromised. 4. **Secure programming** is analogous to defensive driving, which requires drivers to anticipate dangerous situations. 5. More important than looking for a **digital signature** is making sure you're downloading from a reputable site. 6. To create a **bug fix**, programmers first locate the source of the defect.

QUICKCHECK
Fill in the gaps in the text.

1. A condition in which data in memory exceeds its expected boundaries and flows into memory areas intended for use by other data is called a(n) … overflow.
2. Hackers also use verbose … messages to uncover security vulnerabilities.
3. Software development techniques, such as … methods, which generate proof that the program code meets listed requirements, and … modeling that can be used to identify potential vulnerabilities to security breaches.
4. A technique called … programming focuses on source code walkthroughs, simplification, and filtering input.
5. … code is a software program that identifies its source and carries a digital certificate attesting to its authenticity.
6. Despite the best development efforts, code defects are sometimes found after products ship and must be remedied with … .

DISCUSSION
Work in groups. Discuss the following questions:

1. Describe how buffer overflows and verbose error messages make computer programs vulnerable to hackers.
2. Create an outline that focuses on techniques for secure programming.
3. List steps that consumers can take to avoid vulnerabilities that exist in defective software code.

WRITING
Student A, write a short summary about different methods hackers use to gain unauthorized access to information; student B, write a short summary about the techniques the programmers apply to anticipate how a program might fail.

SPEAKING
On the basis of the questions below speak about the steps you can take to avoid security problems.

1. Do you look for a digital signature to make sure you're downloading from a reputable site?
2. Do you watch for patches and apply them?
3. Do you keep your firewall and antivirus software up to date?

FINAL UNIT TEST

1. JavaScript is:
   a. a parameter. b. a keyword for a line of program code. c. an interpreted programming language.
2. To develop applications for the iPhone, which of the following programming languages would you need to use?
   a. BASIC. b. Objective-C. c. Java.
3. A … such as Notepad allows programmers to enter lines of code using a word processing interface. A ... offers tools more targeted to programmers.
   a. VDE. b. Text editor. c. Program editor.
4. Which environment offers the best array of tools for editing program code?
   a. Text editor. b. A program editor. c. A VDE.
5. Suppose you're looking at program code and you see // symbols. What does that tell you?
   a. The text that follows is a comment that documents the code.
   b. There is a syntax error in the code that was found by a debugger.
6. … are sometimes called comments and the process of adding them is sometimes referred to as commenting the code.
   a. Documentations. b. Remarks. c. References.
7. To prevent hackers from guessing the location of critical program elements, programmers can use a technique called … space randomization.
8. Should you look for a digital signature before downloading an iPhone app?
   a. Yes, to make sure it is free of viruses.
   b. No, only signed apps can be posted at the Apple App Store.
9. What is the danger of buffer overflows?
   a. A programmer establishes limits on the length or type of data.
   b. They are a security hole that can be exploited by malware.
10. The OO paradigm allows programmers to hide the internal details of objects and their methods. This process is called … .
11. The process of passing certain characteristics from a superclass to a subclass in OO programming is referred to as … .
12. The … paradigm focuses on a step-by-step algorithm that describes the solution, whereas the … paradigm focuses on describing the problem.
13. … languages allow you to describe problems using words rather than the abstract structures procedural and object-oriented languages require.
14. One of … today's most popular languages for implementing object-oriented programs is … .
15. Declarative languages can be used for problems that require calculations, but those problems are typically better suited to … languages.

UNIT 8. DATABASES

READING
Read the text and find answers to the questions.

1. What is a database?
2. What is data mining?
3. What is big data?

TEXT A: FILE AND DATABASE CONCEPTS

A **database** is a collection of information. Today, most databases are stored as computer files. Databases can incorporate several lists. For example, the database for an e-commerce site, such as Amazon.com, includes inventory lists and customer lists.

The tasks associated with creating, maintaining, and accessing the information in databases are referred to as data management, file management, or database management. Databases can be used in a variety of ways, from a simple tool for collecting and tracking data, to a comprehensive source for making decisions and predicting future trends.

Collect and store data. A database is a collection of data, but that collection grows as additional data is obtained. Data can be collected and entered manually or electronically. Information can also be removed from a database when it is no longer needed.

Update data. One of the primary database management activities is keeping data up to date by entering current addresses, inventory quantities, and so on. As with collecting data, updates can be made manually or electronically.

Organize and output data. The data in a typical database is stored in no particular order. New data is appended to the end of the file. To make data into a more suitable report, it can be organized in different ways. It can be alphabetized, placed in numeric order, grouped and subtotaled. Database output is easy to organize and reorganize without actually rearranging the physical data on the disk.

Distribute data. Databases, combined with mail merge and other computerized technologies, offer efficient ways to distribute information customers, employees, government agencies, and other companies.

Find data. Databases make it easy to locate information. A pharmacist can check a pharmaceutical database for drug interaction before filling a prescription. A computer technician can check a manufacture's database to find the part number for replacing your computer's fried hard drive.

Analyze data. Databases include certain facts as raw data, such as names, addresses, bank balances, prices, and inventory quantities. Analyzing this data can produce information that is not readily apparent from simply looking at raw data.

What is data mining? **Data mining** refers to computer algorithms that analyze information to discover previously unknown and potentially useful information, including relationships and patterns. The data accessed by data mining and analysis

techniques is often stored in a **data warehouse,** which is a storage for data from more than one database. Data from operational databases is transferred to a data warehouse where it can be combined with data from other databases to enhance the data set.

Predictive analytics refers to a branch of data mining that analyzes current and historical data to predict future trends. It makes use of statistical algorithms, neural networks and optimization research to discover patterns in data. For example, researchers might use it to predict customer behavior, unmask terrorists, forecast storm paths, etc. Like data mining, predictive analytics processes data autonomously, rather than under the direction of an operator who specifies what to look for.

OLAP (online analytical processing) is a data analysis technique that allows decision makers to quickly get answers to complex queries that encompass multiple factors, such as locations, revenue, time periods, and employee status. Unlike data mining and predictive analytics, OLAP is an interactive process that allows decision makers to devise unique queries, enter them, and get an immediate response.

Big data refers to huge collections of data that are difficult to process, analyze, and manage using conventional database tools. An example the one million transactions generated by Walmart sales registers every hour, which are stored in databases measured in petabytes, not gigabytes or terabytes.

The simplest model for storing data is a **flat file** that consists of a single, two-dimensional table of data elements. Each row in the table is a record, and each column of the table is a field. Computer databases display records as rows in a table or as forms.

A **field** contains the smallest unit of meaningful information, so you might call it the basic building block for a structured file or database. Each field has a unique **field name** that describes its contents. For example, in an iTunes playlist, the field called Name holds the name of a song, the Time field holds the song length, the Artist field holds the name of the performer, the Album field holds the name of the album and the Genre field holds the type of the song.

In the world of databases, a **record** refers to a collection of data fields. Each record stores data about one entity – a person, place, thing, or event. For example, a data record stored in an iTunes playlist contains fields of data pertaining to a digital music track.

Flat files are the foundation for simple databases, such as an e-mail address book, an iTunes playlist, or the addresses for a mail merge. Spreadsheets are also modeled on flat files. With a flat file, you can search for, update, group and organize. Each record in a flat file, however, is an independent entity and no relationships can be established between records.

The term **DBMS** (database management system) refers to software that is designed to manage data stored in a database. Each DBMS specializes in one database model, but some DBMS software offers versatility by dealing with a variety of models and data.

The Web allows access to many databases. When you shop at one online store, for example, the photos, descriptions, and prices you see are pulled from the merchant's database and displayed as Web pages. More direct database access is

offered by online public access catalogs. A database also provides the foundation for online access to course registration systems, real estate listings, movie reviews, flight schedules, and other information.

The Web provides both opportunities and challenges for accessing the information in a database. Obviously, with its global reach, the Web provides an opportunity for many people to gain access to data from multiple locations.

A technique called **static Web publishing** is a simple way to display the data in a database by converting a database report into an HTML document, which can be displayed as a web page by a browser. Static publishing provides extremely limited access to a database because it creates a Web page that displays a snapshot of your data at the time the report was generated. The advantages include security and simplicity. Your data remains secure because you have not provided direct access to your database, so unauthorized users cannot change your data.

In several situations, such as making e-commerce purchase or registering for a social networking site, it is important for people to use a browser to add or update records in a database.

So, many techniques exist for storing, accessing and displaying the data from databases. Individuals can use simple tools to create personal databases, such as address books. Corporate database managers, however, need to be familiar with more complex tools used to distribute data over networks and the Web. Sometimes more than one database management tool has the potential to work for a specific application.

COMPREHENSION
According to the text, are the following sentences TRUE or FALSE? Say why?

1. A data warehouse is a storage for data from more than one database.
2. Predictive analytics processes data under the direction of an operator who specifies what to look for.
3. A flat file consists of a single, four-dimensional table of data elements.
4. The aim of DBMS is to store data in a database.
5. The Web allows access to some databases.

VOCABULARY
1. Find words or expressions in the text which mean the following:

a) to keep up to date;
b) the way an organization manages the information held on its computers;
c) a huge selection of data;
d) a basic building block for a structured file or database;
e) a collection of data fields;
f) software designed to manage data stored in a database.

2. Give Russian equivalents to these words or expressions from the text.

> database management, to track data, raw data, to devise unique queries, conventional database tools, field name, to gain access to data

QUICK CHECK
Fill in the gaps in the text. The first letter is given.

A(n) d… is a collection of information, generally stored as computer files. The information it contains can be stored, updated, organized, output, distributed, searched, and analyzed. The simplest model for storing data is a(n) f… file that consists of a single, two-dimensional table of data elements. Each row in the table is a(n) r…, and each column of the table is a(n) f… . Flat files can be created and manipulated by using a variety of tools, including word processing and spreadsheet software. For databases composed of more than one record type, however, it is best to use a database management system, which is abbreviated as … . The data in a database can be accessed over the Web. A simple process called s… Web publishing converts a database report into an HTML document, which can be displayed by a browser.

DISCUSSION

1. How is database information used?
2. What is predictive analytics?
3. What is OLAP?
4. What is the simplest way to store data?
5. How are flat files used?

WRITING
Write a short summary of the text above using the key terms below:

> collect and store data, update data, organize and output data, distribute data, find data, analyze data, data mining, big data, flat file, DMBS

SPEAKING
On the basis of the questions below speak about data mining.

1. Should your government continue to develop and deploy data mining techniques designed to identify terrorists?
2. Are you concerned about your personal data being included in government data mining operations?
3. Do you think that governments should apologize to and compensate individuals who are inappropriately harmed by data mining operations?

TEXT B: DATABASE DESIGN

READING
Skim the text and find key words and phrases.

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 should 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. 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 want to search for, sort on, or use in a calculation should be in its own field.

The data that can be entered into a field depends on the field's data type. From a technical perspective, **a 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.

There's an old saying in the computer industry: «garbage in, garbage out». This adage is especially true when dealing with databases. The information produced by reports and processing routines is only as accurate as the information in the database. Unfortunately, data entry errors can compromise the accuracy and validity of a database. When designing a database, it is important to think ahead and envision potential data entry errors. Most DBMSs provide tools that database designers can use to prevent some, but not all, data entry errors.

A process called **normalization** helps database designers create a database structure that minimizes storage space and increases processing efficiency. The goal of normalization is to minimize **data redundancy** – the amount of data that is duplicated in a database. To normalize a database, one of the designer's main tasks is to decide how best to group fields into tables.

The way that database queries, records, and reports appear on the screen depends on the user interface. An operating system provides some conventions for the user interface, such as dialog box and button styles, but additional design decisions must be made for the database user interface.

Designing a 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.

The interface for smaller databases, such as those used by small businesses or individuals, is most likely created by the database designer.

Some DBMSs include tools to create database interfaces. Others require separate tools for this task.

After the design for the database structure is complete, 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 tools supplied 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 misspellings 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 incorporated 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 spreadsheet 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. You would use either an import routine or an export routine to move data from one location to another, but not both.

Query languages like **SQL** (Structured Query Language) 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. An SQL query begins with an action keyword, or command, which specifies the operation you want to carry out. 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.

COMPREHENSION

Read the text and find answers to the questions.

1. How does a database designer know what data to store?
2. What is a data type?
3. Can a database designer prevent people from entering inaccurate data?
4. How does a database designer group fields into tables?

5. Does a database designer have control over the user interface?
6. How is data loaded into databases tables?
7. How does SQL work?

VOCABULARY

1. Complete the following sentences with these words.

operating, converts, user, built-in, numeric, manually, errors, normalize, filing

1. A database designer might study the current … system to compile a list of available data.
2. Data can be broadly classified as … or character.
3. Most DBMSs provide tools to prevent some data entry … .
4. One of main tasks to … a database is to decide how to group fields into tables.
5. An … system provides some conventions for the user interface.
6. Large databases might require a group of … interface designers.
7. Entering data … can take a long time.
8. Some DBMSs provide … import and export routines.
9. The client software collects your input and then … it into an SQL query.

2. Give Russian equivalents to these words or expressions from the text:

to determine, a perspective, an adage, a validity, data redundancy, user interface designers, import and export routines, SQL query

QUICK CHECK

Fill in the gaps in the text.

1. A(n) … is the arrangement of fields, tables, and relationships in a database.
2. When designing a database, each field is assigned a(n) … .
3. When designing a database, it is important to envision potential data … errors.
4. The number of tables in a database can be determined by a process called …, which helps a database designer group fields into record types and avoid data redundancy.
5. The way that database queries, records, and reports appear on the screen depends on the … .
6. SQL is a database query language that generally works behind the scenes as an intermediary between the database … software provided to users and the database itself.
7. Although the specifications for searches 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.
8. An SQL query contains SQL …, such as SELECT, FROM, INSERT, JOIN, and WHERE.

DISCUSSION
Make up your own list of questions to be used in the discussion.

WRITING
Write 3 techniques that a database designer can use to reduce data entry errors.

SPEAKING
On the basis of the questions below speak about database design.

1. Have you ever designed a database?
2. What steps do you take to structure a database?
3. Where do you usually use data types?
4. Can you avoid data entry errors?
5. Do you have any ways to minimize data redundancy?

READING
Read the text and find answers to the questions.

1. How vulnerable are databases?
2. What are access controls?
3. What can monitoring accomplish?

TEXT C: DATABASE SECURITY

Databases are vulnerable to physical theft, hacking, and unauthorized access. A disk or tape containing a backup or an archive could be stolen. A laptop computer containing a database used by a field representative or teleworker can go missing. Hackers can gain unauthorized access to a database over the Internet or an unsecured wireless connection.

The qualities that make databases efficient also make them vulnerable. Data stored in digital format is easy to copy, back up, store, and transmit. Although it would be impractical to steal millions of paper records from filing cabinets, to steal a digital database, a criminal simply has to pocket a small backup drive or make a copy of the original database.

When a database is illicitly copied, it is stolen but not missing, as it would be if a crook made off with the folders in a filing cabinet. The theft might not be discovered for days or weeks, if ever, and affected individuals are never warned that their identities are at risk.

Privacy. You expect personal information to remain confidential. However, when your data is in a computer database, there is a risk that it can be viewed by unauthorized individuals or distributed without your permission. A preferred customer card at your favorite supermarket could be used to collect data about the groceries you purchase.

Accuracy. After accepting the fact that personal data is stored in countless databases, it would be comforting to know that the data is accurate. However, data entry errors, update errors, and hacking all add to doubt about the veracity of database data.

Security. Criminals have become sophisticated in the use of bots, key-loggers, and redirection to access data stored on personal computers and in corporate databases. The data stored in a single database is often sufficient to provide a criminal with enough information to access your bank account or use your credit card. New trends in data aggregation and analysis make it possible to assemble a detailed picture of an individual's life with enough critical ID numbers and PINs to steal an entire identity and then run up debt, acquire a criminal record, and put a real person's life in shambles.

Today's computers are under assault from hackers and natural disasters. Although no computer system can be 100 % secure, system administrators can take steps to secure computer systems and the databases they contain. Security measures include encryption, access controls, data security policies, and intrusion monitoring.

Database data that's transmitted over the Web can be encrypted using encryption technologies such as SSL. When that data arrives at the database, it is unencrypted and usually stored in plaintext. Encrypted databases are less efficient than unencrypted databases because all or part of the database has to be decrypted for the query to locate information.

Most operational databases are not encrypted while being used, but the data they contain can be encrypted before it is archived. Thieves who gain access to a database archive cannot make sense of the data if it is encrypted.

An access control limits access to systems, such as computer databases. Access controls can block unauthorized users and limit activities of authorized users. IT professionals sometimes classify access controls as identification and authentication, authorization, and accountability.

Identification and authentication determine who can access a database and the information it contains. Authorization defines what an authenticated user can do. Accountability tracks what a user did.

Basic security restricts physical access and network access to the computer that hosts the database. Physical access can be limited to authorized personnel by housing the computer in a locked data center. Online access can be limited by firewalls and passwords. System administrators should be sure to change all default administrator passwords before opening the database to internal and external users. Security experts also recommend separating the server that hosts the database from the server that hosts publicly accessible services, such as Web pages.

A good set of policies decreases the risk of unauthorized access within the workplace, minimizes the chance of confidential data escaping from the workplace, and helps improve data entry accuracy.

Policies for retiring old equipment are also essential, and not just for computers. Modern office copier machines contain a hard disk, which stores images

of every page that is copied. Removing and destroying storage devices from all discarded devices is a requirement for data security.

A database audit is a procedure that monitors and records user activity within a database. In some instances, auditing can identify intruders before they can compromise a system. If an intruder breaches database security, an audit can help to identify the damage and correct it.

Tracking who makes changes in a database helps an organization maintain accountability, trace the source of errors, and make corrections. If a database has been compromised by a hacker, an audit report can be used to check recent changes to the database to make sure they are legitimate.

If abnormal usage patterns become evident, database auditing tools can be configured to check specific types of database activity. For example, if a system administrator suspects that data is being surreptitiously deleted or changed, an audit can be set up to record any successful or unsuccessful deletions from tables in the database.

In the meantime, what to do? You can't protect your personal data once you've released it, so the key to minimizing your risk is to be vigilant about the information you divulge. So, you should: know when data is being collected; find out how data is being used; find out what data is retained; supply only the data that is required; protect your passwords; not to trade your privacy; use antivirus software; not to reply to spam.

COMPREHENSION
Write the questions that could produce the following answers.

1. Databases are vulnerable to physical theft, hacking, and unauthorized access.
2. Security measures include encryption, access controls, data security policies, and intrusion monitoring.
3. Encrypted databases are less efficient than unencrypted databases because all or part of the database has to be decrypted for the query to locate information.
4. Access controls can block unauthorized users and limit activities of authorized users.
5. Basic security restricts physical access and network access to the computer that hosts the database.
6. A database audit is a procedure that monitors and records user activity within a database.

VOCABULARY
1. The text contains a number of verb-noun partnerships (e.g. achieve objectives). Match up these verbs and nouns and make up your own sentences with them.

A	to gain, to collect, to access, to secure, to breach, to make, to accept, to take, to make
B	sense, a security, steps, a copy, access, a bank account, a database, data, the fact

2. Translate the Russian fragments into English.

Копировать/резервировать; точность/правильность; точность данных базы данных; перехватчик данных ввода; технология шифрования; незашифрованный текст; система сетевой защиты/межсетевая защита; ревизия базы данных; законный/разрешенный; незаметно удаленный; разглашать информацию.

QUICK CHECK
Fill in the sentences in the text.

1. Databases are vulnerable to physical theft, hacking, and … access. 2. Data stored in digital format is easy to copy, …, store, and transmit. 3. A(n) …… limits access to systems, such as computer databases. 4. … tracks what a user did. 5. Online access can be limited by … and passwords. 6. If a database has been compromised by a hacker, a(n) … report can be used to check recent changes to the database to make sure they are … .

DISCUSSION

1. Database vulnerabilities
2. Database security measures
3. The ways to minimize database vulnerability

WRITING
Write 3-4 steps to protect your privacy and identity when working with databases.

SPEAKING
On the basis of questions below speak about database security.

1. How safe is the data in your database?
2. Can you protect your privacy when so much personal data is stored in corporate and government databases?
3. How do you usually restrict access to databases?
4. How do policies in your country help to secure databases?
5. Can you avoid vulnerability?

FINAL UNIT TEST

1. Most databases are stored as … files.
2. The tasks connected with creating, maintaining, and accessing the information in databases are referred to as … management, … management, or … management.
3. The data accessed by data mining and analysis techniques is often stored in a … .

4. … refers to a branch of data mining analyzing current and historical data to predict future trends.
5. … is an interactive process that allows decision makers to devise unique queries, enter them, and get an immediate response.
6. The data that can be entered into a field depends on the field's … type.
7. … data contains letters, numerals, and symbols not used for calculations.
8. … data contains numbers.
9. An operating system provides some conventions for the user …, such as dialog box and button styles.
10. An SQL … is a sequence of words, much like a sentence.
11. Hackers can gain unauthorized access to a database over the Internet or an unsecured … connection.
12. Today's computers are under … from hackers and natural disasters.
13. … and authentication determine who can access a database and the information it contains.
14. A good … of policies decreases the risk of unauthorized access.
15. If abnormal usage patterns become evident, database … tools can be configured to check specific types of database activity.

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