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Unit 1

COMPUTERS. INTRODUCTION.

PART I

Task 1: Before reading think of your own definition of a computer science. Discuss your ideas in groups.

Task 2: Look through the text and check if you were right. Translate the underlined words into Russian.

TEXT A

COMPUTER SCIENCE

Computers today are far more than the number crunchers. Today, computers are used to store and manage information in the form of words, numbers, sounds, and pictures. With the invention of the computer, people began to see the potential for faster management of this information flow. Even though computers were at first used mainly for mathematical calculation, it wasn't long before businesses began to understand how their ability to handle information could be used as a competitive advantage over other companies that had not yet computerized. Soon businesses were racing to convert information into forms that could be managed by computers.

By computer science nowadays we mean the study of computers, including their design (architecture) and their uses for computations, data processing, and systems control. The field of computer science includes engineering activities such as the design of computers and of the hardware and software that make up computer systems. It also encompasses theoretical, mathematical activities, such as the design and analysis of algorithms, performance studies of systems and their components by means of techniques like queueing theory, and the estimation of the reliability and availability of systems by probabilistic techniques.

Since computer systems are often too large and complicated to allow a designer to predict failure or success without testing, experimentation is incorporated into the development cycle. Computer science is generally considered a discipline separate from computer engineering, although the two disciplines overlap extensively in the area of computer architecture, which is the design and study of computer systems.

The major subdisciplines of computer science have traditionally been (1) architecture, which includes all levels of hardware design, as well as the integration of hardware and software components to form computer systems; (2) software, which refers to the programs, or sets of instructions, that tell a computer how to carry out tasks, subdivided into software engineering, programming languages, operating systems, information systems and databases, artificial intelligence, and computer graphics; and (3) theory, which covers computational methods and numerical analysis on the one hand, and data structures and algorithms, on the other.

Computer science has indirect relationships with virtually all disciplines that use computers. Applications developed in other fields often involve collaboration with computer scientists. In return, computer scientists get the opportunity to observe novel applications of computers, from which they gain a deeper insight into their usage. These relationships make computer science a highly interdisciplinary field of study.

Task 3: Read the text and choose the correct answer.

1. What does computer science deal with?

   a. description of how computers were first developed, how they evolved, and how they influence our lives today;

b. the design and use of computers;
c. mostly with mathematical computer calculations.

2. What are computers used for?
   a. for improving of the productivity of labour of scientists, designers, managers and other specialists;
   b. for saving and handling data;
   c. only for creating and manipulating text and pictures.

3. Computer systems are too large and complicated
   a. to do without testing;
   b. to incorporate experimentation;
   c. to predict failure or success.

4. Computer architecture includes
   a. only instructions which tell computers what to do;
   b. hardware design only;
   c. integration of hardware and software components.

5. A professional computer scientist must have in-depth knowledge of
   a. computation techniques and algorithms;
   b. hardware design;
   c. a range of different sciences.

Task 4: Answer the following questions.

1. What is "computer science"?
2. Why is testing so important in the field of computer science?
3. Is there a difference between computer science and computer engineering?
4. What are the subdisciplines of computer study and what do they include?
5. Can you name some fields of research in which computer scientists are involved in?

Task 5: Discuss in groups.

1. Why is the computer science so important in our life nowadays?
2. What problems can computer science solve?
3. What operations can computer perform?
4. Today, the number of jobs that are related to the use of computers or the maintenance of computers is growing steadily. Describe four different computer-related jobs and the skills these jobs require.

Task 6: Share information on how you use computers. Compare your answers and make a list of uses for your class.

Task 7:You are going to hear four people talk about how they use computers. Before listening try to predict the uses they describe. Then listen and note the actual uses described.

User	**Use**
Primary school teacher	
Open University student	
Girl (Louise) 6 years old	
Artist	

Task 8: Listen to the recording again to find the answers to these questions:

1- How does the story-telling program encourage children to work together?

2- In what way is the children's reaction to this program different from other uses they make of the computers?
3- What is the OU student studying?
4- What opportunity has she to meet other students?
5- What can you do with Pets 3?
6- What does Louise do with clipart?
7- How did the artist display work to dealers in the past?
8- What is the difficulty in selling through a web site?

PART II

Task 9: How do you think these professions might use computers?

1- architects	(a) to experiment with different garden designs
2- interior designers	(b) to design structures and buildings
3- farmers	(c) to keep a database of clients
4- landscape gardeners	(d) to demonstrate alternative interior designs to clients, so they can choose one
5- musicians	(e) to compose music and to play it back
6- rally drivers	(f) to keep financial accounts; to keep a database of livestock
7- salespeople	(g) to plot their best route

Task 10: Reading Practice
In groups of 4 divide the text into 4 parts, read your part, write down 10-12 words or word combinations which can be used to speak about the application of computers in different fields and prepare to tell your group about what you have read.

TEXT B
COMPUTERS IN OUR LIVES

Computer technology is used to serve and connect people in the modern world. Desktops, laptops and mobile devices network the world together and perform multiple operations at once; however, this industry includes more than these machines. Individuals, communities, government and organizations rely on computer technology to produce or innovate the majority of things in their lives, such as food, services, entertainment, care, communication, education and transportation.

Food

Milking machines use computer technology.

Farmers use innovations in computer technology to determine the best time to plant, fertilize, harvest and sell crops. The Internet offers weather and stock market reports in real-time, and its global network of potential buyers is more expansive than local merchants. New machinery, such as cow milking machines, uses basic computer programming routines to automate the care of animals and crops. Harvesting vehicles give drivers more information when gathering crops, and farmers can detect if plants are contaminated with fungal toxins. As farmers become aware of new farming technology, they can adapt their future farming methods.

Services

Cashiers use barcode scanners to ring up items and maintain inventory.

Computer technology includes any machines that receive commands and perform calculations or services accordingly. Many types of operations, such as billing, record keeping, transactions and planning, take place through commercially available or customized machines. Most modern

devices use microchips and processing units to perform their basic functions. ATM machines, gas station pumps, GPS units and barcode scanners may be common in everyday life; however, each relies on circuit boards and digital data to meet the needs of consumers.
People gain more access to personalized services through the Internet. You could order a pizza or groceries online, and email your doctor's office or visit WebMD.com after receiving indigestion from something you eat. Look for online coupons that print out as discounts or free merchandise coupons for local stores and restaurants. Scan a product's barcode into your smartphone, and read reviews or price-match the item before purchasing it.

Entertainment

Use computer technology to purchase movie tickets online.
Major motion pictures and television programs use some form of visual, audio and animation effects in their production. Video games employ graphics produced by a computer, and each game plugs into a computer-based home entertainment system. Players can play by themselves or with others over the Internet. Some game systems can sell downloadable programs and stream movies online.
Use mobile phone applications to make reservations at restaurants or hair salons to reduce wait time. Purchase movie tickets online to avoid standing in a crowded line, or play a game on your phone while waiting for the movie to start. Store your music library on a single device instead of carrying around individual CDs.

Care

Physicians rely on computer technology to obtain current information on patients.
A negative side effect of computer technology is the way it can affect your health. The field of ergonomics studies how a person's sitting position when using electronic equipment can affect the user mentally and physically. People who sit incorrectly or who stare at a computer screen all day may experience headaches. The position of a computer keyboard can create or prevent carpal tunnel syndrome.
Other advances in computer technology have created more options for health care. Medical websites, such as WebMD.com, provide comprehensive overviews of what a person may be experiencing physically through their symptoms. Doctors` offices can send patients a reminder email for an appointment, or fax a prescription to a pharmacy. Organic grocery stores or bulk sales of vitamin supplements can offer alternative options to traditional medicine.

Communication

Social media websites enable people to connect online in real-time.
People correspond with friends, family, acquaintances and business associates through social media, email, texting and instant messaging. Use computers to create holiday newsletters, and print off labels instead of hand writing each envelope. Stay in touch from work at home, attend video conferences instead of having to travel and send a mass email through MailChimp.com. Avoid the expense of a high school reunion by forming connections to old classmates through Facebook, Twitter, LinkedIn and other social networking sites. Access news, weather forecasts, stock prices and more through websites and blogs that regularly compile top stories.

Education

Schools with computer labs teach age-appropriate lessons on technology.
A computer is a useful tool for advancing educationally in traditional and non-traditional ways. Colleges and universities offer online courses for adults who are looking to obtain a degree without quitting their job. Younger students rely on computers to research and access information, or to submit their work to their teacher. Professional or volunteer tutors can be found online to gain help on a variety of topics.
Computer technology makes it easier to learn more about other cultures. Use the Internet to take a virtual trip to another country by exploring ideas, art, music, products and other examples of culture. Have a video phone call on Skype with a missionary and order local ethnic food to eat while you interact.

Transportation

Some GPS systems come pre-installed in newer vehicles.
The basic functions of modern vehicles are controlled through computer chips and circuitry. Engine microprocessors calculate the proper mix of air and fuel for combustion, and a circuit board regulates the timing of the spark plugs. Certain safety features or luxuries, such as airbags, cruise control, anti-lock brakes and automatic transmission, all rely on computer technology to function.
GPS systems passively receive satellite signals that inform drivers of their location or how to find a specific destination. The device calculates the information and creates a display that adapts to movement, and it gives step-by-step directions on how to navigate the most-direct path available. Drivers can travel more confidently knowing that they can typically get where they need to go if service is available.

Task 11: When you read texts like these, you don't always need to understand every word. But there are words which you can guess from the context. Look at these words. Are they nouns (n), verbs (v) or adjectives (adj)?

1. expansive	2. routines	3. detect	4. adapt	5. perform
6. entertainment	7. employ	8. connected	9. advances	10. appointment

Now find these words in the text and match them with the meanings below.

a	appointment		f	correct or suitable	
b	transaction		g	to make smaller	
c	to reduce		h	arrangement for a meeting	
d	to obtain		i	business operation	
e	appropriate		j	to get	

PART III

Task 12: Look through the text. Can you understand the author`s message?

TEXT C

COMPUTERS MAKE THE WORLD SMALLER AND SMARTER

The ability of tiny computing devices to control complex operations has transformed the way many tasks are performed, ranging from scientific research to producing consumer products. Tiny 'computers on a chip' are used in medical equipment, home appliances, cars and toys. Workers use handheld computing devices to collect data at a customer site, to generate forms, to control inventory* and to serve as desktop organisers.

Not only is computing equipment getting smaller, it is getting more sophisticated. Computers are part of many machines and devices that once required continual human supervision and control. Today, computers in security systems result in safer environments, computers in cars improve energy efficiency, and computers in phones provide features such as call forwarding, call monitoring, and call answering.

These smart machines are designed to take over some of the basic tasks previously performed by people; by so doing, they make life a little easier and a little more pleasant. Smart cards store vital information such as health records, drivers' licenses, bank balances, and so on. Smart phones, cars, and appliances with built in computers can be programmed to better meet individual needs. A smart house has a built-in monitoring system that can turn lights on and off, open and close windows, operate the oven, and more.

With small computing devices available for performing smart tasks like cooking dinner, programming the VCR*, and controlling the flow of information in an organization, people are able to spend more time doing what they often do best - being creative. Computers can help people work more creatively.

Multimedia systems are known for their educational and entertainment value, which we call 'edutainment'. Multimedia combines text with sound, video, animation, and graphics,

which greatly enhances the interaction between user and machine and can make information more interesting and appealing to people. Expert systems software enables computers to 'think' like experts. Medical diagnosis expert systems, for example, can help doctors pinpoint* a patient's illness, suggest further tests, and prescribe appropriate drugs.

Connectivity enables computers and software that might otherwise be incompatible to communicate and to share resources. Now that computers are proliferating in many areas and networks are available for people to access data and communicate with others, personal computers are becoming interpersonal PCs. They have the potential to significantly improve the way we relate to each other. Many people today telecommute -that is, use their computers to stay in touch as with the office while they are working at home. With the proper tools, hospital staff can get a diagnosis from a medical expert hundreds or thousands of miles away. Similarly, the disabled can communicate more effectively with others using computers.

Distance learning and videoconferencing are concepts made possible with the use of an electronic classroom or boardroom accessible to people in remote locations. Vast databases of information are currently available to users of the Internet, all of whom can send mail messages to each other. The information superhighway is designed to significantly expand this interactive connectivity so that so people all over the world will have free access to all these resources.

People power is critical to ensuring that hardware, software, and connectivity are effectively integrated in a socially responsible way. People - computer users and computer professionals - are the ones who will decide which hardware, software, and networks endure and how great an impact they will have on our lives. Ultimately people power must be exercised to ensure that computers are used not only efficiently but in a socially responsible way.

*inventory-goods or materials held by an organisation
*VCR-abbreviation for video cassette recorder
*pinpoint-to find out

Task 13:Check if you understand the following words and word combinations from the text.

Ability, tiny, appliances, customer, sophisticated, require(d), supervision, features, to take over, vital, previously, to meet individual needs, the flow of information, entertainment value, appealing, software, to enable somebody to do something, to be incompatible, to share (resources), to access (data), significantly, to improve, to stay in touch, accessible, remote, currently, to expand, connectivity, responsible, to exercise power, to endure, an impact, to ensure.

Task 14: Find the answers to these questions in the text.

1.Name some types of devices that use 'computers on a chip'.
2.What uses of handheld computers are mentioned in the text?
3.What are the benefits of using computers in security systems, cars and phones?
4.What smart devices are mentioned in the text?
5.What are smart cards used for?
6.What are the advantages of multimedia?
7.What can medical expert systems do?
8.In what way have computers changed the way people communicate?
9.What potential do computers have in communication?
10.How can computers help the disabled?

11.What types of computing systems are made available to people in remote locations using electronic classrooms or boardrooms?
12.What aspects of computing can people power determine?

Task 15:Match the terms in Table A with the statements in Table B.

Table A	Table B
a. Edutainment	1. Software that enables computers to "think" like experts.
b. Multimedia	2. Use computers to stay in touch with the office while working at home.
c. Expert system	3. Internet system designed to provide free, interactive access to vast resources for people all over the world.
d. Telecommute	4. Multimedia materials with a combination of educational and entertainment content.
e. Information superhighway	5. A combination of text with sound, video, animation, and graphics.

Task 16: Mark the following statements as True or False.

1) Desktop organizers are programs that require desktop computers.
2) Computers are sometimes used to monitor systems that previously needed human supervision.
3) Networking is a way of allowing otherwise incompatible systems to communicate and share resources.
4) The use of computers prevents people from being creative.
5) Computer users do not have much influence over the way that computing develops.

Task 17: Do you know what we mean by the summary of an article? Discuss in groups and try to give the definition of a summary. Why do you think it is important to learn to make summaries? Summarize the text above in 12-15 sentences. In the first paragraph point out the message of the author, illustrate the main points of the article with some examples from the text in the main part of the summary. Check that your summary should have a clear structure and a conclusion.

Task 18: Try to give the definitions of the following types of computers. Use a dictionary if necessary.

Supercomputer, mainframe, minicomputer, microcomputer, desktop computer, workstation, laptop, notebook, handheld, PDA, a server.

Task 19: Read the text and check if your definitions were correct.

TEXT D

TYPES OF COMPUTERS

Computer is an electronic device that can accept data in a certain form, process the data and give the results of the processing in a specified format as information.

The modern world of high technology is possible mainly due to the development of the computer. Computers have opened up a new era in manufacturing by means of automation and they have enhanced modern communication systems.

Essentially all of the computers in use today are based on the same fundamental design. Despite their size, speed, or cost, almost all of the computers we use today are based on a design that includes the following elements:

- Computers process data using some kind of central processing system.
- Computers provide some method of storing data.
- Computer systems include specialized devices that humans can use to communicate with the processing hardware.

Computers have been designed in this way since their inception. But different types of computers can vary significantly in their size and processing capacity, cost, and speed. Computers traditionally have been categorized as being one of four main types – microcomputers (desktop PCs, workstations, portable - laptops, notebooks, tablets, handheld – smartphones, palmtop computers, PDAs), minicomputers (server), mainframes and supercomputers.

Supercomputers are the most powerful and expensive computers. They are often grouped together with the mainframes. Although they are similar in basic design to the mainframes, they can process data faster than any other type of computer. Supercomputers generally are used by very large companies and research institutions to process complex mathematical calculations.

The large and powerful computers are known as ***mainframes***. They generally cost hundreds of thousands or even millions of dollars and they usually are used as central data processing and storage devices by large businesses or government agencies. An organization's computer users can usually access the mainframe from many different offices that can be in different buildings or even in different cities. Many people can be in contact with the mainframe at the same time and at any one moment the mainframe can be processing several different programs for several different users. For that reason, mainframes are often referred to as host computers. They are host to many users in many different locations. Many printers and a variety of storage devices may be attached to the mainframe computer.

A ***minicomputer*** is a computer manufactured on a single printed board which contains one or more chips. At present these computers have become so powerful that they are used as CAD/CAM systems.

Minicomputers are smaller and less expensive than mainframes. Although they may be accessed by a number of different users just as mainframes are, there are usually fewer access sites and the access sites are usually located in closer proximity to the minicomputer. Because they are designed to serve the needs of many different users, they are also referred to as host computers, but, because of their more limited capacity and speed when many users are in communicate with the minicomputer, the computer's response time may be noticeably slower.

Minicomputers are generally thought of as medium sized computers. While the mainframe may do the data processing and data storage for the widespread offices of an entire large company, minicomputers are generally limited to data processing and storage in one location (often for one department or for a smaller company).

Microcomputers come in many different sizes and they offer users a number of different capabilities. Regardless of their size and appearance, all microcomputers are, basically, "personal"; that is, they are designed to be used by one person at a time. Personal computers are also called home computer. The most compact are called ***handheld***. They are portable and work on built in batteries. Unlike mainframes and minicomputers, microcomputers generally do not have devices attached that allow them to be "host" to several users at the same time. And microcomputers are not only personal, generally they are local.

Microcomputers are based on a microprocessor. A microprocessor is a single chip that includes a large number of miniaturized circuits that are designed to carry out specific computing tasks. It's the microprocessor that does all of the data processing in a personal computer. Microprocessors can obtain from memory and execute a limited set of instructions in order to perform addition or subtraction on a binary system and to input or output binary data.

Workstations are microcomputers because they are based on a microprocessor. And like other microcomputers, they are designed to be used by one person at a time. However

workstations are usually faster than desktop PCs, often have more storage than PCs, and may use more complex and powerful operating systems than PCs. Workstations are often used for scientific tasks or for managing detailed design and graphics tasks. Often they are used as multiprocessing machines: that is, because they are fast and use a powerful operating system, they can be used to carry out more than one type of data processing task at the same time.

Task 20: Choose one of the types of a computer system and prepare a talk about it giving your own examples.

Unit 2

COMPUTER ARCHITECTURE. OPERATING SYSTEMS.

PART I

Task 1:Find out the meaning of the following words and word combinations. Use a dictionary if necessary.
Processor, RAM, ROM, CPU, peripherals (input, output, storage and communications devices), the system bus, memory address, expansion cards (video and graphics cards, sound cards, NICs), network, memory expansion slots, to format (a disk), RAID (redundant array of inexpensive disks), to crash, CD-RW, DVD, barcode reader, power, capacity, hertz, bytes, bits, magnetic storage devices, optical storage devices, resolution, binary system, applications programs, hardware, operating system, bus, chip, motherboard.

Task 2:Study the text below to find this information:

1 What is the memory size of this PC?
2 What input devices are supplied?
3 What size is the display screen?
4 How fast is the processor?
5 What is the capacity of the hard drive?
6 Which operating system does it use?
7 What multimedia features does the computer have?

HOW TO READ A COMPUTER AD

1 Intel Pentium 4 processor (3GHz, 800MHz FSB)
2 Mini – tower chassis
3 1 GB dual channel DDR2 SDRAM
4 200 GB Serial ATA hard drive (7200r.p.m.)
5 128 MB PCI-Express video card
6 Integrated audio
7 48X CD-RW drive
8 19” TFT flat panel XGA(1024x768) monitor
9 Microsoft windows XP Professional

1.The main processor chip called a ‘Pentium 4’ that was designed and manufactured by the Intel Corporation. It operates at a clock speed of three gigahertz and has a front side bus that operates at a speed of eight hundred megahertz.
2 A small, tall and narrow style of case containing the computer system.

3. Synchronous dynamic random access memory with a capacity of one gigabyte. It is a high bandwidth, double data rate memory.
4 A hard drive with a capacity of two hundred gigabytes that uses a type of connection interface known as Serial ATA i.e. it has a serial data connection rather than the original parallel connection. It rotates at a speed of seven thousand, two hundred revolutions per minute.
5. Electronics for driving the graphics output that has a memory capacity of one hundred and twenty-eight megabytes and uses a type of connection interface known as PCI-Express.
6. Electronics for controlling the sound output that is built into the main electronics of the computer.
7. A compact disk read/write disk drive that operates at forty-eight times the speed of the original CD drives.
8. A nineteen inch, flat display screen made from thin film transistors with a resolution of 1024 by 768.
9. The operating system that is used to control the system.

Task 3: Match each item in Column A with its function in Column B. Then describe its function in two ways.
E.g. ROM holds instructions which are needed to start up the computer.
ROM is used to hold (for holding) instructionswhich are needed to start up the computer.
The function of ROM is to hold instructionswhich are needed to start up the computer.

A - Item	**B - Function**
1.RAM	**a.** controls the cursor
2.Processor	**b**. inputs data through keys like a typewriter
3.Mouse	displays the output from a computer on a screen
4.Clock	**d**. reads DVD-ROMs
5.Flash memory key	**e**. reads and writes to electronic chips on a card
6. Monitor	**f**. holds instructions which are needed to start up the computer
7. Keyboard	**g**. holds data read or written to it by the processor
8. DVD –ROM drive	**h.** provides extremely fast access for section of a program and its data

9. Cache	**i**. controls the timing of signals in the computer
10. ROM	**j.** controls all the operations in a computer

Task 4: Work in pairs. Find out as much as you can about your partner's computer and complete this table.

FEATURES	
Processor	
Processor speed	
Bus speed	
Memory capacity	
Memory speed	
Memory type	
Hard disk capacity	
Screen size	

Task 5: Put these instructions for opening a computer in the correct sequence.

a. Release the two catches underneath and lift up to remove panel.
b. Shut down your computer by choosing Shut Down from the Apple menu or the Special menu.
c. If there are security screws on the vertical plate on the back of the computer, remove them with a screwdriver.
d. Unplug all cables expert the power cord from your computer.
e. Pulling gently, slide the tray out.

Task 6: Read the text and say what the main components of a PC system are.

TEXT A

COMPUTER ARCHITECTURE

The term "computer" is used to describe a device which can accept the data in a certain form, process it and give the results of the processing in a specified format as information. Computer doesn't have intelligence by itself and is referred to as hardware. A computer system is a combination of five elements:

- hardware;
- software;
- people;
- procedures;
- data/information.

The electronic, magnetic, electrical and mechanical parts that make up a computer system are called hardware. Computer hardware refers to the computer's machinery, its electronic devices and its circuits. A computer is actually a system, a combination of parts that work together. Computer hardware can be divided into four categories:

1) input hardware (keyboard, mouse, etc.);
2) processing hardware (CPU, main memory);
3) storage hardware (fixed-disk drive, CDs/DVDs, flash drive, etc.);
4) output hardware (display monitor, printer, etc.).

The hardware is designed to work hand-in-hand with computer programs that are often designed specifically for use with one type of hardware. Software is the term used to describe the instructions that tell the hardware how to perform a task. People, however, are the most

important component of the computer system: they create the computer software instructions and respond to the procedures that those instructions present.

The basic job of the computer is the processing of information. Three basic steps are involved in the process. First, data is fed into the computer's memory. Then, when the program is run, the computer performs a set of instructions and processes the data. Finally, we can see the results (the output) on the screen or in printed form. Computers accept information in the form of instruction called a program and characters called data to perform mathematical and logical operations and then give the results. The data is raw material while information is organized, processed, refined and useful for decision making. Computer is used to convert data into information. Computer is also used to store information in the digital form.

PROCESSING HARDWARE

The Central Processing Unit

Today's computers are designed around a single large-scale processing chip known as the central processing unit (CPU). At the microscopic level, many circuits and processing capabilities are incorporated into one chip that may only be one or two inches square. The CPU can be thought of as the "brains" of the computer. Its function is to execute program instructions and coordinate the activities of all the other units. The Control Unit, the ALU and the registers make up the CPU of a computer. Each new generation of CPUs has added new processing capabilities and yet, despite this increased capability, each new generation processes information faster. Today's CPUs are complex devices composed of many different components and circuits that carry out a great variety of functions.

Main Memory

The main memory holds the instructions and data which are currently being processed by the CPU. In today's computers, the CPU acts on instructions that are retrieved from a storage system known as main memory. The CPU also uses this main memory to store data temporarily as it carries out processing tasks. This temporary storage system is based on sets of silicon chips. Each chip is actually made up of millions of circuits that store data in a coded format. **RAM** is the volatile computer memory, used for creating loading and running programs and for manipulating and temporarily storing data. This information is lost when the computer is turned off. **ROM** is nonvolatile non-modifiable computer memory used to hold programmed instructions to the system. ROM contains permanently stored information such as the instructions that are needed for the computer's operation.

Power is a function of both speed and capacity. The power of a computer depends on the combination of all the components. When buying a computer, the choice is often made between different components, in particular between different processor speeds, amounts of memory and hard disk sizes. Units of measurement commonly used in computing are shown below.

Unit	*Symbol*	*Meaning*	*Measurement*
Hertz	Hz	cycles per second	frequency
byte	B	space for one character, i.e. one letter, number, punctuation mark, symbol or even a space	capacity

Hertz are measured using the decimal system but *bytes* are measured using the binary system. The values of the unit prefixes vary in these two systems as shown in the table below.

Unit	*Symbol*	*Decimal System*	*Binary System*
Kilo	K	$10^3 = 1000$	$2^{10}=1024$
Mega	M	$10^6 = 1000000$	$2^{20}= 1048576$
Giga	G	$10^9 = 1000000000$	$2^{30} = 1073741824$

THE PERIPHERALS

The peripherals are the physical units attached to the computer. They include storage devices and input/output devices.

SECONDARY STORAGE SYSTEMS

Hard Disk Drive

Hard disks (also known as fixed disks) are very similar to diskettes but they are fixed permanently inside the computer. Hard disks use one or more spinning platters that are very much like diskettes, but they can hold far greater amounts of data.

Flash

It is another type of hard drive, known as "removable", allows you to record data on "cartridges" which can be removed and stored off-line for security purposes. Some systems allow to back up entire PC on one disk.

Optical Disk Drive

Optical disks can store information at much higher densities than magnetic disks. Some storage devices use a nonmagnetic technology that is based on optical disks. Optical disks are far more durable and they can be used to store significantly more information. There are various types of optical drives: **CD-ROM;** CD-Recorders in two different forms: **CD-R** and **CD-RW; DVD** (digital versatile disk); **magneto-optical (MO) drives.**

Input Devices

Devices that are used to get information into the computer are known as input devices. Input devices are used to convert information from a form used by humans into a form that is usable by computers. Today, there are many different ways to get information into the computer, but the keyboard is still one of the most common input devices.

The computer mouse is another input device. It is referred to as a pointing device. A pointing device is used to move a pointer around on the display screen. Another input devices are joystick, touchscreen, microphone, barcode reader, scanner, camera, etc.

Output Devices

Output devices are used to get information out of the computer in a form useable by humans. The display monitor and the printer have long been the computer's primary output devices. But the type and variety of both monitors and printers are in constant change.

Task 7: Give definitions to the following words and expressions using the text:

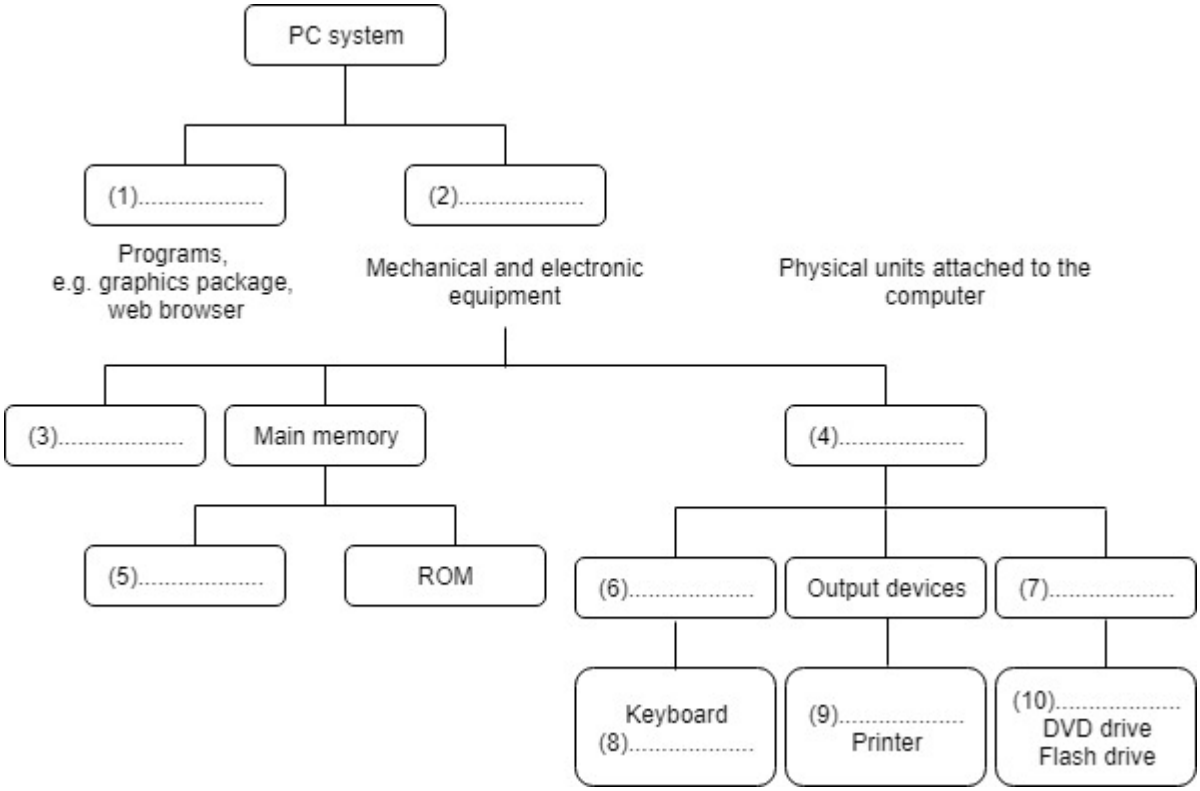
computer	hardware	software	procedure	data	information
CPU	main memory	RAM	hard disk drive	scanner	CD-ROM
ROM	printer	modem	motherboard	keyboard	sound-card

Task 8: Read the text in detail and answer the following questions.

1) What does the term «computer» describe?
2) Is computer intelligent?
3) What are five components of a computer system?
4) What is software?
5) What is the difference between hardware and software?
6) Why are people the most important "component" of a computer system?
7) In what way do terms "data" and "information" differ?
8) How does computer convert data into information?
9) Why can the central processing unit be thought of as the "brains" of computer? Name the CPU's three different components and describe what they do.
10) What is the main memory? How does it work?
11) What is the difference between ROM and RAM?

12) What units of measurement are used in computing?
13) Describe the role of input devices and describe how they are changing because of new methods now being used to interact with computers.
14) Today's computers use secondary storage systems to store data that is not currently being processed. Name and describe three different types of secondary storage systems.

Task 9 : Complete a diagram of a PC system.



Task 10: Listen to a teacher explaining the diagram and check your answers.

Task 11 : Make notes about the features of the computer that you would most like to have. Think about the features in the box.

CPU Speed Optical disk drives Wireless connectivity Minimum/maximum RAM Monitor Ports and card memory slots Hard disk Software

Task 12: In pairs describe your ideal computer system. Give reasons for your choices.
Useful language: It`s got… It`s very fast. It runs at… The standard RAM memory is… and it`s expandable… The hard disk can hold… I need a large, flat LCD screen because … As for the Internet, …

PART II
Useful words and word combinations:

Supervisor program – главная программа
Resident – хранящийся в памяти компьютера
Package- пакет, блок, модуль
Carry-out- выполнять, проводить
Application program- прикладная программа
Assembly line- сборочный конвейер

Load- загружать,
Remain- оставаться
Refer- отсылать, обращаться, ссылаться
Entire- целый, полный
Establish - создать
Central processing unit- центральный процессор
Hide- прятать
To be aware- осознавать, понимать, знать
Input- вход
Output- выход
Invoke- вовлекать

Task 13: Read the text and explain what we need an operating system for.

TEXT B

OPERATING SYSTEMS: HIDDEN SOFTWARE

When a brand new computer comes off the factory assembly line, it can do nothing. The hardware needs software to make it work. Are we talking about applications software such as wordprocessing or spreadsheet software? Partly. But an applications software package doesn't communicate directly with the hardware.

Between the applications software and the hardware is a software interface – an operating system. An operating system is a set of programs that lies between applications software and the computer hardware.

The most important program in the operating system, the program that manages the operating system, is the supervisor program, most of which remains in memory and is thus referred to as resident. The supervisor controls the entire operating system and loads into memory other operating system programs (called non-resident) from disk storage only as needed.

An operating system has three main functions: (1) manage the computer's resources, such as the central processing unit, memory, disk drives, and printers, (2) establish a user interface, and (3) execute and provide services for applications software. Keep in mind, however, that much of the work of an operating system is hidden from the user. In particular, the first listed function, managing the computer's resources, is taken care of without the user being aware of the details.

Furthermore, all input and output operations, although invoked by an applications program, are actually carried out by the operating system.

Task 14 : Read the text again and answer the following questions:

1. What difference is there between applications software and operating systems?
2. Why is the supervisor program the most important operating system program?
3. What is the difference between resident and non-resident programs?
4. What are the main functions of an operating system?

Task15: In groups think of what you know about Linux.

Task16: Read the text and say what new information about Linux you learned.

TEXT C

LINUX

Linux has its roots in a student project. In 1992, an undergraduate called Linus Torvalds was studying computer science in Helsinki, Finland. Like most computer science courses, a big component of it was taught on (and about) Unix. Unix was the wonder operating system of the 1970s and 1980s: both a textbook example of the principles of operating system design, and sufficiently robust to be the standard OS in engineering and scientific computing. But **Unix** was

a commercial product (licensed by AT&T to a number of resellers), and cost more than a student could pay.

Annoyed by the **shortcomings** of Minix (a compact Unix clone written as a teaching aid by Professor Andy Tannenbaum) Linus set out to write his own 'kernel' — the **core** of an operating system that handles memory **allocation**, talks to hardware devices, and makes sure everything keeps running. He used the **GNU** programming tools developed by Richard Stallman's Free Software Foundation, an organisation of volunteers dedicated to fulfilling Stallman's ideal of making good software that anyone could use without paying. When he'd written a basic **kernel**, he released the source code to the Linux kernel on the Internet.

Source code is important. It's the original from which compiled programs are generated. If you don't have the source code to a program, you can't modify it **to fix bugs** or add new **features**. Most software companies won't sell you their source code, or will only do so for an eye-watering price, because they believe that if they make it available it will destroy their revenue stream.

What happened next was astounding, from the **conventional**, commercial software industry point of view - and utterly predictable to anyone who knew about the Free Software Foundation. Programmers (mostly academics and students) began using Linux. They found that it didn't do things they wanted it to do -so they fixed it. And where they improved it, they sent the improvements to Linus, who rolled them into the kernel. And Linux began to grow.

There's a term for this model of software development; it's called **Open Source** (see www.opensource.org/ for more information). Anyone can have the source code - it's free (in the sense of free speech, not free beer). Anyone can contribute to it. If you use it heavily you may want to extend or develop or fix bugs in it - and it is so easy to give your fixes back to the community that most people do so.

An operating system kernel on its own isn't a lot of use; but Linux was purposefully designed as a near-clone of Unix, and there is a lot of software out there that is free and was designed to compile on Linux. By about 1992, the first 'distributions' appeared.

A **distribution** is the Linux-user term for a complete operating system kit, complete with the utilities and applications you need to make it do useful things — command interpreters, programming tools, text editors, typesetting tools, and graphical user interfaces based on the X windowing system. X is a standard in academic and scientific computing, but not hitherto common on PCs; it's a complex distributed **windowing system** on which people implement graphical interfaces like KDE and Gnome.

As more and more people got to know about Linux, some of them began to **port** the Linux kernel to run on non-standard computers. Because it's free, Linux is now the most widely-ported operating system there is.

Task 17: Read the text again and do the following tasks.

A. Finish the statements according to the information of the text.

1.Most computer science courses in the 1990s were based on …
2.Unix was a very important operating system in the ’70s and the ’80s because …
3.However, the disadvantage of Unix was …
4.Disappointed by Unix's disadvantages, Linus Torvalds decided ...
5.Because Linux started becoming more popular …
6.Most software companies are afraid that …
7.From then on, Linux began to develop because the programmers who used it...
8.This kind of software development is called Open Source and means that...
9.In about 1992, the first 'distributions' of Linux appeared. In other words, ...
10.He also made Linux kernel available to everyone when …

B. Find the answers to these questions in the text

1.What did Linus Torvalds use to write the Linux kernel?
2.How was the Linux kernel first made available to the general public?
3.What is a programmer likely to do with source code?
4.Why will most software companies not sell you their source code?
5.What type of utilities and applications are provided in a Linux distribution?
6.What is X ?
7.What graphical user interfaces are mentioned in the text?

C. Mark the following statements as True or False:
1.Linux was created in the 1980s,
2.Minix was created by a university student,
3.Linux is based on Unix,
4.Minix is based on Unix,
5.Linux runs on more types of computer than any other operating system.

Task 18: In pairs discuss what you have learned about the operating system Linux.
Student A: speak about the history of Linux and its perspectives for the future.
Student B: speak about the advantages of Linux which made it so popular.

PART III

Task 19: Specialist Reading. Read the text and make your own vocabulary list.

TEXT D

OPERATING SYSTEM DESIGN

Part 1. Problems with Monolithic Systems.

In a standard monolithic system, the kernel contains the entire operating system linked in a single address space and running in kernel mode, as shown in Fig. 1. The kernel may be structured into components or modules, as indicated by the dashed rectangular boxes, but there are no protection boundaries around the components. In contrast, the solid rounded rectangles indicate separate user-mode processes, each of which runs in a separate address space protected by the MMU hardware.

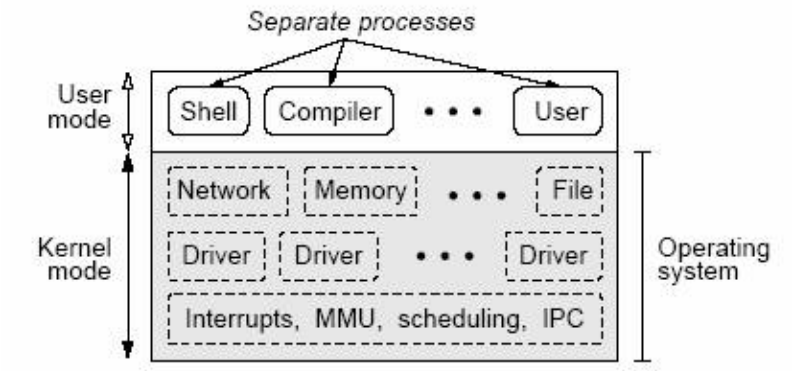


Figure 1: Structure of a monolithic system.The entire operating system runs in kernel mode without proper fault isolation.

Monolithic operating systems have a number of problems that are inherent to their design. While some of these problems were already mentioned in the

introduction, we summarize them here:
1. No proper isolation of faults.
2. All code runs at the highest privilege level.
3. Huge amount of code implying many bugs.
4. Untrusted, third-party code in the kernel.
5. Hard to maintain due to complexity.

This list of properties questions the reliability of monolithic systems. It is important to realize that these properties are not due to a bad implementation, but are fundamental problems that stem from the operating system design. The kernel is assumed to be correct, while its size alone means that it must contain numerous bugs. Moreover, with all operating system code running at the highest privilege level and no proper fault containment, any bug might be fatal. A malfunctioning third-party device driver, for example, can easily destroy key data structures and take down the entire system. That this scenario is a serious threat follows from the observation that the majority of operating system crashes are caused by device drivers. Yet another problem is that the immense size of monolithic kernels makes them very complex and hard to fully understand. Without a global understanding of the kernel even the most experienced programmers can easily introduce faults by not being aware of some peculiar side-effect of their actions.

Part 2. Minimal Kernel Systems.

At the other extreme is the minimal kernel, which contains only the barest mechanism, but no policy. A minimal kernel provides interrupt handlers, a mechanism for starting and stopping processes (by loading the MMU and CPU registers), a scheduler, and inter-process communication, but ideally nothing else. Standard operating system functionality that is present in a monolithic kernel is moved to user space, and no longer runs at the highest privilege level.

Different operating system organizations are possible on top of a minimal kernel. One option is to run the entire operating system in a single user-mode server, but in such a design the same problems as in a monolithic system exist, and bugs can still crash the entire user-mode operating system.

A better design is to run each untrusted module as a separate user-mode process that is isolated from the others. We took this idea to the extreme and fully compartmentalized our system, as shown in Fig. 2. All operating system functionality, such as device drivers, the file system, the network server and high- level memory management, runs as a separate user process that is encapsulated in a private address space. This model can be characterized as a *multi server operating system*.

Logically, our user processes can be structured into three layers, although from the kernel's point of view, they are all just processes. The lowest level of user-mode processes are the device drivers, each one controlling some device. We have implemented drivers for IDE, floppy, and RAM disks, keyboards, displays, audio, printers, and various Ethernet cards. Above the driver layer are the server processes. These include the file server, process server, network server, information server, reincarnation server, and others. On top of the servers come the ordinary user processes, including shells, compilers, utilities, and application programs. With a small number of minor exceptions, the servers and drivers are normal user processes.

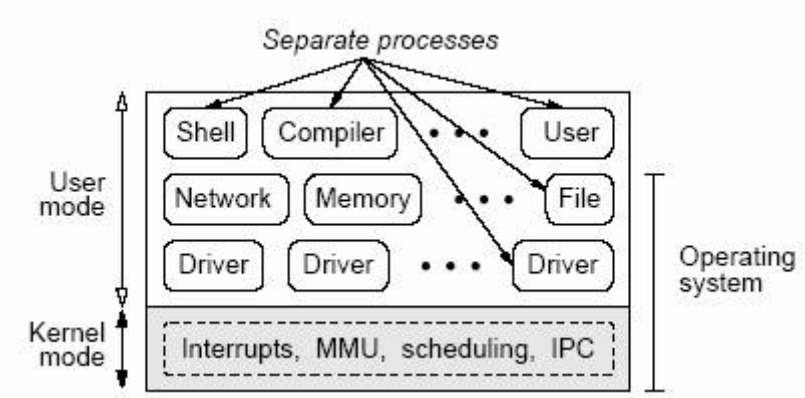


Figure 2: Structure of our system.
The operating system runs as a collection of isolated user-mode processes on top of a tiny kernel.

To avoid any ambiguity, we note again that each server and driver runs as a*separate*user process with its own address space completely disjoint from theaddress spaces of the kernel and other servers, drivers, and user processes. In ourdesign, processes do not share any virtual address space and can only communicate with each other using the IPC mechanisms that are provided by the kernel. This point is crucial to the reliability as it prevents faults in one server or driver from spreading to a different one, in exactly the same way that a bug in a compilation going on in one process cannot affect what a browser in a different process is doing.

In user mode, the operating system processes are restricted in what they cando. Therefore, to support the servers and drivers in performing their tasks, thekernel exports a number of kernel calls that authorized processes can make. Devicedrivers, for example, no longer have privileges to perform I/O directly, but canrequest the kernel to do the work on their behalf. In addition, servers and driverscan request services from each other. All such IPC is done by exchanging small,fixed-size messages. This message passing is implemented as traps to the kernel,which checks the call being requested to see if the caller is authorized to make it.

Task 20: Read the text again and translate it into Russian.

Unit 3

USER INTERFACES. MODERN SOFTWARE. PROGRAMMING LANGUAGES.

PART I

TEXT A

USER INTERFACES

Task 1: Read the text and find the answers to the following questions.

1.What developments are driving the development of completely new interfaces?
2.What has inspired a whole cottage industry to develop to improve today`s graphical user interface?
3.In what way have XML-based formats changed the user interface?
4.What type of computers are certain to benefit from speech technology?
5.Name a process where a mouse is particularly useful and a process where it is not?
6.What facilities are multimodal interfaces likely to offer in the future?
7.What type of input device will be used to give vision to the user interface?
8.What development has led to an interest in intelligent agents?
9. In what way can intelligent agents be used?

Cheaper and more powerful personal computers are making it possible to perform processor-intensive tasks on the desktop. Breakthroughs in technology, such as speech recognition, are enabling new ways of interacting with computers. And the convergence of personal computers and consumer electronics devices is broadening the base of computer users and placing a new emphasis on ease of use. Together, these developments will drive the industry in the next few years to build the first completely new interfaces since SRI International and Xerox's Palo Alto Research Center did their pioneering research into graphical user interfaces (GUIs) in the 1970s.

True, it's unlikely that you'll be ready to toss out the keyboard and mouse any time soon. Indeed, a whole cottage industry - inspired by the hyperlinked design of the World Wide Web - has sprung up to improve today's graphical user interface. Companies are developing products that organize information graphically in more intuitive ways. XML-based formats enable users to view content, including local and network files, within a single browser interface. But it is the more dramatic innovations such as speech recognition that are poised to shake up interface design.

Speech will become a major component of user interfaces, and applications will be completely redesigned to incorporate speech input. Palm-size and handheld PCs, with their cramped keyboards and basic handwriting recognition, will benefit from speech technology.

Though speech recognition may never be a complete replacement for other input devices, future interfaces will offer a combination of input types, a concept known as multimodal input. A mouse is a very efficient device for desktop navigation, for example, but not for changing the style of a paragraph. By using both a mouse and speech input, a user can first point to the appropriate paragraph and then say to the computer, 'Make that bold.' Of course, multimodal interfaces will involve more than just traditional input devices and speech recognition. Eventually, most PCs will also have handwriting recognition, text to speech (TTS), the ability to recognize faces or gestures, and even the ability to observe their surroundings.

At The Intelligent Room, a project of Massachusetts Institute of Technology's Artificial Intelligence Lab, researchers have given sight to PCs running Microsoft Windows through the use of video cameras. 'Up to now, the PC hasn't cared about the world around it,' said Rodney A. Brooks, the Director of MIT's Artificial Intelligence Lab. 'When you combine computer vision with speech understanding, it liberates the user from having to sit in front of a keyboard and screen.'

It's no secret that the amount of information - both on the Internet and within intranets - at the fingertips of computer users has been expanding rapidly. This information onslaught has led to an interest in intelligent agents, software assistants that perform tasks such as retrieving and delivering information and automating repetitive tasks. Agents will make computing significantly easier. They can be used as Web browsers, help-desks, and shopping assistants. Combined with the ability to look and listen, intelligent agents will bring personal computers one step closer to behaving more like humans. This is not an accident. Researchers have long noted that users have a tendency to treat their personal computers as though they were human. By making computers more 'social,' they hope to also make them easier to use.

As these technologies enter mainstream applications, they will have a marked impact on the way we work with personal computers. Soon, the question will be not 'what does software look like' but 'how does it behave?'

Some hints: SRI International: an advanced technology research center affiliated with Stanford University; pioneer: a person who is the first to study and develop a particular area of knowledge; unlikely: not likely to happen, not probable; but indeed: used to add information to a statement; intuitive: (of computer software, etc.) easy to understand and to use; eventually: after a long time, or after a lot of things have happened; surroundings: everything that is around or near sb/sth

Task 2: Reading Comprehension

1. According to the text, more people are using computers because
   A. computer functions are becoming integrated into other electronic devices
   B. they need to perform very intensive tasks at work
   C. of new technological developments
   D. personal computers have become cheaper and more powerful
2. The text implies that
   A. computer industries can now run in cottages
   B. graphical user interfaces are improved because the Web is designed on hyperlinks
   C. people will be using new interfaces in their personal computers in the distant future
   D. keyboard and mouse will continue to be used
3. The design of graphical user interfaces will change
   A. as a result of new technological advances
   B. because of the use of XML
   C. when people are able to view web content within a single browser interface
   D. with the discovery of speech recognition
4. The text implies that
   A. we will be able to enter data in a computer system using many input devices
   B. mouse, keyboard and speech recognition devices will be the basic input devices of future interfaces

C. mice are not suitable for working with desktop computers
D. speech recognition will completely replace other input devices

5. Intelligent agents, according to the text,
   A. will make computing important
   B. are people who help with computer tasks in helpdesks and shops
   C. will make computers seem more like humans
   D. are programs that can see and listen
6. In paragraph 6, what is the phrase "This is not an accident" closer in meaning to, from the following?
   A. this is not damaging
   B. this is not unexpected
   C. this is not a problem
   D. this is not dangerous

7. Which one best describes the main idea of the whole text?

a. Computers are becoming more powerful in processing complex tasks, such as speech recognition.

b. Speech recognition will soon be the main user interface for computing devices.

c. The emphasis of user interface design is shifting to ease of use.

d. Breakthroughs in UI technology are transforming the way we interact with computing devices

8. What are "processor-intensive tasks"?

a. Tasks which involve data processing.

b. Tasks whose underlying intent is to use the processor.

c. Tasks which use the processor more than average tasks.

d. Tasks which process data intensively.

9. Which developments is the phrase "these developments" (1) referring to? Name them in (properly worded) English.

10. Which one is equivalent to "to toss out"? (multiple choices may be selected)

a. to dispose of b. to recycle c. to scrap d. to destroy e. to throw away

11. What does "to spring up" mean in the passage?

a. to bounce like a spring b. to come into being c. to appear like the spring season d. all of the above

12. Which one is false, based on the passage?

a. Using a single UI technology is probably better than using several technologies together.

b. Organizing information graphically in more intuitive ways is one way in which current UIs are being improved.

c. When using a word processing software, speech recognition technology may be better than the mouse in changing the style of a paragraph.

d. Multimodal interfaces can still incorporate mouses and keyboards.

13. Translate the sentence "But it is the more dramatic innovations such as speech recognition that are poised to shake up interface design".

14.List five UI technologies mentioned in the passage.

Task 3: Study the following definitions and vocabulary list.

TYPES OF SOFTWARE. MAIN CONCEPTS.

Computer programs and **software** are two terms used to refer to the set of instructions used to control the computer.

A computer's **operating system is** designed to specifically address the capabilities of the computer's microprocessor.

System software is comprised of a set of programs used to operate the computer itself.

Application or productivity software is used to perform specific tasks such as writing letters, calculating costs, or maintaining records.

Programming software is used by professional **computer programmers** to create computer programs. There are four types - machine languages, assembly languages, high-level languages, and nonprocedural fourth-generation languages (4GLs).

New programming methods include **natural language** approaches and **object-oriented programming** (OOP), which is based on a concept of "objects" that combine data and procedures.

LANGUAGE MATERIAL

approach	подход, приближение	to complete	совершать, завершать
compiler	компилятор, транслятор	to conduct	проводить
control	управление	to debug	исправлять ошибки
flowchart	блок-схема	to direct	управлять, руководить
general-purpose	общего назначения	to handle	управлять, обращаться
internal	внутренний	to provide with	обеспечивать чем-либо
peripheral	периферийный	to punch	перфорировать
to boot	загружать	to secure	обеспечивать безопасность

Task 4: Match the English word combinations in the left-hand column with the Russian equivalents in the right-hand column.

1. low-level language	a) естественный язык
2. system software	b) язык низкого уровня (ЯНУ)
3. applications software	c) программное обеспечение
4. programming software	d) приложение для горизонтального рынка
5. horizontal application	e) язык запросов
6. vertical application	f) объектно-ориентированный язык
7. procedural language	g) приложение для вертикального рынка
8. query language	h) процедурный (императивный) язык
9. natural language	i) системное программное обеспечение
10. object-oriented language	j) прикладное программное обеспечение

Task 5: Read the text quickly and explain the difference between types of software.

TEXT B

TYPES OF SOFTWARE

Before computer hardware can be used to carry out real work, it must receive instructions about what to do. Every computer needs software that is used to operate the computer itself. Software is the final computer system component. Without computer software, a computer system is of little value to us. The computer program coordinates and controls the internal operations and resources of the computer system and provides the interface through which the user instructs the computer to perform specific tasks. The computer is a general-purpose machine which requires specific software to perform a given task. Software determines the order in which these operations are performed.

During the early days of computers, computer programmers used complex, low-level languages to encode their instructions to the computer. The data to be acted on was encoded by punching out holes in cards using a card-punch machine. As computers became smaller and more

personalized, a large number and variety of software packages were developed to meet the diverse needs of personal computer users. And, as these programs became increasingly more complex and sophisticated, they have, at the same time, become easier to use.

Programs usually fall in one of three categories: *systems software, applications software, and programming software.* At any one time, one, two, or all three of these software types may be in operation.

Systems software is usually composed of a group of programs. An operating system, for example, is a collection of system programs that aid in the operation of a computer regardless of the application software being used. When a computer is first turned on, one of the systems programs is booted or loaded into the computer`s memory. This software contains information about memory capacity, the model of the processor, the disk drives to be used, and more. Once the system software is loaded, the applications software can be brought in.

Today's large computers operate in a *multi-user environment*, meaning that the systems software must keep track of many users who are all in contact with the computer at the same time. Modern *time-sharing* systems may serve the needs of thousands of users in many different locations, creating the need for today's more sophisticated systems software.

Applications software includes most of the types of programs we use every day to get our computerized work done. Applications programs are widely used in our society for entering and editing text, for entering and manipulating numeric data, and for record-keeping. These types of programs are sometimes referred to as *general-purpose applications*. Because they are used by a wide variety of users in many different environments, they are also known as *horizontal applications*. There are only a few types of software that can be truly said to cut across all aspects of computerized activity. They are:

- Word processing and desktop publishing
- Electronic spreadsheets
- Database management
- Graphics
- Communications

These programs are used by many different types of users for many different purposes. But there are also much more specialized applications programs. They are used for such computer tasks as the calculation of the wind currents around a skyscraper, for analyzing the chemical components in an ore sample, or for teaching a child how to tell time. An almost endless variety of such programs are sometimes referred to as *vertical applications* because, even though they are also examples of the applications category, they are used to carry out tasks within a narrowly defined area. Because both horizontal and vertical applications are used as toolsto help us get our work done, they are all sometimes referred to as *productivity software*.

Programming software is used by computer programmers to create all of the computer programs we use, including applications programs and systems software programs. A programming language has words, symbols, and rules of grammar (known as the syntax of the language). Programming software is used to formulate and store the complex sets of instructions that are used to dictate computer tasks. Every program, including all of the systems and applications programs, and even the programming languages themselves, begin as a set of specific instructions to the computer.

Task 6: Find in the text and write down 15-20 words or word combinations which can be used to speak about the categories of software.

Task 7: Tell your partner about one of the types of software ask him/her to tell you about the others.

PART II

Task 8:Transcribe, read and translate these words.

To deal with; a source; several; a brief description; an acronym; to involve; artificial intelligence; a general purpose language; to support; consequently; to require; to refer to; various; unique; specific; an applications program; to fetch; required; vendor; linkage editor; to execute; executable.

Task 9: Try to guess the meaning of these words without using a dictionary.

To compile, a compiler, an instruction, to interpret, to convert, algorithmic, a machine code, to transform, a system program, an instruction, to introduce, (a) type, routines, manufacturer of the machines.

Task 10: Match the words in the left-hand column with their Russian equivalents.

1)	secondary memory devices	a)	объектный модуль
2)	central processing unit	b)	программный пакет
3)	computer-based training (CBT) packages	c)	язык высокого уровня
4)	computer's operating system	d)	устройства памяти второго уровня
5)	object module	e)	обработка данных
6)	load module	f)	компьютерные тренировочные пакеты
7)	software package	g)	центральный процессор
8)	high-level language	h)	операционная система
9)	mathematical and scientific purposes	i)	загрузочный модуль
10)	data processing	j)	математические и научные цели

Task 11: Before reading the text try to fill in the gaps in these sentences.

1. A ___ ___ is a program written in one of the high level languages.
2. A program written in a high level language must be interpreted into ___ ___ before the computer will read and process it.
3. A program designed to perform a specific task is called an ___ ___.

4. An___ ___ is the program produced when the original program has been converted into machine code.
5. A ___ is a program that converts a high-level language into machine code.
6. The systems program which fetches required systems routines and links them to the object module is known as the ___ ___.
7. The ___ ___ is the program directly executable by the computer.

Task 12: Read the text and check your answers.

Text C

PROGRAMS AND PROGRAMMING LANGUAGES

Computers can deal with different kinds of problems if they are given the right instructions for what to do. Instructions are first written in one of the high-level languages, e.g. FORTRAN, COBOL. ALGOL, PL/I, PASCAL, BASIC, or C, depending on the type of problem to be solved. A program written in one of these languages is often called a source program, and it cannot be directly processed by the computer until it has been compiled, which means interpreted into machine code. Usually a single instruction written in a high-level language, when transformed into machine code, results in several instructions. Here is a brief description of some of the many high-level languages:

FORTRAN acronym for FORmula TRANslation. This language is used for solving scientific and mathematical problems. It consists of algebraic formulae and English phrases. It was first introduced in the United States in 1954.

COBOL acronym for Common Business-Oriented Language. This language is used for commercial purposes. COBOL, which is written using English statements, deals with problems that do not involve a lot of mathematical calculations. It was first introduced in 1959.

ALGOL acronym for Algorithmic Language. Originally called IAL, which means International Algebraic Language. It is used for mathematical and scientific purposes. ALGOL was first introduced in Europe in 1960.

PL/I Programming Language I. Developed in 1964 to combine features of COBOL and ALGOL. Consequently, it is used for data processing as well as scientific applications.

BASIC acronym for Beginner's All-purpose Symbolic Instruction Code. Developed in 1965 at Dartmouth College in the United States for use by students who require a simple language to begin programming.

C developed in the 1970s to support the UNIX operating system. C is a highly portable general-purpose language.

Other such languages are APL (developed in 1962). PASCAL (named after Blaise Pascal and developed in 1971), and LISP and PROLOG, both of which are used for work in artificial intelligence. LOGO is a development of LISP (list processing) which has been used to develop computer-based training (CBT) packages.

When a program written in one of these high-level languages is designed to do a specific type of work such as calculate a company's payroll or calculate the stress factor on a roof, it is called an applications program. Institutions either purchase these programs as packages or commission their own programmers to write them to meet the specifications of the users.

The program produced after the source program has been converted into machine code is

referred to as an object program or object module. This is done by a computer program called the compiler, which is unique for each computer. Consequently, a computer needs its own compiler for the various high-level languages if it is expected to accept programs written in those languages. For example, in order that an IBM RS/6000 may process a program in FORTRAN, it needs to have a compiler that would understand that particular model and the FORTRAN language as well.

The compiler is a systems program which may be written in any language, but the computer's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. Another systems program is the linkage editor, which fetches required systems routines and links them to the object module (the source program in machine code). The resulting program is then called the load module, which is the program directly executable by the computer. Although systems programs are part of the software, they are usually provided by the manufacturer of the machine.

Unlike systems programs, software packages are sold by various vendors and not necessarily by the computer manufacturer. They are a set of programs designed to perform certain applications which conform to the particular specifications of the user. Payroll* is an example of such a package which allows the user to input data – hours worked, pay rates, special deductions, names of employees – and get salary calculations as output. These packages are coded in machine language (0s and 1s) on magnetic tapes or disks which can be purchased, leased, or rented by users who choose the package that most closely corresponds to their needs.

Note: payroll – list of employees and the amount of money to be paid to each of them.

Task 13 : Find in the text English equivalents to the following Russian ones.

Решать проблему; в зависимости от типа проблемы, которую предстоит решить; представлять; искусственный интеллект; для поддержки системы; следовательно; в научных целях; предназначенный для выполнения конкретного вида работы; покупать эти программы; преобразовать в машинный код; исполняемый; в отличие от; соответствовать потребностям.

Task 14: These are the answers to the questions about the text. Ask the questions.

1. No, it is quite wordy so it is used for commercial purposes.
2. To support the UNIX operating system.
3. An applications program.
4. It is done by the compiler.
5. It fetches required systems routines and links them to the object module.
6. No, they are also sold by various vendors.

Task 15: Find the passages in the text where the following ideas are expressed.

1. Systems programs control the work of the computer system.
2. Software packages are not always sold by the manufacturer.
3. Usually, every high-level instruction translates into many more in machine code.
4. Systems programs are usually provided by the manufacturer.
5. Programmers may be required to write software for their employers.

Task 16: Choose the correct word to complete each sentence. You may have to change some words slightly.

1. *instruction, instruct, instructed, instructor*

a) Our maths _____ explained to us the principles of binary arithmetic.

b) We were _____ to document our programs very carefully.

c) Both _____ and data have to be changed to machine code before the computer can operate on them.

2. *compilation, compiler, compile, compiled*

a) Our university computer does not have a PASCAL _____.

b) Usually, a programmer _____ his program before he puts in the data.

c) A source program cannot be directly processed by the computer until it has been _____.

3. *result, results, resulting*

a) The linkage editor links systems routines to the object module. The _____ program, referred to as the load module, is directly executable by the computer.

b) The _____ of these mathematical operations were obtained from the university mainframe and not from my micro.

c) The use of spyware may _____ in making your computer perform more slowly.

4. *specification, specify, specific, specified, specifically*

a) Key procedures to minimize the danger of infection of your PC should be _____ .

b) An applications program is designed to do a _____ type of work, such as calculating the stress factor of a roof.

c) Did the analyst give the new programmer the _____ necessary to start on the project?

Task 17: Summarise the text. Use the following words.

The text is about...; First of all...; Secondly/then...; Next...; the definition of...is given; ...is (are) described; According to ...; In conclusion/ To sum up... .

Task 18: Discuss in groups the following questions.

1. What do you think is more expensive - hardware or software?
2. Describe the three main types of software used today.
3. Applications software represents the great variety of computer programs in use today. Describe the difference between horizontal applications and vertical applications. Name four examples of each type.
4. Describe the differences between machine languages, assembly languages, and high-level languages.

5. Name four common high-level programming languages.

PART III

Task 19: Read and translate the text.

TEXT D

A PROGRAMMING LANGUAGE THEORY

Programming language theory (commonly known as PLT) is a branch of computer science that deals with the design, implementation, analysis, characterization, and classification of programming languages and their individual features. It is a multi-disciplinary field, both depending on and, in some cases, affecting mathematics, software engineering, linguistics, and even the cognitive sciences. It is a well-recognized branch of computer science and an active research area, with results published in numerous journals dedicated to PLT, as well as in general computer science and engineering publications.

A programming language is a machine-readable artificial language designed to express computations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that specify the behavior of a machine, to express algorithms precisely, or as a mode of human communication.

Many programming languages have some form of written specification of their syntax and semantics, since computers require precisely defined instructions. Some are defined by a specification document (for example, an ISO Standard), while others have a dominant implementation (such as Perl).

The first programming languages predate the modern computer. The 19th century had "programmable" looms and player piano scrolls which implemented what are today recognized as examples of domain-specific programming languages. By the beginning of the twentieth century, punch cards encoded data and directed mechanical processing. In the 1930s and 1940s, the formalisms of Alonzo Church's lambda calculus and Alan Turing's Turing machines provided mathematical abstractions for expressing algorithms; the lambda calculus remains influential in language design.

A programming language provides a structured mechanism for defining pieces of data, and the operations or transformations that may be carried out automatically on that data. A programmer uses the abstractions presented in the language to represent the concepts involved in a computation. These concepts are represented as a collection of the simplest elements available (called primitives).

Programming languages differ from most other forms of human expression in that they require a greater degree of precision and completeness. When using a natural language to communicate with other people, human authors and speakers can be ambiguous and make small errors, and still expect their intent to be understood. However, figuratively speaking, computers "do exactly what they are told to do", and cannot "understand" what code the programmer intended to write. The combination of the language definition, a program, and the program's inputs must fully specify the external behavior that occurs when the program is executed, within the domain of control of that program.

Programs for a computer might be executed in a batch process without human interaction, or a user might type commands in an interactive session of an interpreter. In this case the "commands" are simply programs, whose execution is chained together. When a language is used to give commands to a software application (such as a shell) it is called a scripting language.

Many languages have been designed from scratch, altered to meet new needs, combined with

other languages, and eventually fallen into disuse. Although there have been attempts to design one "universal" computer language that serves all purposes, all of them have failed to be generally accepted as filling this role.

Comprehension check

Task 20: Answer the following questions:

What does programming language theory deal with?
Why can it be called a multi-disciplinary field?
What is a programming language?
What are programming languages used for?
What is known about the history of programming languages?
What does a programming language provide?
How are the concepts involved in a computation represented?
How do programming languages differ from other forms of human expression? Why?
Why hasn`t one universal computer language been produced?

Task 21: Summarise the text in12-15 sentences.

Task 22: Study the words given at the bottom and explain their meanings. Read the text.

TEXT E

HOW DO COMPUTER LANGUAGES WORK?

Every program ultimately has to execute as a stream of bytes that are instructions in your computer's *machine language*. But human beings don't deal with machine language very well; doing so has become a rare, black art even among hackers.

Almost all Unix code except a small amount of direct hardware-interface support in the kernel itself is nowadays written in a *high-level language*. (The 'high-level' in this term is a historical relic meant to distinguish these from 'low-level' *assembler languages*, which are basically thin wrappers around machine code.)

There are several different kinds of high-level languages. In order to talk about these, you'll find it useful to bear in mind that the *source code* of a program (the human-created, editable version) has to go through some kind of translation into machine code that the machine can actually run.

1. Compiled languages

The most conventional kind of language is a *compiled language*. Compiled languages get translated into runnable files of binary machine code by a special program called (logically enough) a *compiler*. Once the binary has been generated, you can run it directly without looking at the source code again. (Most software is delivered as compiled binaries made from code you don't see.)

Compiled languages tend to give excellent performance and have the most complete access to the OS, but also to be difficult to program in.

C, the language in which Unix itself is written, is by far the most important of these (with its variant C++). FORTRAN is another compiled language still used among engineers and scientists but years older and much more primitive. In the Unix world no other compiled

languages are in mainstream use. Outside it, COBOL is very widely used for financial and business software.

There used to be many other compiler languages, but most of them have either gone extinct or are strictly research tools. If you are a new Unix developer using a compiled language, it is overwhelmingly likely to be C or C++.

2. Interpreted languages

An *interpreted language* depends on an interpreter program that reads the source code and translates it on the fly into computations and system calls. The source has to be re-interpreted (and the interpreter present) each time the code is executed.

Interpreted languages tend to be slower than compiled languages, and often have limited access to the underlying operating system and hardware. On the other hand, they tend to be easier to program and more forgiving of coding errors than compiled languages.

Many Unix utilities, including the shell and bc(1) and sed(1) and awk(1), are effectively small interpreted languages. BASICs are usually interpreted. So is Tcl. Historically, the most important interpretive language has been LISP (a major improvement over most of its successors). Today, Unix shells and the Lisp that lives inside the Emacs editor are probably the most important pure interpreted languages.

3. P-code languages

Since 1990 a kind of hybrid language that uses both compilation and interpretation has become increasingly important. P-code languages are like compiled languages in that the source is translated to a compact binary form which is what you actually execute, but that form is not machine code. Instead it's *pseudo code* (or *p-code*), which is usually a lot simpler but more powerful than a real machine language. When you run the program, you interpret the p-code.

P-code can run nearly as fast as a compiled binary (p-code interpreters can be made quite simple, small and speedy). But p-code languages can keep the flexibility and power of a good interpreter.

Important p-code languages include Python, Perl, and Java.

Ultimately, deal with, rare, black art, Unix, kernel, relic, distinguish, compiled language, source code, OS, interpreted language, utility, shell, BC (binary code), SED (smoke-emitting diode), AWK, BASIC, Tcl, LISP, P-code language (pseudo code), Python, Perl.

Task 23: Describe each kind of high-level languages (advantages, disadvantages, examples).

Task 24: Check yourself.

In groups discuss answers to the following questions and prepare to present them to other groups.

1. One of the components of a computer is its *CPU.* What is a CPU and what role does it play in a computer?

2. What does Basic serve for?
3. Which language uses a system of tags?
4. What is the foundation of any programming language?
5. Which languages are designed to be used inside webpages?
6. Which language was used to write the Windows operating system?
7. What language was originally designed as a structured language?
8. What does HTML stand for?
9. Explain what is meant by an "asynchronous event." Give some examples.
10. What is the difference between a "compiler" and an "interpreter"?
11. Explain the difference between *high-level languages* and *machine language.*
12. If you have the source code for a Java program, and you want to run that program, you will need both a *compiler* and an *interpreter.* What does the Java compiler do, and what does the Java interpreter do?
13. What is a *subroutine?*
14. Java is an object-oriented programming language. What is an *object*?
15. What is a *variable?* (There are four different ideas associated with variables in Java. Try to mention all four aspects in your answer. Hint: One of the aspects is the variable's name.)
16. Java is a "platform-independent language." What does this mean?
17. What is the "Internet"? Give some examples of how it is used. (What kind of services does it provide?)